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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME I Section 1

Introduction

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Warsaw, June 2022.

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Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdansk on July 7, 2016, mark: RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project entitled. "Construction of the Bałtyk III Offshore Wind Farm"
DWA	Decision on environmental conditions for the project
KPA	Act of June 14, 1960 Administrative Procedure Code (i.e. OJ. U. of 2021, item 735, as amended).
IMF BII	Bałtyk II Offshore Wind Farm
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
NIS 2015	The worst case scenario from the Report 2015, which is a set of project parameters causing the worst case impacts, and which was the basis for conducting the environmental impact assessment during the procedure concluded with the issuance of the Environmental Decision.
EIA	Environmental impact assessment
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report 2015	Environmental impact assessment report for the proceedings completed by the decision of RDOŚ dated July 7, 2016, mark: RDOS-Gd-WOO.4211.12.2015.KP.22
Report/EIA Report	Report on environmental impact for the amendment of the environmental decision issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (Journal of Laws of 2020, item 283, as amended).

1. Subject matter of the report and justification for proceeding.

The subject of this EIA Report is the environmental impact assessment of the project involving the construction of the offshore wind farm OWF Bałtyk Środkowy III ("OWF BIII", "the Project"), which has already received the decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, mark: RDOŚ-Gd-WOO.4211.12.2015.KP.22 (the "Environmental Decision"). The report was prepared and submitted in the course of proceedings to amend the decision on environmental conditions, based on the provision of Article 87 of the Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (ie. Journal of Laws 2022, item 1029; "EIA Act") in connection with the provision of Article 155 of the Act of June 14, 1960 Code of Administrative Procedure (i.e. OJ. U. of 2021, item 735, as amended; "KPA"). In this case, the provisions on the environmental decision shall apply accordingly. The nature of the proceedings in question, i.e. amending an existing decision rather than obtaining a new environmental decision, has a major impact on the shape and content of this report.

The basic assumptions of the OWF Bałtyk Środkowy III project have not changed. However, since the issuance of the Environmental Decision, significant technological progress has been observed with regard to installations used for offshore wind farms, as a result of which solutions are available that were not foreseeable at the stage of obtaining the aforementioned decision, and which make it possible to achieve the same result in terms of energy generation with reduced environmental impacts, and the Project itself is at a much more advanced stage of development. It should also not be overlooked that since the issuance of the Environmental Decision, enormous progress has been made in the knowledge of natural resources in Polish marine areas, of other investments of this type planned in the vicinity of the Project. Thanks to further studies of the marine environment and analyses of the impact assessments of successive offshore wind farms, knowledge of the impacts caused by the construction and operation of such projects has been significantly enriched. The consequence of the development of other offshore wind farm projects is a significant change in the factual conditions, including as a consequence of the obligations imposed in the content of the issued decisions on environmental conditions, and which constitute the implementation environment of the OWF Bałtyk Środkowy III. In the issued decisions on environmental conditions, the environmental protection authorities determined the shape and location of corridors ensuring undisturbed migration of birds to Slupsk Shoal, validated a significant part of the statements on the potential impacts of other offshore wind farm projects planned in Polish maritime areas, including the cumulative impacts of these projects and the Project, and verified a number of solutions for the proposed minimization measures.

Regardless of the environment in which the Project is being prepared, it is particularly important to emphasize the development work on the OWF Bałtyk Środkowy III project itself, which has been going on since the date of issuance of the Environmental Decision, i.e. since July 2016. Since then, wind measurements have been carried out, preliminary geotechnical studies have been performed, and the boundary conditions defined by the Environmental Decision have been used to prepare a plan for the deployment of the farm's infrastructure and preliminary verification of possible technologies to be used. Changes in the scope of equipment and installations used for the implementation of the farm were also influenced by technological advances, which, on the one hand, make it possible to reach for solutions that were unavailable at the time of obtaining the Environmental Decision, and, on the other hand, cause than some solutions are being phased out and will not be available at the time of implementation

OWF Bałtyk Środkowy III. All of the above factors influenced the decision to update the environmental impact assessment of the OWF Bałtyk Środkowy III, so as to consequently adjust the content of the held Environmental Decision to the current technical and organizational assumptions of the project, at an advanced stage of development, and also influenced by technological changes. In addition, since the issuance of the decision, there has been a change in the implementation environment of the OWF Bałtyk Środkowy III project, an update in knowledge of the marine environment and the impacts associated with the construction and operation of offshore wind farms cumulative impacts with the Project. This is because the Applicant is convinced that both the stage of preparation for the implementation of wind energy in Polish maritime areas, as well as the stage of advancement of the OWF Bałtyk Środkowy III project, allow already at this stage to effectively verify the parameters of the planned project and some of the conditions imposed by the Environmental Decision.

The provision of Article 155 of the KPA, which is applicable to the case at hand, allows a final decision, by virtue of which a party has acquired rights, to be amended at any time with the consent of the party, if a special provision does not oppose such an amendment and the public interest or the legitimate interest of the party supports it. It should be emphasized that in the present case, the justification for changing the decision is both the legitimate interest of the Party and the public interest. Conducting this proceeding will make it possible to adjust the technical parameters of the OWF Bałtyk Środkowy III Project and the conditions for its implementation to the best offshore wind farm technologies planned for implementation and the best practices for conducting construction works. The changes to be made will allow the project to adapt to technological developments and optimize the solutions adopted in such a way that they will allow the Project to be more efficient without increasing environmental impacts. Such an action is fully in line with the public interest related to the need to urgently provide new generating capacity in the Polish power system, reduce the dependence of the Polish energy sector on external suppliers, and strive to achieve climate neutrality by increasing the share of renewable sources in Poland's total energy mix and the resulting reduction in greenhouse gas emissions.

The subject of the proposal is also to modify the conditions imposed by the Environmental Decision, including the condition related to the need to conduct a re-evaluation of the environmental impact in the course of the construction permit. This action will optimize the process of implementation of the Project significantly shortening the stage of its preparation for implementation and operation, while respecting the natural and social environment and in accordance with the principles of sustainable development.

Optimization and acceleration of the process of preparation of the implementation of the OWF Bałtyk Środkowy III project is also clearly a legitimate interest of the Party. Shortening the overall process allows the project to be more cost-effective and allows the project to enter the operation phase of the project more quickly by reducing the period during which the project does not allow the project to generate a profit, but causes costs. At the same time, it should be emphasized that the proposed amendment to the Environmental Decision is not opposed by any legal provision, nor does the amendment itself lead to a violation of the public interest. The social interest that the decision on environmental conditions realizes is expressed in the assessment of the possibility of realization of the planned project in a given location and such determination of the conditions for its implementation as to minimize the possibility of negative effects on people and the environment associated with the implementation and operation of the Project. The proposed change to the terms of the Environmental Decision does not in any way lead to a reduction in the level of protection of people and the

environment established by the existing content of the decision - as demonstrated in the body of the Report. This change is possible precisely as a result of updating and clarifying the parameters of the Project, including in connection with taking into account already at this stage some of the recommendations and conditions set forth in the Environmental Decision, as well as technological advances that allow optimizing the use of resources. Also of significance are the changes in the factual situation caused by the issuance of environmental decisions for other offshore wind farm projects and the knowledge of the natural resources of Polish marine areas and the impacts caused by offshore wind farms, obtained through the proceedings concluded by these decisions.

And, in particular, it should be pointed out that the impact assessment carried out in this Report has a dimension and effect equivalent to the environmental reassessment, and thus the purpose of imposing the reassessment as specified in the text of the Environmental Decision will be achieved.

2. Requested change in the parameters of the Project and the conditions of the Environmental Decision

The proposed change in the parameters of the Project is in the nature of an adjustment to the current state of knowledge and best available technology of the parameters, which in the Environmental Decision in most cases were specified as acceptable maximum parameters. In many cases, the Environmental Decision allows the investor to choose from among the methods of implementation of the Project evaluated in the course of the environmental impact assessment, as well as from among a group of specified technical solutions. Proposed changes to the parameters of the Project will either lead to a reduction in the maximum total range of conditions specified in the Environmental Decision or to a reduction in the range of project implementation methods or technical solutions. Changes in the parameters of the Project that exceed the parameters specified in the Environmental Decision - the maximum height of the rotor and the maximum diameter of the rotor, as well as the maximum area of the foundation for the associated infrastructure - are at the same time combined with radical changes in the number of power plants planned for implementation, as a result, the changes made in the number of power plants not only compensate for the changes in the impacts associated with changes in these parameters, but lead to a significant reduction. The table below summarizes the basic parameters of the Project subject to updating compared to the parameters approved by the Environmental Decision and to the most far-reaching scenario (NIS 2015), which is a set of parameters of the Project causing the most far-reaching impacts, and which was the basis for conducting the environmental impact assessment during the proceedings concluded with the issuance of the Environmental Decision.

Table 1. Comparison of basic parameters of the Project subject to change and clarification

	Parameters of the Project at the current stage of project development	Parameters of the Project approved in the Environmental Decision	Parameters constituting the 2015 NIS that form the basis of the impact assessment for the Project approved by the Environmental Decision*
Maximum number of power plants [pcs]	60	120	200

Maximum total height of the power plant above sea level. [m]	310	275	212.5
Maximum rotor diameter [m]	250	200	192.5
Maximum total rotor area [m2]	2945244	3768000	5820800
Minimum clearance between the bottom position of the wing and the sea surface [m]	20	20	20
Maximum number of foundations of supporting infrastructure** [pcs]	1	6	8
Maximum bottom area occupied by 1 foundation of supporting infrastructure [m^2]	1964	1257	1257
Types of power plant foundations considered	Foundations: monopile and jacket (truss) type	Foundations: monopile, tripod, jacket (truss) and gravity foundations	Foundations: monopile, tripod, jacket (truss) and gravity foundations
Maximum bottom area occupied by 1 power plant foundation [m^2]	79	1257	1257
Maximum bottom area occupied by all foundations [m^2]	6676	158382	261456

*The 2015 NIS is a set of parameters of the Project that cause the most far-reaching impacts, and which was the basis for conducting the environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision, for most of the parameters of the Project, the parameters of the NIS corresponded to those of the alternative variant from the 2015 Report

** The types of foundations considered have not changed.

The above table indicates those of the basic parameters of the project that were changed and clarified during the design work, detailed information is provided in Section 1 and Section 2 of Volume II of this Report.

The proposed update to the parameters of the Project also applies to exemptions from development within the Project basin. Thus, as a result of planning work on the project and in the execution of condition IV.1 of the Environmental Decision, i.e. in the analysis of potential safety zones for birds and bats in the area of the farm and around its individual elements, and condition IV.2 of the Environmental Decision related to the determination of the legitimacy of the creation of migration corridors Of the Environmental Decision related to the determination of the legitimacy of the creation of migration corridors, as well as taking into account the decisions contained in the decision on environmental

conditions issued for the offshore wind farm Balitca 2 and Baltica 3[1] a decision was made to exclude part of the BIII offshore wind farm area from the development of wind power plants, for the purpose of creating an expensive migration corridor for birds between clusters of wind power plants, belonging to projects located on the northern and north-eastern slope of Slupsk Shoal - detailed information in this regard can be found in Section 1 of Volume II and Section 5 of Volume IV. The extent of the protection zone resulting from the need to protect the shipwreck located in the project area, as stipulated in Condition I.3.9 of the Environmental Decision, has also been taken into account - detailed information in this regard can be found in Section 1 of Volume II and Section 8 of Volume IV.

Changes and updates to the parameters of the Project, made taking into account the recommendations set forth in the Environmental Decision, combined with the change in factual conditions resulting from new knowledge on the impacts of offshore wind farms, the degree of advancement of other offshore wind farm projects, including those cumulating impacts with the Project, as well as the advancement of the OWF Bałtyk Środkowy III project itself and technological progress, allows to indicate those conditions of the Environmental Decision that should be verified and amended, which is the scope of the subject application of the Investor.

The scope of the proposed changes to the terms of the Environmental Decision includes, in particular:

1. The change specified in I.1. Environmental Decision of the area to be developed in accordance with the conditions set forth in the PSZW from about 89 square kilometers to about 94 square kilometers. This change is due to the improper definition, inconsistent with the regulations of the Law of July 7, 1994. - Construction Law (i.e. Journal of Laws 2021, item 2351, as amended) above the area indicated in the application for the Environmental Decision and the 2015 Report. These changes do not lead to an actual enlargement of the area designated for this type of activity, and are only a consequence of adjusting the conceptual apparatus to that used in the Construction Law, as well as removing potential inconsistencies with condition I.3.8 of the Environmental Decision. In detail, this issue is presented in Section I of Volume 2;
2. The change in point. I.1. The Environmental Decision parameters of the offshore wind farm OWF Bałtyk Środkowy III by indicating that it will consist of a maximum of 60 wind turbines instead of 120 and a maximum of 1 internal offshore substation instead of 6;
3. Modification of the specified in Section I.1. The Environmental Decision parameters of the maximum total height of the power plant above sea level from 275 m to 310 m and the maximum rotor diameter from 200 m to 250 m, while changing the maximum zone of a single rotor from 31,400 m^2 to 49,088 m^2 and determining the maximum total zone of the rotors from 3,768,000 m^2 to 2,945,244 m^2. The amendment also requires analogous changes to conditions I.3.1 and I.3.4, as well as condition II.1.B.1 of the Environmental Decision. These changes are related to the development of wind farm implementation technologies. Wind farm manufacturers are putting into production power plants with ever-increasing capacity, which were not available at the time of the environmental decision. These newly available wind turbine sizes require an increase in certain wind turbine parameters, which at the same time allows for a significant reduction in the number of wind turbines installed. Thus, by introducing

[1] The Baltica offshore wind farm area covered by the PSZW issued for the Baltica 2 offshore wind farm and that issued for the Baltica 3 offshore wind farm were covered by a joint decision on environmental conditions. Decision on environmental conditions dated January 24, 2020, marked RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 issued by the Regional Director of Environmental Protection in Gdansk for the project named "Baltica Offshore Wind Farm."

relatively minor changes in the parameters of the project regarding the maximum height of the power plant and the diameter of the rotor, it is possible at the same time to make a far-reaching reduction in the impacts both at the stage of implementation and operation of the planned project - detailed information in this regard can be found and Section 5 of Volume IV;

4. The change in point. I.1. The Environmental Decision Committee was asked to separately indicate the maximum area of the bottom occupied by 1 foundation of the power plant, setting it at 79 m^2, and separately the maximum area of the bottom occupied by 1 foundation of supporting infrastructure, setting it at 1,964 m^2, and to determine the total area of the bottom occupied by all foundations at 6,676 m^2. At the same time, an amendment to indicate that power plants will be able to be sited using a monopal or jacket type foundation;
5. Changing the wording of the condition on the number of wind turbines in a unit of space within the area designated for the development of power plants - point. I.3.3. According to this condition of the Environmental Decision, the maximum density of power plants can reach 1.35 units/km^2. The density parameter specified in the Environmental Decision describes the number of power plants per km^2 of the farm's area , while it does not specify in any way the distance between individual power plants and can lead to problems of interpretation. Therefore, it is proposed to replace the power plant density condition by specifying a minimum distance between power plants (counting from the axis of individual structures) of 800 m - see also Section 1 Volume II;
6. Removal from point I.1. Environmental Decision parameters describing the power, dimensions and weight of AC transformer stations and AC/DC converter stations. Since the planned maximum number of offshore substations has been reduced from 6 to 1, the final parameters of the substations may deviate from those indicated in the Environmental Decision, while these parameters do not affect the level and significance of the planned Project's environmental impact;
7. Amend the condition specified in Section II.1.A(a) of the Environmental Decision to differentiate the parameter determining the effectiveness of technical solutions to minimize underwater noise impacts according to the species requiring the solutions in question. It is proposed to establish the boundary sizes necessary to be maintained at the boundary of the nearest Natura 2000 area protecting marine mammals, i.e. Slavonian refuge PLH220023 at 140 dB re 1 µPa2s SELcum and weighted by the VHF function [a weighting function for cetaceans with high sensitivity to very high-frequency sounds] for porpoise, and 170 dB re 1 µPa2s SELcum and weighted by the PVC function [a weighting function for seals];
8. Adding another letter in point II.1.B of the Environmental Decision and in this newly added point indicating the exclusion from the possibility of locating the farm's over-water elements at the northwestern end of the body of water intended for the realization of OWF BIII, thus indicating the area allowed for the development of over-water elements in accordance with the coordinates presented in Table 1 in the application for amendment of the Environmental Decision. This condition is the implementation of the decision to exclude from wind power development a part of the BIII offshore wind farm area, for the purpose of creating an unobstructed migration corridor for birds between the groupings of wind power plants belonging to projects located on the northern and northeastern slopes of Slupsk Shoal, taken in consideration of the decision on environmental conditions issued for the Balitca 2 and Baltica 3 offshore wind farms;
9. Removal from Section II.2. The Environmental Decision in the section devoted to monitoring

the impact of the Project on seabirds and birds flying over the surface of the farm (including migratory birds) at the stage of operation of the provision on shutting down turbines located along the route of registered flocks of birds during migration periods. This provision does not address the scope and conditions of monitoring, and is inconsistent with the condition specified in section I.2.31 and I.3.12 of the Environmental Decision, which raises questions of interpretation;

10. Clarification of the condition specified in Section II.2. The Environmental Decision in the section on monitoring the impact of the Project on bats at the stage of operation by indicating that bat activity recorders will be deployed in no less than 6 in the first line of the power plant on the western and southern boundary of the BIII OWF area, which is justified by the characteristics of previous bat sightings in the area of the planned farm and the infrastructure of offshore wind farms planned by other investors, and repealing in this section the part of the condition concerning the study of bat mortality as part of post-implementation monitoring. In the case of bat mortality surveys, there are no methods that give reliable results for conducting such surveys in marine areas. The nature of the environment, including wave action, ocean currents, and the activity of animals picking up dead specimens, makes it impossible to reliably design bat mortality monitoring within OWF BIII. This change is also consistent with the rationale of the Environmental Decision, which indicates that bat monitoring should only be based on a survey of bat activity, and should be conducted on the same basis as monitoring prior to the Project;

11. Resignation of the condition stipulated in point IV of the Environmental Decision, i.e. the need to conduct a re-evaluation of the environmental impact as part of the procedure for issuing a construction permit. In the Environmental Decision in question, 6 reasons are indicated as the basis for imposing the obligation to re-evaluate the environmental impact, all of them no longer valid, which was influenced by both updates and clarifications of the conditions of the Project proposed in the course of the proceedings for which the Report was prepared, the change of factual circumstances resulting from both new knowledge and the decisions which were adopted in the decisions on environmental conditions for the projects of other offshore wind farms, and which significantly affect the execution environment of the OWF BIII project. Thus, maintaining the condition in question in the case of the other changes proposed in this Report would make a reassessment of the environmental impact an unnecessary administrative obligation that adds no new value to the goal of ensuring a high level of environmental protection. Detailed references to the various bases for imposing the obligation to reevaluate the environmental impact in the Environmental Decision can be found in Sections 3, 5, 6 and 7 of Volume II and in Volume V.

A summary of all proposed changes to the conditions set forth in the Environmental Decision can be found in Volume 5 (Summary) in Chapter 4 (Impact of the current parameters of the Project and the results of the impact assessment on the conditions set forth in the Environmental Decision for implementation, operation and decommissioning of the Project). In addition to the aforementioned changes, these are secondary changes to the points of the Environmental Decision as a consequence of taking into account the changes described above or consisting of clarifying interpretative doubts between the various provisions of the Environmental Decision, as well as changes aimed at increasing the level of protection of the marine environment by adding a requirement for visual observation and mammal deterrence prior to the start of bottom clearance operations by controlled explosion of

unexploded munitions by the relevant services.

3. Investor

The investor of the project is IMF Bałtyk III Sp. z o.o., 24/26 Krucza St., 00-526 Warsaw.

4. History of the project

The investor has been developing an offshore wind farm project in the area since 2011, originally under the name Bałtyk Środkowy III and then Polenergia Bałtyk III. The investor has a permit for the erection and use of artificial islands, structures and devices in Polish maritime areas for the project OWF Bałtyk Środkowy III No. MFW/2/2012 dated 30.03.2012.

On July 7, 2016. RDOŚ sign: RDOS-Gd-WOO.4211.12.2015.KSZ.22 issued a decision on environmental conditions for the project titled "Construction of offshore wind farm Baltic Central III." On the other hand, on January 4, 2022. The RDOŚ issued a decision confirming the validity of the project's conditions, which results in the possibility of submitting an Environmental Decision to obtain the decisions indicated in the catalog contained in Article 72 Section 1 of the AIA within 10 years from the date on which the decision on environmental conditions became final - in accordance with the provision of Article 72 Section 4 of the AIA.

Currently, the Investor, taking into account the significant advancement of preparations for the project and changes in the available sizes of wind turbines, as well as a much more advanced level of available knowledge on the environment in Polish maritime areas, the impacts caused by offshore wind farms, applies for an amendment to the decision on environmental conditions issued for the BIII OWF project.

5. Author team

The report's author team is indicated in the table below.

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6. Literature and other sources

1. Decision on environmental conditions issued by the Regional Director of Environmental Protection in Gdansk for the project involving the construction of an offshore wind farm called Baltic Central III dated July 7, 2016, mark: RDOS-Gd-WOO.4211.12.2015.KSZ.22 (zpo)
2. Environmental impact assessment report for the project involving the construction of the Baltic Central III offshore wind farm. SMDI April 2015.
3. Decision on environmental conditions dated January 24, 2020, marked RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 issued by the Regional Director of Environmental Protection in Gdansk for the project named "Baltica Offshore Wind Farm."

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME I Section 2

Impact on environmental goals

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BEiŚ	Energy Security and Environment Strategy - Perspective to 2020.
DSRK	Long-term National Development Strategy
Directive 2014/89/EU	Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning (OJ. EU. L. 257 of 2014, p. 135)
GES/subGES	Condition of the marine environment good/below good
GW	Gigawatt
Helsinki Convention/ HELCOM	Convention on the Protection of the Marine Environment of the Baltic Sea Area, done at Helsinki on April 9, 1992. (Journal of Laws of 2000 No. 28, item 346)
KPEiK	National Energy and Climate Plan for the years
NCPC	Concept for Spatial Development of the Country 2030
KPOWM	National program for the protection of marine waters
IMF	Offshore wind farm
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
RES	Renewable energy sources
PEP 2040	Poland's Energy Policy to 2040.
PEkP 2030	National Environmental Policy 2030
PZPPOM	Spatial development plan for Polish maritime areas
PMRO	Maritime Policy of the Republic of Poland until 2020 with an Outlook to 2030
PZPWP	Pomeranian Voivodeship Spatial Development Plan 2030
Marine Strategy Framework Directive/RDSM	Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (OJ EU L of 25 June 2008)
Water Framework Directive/RDW	Directive 2000/60/EC of the European Parliament and of the Council of October 23, 2000 establishing a framework for Community action in the field of water policy (OJ EU L of December 22, 2000)
ED	Strategy for Responsible Development
SRWP	Pomeranian Voivodeship Development Strategy 2030

1. Introduction

The energy industry is experiencing a period of extremely dynamic changes in the world, which are caused, on the one hand, by attempts to respond to climate threats caused, among other things, by the burning of fossil fuels, and, on the other hand, by technological advances that make it possible to implement solutions not available a decade ago, while significantly affecting the cost of investment implementation. Offshore wind energy is an area where it is positively stimulated by both factors indicated. Nevertheless, the development of offshore wind energy to date has faced developmental problems in Polish conditions, which have not allowed to use the autos of this technology.

However, the modernization challenges facing the Polish energy sector make solutions that diversify Poland's sources of energy acquisition, especially in combination with ensuring low-carbon or non-carbon energy sources, not only prospective, but timely and highly desirable. To date, the development of offshore wind energy has largely been through climate policy, as defined in a series of documents at the international, EU and national levels. However, it is to be expected that market factors will become important in the coming years, both in the dimension of the cost of energy production, as well as consumers' expectations in terms of energy sources. However, regardless of the increased importance of these factors, the role of international and domestic policy instruments will be very important in this area. The following are the most important strategic documents on which the environmental objectives of the BIII OWF may be affected. It should be emphasized, however, that some of the analyzed documents are firmly rooted in the realities of the passing decade and will need to be revised and updated in the face of changing conditions and trends.

2. International and EU strategic documents strategic

2.1. International and European energy and climate policies climate

Climate change, but also the international community's response to it, is currently the most important subject of discussion in all forums of international cooperation. The need for solutions at the global level is not only demanded by the scientific community, but is reflected in international documents. Concluded in December 2015 as part of the United Nations Framework Convention on Climate Change, the Paris Agreement is currently the main document setting out the goals of the signatories - the parties to the agreement - to combat climate change. The Covenant's strategic environmental goal is to contain the rise in global temperature in the second half of this century to at least 2°C, and if possible even 1.5°C.

The system of national emission reduction targets introduced by the European Union aims to reduce member states' greenhouse gas emissions by 2030 as envisioned by the Paris Agreements.

The policy framework was adopted by EU leaders in October 2014. It is an extension of the Climate and Energy Package to 2020, and is in line with the long-term outlook set forth in the Roadmap for moving to a competitive low-carbon economy by 2050, the Energy Roadmap 2050, the Clean Energy for All Europeans Package (the so-called Winter Package), and especially Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources. The framework strategy for a stable energy union based on a forward-looking

climate policy envisions, among other things, reducing emissions by promoting investment in new technologies, such as offshore wind farms.

The primary environmental goals for 2030 are:

- a reduction of at least 40% in greenhouse gas emissions (relative to 1990 levels);
- ensure at least 32% of the share of renewable energy in total energy consumption;
- increasing energy efficiency by at least 32.5%.

However, it should be emphasized that the European Union's climate policy is increasingly oriented towards accelerating the path of achieving greenhouse gas emission reductions. The premise of the European Union's new strategy, the European Green Deal, is to achieve climate neutrality by 2050 and decarbonize the energy sector. The proposed legislative solutions will still be the subject of work in the European Council and the European Parliament, nevertheless, the documents presented by the European Commission as implementing the new strategy envisage building an energy sector based to a greater extent on renewable sources, including the full use of the potential of offshore wind energy - proposing to raise to 40% the share of energy produced from renewable sources and to reduce greenhouse gas emissions by at least 55% by 2030.

2.2. Building a climate-resilient Europe - the EU's new Climate Change Strategy on adaptation to climate change, Brussels 2021

The strategy is a complementary document to the European Green Deal strategy. A key objective of the Strategy is to make EU society resilient to climate change and fully resilient to the inevitable effects of climate change. According to the adopted assumption, this goal is to be achieved in 2050, as a result of the implementation of a series of actions in three areas of increasing resilience to climate change, viz:

- filling knowledge gaps on climate change impacts and resilience solutions by creating an extensive knowledge base on which effective adaptation actions will be taken. The need for more knowledge stems from uncertainty about the pace and extent of climate change and its effects on natural and man-made ecosystems;
- making adaptation efforts more systemic. The strategy calls for improving national and regional adaptation plans and strategies as instruments for a systemic approach to climate change adaptation. The need to integrate climate resilience into the budget policies of member states is considered necessary action in this area - introducing procedures for processes and tools to counteract ex ante climate risks and eliminate ex post impacts of natural disasters.
- introduce nature-based solutions on a larger scale - in cities or other large infrastructure facilities, it is crucial to increase the importance of blue-green infrastructure by developing green urban spaces and building green roofs and walls; at the ecosystem level, work leading to increased protection and restoration of wetlands, peatlands, coastal and marine ecosystems, and promoting and carrying out sustainable management of forests and agricultural land in a cost-effective manner needs to be intensified.

The strategy calls for an overall acceleration of adaptation to climate change. To this end, the Union is to increase the target level of spending on climate action to 30% in its long-term budget for 2021-2027. The second step needed to accelerate adaptation is to invest in sustainable, climate-resilient infrastructure. Widespread use of insurance as a risk transfer mechanism to cover financial losses associated with climate risk may become a necessary endeavor

2.3. Directive 2014/89/EU - maritime spatial planning maritime areas

Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 *establishing a framework for maritime spatial planning* (OJ. EU. L. 257 of 2014, p. 135) ("Directive 2014/89/EU") aims to promote:

- sustainable growth in the maritime economy;
- sustainable development of marine areas;
- sustainable use of marine resources.

Directive 2014/89/EU imposes a legal requirement on EU member states to create transparent maritime planning systems and cooperate with neighbors to do so. When establishing maritime spatial planning, Member States shall take due account of the specific characteristics of maritime regions and the relevant existing and future activities and uses of these areas, their impact on the environment and on natural resources, and shall take into account the interaction between land and sea (Article 4(5) of Directive 2014/89/EU). Directive 2014/89/EU notes the need to maintain an integrated approach in the planning process, involve and consult stakeholders, use the best available data and information, take into account the interaction between land and sea, ensure cross-border cooperation between member states, and promote cooperation with third countries.

The provisions of the Directive establishing a framework for maritime spatial planning were implemented into Polish law primarily by the Act of March 21, 1991 *on maritime areas of the Republic of Poland and maritime administration* (consolidated text Dz. U. of 2020, item 2135, as amended).

2.4. Convention on the Protection of the Marine Environment of the Baltic Sea Area, done at Helsinki on April 9, 1992. - Helsinki Convention

Convention on the Protection of the Marine Environment of the Baltic Sea Area, done at Helsinki on April 9, 1992. (Journal of Laws of 2000, No. 28, item 346) - ("Helsinki Convention") ("HELCOM"), which came into force on January 17, 2000, covers the entire Baltic Sea area, including inland waters, as well as the waters of the sea itself and its bottom. All measures are also being taken to reduce pollution throughout the Baltic Sea basin.

The 1992 Helsinki Convention, concerns the protection of the Baltic Sea environment from pollution by harmful substances from all possible sources and from adverse effects through energy (e.g. radiation, inducing temperature changes). It also includes provisions for the protection of coastal flora and fauna.

Of key importance among the Convention's provisions is the provision obliging the Contracting States to take all measures that become necessary to ensure the protection of the Baltic marine environment and the ecological restoration of the Baltic region (Article 3).

Importantly, HELCOM has determined that marine Natura 2000 sites meet the criteria for inclusion in HELCOM's network of marine protected areas.[1] The way in which environmental protection is established and implemented in Natura 2000 areas that overlap with the Baltic Marine Conservation

[1] EC, Guidelines for the establishment of Natura 2000 networks in the marine environment. Application of the Habitats and Birds Directives, Brussels 2007, p. 11.

Areas must be in accordance with the content of the Helsinki Convention and the recommendations issued by HELCOM.

3. Implementation of the project in the context of national strategic and planning documents planning

3.1. Long-term National Development Strategy ("DSRK")

The DSRK is a document that defines the main trends, challenges and scenarios of the country's socio-economic development and the directions of the country's spatial development, taking into account the principle of sustainable development. It is an overarching document whose development goals will be implemented through the country's medium-term development strategy and through nine integrated strategies.

One of them is the strategic area "Energy Security and Environment" (BE&E), which has the main goal of ensuring an optimal amount of energy at the lowest possible prices and diversifying the sources and routes of energy carriers. The key environmental goals are the process of reducing CO2 emissions and air pollution. It is also important to take measures for the efficient use of environmental resources.

3.2. Strategy for responsible development (SOR)

The Strategy for Responsible Development is an update of the country's medium-term development strategy. The document sets out the principles, goals and priorities for the country's development in the economic, social and spatial dimensions until 2020, but in the perspective to 2030. The strategy deliberately assumes a longer time horizon as a response to shortcomings in the area of instruments supporting the implementation and monitoring of the long-term strategy. The Strategy defines its main objective as the creation of conditions for an increase in the income of Poland's population with a simultaneous increase in social, economic, environmental and territorial cohesion. The following were identified as specific objectives:

- Sustainable economic growth based increasingly on knowledge, data and organizational excellence;
- Socially responsive and territorially sustainable development;
- An effective state and institutions for growth and social and economic inclusion.

For the achievement of both the main and specific goal, strategic projects have been formulated. Among them, in the context of this document, the project stands out: Strategy for Transformation to a Low Carbon Economy and Clean Air. The first is to develop an implementation framework for decarbonizing and reducing the energy intensity of the economy. The Clean Air Project, on the other hand, focuses on activities related to improving air quality, particularly through the elimination of emission sources and the introduction of quality requirements for solid fuels.

3.3. National Environmental Policy 2030 (PEkP 2030)

The National Environmental Policy 2030 was adopted in 2019, and it is one of nine sectoral strategies under the Law on the Principles of Development Policy. By the same token, the enacted National Environmental Policy 2030, together with the future Energy Policy of Poland until 2040, will fill in the area of state policy that has so far been defined by the Energy Security and Environment (E&E) strategy.

The National Environmental Policy was built on the basis of 3 specific goals, i.e. Environment and Health, Environment and Economy, and Environment and Climate, and complemented by two horizontal goals Environment and Education and Environment and Administration. Among the directions of intervention particularly relevant from the point of view of the connection with the planned project is direction 7.10 Counteracting climate change. It assumes further efforts to reduce greenhouse gas emissions, with renewable energy sources along with a proper management system identified as one way.

3.4. Energy Policy Poland

The current Polish Energy Policy until 2040 ("PEP 2040") outlines the future directions and goals of Poland's energy policy. The Energy Policy of Poland defines the goals of the state policy The document indicates that the goal of the state energy policy is energy security while ensuring the competitiveness of the economy and energy efficiency and reducing the environmental impact of the energy sector. Among the indicators for achieving the goals is also the 23% share of RES in gross final energy consumption in 2030.

In 2020, Poland's Climate Ministry presented assumptions for a draft update of Poland's energy policy - the Energy Policy of Poland until 2040. One of the pillars of the proposed document is a zero-carbon energy system. One of the specific objectives for the implementation of the energy policy pillars identified is the development of renewable energy sources (Specific Objective 6), and within this framework the strategic project - Implementation of offshore wind energy - is to be implemented.

The document stresses that the energy policy will seek to fulfill the commitment contained in the above EU strategies. The goal, therefore, is to realize the pledges made: in the long term, a Europe that is a low-carbon economy and a secure, sustainable and competitive energy supply. Assumed environmental goals include balancing key emissions (CO2).

3.5. Concept for Spatial Development of the Country 2030 ("KPZK")

The NCP was adopted by Resolution No. 239 of the Council of Ministers on December 13, 2011. (M.P.2012.252). It is the main document on spatial development in the long term, and defines the goals and directions of the country's spatial development policy. The development of offshore wind farms is included in the document as a tool for improving the country's energy security. The NCP specifies that wind power will account for 45% of the energy obtained from RES. According to the findings of the NAP 2030, the planned project is located in the zone of distributed renewable wind energy development. The NAP 2030 sets 6 goals that implement the strategic objective. Relevant to the implementation of the project, the environmental goals of the NSPCC are the diversification of energy sources, resulting in a reduction in CO2 emissions, including the development of RES.

3.6. Spatial development plan for Polish maritime areas ("PZPPOM")

The spatial development plan for the Polish maritime areas of internal waters, territorial sea and exclusive economic zone at a scale of 1:200000 was adopted as of April 14, 2021.[2]

The plan, was prepared jointly by the directors of the Maritime Offices in Szczecin, Slupsk and Gdynia, so as to ensure consistency of spatial development of the entire plan area. The plan covers the entirety of internal waters, the territorial sea and the exclusive economic zone under the jurisdiction of the Polish maritime administration, excluding the waters of ports and three lagoons, for which, due to the scale of conflicts and the intensity of interactions between land and sea, plans will be drawn up on a larger scale so that detailed issues can be included in them.[3] The area POM.45.E is designated in the Plan for the purpose of obtaining renewable energy, while internal and external technical infrastructure are considered integral to projects of this kind. Thus, the Plan takes into account the implementation of the BIII OWF in the area in question. The Plan indicates restrictions related to the use of space, including technical infrastructure:

- it is limited to the infrastructure necessary for the energy acquisition function;
- is limited to ways that do not ecologically threaten the function of spawning grounds and the survival of the early life stages of fish (eggs and larvae) of commercial species;
- it is required to lay linear elements of technical infrastructure in a space-saving manner, under the surface of the seabed, and if this is not possible for environmental or technological reasons, other permanent protection should be used, allowing the safe use of anchored pond nets.

The plan, in the section defining the conditions of use of the basin for obtaining renewable energy, indicates that:

- the area is dedicated to obtaining energy from wind through wind turbines, recognizing internal and external technical infrastructure as part of projects serving this purpose;
- at the time of commencement of the project of erecting artificial islands and structures, it is required to introduce, by a decision of the territorially competent director of the maritime office, a ban on fishing and navigation in the body of water occupied after construction, along with a 500-meter safety zone around the body of water, for the duration of construction;
- during the operation of offshore wind turbines, it is required to introduce, by decision of the territorially competent director of the maritime office, restrictions on fishing and navigation in the safety zones established for each structure and in places that threaten the safety of the internal technical infrastructure.

The plan takes into account the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas issued to the Investor for the subject body of water with the reference GI7/62/1170069/Decision/2012 by the Minister of Transport, Construction and Maritime Economy on March 30, 2012.

3.7. Maritime Policy of the Republic of Poland until 2020 with an Outlook until 2030 ("PMRP")

In the PMRP adopted by the Council of Ministers on March 17, 2015. The PMRP determined that the real potential for offshore wind energy development in Poland, which can bring the greatest benefits to

[2] Ordinance of the Council of Ministers of April 14, 2021 on the adoption of a spatial development plan for internal marine waters, territorial sea and exclusive economic zone at a scale of 1:200,000 (Journal of Laws of 2021, item 935)
[3] https://legislacja.rcl.gov.pl/projekt/12345201/katalog/12776609#12776609, accessed May 2022.

the Polish energy balance and the Polish economy, is 6 GW of installed capacity in offshore wind farms by 2030, with 1 GW in 2020 and another 2 GW by 2025. The creation of conditions for the construction of offshore wind farms was identified as a measure to improve energy security.

3.8. National Energy and Climate Plan 2021-2030 (NERP)

The National Energy and Climate Plan was developed by an inter-ministerial team under the coordination of the Ministry of State Assets, and it implements the obligation under Regulation (EU) 2018/1999 of the European Parliament and of the Council of December 11, 2018. on Governance of the Energy Union and Climate Action, amending Directive 94/22/EC, Directive 98/70/EC, Directive 2009/31/EC, Regulation (EC) No. 663/2009, Regulation (EC) No. 715/2009, Council Directive 2009/119/EC, Directive 2010/31/EU, Directive 2012/27/EU, Directive 2013/30/EU and Council Directive (EU) 2015/652 and repealing Regulation (EU) No. 525/2013. The document, after adoption by the Committee on European Affairs, was forwarded to the European Commission on December 30, 2019.

The NAPE outlines assumptions and goals, as well as policies and actions to implement the 5 dimensions of the energy union, i.e.

1. energy security,
2. internal energy market,
3. energy efficiency,
4. decarbonization and
5. research, innovation and competitiveness.

The National Energy and Climate Plan 2021-2030 sets the following climate and energy targets for 2030:

- -7% reduction in greenhouse gas emissions in non-ETS sectors compared to 2005 levels,
- 21-23% share of RES in gross final energy consumption (the 23% target will be achievable if Poland is granted additional EU funds, including those earmarked for a fair transition), taking into account:
    - ⇒ 14% share of RES in transportation,
    - ⇒ annual increase in the share of RES in heating and cooling by 1.1 percentage points on average per year,
- a 23% increase in energy efficiency compared to PRIMES2007 projections,
- reducing to 56-60% the share of coal in electricity generation.

The NERP includes measures to support renewable energy sources in its stated goals, while indicating that offshore wind generation sources will account for the largest amount of energy generated from renewable energy sources, projecting the capacity achieved from these sources at 3.8 GW in 2030 and about 8 GW in 2040.

3.9. National program for the protection of marine waters ("NTPP")

According to Article 145 of the Water Law, the environmental goals for marine waters are achieved by taking measures specified in the National Marine Waters Protection Program, adopted by the Council of Ministers by decree on December 11, 2017. (Journal of Laws of 2017, item 2469).

The NEB is a strategic document required to be developed by the Maritime Strategy Framework Directive (MSFD) for member countries. The goal of the NSPOWM is to identify the optimal set of measures that will lead to the achievement of good environmental status of marine waters within a specified time.

The set of environmental objectives for marine waters is set forth in the Regulation of the Minister of Environment of 17.02.2017 on the adoption of a set of environmental objectives for marine waters (Journal of Laws 2017, item 593) issued on the basis of Article 61o paragraph 8 of the Act of 18 July 2001. - Water Law (i.e. OJ. U. of 2021, item 2233, as amended). This act defines environmental objectives for 11 categories of characteristics - descriptors that, according to the provisions of the RDSM, constitute criteria for assessing the good state of the marine environment (Annex I to the RDSM).

A preliminary assessment of the state of the marine environment, as required by the ICZM, was prepared in 2013 by the Chief Inspector of Environmental Protection and adopted by the Council of Ministers on November 10, 2014. This assessment is used to obtain information on the current state of the marine environment, and thus serves as a starting point for determining the courses of action needed to be implemented to achieve the goals set by the ICZM. Criteria and methodological standards for measures of achieving good environmental status of marine waters are set out in European Commission Decision 2017/848/EU. In connection with the obligation to update the assessment of the state of the environment of marine waters in 6-year cycles, an update of the preliminary assessment of the state of the environment of the Polish Baltic Sea zone covering the years 2011-2016 was published by the Chief Inspector of Environmental Protection in 2019. Updating the assessment provides a basis for verifying the effectiveness of measures taken to achieve environmental goals for marine waters, and thus modifying the national marine water protection program.

As part of the Project's impact assessment, an analysis was made of the impact of the proposed changes to the Project previously subjected to the impact assessment on changes in the nature and extent of potentially generated impacts, and consequently on the ability of the modified Project to affect the state of marine waters and the ability to achieve a set of environmental objectives set for them and the national marine water protection program (see Section 4 below).

3.10. Pomorskie Region Development Strategy 2030 ("SRWP")

The SRWP is the basic strategic document guiding the development of Pomorskie Voivodeship. It was adopted by the Sejmik of Pomorskie Voivodeship by Resolution No. 376/XXXI/21 of April 12, 2021. The strategy sets strategic and operational objectives and directions of activities. The planned project is in line with Operational Objective 1.2 Energy security.

The SRWP points to climate change risks identified as one of the key threats to the region. The development directions will emphasize low-carbon and renewable energy as a desirable development direction, while highlighting the opportunity of offshore wind energy development.

3.11. Pomeranian Voivodeship Spatial Development Plan 2030 ("PZPWP")

The PZWP was adopted by Resolution No. 318/XXX/16 of the Pomeranian Regional Assembly on December 29, 2016. Electricity production and the transformation of the region into a national leader

in renewable energy production is one of the main goals and objectives of the Plan. For the realization of the BII offshore wind farm, it is important to include among the activities and projects of the 2030 FMP the construction of transmission networks and substations for the derivation of power from new system and renewable energy sources, including offshore wind farms. PZPWP 2030 also indicates the possible and expedient activation of port and shipyard areas for offshore development activities, including, for example, a logistics and service and maintenance center for offshore wind farms in the ports of Leba, Ustka and Władysławowo.

4. Implementation of the project and the environmental objectives arising from strategic and planning documents planning documents

4.1. Environmental objectives of documents from the areas of energy, climate, economic development and land use

Table 1. Analysis of the environmental objectives arising from the strategic documents relevant to the implementation of the Project in terms of its relevance to the strategic objective

European documents	
Strategic objective relevant to the implementation of the Project	**Relevance of the Project in the context of the stated strategic objective**
EU Strategy for the Baltic Sea Region	
Goal Save the Sea: • sub-goal - clean sea water - activities under this goal focus on combating eutrophication; • sub-goal - rich and healthy animate nature; • measures to protect and counteract the loss of biodiversity.	The impact on water quality will be temporary and insignificant and will not contribute to the inability to achieve or maintain good water status. The low impact of the project during the construction phase of the farm on the occurrence of species and habitats and the low impact during the operation period should ensure that there is no conflict with the goal of preserving biodiversity.
Goal Increase Prosperity: • sub-goal - climate change adaptation, mitigation and risk management - measures to adapt and mitigate the impact of climate change.	Implementation of the project does not conflict with the goals of the plan. Construction of the BIII offshore wind farm will have a positive impact on reducing climate change pressures and will be neutral to climate change adaptation measures.
A clean planet for all. European long-term strategic vision for a prosperous, modern, competitive and climate-neutral economy, 2018	
The goal of the Strategy is to present a vision that can achieve zero net greenhouse gas emissions by 2050 through a socially equitable and cost-effective transition. The Strategy underscores the opportunities this transformation creates for the Union's citizens and its economy, and identifies future problems. It is intended to set the course for EU climate and energy policy and give shape to what the EU sees as its long-term contribution to the Paris Agreement's temperature goals,	Implementation of the project will contribute to reducing the environmental impact of the energy industry, due to the replacement of the use of fossil fuels in energy generation with non-emitting technology. It fits directly into the goal of maximizing the use of renewable energy sources. The impact on marine water quality will be temporary and insignificant and will not contribute to the inability to achieve or maintain good water status. The way the farm is designed

consistent with the UN Sustainable Development Goals. The document sets out proposed courses of action until 2050 in 7 strategic areas, of which the important ones from the point of view of the planned Project are: 1. Maximize the benefits of energy efficiency, including zero-emission buildings. 2. Maximize the use of renewable energy sources and electricity to completely decarbonize Europe's energy supply. 3. Adopting clean, safe and network-based mobility. Competitive EU industry and closed-loop economy as key enabler to reduce greenhouse gas emissions	and constructed is to ensure that pressure on marine waters is kept as low as possible. At the same time, the implementation of the project does not interfere with the possibility of achieving environmental goals for marine waters.
Building a climate-resilient Europe - the EU's new Climate Change Adaptation Strategy, Brussels 2021	
The EU's 2021 Adaptation Strategy complements the one published in 2019. European Green Deal. A key objective of the Strategy is to make EU society resilient to climate change and fully resilient to the inevitable effects of climate change.	Implementation of the project will only have a minor impact on the Baltic Sea ecosystem, mainly during the construction phase. During the operational period, the project will not contribute to the deterioration of ecosystems and their functions. Appropriate design and implementation of the Project will not conflict with climate change adaptation activities.
EU biodiversity strategy 2030	
The Strategy includes a number of commitments, showing 2030 as the horizon for achieving them. Among the main goals are: - the creation of a larger network of protected areas on land and at sea throughout the EU; - launching a plan for the restoration of natural resources; - introduce measures to enable the necessary transformational change - the need to free up funding for biodiversity and apply a new, strengthened governance framework to ensure better implementation of the Strategy and track progress; raise awareness and increase funding and investment; - ensure better respect for nature in public and business decision-making.	Implementation of the project will have little impact on the Baltic Sea ecosystem. During the period of operation, the project will not contribute to the deterioration of ecosystems and their functions, and with regard to fish and benthic habitats, it may promote improved habitat and development due to the existence of exclusion zones from anchoring or certain forms of fishing and restrictions on vessel traffic.
European Landscape Convention	
Integrate the landscape into its own regional and urban planning policies, and its own cultural, environmental, agricultural, social and economic policies, as well as any other policies that directly or indirectly affect the landscape.	The project will not affect policies related to ensuring landscape protection in regional and local planning. The project's impact on the coastal landscape will not be negative due to its significant distance from the shore.

National documents	
Concept of Spatial Development of the Country 2030	
Objective 4. Shaping spatial structures that support the achievement and maintenance of high quality of the natural environment and landscape values of Poland: 4.1. integration of activitieś in the operation of a coherent ecological network of the country as a basis for the protection of the most valuable natural and landscape resources; 4.2. countering fragmentation of natural space; 4.3. introduction of landscape management in accordance with the provisions of the European Landscape Convention; 4.4. to rationalize the management of the country's limited surface and groundwater resources, including preventing the occurrence of water deficits for the needs of the population and economic development; 4.5. achieve and maintain the good status and potential of water and related ecosystems; 4.6. reduce the environmental burden caused by emissions of pollutantś to water, atmosphere and soil.	The degree of the project's impact on the country's ecological network and the most valuable natural and scenic resources is small, limited mainly to the construction phase and, with respect to birds, the operation phase. There will be no permanent fragmentation of natural space due to measures to minimize the barrier to migratory birds, including migration corridors. The impact on water quality will be temporary and insignificant, and will not contribute to the inability to achieve or maintain good water status. Implementation of the Project may contribute to reducing the environmental impact of energy, due to the replacement of fossil fuels with a renewable, non-emitting energy source such as wind.
National Environmental Policy 2030.	
Direction of intervention - Tackling climate change. Task - Support for investments related to the increase of production from renewable sources	The planned Project is in line with the proposed policy directions and contributes to the goal for which the direction was formulated
Direction of intervention - Management of natural and cultural heritage resources, including protection and enhancement of biological and landscape diversity, task - Protection of species and habitats of the Baltic Sea and effective management of Natura 2000 marine areas	The method of implementation of the Project and the provided minimization measures are constructed in such a way as to minimize the potential for negative impacts. The environmental impact assessment for the project showed no significant impacts. The proposed changes to the project further reduce the potential for impacts on protected species and habitats in marine areas
Poland's Energy Policy to 2040.	
Poland's energy policy defines the objectives of state policy, indicating that it is energy security while ensuring the competitiveness of the economy and energy efficiency, and reducing the environmental impact of the energy sector. Among the indicators for achieving the goals is also the 23% share of RES in gross final energy consumption in 2030.	Taking into account the higher emissivity of fossil solid fuels in relation to wind energy, the implementation of the Project will be in line with the goals of reducing the impact of energy on the environment, in particular, it will be directly in the implementation of strategic projects Implementing offshore wind energy under specific objective 6. Development of renewable energy sources.
Program for the conservation and sustainable use of biodiversity with an Action Plan for 2015-2020	

Objective 3. Maintenance and restoration of ecosystems and their services.	The minor impact of the project during the construction phase on benthic habitats, marine mammals and fish, and the minor impact during the operation period on birds will result in an insignificant impact on the Baltic Sea ecosystem. To a certain extent, due to the existence of zones excluded from anchoring or certain forms of fishing and vessel traffic, the implementation of the project may have a positive impact.
Objective 4. Ensure sustainable use of fishery resources.	To some extent, due to the existence of zones excluded from anchoring or certain forms of fishing, the implementation of the project may have a positive impact.
Objective 5. Control of invasive alien species.	The assessment made at the report stage prior to the issuance of the environmental decision remains valid, ie: The venture will be implemented in the waters of the Baltic Sea. The manner in which the work is carried out and the sources of materials used in the implementation of the Project should ensure that there is no conflict with the objective.
Strategic adaptation plan for sectors and areas vulnerable to climate change until 2020 with an outlook to 2030	
Goal - Ensure energy security and a good environment: • direction of action - adaptation of the coastal zone to climate change; • course of action - adaptation of the energy sector to climate change.	Implementation of the Project does not conflict with the objectives of the plan. Appropriate design and implementation of the project will not conflict with climate change adaptation measures. Implementation of the project can contribute to the direction of action related to adaptation of the energy sector to climate change.
Pomeranian Voivodeship Development Strategy 2020	
Objective 1.2 Energy security	The project fits directly into this goal as part of achieving climate neutrality. The project coincides with the goals of developing renewable energy sources and improving air quality.

4.2. Environmental objectives for waters marine

The conservation principles and targets for marine waters set out in the Marine Strategy Framework Directive require Member States to take the measures necessary to achieve or maintain good environmental status of marine waters by 2020 at the latest.

In the Polish legal order, the state's obligations to achieve the ICZM goal of good status of marine waters and the tools for achieving it are defined in the Act of July 20, 2017. *Water Law* and executive acts to this law.

An act of particular importance, for the analyses conducted in this report, is the Regulation of the Minister of Environment dated February 25, 2021 *on the adoption of a set of environmental objectives for marine waters*. This act defines environmental objectives for 11 categories of characteristics - descriptors that, according to the provisions of the RDSM, constitute criteria for assessing the good state of the marine environment (Annex I to the RDSM). The distinguished goals include features of indicators of environmental status (D1, D4), as well as indicators of environmental pressure (D2, D3, D5, D6, D7, D8, D9, D10, D11). The objectives set by the regulation for Polish marine waters are shown in Table 2.

Table 2. Summary of environmental objectives for marine waters broken down into 11 categories of features - descriptors

	Feature - descriptive indicator for which the target is set	Description of the objective
D1	Biodiversity	Reduce or maintain anthropogenic pressure at a level that ensures the maintenance of natural habitats, where the natural biodiversity of the biotic elements present is preserved, including in fisheries, and habitat protection within Natura 2000 protected areas is ensured.
D2	Foreign species	Reduce the possibility of the spread of alien species introduced into the environment as a result of human activities to ensure the occurrence of alien species at levels that do not disrupt the structure and functioning of the ecosystem, especially with regard to specific groups of species, areas particularly vulnerable to introduction, and general habitat types, by taking appropriate measures.
D3	Commercially exploited fish and shellfish species	maintaining populations of commercially exploited fish and shellfish within safe biological limits corresponding to natural conditions by ensuring that the exploitation of all commercially exploited fish stocks is at or below the level of maximum sustainable yield ensuring that all commercially exploited fish are within safe biological limits, and by limiting or maintaining the exploitation of fish stocks at a level that ensures that their full reproductive capacity and full range of individual ages and sizes are maintained.

	Feature - descriptive indicator for which the target is set	Description of the objective
D4	Food chain	Reduce the impact of human activities to a level that allows the ecosystem to reach a state in which all elements of the marine trophic chain exhibit a natural and stable level of abundance and diversity, and the productivity of biotic components ensures the proper functioning of the trophic network.
D5	Eutrophication	Maintain the inflow of annual loads of nitrogen and phosphorus carried into the Baltic Sea by rivers and in the form of atmospheric deposition below the maximum inflow values (MAI) established within the framework of regional arrangements (HELCOM), which will allow to reduce the concentration of nutrients in the sea to a level that does not exceed permissible threshold values, which are in accordance with the recommendations of the applicable national and European Union acts, and which guarantee the achievement or maintenance of good environmental status and do not cause negative effects in the form of excessive algal growth, elevated concentrations of chlorophyll "a" in the water column, a decrease in the transparency of seawater and the level of oxygenation of bottom waters, which consequently promote the proper development of pelagic and benthic habitats.
D6	Seabed integrity	Reduce cumulative pressure on the seabed to a level that allows benthic habitats to function at a near-natural level.
D7	Hydrographic conditions	Reduce pressures associated with permanent changes in hydrographic conditions. Reduce cumulative pressures on habitats.
D8	Pollutants and their effects	Reduction or maintenance at the current level of the inflow of pollutants, originating from marine sources, including the application of measures to minimize releases of pollutants as a result of emergency events, and land-based pollutants entering the marine environment, in order to achieve or maintain concentrations of pollutants in biotic and abiotic elements of the marine ecosystem at levels that do not exceed permissible thresholds, below which the probability of undesirable effects of hazardous substances on marine organisms is minimal and which are in accordance with the recommendations of applicable national and international legal acts, and which guarantee the achievement or maintenance of good environmental status.
D9	Contaminants in fish and shellfish for consumption	Reduce or maintain the influx of pollutants (hazardous) from various marine and terrestrial sources entering the marine environment, in order to achieve or maintain the

	Feature - descriptive indicator for which the target is set	Description of the objective
		concentrations of pollutants (hazardous) in fish and shellfish for human consumption at levels that do not exceed permissible values, which are in accordance with the standards and provisions of applicable national and international legal acts and which guarantee the achievement of good environmental status.
D10	Waste in the marine environment	Reduce the amount of newly emerging and deposited solid waste in the marine environment from various land and marine sources to levels that guarantee the proper functioning of the ecosystem, taking into account the natural resilience of the ecosystem, or to eliminate newly emerging waste altogether.
D11	Underwater noise	Reduce pressures associated with the temporal and spatial occurrence of impulse sounds in the sea associated with human activities, above levels that have a negative impact on marine animal populations. Reduce pressures associated with the temporal and spatial occurrence of continuous low-frequency sounds in the sea associated with human activities, above levels that have a negative impact on marine animal populations.

The Regulation on Adopting a Set of Environmental Objectives for Marine Waters also divides Polish marine waters into basins where monitoring and diagnostics of the current state of marine waters are carried out. From the point of view of the Project, the body of water for which it is necessary to assess the impact on the possibility of achieving the goals set for good environmental status of marine waters is: the Bornholm Basin body of water (formerly: body of water No. 36 - open waters of the Bornholm Basin).

According to the requirements of the IODR, Member States were required to conduct a preliminary assessment of the state of the marine water environment by 2012. The preliminary assessment of the state of the marine water environment was prepared in 2013 by the Chief Inspector of Environmental Protection and adopted by the Council of Ministers on November 10, 2014. The assessment is used to obtain information on the current state of the marine environment, and thus serves as a starting point for determining the courses of action needed to be implemented to achieve the goals set by the ICZM. This assessment is carried out for all 11 characteristics - descriptive indicators, which are the criteria for assessing the good condition of the marine environment. Criteria and methodological standards for measures of achieving good environmental status of marine waters are set out in European Commission Decision 2017/848/EU. Assessment results for all 11 traits-descriptive indicators were defined in two classes: good state (GES) and below good state (subGES). As noted above, in order to take into account the applicable classification for transitional and coastal waters under the WFD, the boundaries of good and below good status were adopted to run in line with the lower limit of good water status according to the WFD classification.

Member States are required to update the original assessment of the state of the environment every six years (similarly, an update of the environmental objectives and the adopted program of measures

to achieve the goals of the ICZM is required. In 2019. The Chief Inspector of Environmental Protection published an Update of the Preliminary Assessment of the Environmental Status of the Polish Baltic Sea Area covering the years 2011- 2016.

A summary of the 2018 updated assessment of the state of the marine environment by 11 features - descriptors for the Bornholm Basin is presented in Table 3. The environmental goals for all marine areas within Polish jurisdiction have been set uniformly. The table also summarizes the importance of activities undertaken in the implementation of the Project,

relevant to achieving the goals of good marine environmental status and the nature of potential impacts. The table also indicates the relevant chapters of this Report with more detailed information related to the impacts so identified.

Table 3. Environmental objectives established for marine waters in the zone of influence of the Project

Feature-Descriptive Indicator/Place of Analysis in Report	Current status of the Bornholm Basin basin	Link to the Project	Potential impacts	Assessment of the impact of the Project on environmental objectives [affects - YES/does not affect - NO]
D1. Biodiversity Chapter: T IV R 13.	subGES - for mammals, breeding birds, fish and benthic habitats, GES for wintering birds and pelagic habitats	Ensure the protection of biodiversity in the Project area, maintaining the habitats in the area in a state corresponding to their natural conditions. Ensure proper conditions for sensitive species occurring in the area of influence of the project (such as porpoise).	Disturbance of the structure of the seabed; Release of pollutants and nutrients from bottom sediments; Sedimentation of agitated sediments; Presence of steel/concrete structures and cables; Underwater noise; Risks associated with the spread of alien species; Flushing during construction work.	NO
D2. Foreign species Chapters: T IV: R 3, R 4, R 5, R 6, R 7.	subGES	Risk of introducing new alien species during the implementation and operation phases of the project.	The spread of alien species.	NO

Feature-Descriptive Indicator/Place of Analysis in Report	Current status of the Bornholm Basin basin	Link to the Project	Potential impacts	Assessment of the impact of the Project on environmental objectives [affects - YES/does not affect - NO]
D3. Commercially exploited fish and shellfish species Chapters: TIV: R 4, R 10.	no aggregated indicator for the whole trait, subGES for sprat, GES for herring	Occurrence of fishing areas in the farm area.	Disturbance of the structure of the seabed; Release of pollutants and nutrients from bottom sediments; Sedimentation of agitated sediments; Presence of steel/concrete structures and cables; Underwater noise.	NO
D4. Food chain Chapters: TIV: R 2,R 3,R 4, R 5, R 6, R 7, R 10.	subGES for all trophic groups A, B, C	Occurrence of species at the top of the food chain in the project area. Their presence may indicate good conditions for the functioning of the food chain.	Disturbance of the structure of the seabed; Release of pollutants and nutrients from bottom sediments; Sedimentation of agitated sediments; Presence of steel/concrete structures and cables; Underwater noise.	NO
D5. Eutrophication Chapter: TIV R 2.	subGES	Construction work, including installing foundations, burying cables and making embankments of rock material, anchoring can cause agitation of bottom sediments, which in turn can result in the release of pollutants and nutrients.	Disturbance of the structure of the seabed; Release of pollutants and nutrients from bottom sediments; Sedimentation of agitated sediments.	NO
D6. Seabed integrity	GES	Installing foundations, burying	Disturbance of the structure of the seabed;	NO

Feature-Descriptive Indicator/Place of Analysis in Report	Current status of the Bornholm Basin basin	Link to the Project	Potential impacts	Assessment of the impact of the Project on environmental objectives [affects - YES/does not affect - NO]
Chapters: TIV: R 2, R 3.		cables and making embankments of rock material will lead to occupation of the seabed and locally lead to changes in the environmental conditions of the seabed.	Release of pollutants and nutrients from bottom sediments; Sedimentation of agitated sediments; Presence of steel/concrete structures and cables.	
D7. Hydrographic conditions Chapter: TIV: R 2.	GES	Temporal dispersion of agitated material from the seafloor. Presence of steel/concrete structures and cables, and occupation of space during construction work.	Bottom sediment agitation; Changes in hydrodynamic conditions.	NO
D8. Pollutants and their effects Chapters: TIV: R 2, R 3, R 4.	GES (in the D8C2 and D8C3 GES criteria group, subGES for the D8C1 criteria group)	Construction work, including installation of foundations and cables, making rock embankments, anchoring, etc. will cause temporary agitation of bottom sediments. Release of metals from anodes.	Disturbance of the structure of the seabed; Release of pollutants and nutrients from bottom sediments; Anode emissions.	NO
D9. Contaminants in fish and shellfish for consumption Chapters: TIV: R 2, R 3, R 4.	GES (GES for 9 substances, subGES for the sum of PBDE congeners)	Construction work such as installing foundations and cables and making rock embankments, anchoring, etc. will cause temporary agitation of bottom sediments.	Disturbance of the structure of the seabed; Release of pollutants and nutrients from bottom sediments; Anode emissions.	NO

Feature-Descriptive Indicator/Place of Analysis in Report	Current status of the Bornholm Basin basin	Link to the Project	Potential impacts	Assessment of the impact of the Project on environmental objectives [affects - YES/does not affect - NO]
		Release of metals from anodes.		
D10. Waste in the marine environment Chapters: not applicable	lack of data	Due to the need for waste management on land, project activities will not be relevant.	None - not applicable.	NO
D11. Underwater noise Chapters: TIV: R 4, R 6.	subGES	The impacted area may contain species sensitive to underwater noise (marine mammals, fish).	Underwater noise associated with foundation installation.	NO

According to the 2013 Preliminary Assessment of the Environmental Status of Marine Waters, the overall assessment of Polish marine waters was determined to be below good status (subGES). On the other hand, the assessment on a sub-basin-by-sub-basin basis showed good status (GES) as achieved only for basin 36 - open waters of the Bornholm Basin. The update of the preliminary assessment of the environmental status of the Polish Baltic Sea zone was carried out using a modified methodology, which makes it impossible to unambiguously compare the results of the updated assessment with the preliminary assessment, nevertheless, thanks to this change, it is possible to maintain compatibility of the assessment methods adopted in the Baltic Sea region. The updated preliminary assessment also does not include a feature-based overall assessment for Polish marine waters and individual basins.

4.3. Baltic Sea Action Plan HELCOM

- Achievement of the good ecological status of the Baltic environment is assessed according to criteria established for four key intervention sectors:
  - eutrophication - the goal is to achieve a state in which the Baltic Sea is not affected by eutrophication, and the determinant of this state is the achievement of operational ecological goals:
  - nutrient concentrations close to natural levels;
  - clear water;
  - algae blooms at natural levels;

  - the natural occurrence and distribution of plants and animals;
  - the natural oxygenation level of the waters;
- hazardous substances - the goal is to achieve such a state of the Baltic Sea, when the lives of organisms will not be threatened by the presence of hazardous substances. The operational environmental goals are:
  - concentrations of hazardous substances slightly different from natural ones;
  - all fish useful for consumption;
  - no health problems in animals;
  - radioactive contamination at pre-Chernobyl levels;
- biodiversity and nature conservation - the strategic objective is to achieve a favorable conservation status of the Baltic Sea biodiversity, the operational objectives to achieve this objective are:
  - restoration and maintenance of the integrity of the seabed at a level that guarantees the functioning of ecosystems;
  - demonstration by habitats and associated species of distribution, abundance and quality in accordance with prevailing physiographic, geographic and climatic conditions;
  - water quality adequate to ensure the integrity, structure and functioning of the ecosystem to be restored or preserved;
- offshore operations - the strategic objective in this segment is to conduct marine transportation and other offshore activities in a manner that is friendly to the marine environment, its achievement is to be served by operational management objectives:
  - prohibition of illegal discharges - as compliance with already existing international regulations;
  - safe maritime transportation without pollution incidents;
  - an effective rescue and accident response service equipped with adequate rescue capabilities;
  - minimizing pollution from ship sewage;
  - no case of introduction of alien species from ships;
  - minimizing atmospheric pollution from ships;
  - no harmful discharges from offshore mining platforms;
  - minimizing the risks associated with offshore structures.

The strategic and operational goals are binding for the Baltic Sea as a whole, with analyses of the status and progress in achieving the goals being conducted for the sub-accessions. From the point of view of the Project's area of influence, the Borholm Basin subacre is important.

According to the state assessment conducted as part of Helcom's second comprehensive assessment of the state of the Baltic Sea (State of the Baltic Sea - Second HELCOM holistic assessment 2011-2016) - the result for the Borholm Basin sub-acreage is a failure to achieve good ecological status. Also, the evaluation of sub-measures indicates the lack of attainment of good status in each component category. As can be seen from the impact assessment carried out (see Volume IV of the EIA), the proposed changes to the project previously assessed will not affect the nature and extent of the impacts potentially generated by the implementation of the project in its original form, and thus this allows us to conclude that the Project will not significantly alter the ecological status in any of the listed component categories.

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11. Concept for Spatial Development of the Country 2030, 2011
12. Convention on the Protection of the Marine Environment of the Baltic Sea Area, done at Helsinki on April 9, 1992. (Journal of Laws of 2000 No. 28, item 346)
13. National marine conservation program, 2017
14. National Energy and Climate Plan 2021-2030, 2019
15. Pomeranian Voivodeship Spatial Development Plan 2030, 2016
16. National Environmental Policy 2030, 2019

17. Poland's energy policy until 2040, 2021

18. Maritime Policy of the Republic of Poland until 2020 with an Outlook to 2030, 2015

19. Program for development of electric power industry with consideration of renewable sources in Pomeranian Province until 2025, 2010

20. Draft update of the set of environmental objectives for marine waters, 2019

21. United Nations Framework Convention on Climate Change (UNFCCC), 1992

22. Regulation of the Minister of Environment of February 25, 2021 on the adoption of a set of environmental objectives for marine waters (Journal of Laws 2021, item 569)

23. Energy Security and Environment Strategy - Perspective to 2020, 2014

24. Strategy for Responsible Development to 2020 (with an Outlook to 2030), 2017

25. National Development Strategy 2020, 2012

26. Strategy for the development of seaports until 2015, 2007

27. Pomeranian Voivodeship Development Strategy 2030, 2021

28. Law of April 10, 1997. - Energy Law (i.e. OJ. U. of 2021, item 716, as amended).

29. Law of July 18, 2001. - Water Law (i.e. OJ. U. of 2021, item 2233, as amended).

30. Law of February 20, 2015 on renewable energy sources (i.e. OJ. U. of 2021, item 610, as amended).

31. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (i.e. OJ. U. of 2022, item 457, as amended).

32. Law of March 27, 2003 on spatial planning and development (i.e. OJ. U. of 2022, item 503).

33. Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (i.e. OJ 2022, item 1029).

34. Law of July 7, 1994. - Construction Law (i.e. OJ. U. of 2021, item 2351, as amended).

5.2. Websites websites

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2. https://ec.europa.eu/clima/policies/adaptation/what_en, accessed May 2022.

6. Index tables

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME I Section 3

Environmental impact assessment procedure

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
DWA	Decision on environmental conditions for the implementation of the project
KPA	act of June 14, 1960 Code of Administrative Procedure (i.e. OJ. U. of 2021, item 735, as amended).
OWF BIII/ Project	Offshore wind farm OWF Bałtyk II (originally: Bałtyk Środkowy III and Polenergia Bałtyk III)
EIA	Environmental Impact Assessment
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report 2015	Environmental impact assessment report for the proceedings completed by the decision of RDOŚ dated July 7, 2016, mark: RDOS-Gd-WOO.4211.12.2015.KSZ.22
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments(consolidated text, Journal of Laws of 2022, item 1029).

1. Introduction

This Section describes the legal requirements for the environmental impact assessment procedure in procedural terms, as well as determining the scope of the EIA Report with particular attention to the specifics of the procedure involving the amendment of the decision on environmental conditions

EIA is carried out in Poland under the provisions of the Act of October 3, 2008 on providing information about the environment and its protection, public participation in environmental protection and environmental impact assessments. This law, together with implementing regulations, in particular the Decree of the Council of Ministers of September 10, 2019 on projects likely to have a significant impact on the environment, fully implements the provisions of Directive 2011/92/EU of the European Parliament and of the Council of December 13, 2011 on the assessment of the effects of certain public and private projects on the environment (the "EIA Directive"), hence there is no need to separately describe the requirements of this Directive in the report.

It should be mentioned that the procedure for amending the DWA, as well as the legal requirements, are analogous to those for the issuance of this decision with the proviso that they should be taken into account to the extent corresponding to the subject and nature of the changes planned to be made.

2. The scope of the EIA Report and its compliance with the requirements of the of the law

This Environmental Impact Report was prepared for the purpose of amending the environmental decision dated July 7, 2016, mark: RDOS-Gd-WOO.4211.12.2015.KSZ.22 issued by the Regional Director of Environmental Protection in Gdansk ("Environmental Decision"). The scope of the EIA Report was adapted to the subject matter and scope of the changes covered by the application. The information presented in the Report refers to the current conditions related to the implementation of the planned Project, which, according to the proposal of the project planner, are to be determined differently than in the aforementioned decision. In addition, the Report presents the environmental effects of its implementation in areas where the planned changes result in a consequent need to update the conditions for implementation of the project in relation to those presented in the EIA Report prepared at the stage of issuing the Environmental Decision (the "2015 Report").

Formally, the scope of the environmental impact report is defined in Article 66 of the UoA. In the case of the EIA Report, prepared for the purpose of making changes to the Project implemented through an amendment to the Decision, its scope is analogous. However, bearing in mind that the changes made do not result in changes to all the conditions presented in the 2015 Report, this Report refers to the 2015 Report in terms of information that remains current, due to the fact that in this regard the provisions of the environmental decision of July 7, 2016 also remain current and are not subject to change.

Below is a table that presents the scope of the report under the law and its reference to the scope of this EIA Report for the amendment of the Environmental Decision issued for the BIII OWF and the 2015 Report in case the information contained therein remains valid. This summary allows to systematize the document indicating its compliance with the provisions of the EIA Act.

Requirements of Article 66 of the UoA - the report should include:	Relevant section of the IMF BIII report
1) a description of the planned project, in particular: • specification of the investment as a whole and land use conditions at the stage of construction and operation or use, • key specific features of the production processes, • anticipated types and amounts of pollution, resulting from the operation of the planned project;	• Volume II, Sections 1, 3 - 6, 8 - 13 • chapter 3 in each of the Sections of Volume IV (only the basic parameters needed to assess a given environmental element) • Volume V, Section 2
2) description of natural elements of the environment covered by the scope of the anticipated impact of the planned project on the environment, including elements of the environment protected under the Act of April 16, 2004 on nature protection;	• Volume III, Sections 2 - 14 • chapter 8 in each Section of Volume IV (description limited to environmental resources/species subject to EIA)
3) description of existing monuments in the vicinity or within the direct range of influence of the planned project protected under the provisions on the protection and care of monuments;	• Volume III, Section 12
3a) description of the landscape in which the project is to be located	• Volume IV, Section 9
3b) information on connections with other projects, in particular on accumulation of impacts of ongoing, completed or planned projects, for which a decision on environmental conditions was issued, located in the area where the project is planned to be implemented, and in the area of impact of the project or whose impacts fall within the area of impact of the planned project - to the extent to which their impacts may lead to accumulation of impacts with the planned project;	• Volume II, Section
4) a description of the anticipated effects on the environment if the project is not undertaken;	• Volume IV, Sections 2 - 11 (Chapter 5 in each Section of Volume IV)
5) a description of the options analyzed, including: • scenario proposed by the application and reasonable alternative scenario, • the variant that is most favorable to the environment, along with the reasons for their selection;	• Volume II, Section 2

Requirements of Article 66 of the UoA - the report should include:	Relevant section of the IMF BIII report
6) determination of the anticipated environmental impact of the analyzed variants, including in the event of a major industrial accident, as well as possible transboundary environmental impact, and in the case of a road in the trans-European road network, determination also of the impact of the planned road on road safety;	• Volume IV, Sections 2 - 14 (Chapters 9 - 11, 13 in each Section of Volume IV)
6a) comparison of the impacts of the analyzed alternatives	• Volume IV, in each Evaluation Section of Volume IV
7) justification of the variant proposed by the applicant, indicating its impact on the environment, in particular on: • humans, plants, animals, fungi and natural habitats, water and air, • land surface, with consideration to ground mass movements, climate and landscape, • tangible assets, • monuments and cultural landscape, covered by existing documentation, in particular, a register or record of monuments, • forms of nature protection, including on the goals and objects of protection of Natura 2000 areas, as well as the continuity of ecological corridors connecting them • the interaction between the elements mentioned above (as defined in paragraphs a-f of the EIA Act)	• Volume II, Section 2 • Volume IV, Sections 2 - 11 (Chapters 9 - 14 in each Section of Volume IV)
8) a description of the forecasting methods used by the applicant and a description of the anticipated significant environmental impacts of the planned project, including direct, indirect, secondary, cumulative, short-, medium- and long-term, permanent and temporary environmental impacts resulting from: • existence of the venture, • use of environmental resources, emissions;	• Volume IV, Sections 1 - 14 (Chapter 6 in each Section of Volume IV)
9) a description of the actions envisaged to prevent, limit or compensate for negative environmental impacts, in particular on the objectives and object of protection of the Natura 2000 area and the integrity of the area;	• Volume IV , Sections 2 - 7 (Chapter 12 in each Section of Volume IV) • Volume V, Sections 3 - 7
10) a - not applicable	• Not applicable

Requirements of Article 66 of the UoA - the report should include:	Relevant section of the IMF BIII report
10) b - not applicable	• Not applicable
11) if the planned project is related to the use of installations, a comparison of the proposed technology with a technology that meets the requirements referred to in Article 143 of the Act of April 27, 2001. - Environmental Protection Law;	• Volume V, Section 14
11a) reference to environmental objectives arising from strategic documents relevant to the implementation of the project;	• Volume I, Section 2
12) indication whether it is necessary for the planned project to establish a limited use area within the meaning of the provisions of the Act of April 27, 2001. - Environmental Protection Law, and determination of the boundaries of such an area, restrictions on land use, technical requirements for construction facilities and ways of using them; this does not apply to projects involving the construction of a national road;	• Volume V, Section 10
13) presentation of issues in graphic form;	• Entire report
14) presentation of issues in cartographic form at a scale that corresponds to the subject matter and detail of the issues analyzed in the report, and that allows for a comprehensive presentation of the conducted analysis of the environmental impact of the project;	• Entire report
15) analysis of possible social conflicts related to the planned project;	• Volume IV, Section 11
16) presentation of proposals for monitoring the impact of the planned project at the stage of its construction and operation or use, in particular on the objectives and subject of protection of the Natura 2000 area and the integrity of the area;	• Volume IV, Sections 1 - 11 (Chapter 14 in each Section of Volume IV) • Volume V, Section 9
17) indication of difficulties arising from shortcomings in technology or gaps in modern knowledge that were encountered in the preparation of the report;	• Volume IV, Sections 1 - 11 (Chapter 16 in each Section of Volume IV) • Volume V, Section 15

Requirements of Article 66 of the UoA - the report should include:	Relevant section of the IMF BIII report
18) a summary in non-specialist language of the information contained in the report, for each element of the report;	• Volume VI
19) the name of the person or persons preparing the report;	• Volume I, Section 1, Chapter 4 • Volume III, Sections 2 - 14
19a) a statement by the head of the team of authors of the team, on compliance with the requirements,	• Appendix to the Report
20) 20) Sources of information underlying the report	• Sources of information are indicated at the end of each Section of the report
The information referred to in paragraph 1 points 4-8 should take into account the anticipated impact of the analyzed variants on the objectives and object of protection of the Natura 2000 area and the integrity of the area.	• Volume IV, Chapter 12 in each of the Sections of Volume IV
If the possibility of a transboundary environmental impact is identified, the information referred to in paragraph 1 items 1-16 should take into account the determination of the impact of the planned project outside the territory of the Republic of Poland.	• Volume IV, Chapter 13 in each of the Sections of Volume IV • Volume V, Section 7
If it is necessary for the planned project to establish a limited use area, the report should be accompanied by a copy of the cadastral map certified by the competent authority with the course of the boundaries of the area where it is necessary to establish a limited use area. This does not apply to projects involving the construction of a national road.	• Volume V, Section 10
The report on the environmental impact of the project should consider the impact of the project at the stages of its implementation, operation or use, and decommissioning.	• Volume IV, Sections 2 - 11, (Chapter 9 in each Section of Volume IV)

3. Qualification of the project for EIA

The subject of the proceedings for the purpose of which the EIA Report was prepared is the amendment of the conditions for a project classified as one that may always have a significant impact on the environment, being the construction of the BIII offshore wind farm, which has received a valid

and final decision of the RDOŚ on environmental conditions dated July 7, 2016, which involves the construction of an installation using wind energy to generate electricity, located in the maritime areas of the Republic of Poland.

Taking into account the current state of the law, the intention is listed in the Decree of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws of 2019, item 1839) in § 2 paragraph 1 item. 5) b):

installations using wind energy for electricity generation located in the maritime areas of the Republic of Poland.

At the time when the RDOŚ issued the environmental decision of July 7, 2016 for the BIII OWF, the Regulation of the Council of Ministers of November 9, 2010 on projects that may significantly affect the environment was in force (i.e., Dz. U of 2016, item 71), according to which it was among the projects likely to always have a significant impact on the environment listed in § 2 (1) item. 5) of the aforementioned regulation:

installations using wind energy for electricity generation with a total nominal capacity of the plant of not less than 100 MW and located in the maritime areas of the Republic of Poland.

The circumstance related to the change in the legal status regarding the classification of projects as likely to have a significant impact on the environment does not affect the ability of the authority to amend the DWA.

For the purposes of this proceeding to amend the decision on environmental conditions, the legal basis for conducting the proceedings and preparing this EIA Report will be Article 87 of the EIA Law, which states that: "The provisions of this section and Section VI shall apply mutatis mutandis in the event of a change in the environmental decision. The provision of Article 155 of the Code of Administrative Procedure shall apply mutatis mutandis, with the proviso that consent shall be given only by the party that applied for the environmental decision, or the entity to which the environmental decision was transferred."

According to Article 155 of the Code of Administrative Procedure Act, "A final decision, by virtue of which a party has acquired a right, may be at any time with the consent of the party annulled or modified by the public administration body that issued it, if special provisions do not oppose the annulment or modification of such decision and the public interest or the legitimate interest of the party supports it; the provision of Article 154 § 2 shall apply accordingly." Bearing in mind that the BIII offshore wind farm is among the projects that may always have a significant impact on the environment, listed in § 2 Section 1 item. 5) b) of the Decree of the Council of Ministers on September 10, 2019 on projects likely to have a significant impact on the environment, if the decision on environmental conditions is amended, it is necessary to conduct an environmental impact assessment procedure and prepare an environmental impact report.

At the same time, it should be emphasized that the proposed amendment to the Environmental Decision is not opposed by any legal provision, nor does the amendment itself lead to a violation of the public interest. The social interest that the decision on environmental conditions realizes is expressed in the assessment of the possibility of realization of the planned project in a given location and such determination of the conditions for its implementation as to minimize the possibility of

negative effects on people and the environment associated with the implementation and operation of the Project. The proposed change to the terms of the Environmental Decision does not in any way lead to a reduction in the level of protection of people and the environment established by the existing content of the decision - as demonstrated in the body of the Report. This change is possible precisely as a result of the modification of the parameters of the Project, including in connection with taking into account already at this stage some of the recommendations and conditions specified in the Environmental Decision, as well as changes in the available parameters of offshore wind turbines that occurred during the preparation of the project for implementation. And, in particular, it should be pointed out that the impact assessment carried out in this Report has a dimension and effect equivalent to the environmental reassessment, and thus the purpose of imposing the reassessment as specified in the text of the Environmental Decision will be achieved.

4. Course of proceedings EIA

According to Article 3 (1) (8) of the EIA Act, the environmental impact assessment of a project is understood as the proceedings on the environmental impact assessment of the planned project, including in particular:

a. verification of the project's environmental impact report,
b. obtaining the opinions and agreements required by law,
c. providing opportunities for public participation in the proceedings.

The BIII offshore wind farm is among the projects that may always have a significant impact on the environment, for which an EIA was mandatory. Environmental impact assessment proceedings will also require amending the terms of the environmental conditions decision, which was issued by the RDOŚ for the implementation of the BIII OWF.

EIA in the case of a change in the decision on environmental conditions is carried out as part of the administrative proceedings conducted on a change in the decision on environmental conditions under the procedural rules as for projects that may always have a significant impact on the environment, or for projects that may potentially have a significant impact on the environment in the event that such an obligation was determined by the authority competent to issue the decision on the basis of the so-called screening order.

In the case of the project in question and the changes introduced in the DŚU that has been issued for it, the proceedings will be conducted in accordance with the rules in force for projects that may always have a significant impact on the environment, i.e. it will be required to: prepare an environmental impact report, ensure public participation and obtain the required agreements and opinions. The legal basis for issuing a decision amending the DWA will be Article 87 of the EIA Law in conjunction with Article 155 of the CAP.

The environmental assessment procedure conducted for the purpose of amending the EIA in the present case therefore consists of the following stages:

1. documentation preparation,
2. submission of a DSU application, along with an EIA report,
3. analysis of the documentation by the body conducting the proceedings, the consulting body and the consensus body,

4. issuance of an opinion/agreement,
5. public consultation,
6. issuance of an adjudication.

The preparation of the documentation for obtaining the DWA, as well as for amending this decision for the BIII offshore wind farm, was preceded by the necessary analyses of technical conditions, as well as, most importantly, environmental conditions. The basis for this Report was the EIA Report prepared for the proceedings concluded by the RDEP, which issued the amended decision on environmental conditions. Other projects planned for implementation in the vicinity of the BIII OWF site were also considered. Since the issuance of the Environmental Decision for the OWF Bałtyk Środkowy III, progress has been made in the knowledge of natural resources in Polish maritime areas, of other investments of this type planned in the vicinity of the Project, and the Project itself is at a much more advanced stage of development, as well as the parameters of available offshore wind power plants have changed. The consequence of the development of other offshore wind farm projects is a significant change in the factual conditions, including as a consequence of the obligations imposed in the content of the issued decisions on environmental conditions, and which constitute the implementation environment of the Baltic Central Sea III OWF. In the issued decisions on environmental conditions, the environmental protection authorities determined the shape and location of corridors ensuring undisturbed migration of birds to Slupsk Shoal, validated a significant part of the statements on the potential impacts of other offshore wind farm projects planned in Polish maritime areas, including the cumulative impacts of these projects and the Project, and verified a number of solutions for the proposed minimization measures. In particular, it is important to emphasize the development work on the OWF Central Baltic III project itself, which has been going on since the date of issuance of the Environmental Decision, i.e. since July 2016. Since then, wind measurements have been taken, preliminary geotechnical studies have been carried out and the boundary conditions defined by the Environmental Decision have been used to prepare a plan for the deployment of the farm's infrastructure and preliminary verification of possible technologies to be used.

Based on information from the above sources and the requirements of Article 66 of the UoA, this report has been prepared. An application for a DWA has also been prepared.

The preparation of the Report was preceded by an analysis of the EIA Report prepared prior to the issuance of the Environmental Decision, and consequently also by environmental studies necessary to analyze the conditions and environmental impact of the changes planned to be implemented under the application and

this EIA Report. With regard to the technical conditions of the project and the environmental conditions, which are not subject to change, the results of the marine environment studies conducted for the implementation of the BIII OWF were used. Preparing the Report also used the results of studies conducted for other OWFs being prepared for implementation in the northeastern slope of Slupsk Shoal, as well as analyses dedicated to the changes being made. Attached to the EIA Report is the methodology that forms the basis for the assessment conducted as part of this EIA Report (Volume III).

The application for a decision amending the DWA issued for the BIII OWF is submitted to the authority that issued the environmental decision to be amended, i.e. RDOŚ in Gdańsk, which was competent to

issue a decision on environmental conditions in accordance with Article 75 (1)(1)(c) of the EIA Act.

The EIA report (3 copies) and a graphic appendix showing the extent of the Project's impact are attached to the application to amend the EIA. The application does not include a cadastral map, extracts from the land register, and extracts from the local zoning plan, as the Project is implemented in marine areas. The planned Project is in accordance with the Spatial Development Plan for the Polish maritime areas of internal waters, territorial sea and exclusive economic zone at a scale of 1:200000.[1] The project is planned for implementation in the POM.45.E area, which is designated in the Plan for renewable energy generation, while internal and external technical infrastructure are considered integral to projects of this type. The plan takes into account the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas issued to the Investor for the subject body of water with the reference GI7/62/1170069/Decision/2012 by the Minister of Transport, Construction and Maritime Economy on March 30, 2012.

The RDOŚ in Gdansk sends the received documentation (consistent with the scope as described above), together with an application for an opinion, to the State Border Sanitary Inspector in Gdynia (Art. 77 par. 1 pt. 2 and Art. 78 par. 1 pt. 2 of the EIA Act), and with an application for agreement on the conditions for the implementation of the project - to the Director of the Maritime Office in Gdynia (Art. 77 par. 1 pt. 1 of the EIA Act).

The application and the report are reviewed by the authority conducting the proceedings, the consulting authority and the concurring authority. Pursuant to Article 77(6) of the UoA, the Director of the Maritime Office and the State Border Sanitary Inspector have 30 days to issue an agreement or opinion, respectively. The EIA Act does not set a deadline for the issuance of a DSU, however, in the case of offshore wind farms, specific solutions have been introduced, according to which decisions on environmental conditions for investments consisting in the construction and maintenance of offshore wind farms are issued within 90 days from the date of submission of the application - the provision of Article 76(2) in connection with the provision of Article 76(1)(1) of the Act of December 17, 2020 on promoting electricity generation in offshore wind farms (Journal of Laws of 2021, item 234, as amended).

After analyzing the application and the report, the Director of the Maritime Office in Gdynia issues a decision agreeing to the conditions for the implementation of the project, or refuses such agreement. In turn, the State Border Sanitary Inspector issues an opinion on the matter. The parties are not entitled to complain about any of the aforementioned provisions.

Prior to the issuance of the EIA, in accordance with the provision of Article 79 (1) of the EIA Act, a public participation procedure (the so-called public consultation) will be carried out, during which everyone has the right to review the project documentation and submit comments and proposals.

The final part of the proceedings is the issuance of an environmental decision or refusal to issue one (also in the form of a decision).

Parties to the proceedings or entities acting as parties, dissatisfied with the decision, have the right to appeal the decision to the General Director of Environmental Protection. An appeal shall be filed within fourteen days from the date of delivery of the decision to a party, or within 30 days from the

[1] Ordinance of the Council of Ministers of April 14, 2021 on the adoption of a spatial development plan for internal marine waters, territorial sea and exclusive economic zone at a scale of 1:200,000 (Journal of Laws of 2021, item 935)

date of announcement or delivery of a notice of decision issuance - the provision of Article 76(5) in conjunction with the provision of Article 76(1)(1) of the Law of December 17, 2020 on the Promotion of Electricity Generation in Offshore Wind Farms. An appeal against an environmental decision issued for an offshore wind farm must contain objections relating to the decision, specify the essence and scope of the demand that is the subject of the appeal, and indicate evidence justifying the demand, while the appeal should be considered within 60 days from the date of its receipt - the provisions of Article 76 (4) and (5) of the Law of December 17, 2020 on Promoting Electricity Generation at Offshore Wind Farms.

5. Source materials and comparative

5.1. Acts legislation

1. Act of June 14, 1960 Administrative Procedure Code (i.e.: Journal of Laws of 2020, item 256, as amended)
2. Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz.U. of 2022, item 1029)
3. Act of December 17, 2020 on promoting electricity generation in offshore wind farms (Journal of Laws of 2021, item 234, as amended)
4. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws of 2019, item 1839, as amended)
5. Regulation of the Council of Ministers of November 9, 2010 on projects that may significantly affect the environment (Journal of Laws of 2010. No. 213, item 1397, as amended) - repealed

5.2. Literature, expert studies and administrative decisions administrative

1. Florkiewicz E., Kawicki A. Administrative proceedings in cases specified by the Act of October 3, 2008 on making available information about the environment and its protection, participation of society in environmental protection and environmental impact assessments, Zeszyty Metodyczne Generalnej Dyrekcji Ochrony Środowiska, Warsaw, 2009.
2. Grudzińska I., Zarzecka J. Changes in administrative proceedings in environmental impact assessment cases, General Directorate of Environmental Protection, Warsaw, 2011.
3. Stryjecki M., Mielniczuk K. Guidelines for forecasting environmental impacts of wind farms, General Directorate for Environmental Protection, 2011.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME I Section 4

Public consultation

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
DWA	Decision on environmental conditions for the implementation of the project
KPA	act of June 14, 1960 Code of Administrative Procedure (i.e. OJ. U. of 2021, item 735, as amended).
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
EIA	Environmental impact assessment
Report 2015	Environmental impact assessment report for the proceedings completed by the decision of RDOŚ dated July 7, 2016, mark: RDOS- Gd-WOO.4211.12.2015.KSZ.22
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments(consolidated text, Journal of Laws of 2022, item 1029).

1. Introduction

One element that is particularly important in the environmental impact assessment procedure is public participation, as required by the EIA. This procedure is commonly referred to as public consultation. In accordance with the general principle expressed in Article 79(1) of the EIA Law, it is mandatory to ensure public participation in the proceedings in which the environmental impact assessment of a project is carried out, before issuing an EIA. Based on these regulations, any interested party has, among other things, the right to review the project documentation and submit comments and proposals. Other elements of public participation envisaged by the law include the opportunity for the public to be informed about key issues related to the procedure and the activities undertaken as part of it, and, most importantly, about the decision made and the opportunity to learn about its content.

Within the framework of public participation in the environmental impact assessment procedure, the documentation of the proceedings, i.e. primarily the environmental impact report document and opinions or agreements, if available, are made available to the public. The designated period for submitting comments and proposals is 30 days. According to the law, comments and applications submitted after the 30-day deadline are left without consideration.

In the case of an amendment to the decision on environmental conditions, as stipulated in Article 87 of the UoA, the obligation to ensure public participation in this procedure should be carried out on principles analogous to the procedure for issuing a decision on environmental conditions.

2. Formal consultation procedure public

2.1. Contents of the notice of consultation public

The manifestation of public participation is the provision of information to the extent specified in the law, which presents data on the key stages of the proceedings, as well as, in response to such information, allows the interested public to take actions to which they are entitled or which may be crucial to them in terms of being able to acquire adequate knowledge of the planned project.

One such key element of the procedure, to which the obligation to notify the public corresponds, is the so-called public consultations, which include, within their scope, the display for review of the documentation prepared for this procedure, in particular the environmental impact report. Referring to the public consultation notice, it should include information on:

1) to proceed with an environmental impact assessment of the project;
2) subject of the decision to be issued in the case;
3) the authority competent to issue a decision and the authorities competent to issue opinions and make arrangements;
4) opportunities to familiarize themselves with the necessary case documentation and the place where it is on display for inspection;
5) the opportunity to submit comments and proposals;
6) how and where to submit comments and proposals, while indicating the 30-day deadline for their submission;
7) the authority competent to consider comments and applications.

The other data that is subject to public disclosure is information on:

1) initiation of proceedings;

2) the date and place of the administrative hearing open to the public referred to in Article 36, if it is to be held;

3) transboundary environmental impact proceedings, if conducted.

As for the information on the initiation of proceedings, as a rule, it is provided at the very beginning of the proceedings immediately after their initiation in the form of a separate notice.

2.2. Form of public disclosure public

Ensuring public participation by providing information to the interested public, within the scope of Article 33 (1) of the EIA Law, takes the form of public disclosure.

According to Art. 3 pt. 11) of the EIA Act, making information public is understood as:

a) making the information available on the website of the Public Information Bulletin, the competent authority in the case;
b) announcement of information, in a customary manner, at the headquarters of the authority having jurisdiction over the case;
c) announcement of information by public notice in a customary manner in the place of the planned project;
d) where the seat of the authority with jurisdiction over the case is located in a municipality other than the municipality with jurisdiction over the subject matter of the proceedings - also by announcement in the press or in the customary manner in the locality or localities with jurisdiction over the subject matter of the proceedings.

Public disclosure, according to established case law, is effective the moment it is made. This means that the deadlines that depend on public disclosure begin to run from the moment this action is taken, e.g., the 30-day period for reviewing the necessary case documentation and for submitting comments and proposals.

2.3. Necessary documentation matters

The EIA Law, in Article 33(2), includes among the necessary case documentation:

1) an application for a decision or an amendment thereto, together with the required attachments;
2) required by regulations:
   a) the decision of the authority competent to issue the decision,
   b) positions of other bodies, if the positions are available by the deadline for submission of comments and proposals.

These documents are subject to access by the interested public throughout the entire period of the proceedings, but beyond the 30-day filing period, this is done at the request of the interested party, which is carried out for non-parties to the proceedings under the procedure for access to environmental information.

2.4. Comments and conclusions

Comments and motions are the form in which the interested public can comment on the environmental impact report prepared for the proceedings and the procedure itself for which it was prepared.

Comments and applications may be submitted by the deadline specified in the notice of public disclosure. The notice also indicates the place where the documentation put out for public consultation can be consulted, as well as the place and manner in which comments and proposals can be submitted as part of the proceedings.

According to the EIA Law, comments can be submitted:

1) orally for the record,

2) in writing;

3) by means of electronic communication systems without the need for a qualified electronic signature.

According to Article 35 of the EIA Law, comments submitted after the deadline are left without consideration. The body issuing the decision on environmental conditions is obliged to refer to the comments and requests submitted in a correct manner in the justification to the issued decision, indicating how they were taken into account.

3. Source materials and comparative

3.1. Acts legislation

1. Act of June 14, 1960 Administrative Procedure Code (i.e. OJ. U. of 2021, item 735, as amended).
2. Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz.U. of 2022, item 1029).
3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws of 2019, item 1839)
4. Regulation of the Council of Ministers of November 9, 2010 on projects likely to significantly affect the environment (Journal of Laws No. 213, item 1397, as amended) - repealed

3.2. Literature, expert studies and administrative decisions administrative

1. Florkiewicz E., Kawicki A. Administrative proceedings in cases specified by the Act of October 3, 2008 on making available information about the environment and its protection, participation of society in environmental protection and environmental impact assessments, Zeszyty Metodyczne Generalnej Dyrekcji Ochrony Środowiska, Warsaw, 2009.
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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME I Section 5

Description of the EIA methodology and contents of the Report

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
DWA	Decision on environmental conditions for the implementation of the project
EIA Directive	Directive 2014/52/EU of the European Parliament and of the Council of April 16, 2014 amending Directive 2011/52/EU on the assessment of the effects of certain public and private projects on the environment
Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010) - consolidated text (formerly Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds)
Habitats Directive	Council Directive 92/43/EEC of May 21, 1992 on the conservation of natural habitats and wild fauna and flora (OJ L 206, 22.7.1992)
EIA Directive	Directive 2001/42/EC on environmental assessment of certain plans and programs
KE	European Commission
IMF	Offshore wind farm
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
EIA	Environmental Impact Assessment
Report 2015	Environmental impact assessment report for the proceedings completed by the decision of RDOŚ dated July 7, 2016, mark: RDOS-Gd-WOO.4211.12.2015.KSZ.22
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments(consolidated text, Journal of Laws of 2022, item 1029).
Disorders	Any interference with the environment caused by the project, which may cause changes in the functioning of the ecosystem (both negative and positive), not being emissions

1. Introduction

This chapter presents a description of the methodology that was used to perform an environmental impact assessment for changes to the Central BIII OWF, for which an environmental decision was previously issued. The chapter also presents a diagram of the entire EIA Report, along with information on which elements of the assessment are presented in each volume of the study.

The subject of this Report, as well as the environmental impact assessment conducted herein, is not the Central BIII OWF project. This document is prepared for the purposes of the proceedings conducted in accordance with Article 87 of the EIA Act in conjunction with Article 155 of the Kpa, and thus it concerts the changes planned to be made to the BIII OWF project, and consequently the modifications that must be implemented in the decision on environmental conditions for the planned changes to the BIII OWF to take place. This nature of the procedure for amending the decision on environmental conditions also significantly affects the methodology for conducting the environmental impact assessment - about which in the following chapters, no less, the structure and a significant part of the methodological assumptions are repeated after the environmental impact report prepared for the procedure on the decision on environmental conditions, which ended with the issuance by the Regional Director of Environmental Protection in Gdansk on July 7, 2016 of a decision on environmental conditions, marked RDOŚ-Gd-WOO.4211.12.2015.KSZ.22, for the project entitled. "Construction of the offshore wind farm Baltic Central III". Maintaining the internal structure of the environmental impact report analogous to that of the environmental impact report forming the basis for obtaining the Environmental Decision is intended to make it possible to ensure the conditions of comparability of the material forming the basis for issuing the Environmental Decision and the current amendment process. The question of the assessment methodology is slightly different, which is due to the nature of the procedure for amending the decision on environmental conditions, but nevertheless the methodology used in the environmental impact report forming the basis for the Environmental Decision has been recycled as much as possible.

This chapter also fulfills the requirements of Article 66 (1) (8) of the EIA, according to which the report on the impact of the project should include a description of the forecasting methods used by the applicant.

The presentation in Volume I of the Report of its outline, along with an explanation of the role and content of its various parts, is intended to facilitate the analysis of this extensive study and increase the efficiency of the impact assessment of the Project's changes to the parameters approved in the Environmental Decision proposed in this Report, taking into account the specifics of the procedure for amending the Environmental Decision.

2. General scheme of assessment impact

This EIA Report is a document that describes all of the work, as well as all of the results of the research and analysis, used to assess the environmental impact of the proposed changes to the Project within the parameters approved in the Environmental Decision.

The main assumption of the assessment concept used was to determine how the parameters of the BIII offshore wind farm, and possibly the methods of its implementation or subsequent operation, which are proposed to be changed as a result of the proceedings to amend the Environmental Decision, affect

the nature, extent and intensity of the impacts caused by the implementation and operation of the BIII offshore wind farm.

The methodology for conducting an impact assessment must be tailored to the specifics of the proceedings under which it is conducted. In the case at hand, two features significantly affect the specifics of the environmental assessment being conducted. The first is due to the very nature of the proceedings, which is the amendment of the environmental decision. In such a case, the subject of the proceedings is not the impacts caused by the project itself, as these have already been assessed, but the consequences that the assessed impacts are related to the introduction of modifications to the project, for which the decision on environmental conditions has already been issued. Theoretically, the result of evaluating planned modifications for an already approved project could be threefold. First, the modifications may leave the nature of the impacts generated, their extent and the magnitude of the impacts unaffected. The impacts caused by the project under the modified parameters may be less in terms of the scope and magnitude of the impacts caused than those assessed for the project that is being modified. The third situation is when the planned changes to the project for which the environmental decision was issued cause the scope or magnitude of the impacts to increase, or alternatively change their nature.

The first two cases, i.e., the lack of impact of modifying the parameters of the project on impacts or the impact consisting of a reduction in their scope or magnitude, means that the impacts of the project after the proposed modification will not affect the environment in additional ways that have not yet been assessed. Thus, from the point of view of the purpose of conducting an environmental impact assessment for an amendment to an environmental decision, i.e. assessing the permissibility of modifying the parameters of a project, it is sufficient to confirm that modifying the parameters of a project does not affect the nature, scope and magnitude of impacts, without the need to give a precise measure of the change in impact.

Another situation concerns the third case, i.e., when modification of the parameters of the project affects the scope or magnitude of the generated impacts or their nature in such a way that they are increased or new, previously unassessed impacts appear. In such a case, the impact assessment of the project subject to the proposed modification should make it possible to assess the degree and nature of the change in impact or determine the significance of the overall type of changed environmental impact.

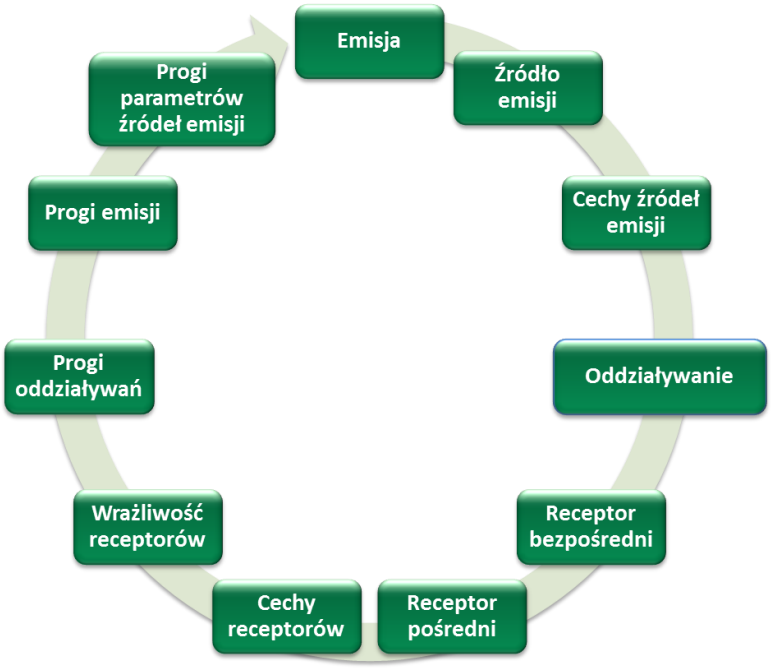
The second important feature affecting the specificity of the conducted environmental impact assessment is the manner/methodology of conducting the environmental impact assessment in the course of the proceedings under which the Environmental Decision was obtained - the original impact assessment. This assessment was carried out based on the concept of the envelope, i.e., determining the parameters of the project that generate the most far-reaching impacts of the so-called "far-reaching scenario" (NIS) and subjecting such theoretical shape of the project to an impact assessment. The furthest-reaching scenario then provides a benchmark for assessing whether the planned project as proposed for implementation is acceptable, or alternatively, what conditions must be introduced for the furthest-reaching scenario so that the impacts generated by the project are not significantly negative impacts. These verified and limited to the thresholds of safe and environmentally acceptable conditions for the implementation of the Project were specified by the authority in the Environmental Decision. Thus, the conditions set forth in the Environmental Decision have become the most far-reaching scenario of acceptable impacts of the Project. In each case, it is the conditions set forth in the

Environmental Decision that are the benchmark for evaluating the changes proposed in this proceeding. Indeed, as noted above, the purpose of this assessment is to verify whether a change in the parameters of the Project made at a further stage of project development, as well as a requested amendment to the Environmental Decision, may cause different or of a different magnitude of environmental impacts than those specified in the Decision. Nonetheless, since the impact assessment contained in the 2015 Report is based on an assessment of the impact of the parameters that may cause the most far-reaching impact scenarios (NIS), in conducting this impact assessment of the proposed amendments to the Environmental Decision and the concretization of the parameters of the Project, it is necessary not only to refer to the conditions specified in the Environmental Decision, but also to the most far-reaching scenario adopted in the 2015 Report (NIS 2015). Indeed, if it was the 2015 NIS that was the basis for conducting the assessment of individual impacts in the course of the original impact assessment of the Project, then only a comparison with the NIS provides a real basis for concluding that the impacts currently under consideration do not exceed the scope of the impact assessment conducted to date, which was the basis for the issuance of the amended Environmental Decision. Thus, in conducting the impact assessment in this Report, reference was made both to the conditions for implementation and operation of the Project approved by the Environmental Decision as a reference point for the proposed modifications to the content of the Environmental Decision, as well as reference was made to the 2015 NIS for reference to the environmental assessment performed in the 2015 Report.

Thus, the parameters of the offshore wind farm, which have been identified as significant for the scale of its environmental impacts, have been adopted after the 2015 Report prepared for the purpose of obtaining the Environmental Decision. The assessment analyzed whether the proposed modifications to the Project's implementation and operation conditions could affect, the assumptions about the environmental conditions forming the basis for the assessment in the 2015 Report, and how the Environmental Decision formulates the environmental conditions for implementation of the Project's design so as to ensure that its implementation will not cause significant environmental damage, regardless of the technology ultimately selected from among those left to choose as a result of the proposed modification of the Project.

The analytical cycle carried out to achieve this assumption is based on the one used in the 2015 Report prepared for the Environmental Decision, but it has been modified and adapted to the needs of carrying out the procedure for amending the Environmental Decision. A diagram showing the interrelationship between emissions/disturbances and their sources, environmental impacts and project parameters is shown in Figure 1 below.

Figure 1. Diagram of the relationship between emissions/disturbances and their sources, environmental impacts and project parameters



	Emission
	Source of emissions
	Features of emission sources
	Impact
	Direct receptor
	Intermediate receptor
	Features of receptors
	Receptor sensitivity
	Impact thresholds
	Emission thresholds
	Parameter thresholds for emission sources

In this cycle, a number of activities and analyses were carried out, the results and conclusions of which are presented in the following volumes and chapters of the EIA Report. Information on the next steps in the executed process of assessing the environmental impact of OWF BIII, is presented below.

- Preparatory stage (completed for the development of the 2015 Report):
    - identify the components of offshore wind farms and the technologies, equipment and processes that may be applicable during the construction, operation and decommissioning of OWFs;
    - to determine, based on the available literature and expert consultations, the possible impacts of offshore wind farms on various environmental elements;
    - identification of elements of the marine environment that are sensitive to particular direct impacts of offshore wind farms;

- identify sources of emissions and environmental disturbances caused by offshore wind farms;
- identification of factors determining the occurrence and scale of impacts:
- venture side,
- on the environmental side,
- identify linkages in the marine ecosystem that may cause secondary impacts;
- planning an environmental research program to provide information on resources and their condition and sensitivity to impacts from the BIII OWF.

- Evaluation stage:
  - verification of the occurrence in the zone of influence of OWF BIII of elements of the marine environment, sensitive to impacts from offshore wind farms, their sensitivity to impacts and interrelationships between them (on the basis of the results of the environmental research program conducted for the Project supplemented by the available results of subsequent studies of the marine environment and the current knowledge of the impacts of offshore wind farms);
  - determination of the parameters adopted during the assessment in the 2015 Report as the basis for conducting the environmental impact assessment, and the parameters approved by the Environmental Decision;
  - determine the impact of changing the conditions of implementation and operation of the BIII OWF on the sources of emissions and disturbances that the BIII OWF may cause, and verify the parameters of the project affecting the occurrence and scale of impacts under the recognized environmental conditions;
  - analysis of the impact of changing the conditions of implementation and operation of the BIII OWF on the scale of impacts caused by the BIII OWF and verification whether the thresholds of significance of impacts on individual environmental elements may be exceeded:
    - at the unit impact of individual project components,
    - with cumulative impacts across the project,
    - when cumulating with other plans and projects,
    - analysis of unplanned impacts,
    - analysis of transboundary impacts,
  - analysis of the impact of changing the conditions of implementation and operation of OWF BIII on the need to change the minimization measures specified in the Environmental Decision and their impact on reducing the scale of impacts;

- assessment of the impact of changing the conditions of implementation and operation of the BIII offshore wind farm on impacts on the integrity, coherence and object of protection of Natura 2000 areas;

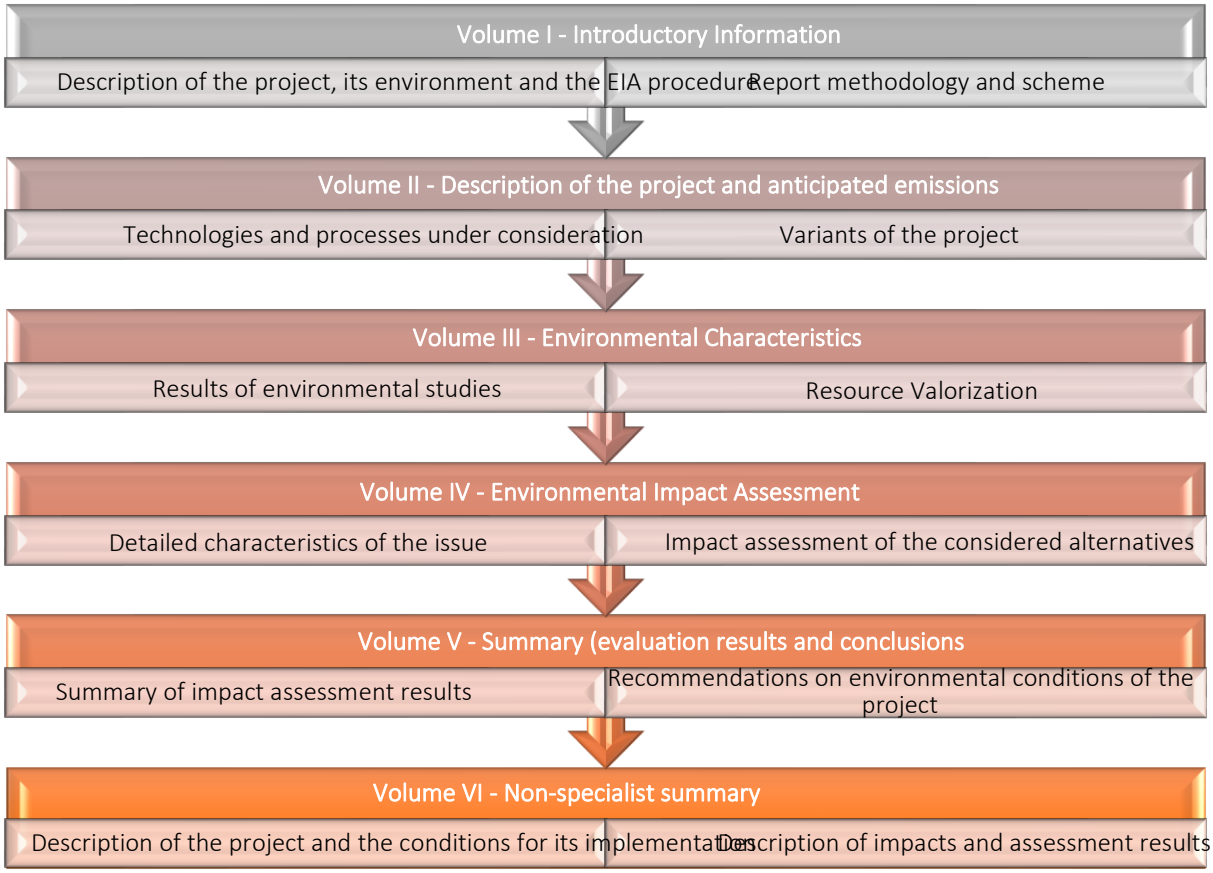
Application stage:

- indication whether the modification of the conditions for implementation and operation of OWF BIII changes the nature of impacts, as well as determination of changes in the scope or intensity of impacts as a result of changes in the conditions for implementation and operation of OWF BIII specified in the Environmental Decision;
- indication whether the assumed modification of the conditions for implementation and operation of the BIII OWF affects other conditions for implementation and operation of the Project, including those relating to minimization measures, monitoring or post-execution analysis.

3. Scheme of the Report EIA

The results and conclusions of all the activities described above are presented in this EIA Report. Due to the very large amount of material and data, and the multithreaded nature of the study, it has been divided into six separate volumes, and each volume has several to a dozen chapters. Each chapter covers a separate topic, described holistically so as to characterize the issue as comprehensively as possible. The following is basic information about the content and purpose of the following volumes of the Report.

Figure 2. Scheme of the EIA Report



I. Volume I - Introductory Information - presents basic information about the project and its political and legal and procedural environment, and refers to the impact of the project's implementation on the environmental objectives set out in strategic documents. It describes the qualification of the project for the environmental impact assessment procedure, describes the requirements for conducting public consultations, and presents the methodology of the environmental impact assessment and the scheme of the Report.

II. Volume II - Description of the project and anticipated emissions/disturbances - is devoted to the description and detailed characteristics of the project to be assessed, and describes all technologies and processes that can be used in the construction, operation and decommissioning of the BIII OWF, indicating the basic technical parameters of individual solutions. In this case, the project description covers the entirety of the BIII OWF after the proposed modifications, as in many cases it is not possible to describe the very essence of the proposed modification without describing the project element that is subject to the modification, as well as the anticipated emissions/disturbances of the modification itself without referring to the emissions caused by the modified element affecting emissions. The description of technologies, processes and their parameters is summarized in a matrix of relationships between the parameters of the various elements of the project and emissions and disturbances, the type of major primary and secondary impacts, and factors affecting the scale of impacts. The following chapters in this volume also characterize in detail such OWF emissions and disturbances as waste and wastewater, noise, hydrographic disturbance and unplanned events. The Report considers as disturbance any environmental interference

caused by the project, which may cause changes in the functioning of the ecosystem (both negative and positive), which are not emissions. The last chapter also describes and characterizes projects that may cause cumulative impacts of OWF BIII. However, it should be emphasized that Volume II does not assess the impact of OWF BIII, and the impacts described here are intended to indicate the possible potential impacts of the offshore wind farm. The description of the project and its parameters and processes associated with its implementation and potential impacts, also takes into account all the elements in this regard, necessary to carry out the stage of reconnaissance (screening) in assessing the impact on the integrity, coherence and object of protection of Natura 2000 areas. The impacts of OWF BIII in modified parameters are described, characterized and assessed in detail in Volume IV. Also in this volume (IV), all the necessary elements of the Natura 2000 impact assessment at the screening stage and the proper assessment, if required, have been performed.

III. Volume III - Characterization of the Environment - presents in the following chapters the conclusions of the performed environmental research program and other available sources of environmental information, including the characterization and valorization of the valuation of individual elements of the marine ecosystem in the zone of potential impacts of the BIII OWF. The resultant reports of the environmental research program have been attached to the Report in the form of appendices, prepared according to the same scheme to enable their joint use at the impact assessment stage. Descriptions of the condition of the environment and individual species fulfill the requirements for characterization of species that are the subject of protection of Natura 2000 areas for the purpose of assessing the impact on the integrity, coherence and object of protection of these areas at the stage of reconnaissance. In characterizing the environment, the available current data on the environment in the area of the project were used, derived from studies carried out for neighboring OWF projects and state environmental monitoring.

IV. Volume IV - Impact Assessment - presents all the legally required elements of the project's environmental impact assessment, with the following chapters performing an assessment of the impacts resulting from the modification of the parameters of the BIII OWF on subsequent elements of the marine environment, including the integrity, coherence and object of protection of Natura 2000 areas. It is in this volume that all potential impacts of the Project on individual elements of the marine ecosystem are described in detail, the key parameters of emissions and disturbances are indicated, the impact of modifications to the parameters of the BIII OWF on the nature, extent and intensity of impacts caused by the variant of implementation of the BIII OWF, for which the Environmental Decision was issued, at all stages of the project, i.e. construction, operation and decommissioning of the BIII OWF, are determined. Cumulative impacts were also characterized here. All characterizations and impact assessments also take into account the requirements for assessing impacts on the integrity, coherence and object of protection of Natura 2000 sites. In addition, in each chapter there is a separate subsection describing the results of the stage of identification of impacts on Natura 2000 areas, and, if it is found necessary to carry out a proper assessment, also its course and results.

All the chapters that make up Volume IV were made according to a standardized template. The unification of EIA chapter templates was intended, among other things, to enable cross-

comparison of assessments of different environmental elements, in order to capture interrelationships and direct and indirect impacts. It also made it much easier to summarize the assessment.

V. Volume V - Summary (assessment results and conclusions) - presents the complete results of the assessment of the impact of the proposed changes to the Project in the parameters approved in the Environmental Decision on the environment as a whole, including on the integrity, coherence and subject of protection of Natura 2000 areas, formulates conclusions and recommendations on the environmental conditions for the implementation of the Project, and also refers to all formal requirements that the EIA Report must contain in the result and conclusion part.

VI. Volume VI - Non-specialist Summary - is a very important element of the Report for maintaining the transparency of the EIA procedure and ensuring public participation. It contains all the most important information about the project, its impacts, environmental conditions, the assessment methodology and its results, as well as recommendations on environmental conditions for the implementation of the project.

4. Methodology evaluation

4.1. Stage preparatory

In the first stage of the environmental impact assessment process for the BIII OWF, analytical activities performed for the environmental impact report prepared for the Environmental Decision were used to determine:

- possible impacts of offshore wind farms on individual environmental elements;
- elements of the marine environment that are sensitive to particular direct impacts of offshore wind farms;
- emission sources and environmental disturbances of offshore wind farms;
- factors determining the occurrence and scale of impacts:
    - venture side;
    - on the environmental side;
- linkages in the marine ecosystem that can cause secondary impacts.

The linkage matrix prepared on the basis of the results of the above work, presented in the table in the next chapter, provided the basic tool for assessing the impact associated with modifying the parameters of the BIII OWF.

4.2. Matrix links

The most important element of the environmental impact assessment of the proposed changes to the Project in the parameters approved in the Environmental Decision was to determine the relationship

between the changed technical parameters of all potential emission sources and the possibility of impacts that could permanently, irreversibly disturb the functioning of the marine environment.

The tool used for this purpose was the created matrix of "emission-source-emission-impact-receptor" relationships, which was created for the environmental impact report prepared for the proceedings under which the Environmental Decision was obtained. It is presented in a table summarizing the characteristics of the technologies and processes considered in the design of the BII offshore wind farm, presented in Volume II, Chapter 7.

Table 1. Template of the matrix of interrelationships of potential emissions and disturbances caused by the OWF and their sources, direct and indirect impacts on the environment and the factors determining them, juxtaposed with the technological parameters of the most far-reaching scenarios for the BIII OWF

Type of emission or disturbance	Source of emissions	Type of impacts	What elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	NIS 2015	Project - variant selected for implementation (Project after update)

Using the project's interaction matrix behind the environment, the interactions between different impacts and the mechanisms of transfer of impacts within the ecological linkages in the marine ecosystem were also verified. Then it was determined between which elements of the environment and how the various direct and indirect impacts will cumulate.

In addition, for the assessment of individual relevant species/habitats susceptible to impacts from the assessed project, individual linkage matrices were performed to determine the relationship between the characteristics of the assessed species/habitat, local environmental conditions, possible impact linkages and project parameters, in terms of the scale and effects of potential impacts. A template for such a matrix is presented in Table 2.

Table 2. Matrix template for linking individual characteristics, environmental conditions and technical parameters for assessing impacted species and habitats

Species	Determinants of OWF BIII affecting the scale of impacts	Direct impacts	Indirect impacts	Source of emissions	OWF parameters affecting the impact
Characterization of the behavioral and ecological characteristics of the species that affect sensitivity to impacts from the OWF	Abiotic				
	Biotic				

4.3. Stage evaluation

4.3.1. Identification of objects evaluations

As mentioned earlier, the first activity, starting the stage of environmental impact assessment of the modification of the parameters of the BIII OWF, was to determine the subject of the assessment, that is, to verify the presence in the zone of influence of the BIII OWF of elements of the marine environment sensitive to impacts from offshore wind farms.

Identification of the evaluation subjects took place at the stage of the research program conducted for the Project. The selected abiotic, biotic and socioeconomic elements of the environment have been studied, the results of which can be found in Volume III of the Report. These results, supplemented by other available environmental information, became the basis for the assessment.

The identified environmental elements that may be affected by the farm are shown in the table below.

Table 3. Technical scope of the environmental impact assessment

Type of element	Subject of impact
Abiotic elements	Hydrological and hydrochemical conditions
	Seabed
	Bottom sediments
	Mineral resources
Biotic elements	Benthic and benthic habitats
	Ichthyofauna
	Marine mammals
	Seabirds
	Birds flying over the farm area
	Bats
	Protected areas and sites and ecological corridors
	Biodiversity
Natura 2000 areas	Object of protection of areas in the zone of influence
	Integrity of individual areas
	Consistency of the Natura 2000 network
Socio-economic elements	Fishing
	Shipping
	Military operations

Type of element	Subject of impact
	Military aviation
	Civil aviation
	Radar and communications systems
	Landscape
	Tourism and recreation
	Health and life of people
	Cultural heritage
	Climate

The assessment of the impact of the project on the environmental components indicated above, in the variant selected for implementation and the rational alternative variant, as well as in cumulation with other projects, is presented in the following chapters of Volume IV of the Report.

4.3.2. Identification impacts

Identification of all possible impacts of the project on a given environmental component, including on the integrity, coherence and object of protection of Natura 2000 areas, was carried out based on:

- a description of the project - a preliminary technical concept and a timetable for project implementation;
- expert knowledge - experience in the environmental impacts of offshore wind farms, accumulated during the implementation of other projects of this type;
- knowledge of the baseline state of the environment, gathered on the basis of available literature and other publicly available information (including that made available by the relevant authorities) and the results of the pre-execution environmental research program dedicated to the project;
- interactions of the project with the environment - a matrix summarizing the possibility of interaction of the project with the environment, taking into account all the previously identified receptors, which is presented in section 4.2 above. Potential impacts were then analyzed in detail in the context of individual environmental elements, taking into account the criteria that are described in the following section.

The environmental impact assessment assessed the residual significance of impacts, i.e. after the application and implementation of measures to minimize individual negative impacts.

A description of any **potential** impacts of the project on a particular environmental component is always included in Chapter 7 of each Assessment Section of Volume IV. On the other hand, the **evaluation of** the modification of parameters for the implementation and operation of the BIII offshore wind farm was performed in Chapter 9 of each evaluation section in Volume IV. The results of the impact assessment of the BIII OWF update on Natura 2000 sites are presented in Chapter 12 of each section.

4.3.3. Determination of the spatial scope evaluation

Determining the spatial scope of the assessment was done by indicating the area that may be affected by the project.

The extent of individual impacts varied, depending on the environmental conditions (e.g., the type of sediment conditioning the turbidity of the water), the environmental element (e.g., the sensitivity of marine mammals to underwater noise) and the type of impact (e.g., the extent of underwater noise impacts on marine mammals, the extent of impacts associated with the spillage of toxic chemicals into the water, which can spread over long distances).

Also, the ranges of potential impacts on Natura 2000 sites were analyzed individually to individual potential impacts on these sites. This is because the extent of potential impacts on the habitats that are the subject of protection of marine areas is different, and the extent of potential impacts on the integrity of areas protecting bird wintering grounds is different.

4.3.4. Determination of the time scope evaluation

Determining the temporal scope of the assessment consisted of indicating the timeframe in which individual impacts may occur, determined by the successive stages of the project, i.e. the construction stage, the operation stage and the decommissioning stage.

4.3.5. Determine the importance of resources environment

Not all species (habitats, assemblages, objects) found during environmental surveys are susceptible to impacts associated with OWF implementation. Not all species and habitats potentially sensitive to impacts from the OWF are protected or endangered, or important for ecosystem functioning. Thus, another element of the assessment was to assign each impact object (environmental resource) one of five values (insignificant, small, medium, large or very large). The assessment of significance was made on a case-by-case basis for each resource, based primarily on the applicable legislation (species protection status, etc.), knowledge of the resource's baseline condition (including the results of the pre-implementation environmental research program dedicated to the project), and knowledge of its sensitivity (sensitivity as a function of the resource's ability to adapt to potential change resulting from the project and its ability to return to its baseline condition). When assessing the importance of individual resources, their conservation status was also taken into account, especially within the European Natura 2000 system. Species and habitats, which are the subject of protection of Natura 2000 areas or have a significant impact on maintaining the integrity of these areas, or listed in the annexes to the Habitats or Birds Directive, were categorized as being of high or very high importance.

The classification of the importance of receptors (environmental resources) and the general definitions of each category are described in the table below. For individual resources/receptors, their importance was categorized individually each time, based on specific criteria.

Table 4. Classification of the importance of objects of influence (environmental resources)

Category of importance of the resource	Definition of	
Insignificant	Abiotic elements/Biotic elements/Socioeconomic elements:	A resource of insignificant importance to the functioning of the ecosystem, abundant (common), not susceptible to changes associated with the implementation of the project or having the ability to adapt to changes in the environment.
Small	Abiotic elements:	Resources of low importance to ecosystem functioning or resources of moderate importance that are not very susceptible to changes associated with the implementation of the project or have the ability to adapt to changes in the environment or natural and quickly return to baseline.
	Biotic elements:	Species/habitats that are not protected or endangered, abundant (common), of little importance to ecosystem functioning, not very susceptible or with the ability to adapt to changes in the environment, or to recover naturally and quickly.
	Socio-economic elements:	Socio-economic resources of little importance in terms of economic, cultural and social value, with little susceptibility or ability to adapt to changes in the environment, or natural and quickly return to baseline.
Medium	Abiotic elements:	Resources of moderate or high importance for ecosystem functioning, having minor
		or lacking the ability to adapt to changes in the environment.
	Biotic elements:	Species/habitats that are not protected, globally abundant but rare in the Baltic Sea region, or species that are protected but not susceptible or not very susceptible to impacts from the project. Species of importance to ecosystem functioning or species with declining but not threatened populations.
	Socio-economic elements:	Socio-economic resources of little importance in general, but of importance to the resource base or livelihoods locally.
Large	Abiotic elements:	A resource that is important but not essential to the functioning of the ecosystem, with neither the ability

Category of importance of the resource	Definition of	
		to adapt to changes in the environment nor the ability to fully return to baseline.
	Biotic elements:	Species/habitats that are protected under national and/or international law, are rare and endangered nationally, and are important for ecosystem functioning.
	Socio-economic elements:	Socio-economic resources protected under national and/or regional laws or strategies that are important to the resource base or livelihoods on a regional scale.
Very large	Abiotic elements:	A resource that is fundamental and essential to the functioning of the ecosystem, without the ability to adapt to changes in the environment or the ability to return to a baseline.
	Biotic elements:	Species/habitats that receive special protection under national and/or international law, are internationally rare and endangered, and are essential for ecosystem functioning.
	Socio-economic elements:	Socio-economic resources protected under national or international laws or strategies, which are important to the resource base or livelihoods on a national scale, for which project impacts may significantly prevent their use.

The result was the identification of environmental resources that may be of such significance that impacts on them should be assessed, and resources that will not be assessed.

4.3.6. Determination of the nature and type of impact

At this stage, each potential impact was classified in terms of:

- its nature:
  - positive impact - resulting in an improvement over the baseline;
  - negative impact - causing an adverse change from the baseline;
  - no impact;
- his type:
  - direct impact - resulting from direct interaction between the activity planned under the project implementation and the environmental resource;

- indirect impact - resulting from other activities that are not directly related to project implementation;
- secondary - not resulting from a direct interaction between the activity planned in the implementation of the project and the environmental resource, postponed in time in relation to such activity, which may extend beyond the area of implementation of the activity; classified as a consequence of direct or indirect impact;
- cumulative - occurring in conjunction with other impacts associated with the development of other projects that affect the same environmental resources.

4.3.7. Determination of the magnitude of impact

Another element of the assessment was to determine the magnitude of the impact. The magnitude of the impact is a function of several variables, which include:

- scale of the impact, in relation to the resources/populations affected:
  - local - impact on populations/socio-economic elements of local importance;
  - regional - impact on regionally significant populations/socio-economic elements;
  - national - impact on populations/socio-economic elements of national importance;
  - international - impact on internationally significant populations/socio-economic elements.

  The range (local, regional, national, international) was determined individually for each environmental element, taking into account the specifics of population distribution. Any additional criteria (e.g., distance) for the detailed definition of individual categories of the scale of impact, including impacts on the integrity, coherence and object of protection of Natura 2000 sites, are indicated in the individual impact assessment chapters in Volume IV.
- frequency of impact:
  - o one-time - an impact that is discontinuous in time, which is certain to occur once and will not recur in the analyzed time horizon;
  - recurrent - an impact that is discontinuous in nature over time, which may occur repeatedly in the analyzed time frame;
  - permanent - an impact of a continuous nature, continuing uninterruptedly over the analyzed time horizon;
- duration of impact:
  - temporary - an impact that ceases when the activity that is the source of the impact ends, and the receptor of the impact returns to its initial state with the cessation of the activity that was the source of the impact; also intermittent, sporadic impacts;

- short-term - a time-limited impact that does not cease with the termination of the activity that gave rise to it and persists for no more than 1 year/vegetation cycle after the end of that activity;
- medium-term - a time-limited impact that persists from 1 year/vegetation cycle to 3 years/vegetation cycle after the cessation of the activity that gave rise to it; also an intermittent, sporadic impact regularly recurring over an extended period of time (e.g., seasonal disturbances);
- long-term - an impact that persists for more than 3 years/vegetation cycles from the cessation of the activity that gave rise to it, or an impact that causes permanent changes in the affected resources that persist after the end of operation.

- intensity of impact:
  - low - impact at the threshold of detection;
  - medium - an impact that noticeably affects the functioning of a resource/species/population/ecosystem/Natura 2000 area (e.g., active avoidance response noticeable in individuals of particular species, change in status of a social group), but does not affect its structure/parameters of functioning;
  - large - impact significantly affecting the functioning of a resource/species/population/ecosystem/Natura 2000 area (e.g., temporary loss of hearing - TTS, long-term change in the status of a social group), affecting its structure/parameters of functioning;
  - very high - impact causing a complete change in the functioning of a resource/species/population/ecosystem/Natura 2000 area, a visible change in the structure/parameters of functioning (e.g., damage to vital functions, permanent/intergenerational changes in the status of a social group);
- reversibility:
  - reversible impact - it ceases to be felt immediately or within a short time after the cessation of the activity that gives rise to it;
  - irreversible impact - felt even after the cessation of the activity that gave rise to it, the resource does not return to the baseline despite the implementation of minimization measures.

The magnitude of the impact was then classified into one of five categories: no change, insignificant, small, moderate, large, according to the matrix shown in the table below. The matrix does not include frequency and reversibility of impact. These categories were additionally described as part of the evaluation.

Table 5. Impact magnitude assessment matrix

Magnitude of impact	Scale of exposure	Duration	Intensity
No change	Without losing the resource, no influence on the structure and operation of the resource		
Insignificant	Local	Momentary	Low
	Local	Momentary	Average
	Local	Momentary	Large
	Local	Momentary	Very large
	Local	Short-term	Low
	Local	Short-term	Average
	Local	Short-term	Large
	Local	Medium-term	Low
	Local	Medium-term	Average
	Local	Long-term	Low
	Regional	Momentary	Low
	Regional	Momentary	Average
	Regional	Momentary	Large
	Regional	Short-term	Low
	Regional	Short-term	Average
	National	Momentary	Low
Small	Local	Short-term	Very large
	Local	Medium-term	Large
	Local	Long-term	Average
	Regional	Momentary	Very large
	Regional	Short-term	Large
	Regional	Medium-term	Low
	Regional	Medium-term	Average
	Regional	Long-term	Low
	National	Momentary	Average
	National	Momentary	Large
	National	Short-term	Low

Magnitude of impact	Scale of exposure	Duration	Intensity
	National	Short-term	Average
	National	Medium-term	Low
	International	Momentary	Low
	International	Momentary	Average
	International	Short-term	Low
Moderate	Local	Medium-term	Very large
	Local	Long-term	Large
	Local	Long-term	Very large
	Regional	Short-term	Very large
	Regional	Medium-term	Large
	Regional	Medium-term	Very large
	Regional	Long-term	Average
	Regional	Long-term	Large
	National	Momentary	Very large
	National	Short-term	Large
	National	Short-term	Very large
	National	Medium-term	Average
	National	Long-term	Low
	International	Momentary	Large
	International	Short-term	Average
	International	Medium-term	Low
Large	Regional	Long-term	Very large
	National	Medium-term	Large
	National	Medium-term	Very large
	National	Long-term	Average
	National	Long-term	Large
	National	Long-term	Very large
	International	Momentary	Very large
	International	Short-term	Large

Magnitude of impact	Scale of exposure	Duration	Intensity
	International	Short-term	Very large
	International	Medium-term	Average
	International	Medium-term	Large
	International	Medium-term	Very large
	International	Long-term	Low
	International	Long-term	Average
	International	Long-term	Large
	International	Long-term	Very large

4.3.8. Determining the importance of impact

The significance of each impact was assessed taking into account the importance of the resource/impact object and the magnitude of the impact, using the impact assessment matrix shown in the table below.

Depending on the relationship between the importance of the resource/receptor and the magnitude of the impact, each impact was classified into one of six categories as an impact: very large, large, moderate, small, negligible, no change.

The environmental impact assessment assessed the residual significance of impacts, i.e. after the application and implementation of measures to minimize individual negative impacts.

Table 6. Impact significance assessment matrix

Importance of the resource/receptor	Magnitude of impact				
	Large	Moderate	Small	Insignificant	No change
Very large	Very large	Large	Moderate	Small	No change
Large	Large	Moderate	Small	Small	No change
Medium	Moderate	Small	Small	Skip	No change
Small	Small	Small	Skip	Skip	No change
Insignificant	Small	Skip	Skip	No change	No change

The different categories of impact significance can be generally defined according to the terminology shown in the table below.

Table 7. General definitions of each category of impact significance

The significance of the impact	General definition
Very large	A change in a resource/receptor of international, national significance that occurs despite the application of minimization measures and may lead to a loss or significant changes in structure or
	parameters of the resource/receptor/ecosystem, leading to serious disruption of its functioning, including loss of proper conservation status, including Natura 2000 sites. Usually impacts of a negative nature, which are key in the process of determining the environmental conditions of the project.
Large	Large or very large changes in the resource/receptor/ecosystem (both negative and positive in nature) that occur despite the application of minimization measures. Changes are considered to be regionally significant, may affect the achievement of national, regional or local goals, including proper conservation status, including Natura 2000 areas, or to violate legislation.
Moderate	Average changes in the resource/receptor/ecosystem that occur despite the application of minimization measures. The changes are considered significant locally, but not nationally or internationally, are within the norms, and are not important for the preservation of proper conservation status.
Small	Minor changes in the resource/receptor that occur despite the application of minimization measures. The changes are within the norm, and are often indistinguishable from the natural level of change. They may be considered locally, but they are not central to the process of determining the environmental conditions of the project.
Skip	Imperceptible changes in the resource/receptor that occur after application of minimization measures.

Significant impacts include those impacts from the large and very large categories (according to the classification shown in Table 6 and Table 7) that cause long-term, irreversible deterioration of the environment or an element of it that threatens its proper functioning. With regard to the assessment of impacts on Natura 2000 sites, both categories fall into those likely to cause significant impacts on the preservation of the proper conservation status of Natura 2000 sites, as well as their integrity and coherence. Both categories found at the screening stage predetermine a proper assessment. The "very large" category found as a result of the proper assessment qualifies the project as having a significant impact on Natura 2000 sites.

In the case of this Report, taking into account its specific nature related to the proceedings on the amendment of the decision on environmental conditions, the key stage of the conducted impact assessment was to determine how the modification of the parameters of the implementation and

operation of the BIII OWF affects the identified impacts of the BIII OWF as it was subjected to the environmental impact assessment during the proceedings on the decision on environmental conditions, which ended in obtaining the Environmental Decision.

The assessment of the impact of modifications to the Project's implementation and operation parameters could be categorized under five thresholds. The following table shows the classification used

Table 8. General definitions of the different categories of impact of updating the parameters of the Project

The impact of updating the parameters of the Project on the significance of the impact	General definition
Significant increase in impacts	Changing the parameters of implementation and operation of the Project affects impacts to such an extent that it leads to a change in impact significance relative to the assessment conducted in the 2015 Report by increasing impact significance by one degree or more
Increasing impacts	Changing the parameters of implementation and operation of the Project affects impacts to the extent that it leads to an increase in impacts, but this change will not change the degree of assessment of significance
No impact	Changing the Project's implementation and operation parameters does not affect the impacts assessed in the 2015 Report
Reducing impacts	Changing the parameters of implementation and operation of the Project affects impacts to the extent that it leads to a reduction in impacts, but this change will not change the degree of assessment of significance
Significant reduction in impacts	Changing the parameters of implementation and operation of the Project affects impacts to such an extent that it leads to a change in impact significance compared to the assessment carried out in the 2015 Report, reducing impact significance by one degree or more

It should be noted, however, that the above classification is a theoretical assumption, due to the nature of the modifications to the parameters of implementation and operation of the Project, i.e. the fact that the changes introduced are of a limiting nature, whether the size of the parameters of the Project, allowed by the Environmental Decision, or the range of possible technologies to be applied, and in the case of changes in the unit parameters of wind power plants being increased, they were combined with a change in the number of plants to be implemented, leading to multiple compensation of the unit

impacts so caused. As a result, the first two degrees of impact assessment of the Project's parameter update could not occur, and the scale of impact in practice was limited to three values - no impact, reduced impacts, significant reduction of impacts.

For impacts that were not assessed in the 2015 Report due to lack of knowledge or a change in legal requirements in this regard, the unmodified methodology of the 2015 Report was used.

4.3.9. Assessment of impacts cumulative

Within the framework of the environmental impact assessments of the project for all resources/subjects of the assessment, analyses of cumulative impacts were also carried out, taking into account the different types of activities undertaken as part of the implementation of the project in question, as well as activities carried out or planned for other projects carried out by external entities. The analyses included activities carried out or planned for projects of a similar or different nature (offshore wind farms, power cables, etc.) that meet the following criteria:

- project built, in operation or under construction;
- a project for which a decision on environmental conditions has been issued, for which construction activities have not yet begun at the stage of preparing this EIA report;

The list of projects that were considered in the assessment of cumulative impacts is included in Chapter 13 of Volume II of the Report.

For each resource/receptor, impacts that may cumulate during the various stages of the project were individually identified, and then the significance of these impacts was assessed by classifying them into one of 6 impact categories: no impact, negligible impact, small impact, moderate impact, high impact or very high impact, according to the scale presented in the table below. The assessment of cumulative impacts also includes issues of cumulative impacts on the integrity, coherence and object of protection of Natura 2000 sites.

The assessment of the significance of cumulative impacts was, as far as possible, performed in accordance with the general assessment methodology adopted and described earlier, but its scope and depth were strongly dependent on the information and quality of documentation available for each project. Where the scope of information and the quality of available documentation were insufficient to perform the assessment in accordance with the adopted methodology, the assessment was descriptive in nature, and the classification of impacts was based on available knowledge and past experience of other similar projects.

Table 9. Classification of cumulative impacts

No cumulative impacts
Cumulative impacts negligible
Cumulative impacts small
Cumulative impacts moderate
Cumulative impacts high

Cumulative impacts very high

The definitions of the categories of cumulative impacts are the same as those shown in the table above.

The assessment of cumulative impacts is always a part of the assessment for the different stages of the project (Chapter 9) of each assessment chapter of Volume IV.

4.3.10. Assessment of impacts unplanned

Unplanned impacts result from sudden unplanned events or failures that are not related to activities included in the project schedule (e.g., leakage of toxic substances into the water due to a collision between two vessels).

In assessing the significance of unplanned impacts, additional factors were taken into account, i.e. the probability of an event that will be the source of the impact and its potential consequences (e.g., taking into account the criteria indicated in sections 4.3.6 - 4.3.7 of this document).

The assessment of the significance of unplanned impacts was carried out on the basis of expert knowledge and past experience with similar projects.

The assessment of unplanned impacts also takes into account the potential impact on the integrity, coherence and object of protection of Natura 2000 sites.

A description of unplanned events that could potentially occur at OWF BIII is provided in Volume II, Chapter 12.

The assessment of unplanned impacts is always found in Chapter 11 of each assessment chapter of Volume IV.

4.3.11. Assessment of impacts transboundary

According to the provisions of the Espoo Convention[1], transboundary environmental impact means any impact, not exclusively of a global nature, in an area under the jurisdiction of a Party, caused by a planned activity, the physical cause of which is wholly or partly located in an area under the jurisdiction of another Party.

In accordance with the adopted methodology, the assessment of transboundary impacts is conducted as part of the environmental impact assessment described in Section 4.3. of this document. Identification of transboundary impacts is done at the stage of categorizing their magnitude. Among others, those impacts whose scale of exposure is described as international - the impact goes beyond the boundaries of the Polish exclusive economic zone (see section 4.3.7. of this document) are assessed.

The assessment of transboundary impacts also takes into account the results of the assessment of impacts on Natura 2000 sites, especially on their coherence. **The assessment of transboundary impacts is always found in Chapter 13 of each assessment chapter of Volume IV.**

[1] Convention on Environmental Impact Assessment in a Transboundary Context, done at Espoo on February 25, 1991. (Journal of Laws No. 96, item 1110)

4.3.12. Assessment of impacts related

Related impacts are understood as a chain of all impacts that may occur in the ecosystem, following the occurrence of an impact on one of its elements. The purpose of assessing associated impacts is to verify that direct impacts on one receptor will not become a source of indirect impacts on another receptor or on the ecosystem as a functional whole, especially in conjunction with direct impacts on that receptor. This is because in such a situation it becomes necessary to apply additional measures aimed at minimizing such impact.

The evaluation of each individual environmental element took into account its interrelationships with other elements of the environment, both in terms of the impact of direct impacts on other elements that indirectly affect the element, as well as the indirect impact of direct impacts of the evaluated element on other environmental components.

The assessment of associated impacts also takes into account the potential for these impacts to affect the integrity, coherence and object of protection of Natura 2000 areas.

The linkages between the various impacts are shown in the linkage matrix in Chapter 7 of Volume II.

4.3.13. Assessment of the impact on the integrity, coherence and object of protection of Natura sites 2000

The subject of the assessment, in accordance with the wording of Article 6 of the Habitats Directive, is only the scope and scale of the impact of the planned project on those elements of the environment for the protection of which individual Natura 2000 areas have been established, as well as the integrity and cohesion of these areas, ensuring their proper state of protection.

As defined in this study:

- The integrity of a Natura 2000 site (Engel J., 2009) is the maintenance of the proper conservation status of those natural habitats and plant and animal populations for the protection of which the site was designated. The integrity of the area also consists of the preservation of ecological structures and processes that are essential for the sustainability and proper functioning of natural habitats and plant and animal populations.
- Coherence (Institute for Sustainable Development) of the Natura 2000 network is the completeness of natural resources in the network and the preservation of functional links between individual Natura 2000 sites at the level of the biogeographical region in the country, ensuring the maintenance in a proper state of protection of natural habitats and species. Consistency refers to the links between Natura 2000 sites, and thus to the ecological corridors that condition the spatial continuity of the entire network. The coherence assessment takes into account:
    - representativeness and numerical criteria;
    - incidence relative to range;
    - fragmentation of space;

- assessment of adequate conservation status based on national natural monitoring.

- On the other hand, the purpose of the analysis is to show whether the project's impacts may reach the scale of **significant impacts, i.e. permanently deteriorating the proper state of protection of habitats and species of birds and bats, for whose protection Natura 2000 areas were established**.

- **The assessment of the impact on the coherence of the Natura 2000 network should take into account the importance of the site for maintaining the coherence of the network in relation to the species and habitats that are protected there.**

The adopted methodology for assessing the impact on the integrity, coherence and object of protection of Natura 2000 sites is based on and follows the guidelines described in:

- a study by the Directorate General - Environment of the European Commission entitled: "Assessment of Plans and Projects Significantly Affecting Natura 2000 Areas - Methodological Guidance on the Provisions of Article 6 (3) and (4) of Habitats Directive 92/43/EEC," November 2001;

- the study "Natura 2000 in environmental impact assessments of projects" by J. Engel (Ministry of Environment, 2009);

- european Commission guidelines "Wind Energy Development and Natura 2000" of October 2010;

- "Guidelines for forecasting environmental impacts of wind farms" by M. Stryjecki and K. Mielniczuk (General Directorate of Environmental Protection, 2011).

To ensure compliance and consistency with the requirements of Directive 85/337 EEC as amended by Directive 97/11 EC (the EIA Directive), and in view of the fact that many projects that are likely to affect a Natura 2000 site will also be projects covered by the EIA Directive, the procedures outlined in these guidelines are similar to those commonly used under the EIA. The guidelines are also consistent with the general approach recommended in European Commission documents on EIA reconnaissance, scoping and verification. In addition, the scope of the EIA Directive includes all plans that require assessment under Article 6 of the Habitats Directive. According to EC guidelines, where projects or plans fall within the scope of activities covered by the provisions of the EIA Directive or the SIA, Article 6 assessments may be part of these assessments. However, within the relevant environmental impact report, the assessments provided for in Article 6 should be clearly distinguished and indicated, or reported separately.

In this report, the assessment of the impact on the integrity, coherence and object of protection of Natura 2000 sites is an immanent part of the performed environmental impact assessment of the proposed changes to the Project in the parameters approved in the Environmental Decision. All the elements of the description of the project, its impacts, the environmental conditions of its implementation take into account the elements necessary to carry out an assessment of the impact on Natura 2000 areas, as demonstrated in the above sections of the description of the methodology for carrying out the EIA.

At the same time, the elements of the Natura 2000 impact assessment are clearly distinguished in the structure of the RIA, through:

a. a separate description of the methodology for assessing the impact on the integrity, coherence and object of protection of Natura 2000 sites;

b. collection of the elements of natura assessment and its results in relation to individual elements of the marine ecosystem (screening and proper assessment, if necessary) in separate chapters No. 12 of each thematic study of Volume IV;

c. a summary of the results of the assessment of impacts on Natura 2000 sites, including indications of required measures to minimize these impacts in a separate chapter of Volume V.

The adopted procedure scheme includes 4 stages of evaluation (the evaluation may end after each of these stages):

- first stage (reconnaissance, preliminary assessment, screening) - the process during which the probable impacts of the project on Natura 2000 areas (individually or in conjunction with other projects or plans) are identified and an analysis is made of whether the anticipated impacts may have a significant impact on these areas;

- the second stage (proper assessment) - assessment of the impact of the project on the integrity of Natura 2000 areas (individually or in conjunction with other projects or plans) in relation to the structure of the areas, their functions and conservation objectives; conducted only if the projected impacts of the project may have a significant impact on Natura 2000 areas; if there are negative impacts, potential mitigation measures are additionally assessed;

- the third stage (impact assessment of the Project update) - the process during which it is analyzed whether the modification of the parameters of implementation and operation of the Project affects the results of the assessment carried out in the 2015 Report, with the classification used to assess the impact of the change as in the assessment of impacts.

The following criteria and factors are considered during the evaluation:

- individual elements of the project that may, individually or in conjunction with other plans or projects, affect Natura 2000 areas;

- any possible direct, indirect or secondary impact of the project (singly or in conjunction with other plans or projects) on Natura 2000 areas, foreseeable as a simple consequence of the following characteristics:

    - size and scale;

    - land occupation;

    - distance from the Natura 2000 area or its fragments of key importance for protection;

    - physical changes resulting from the implementation of the project;

    - emissions (discharged to water or air) and waste;

- transportation requirements;
- duration of construction, operation, decommissioning, etc..;
- cumulative impacts with other projects and plans;
- others,

- all likely changes in the characteristics of the area resulting from:
  - habitat reduction/loss/fragmentation;
  - reduction in population size/decline (changes in density/biomass);
  - changes in the functioning and structure of species and habitats;
  - changes in key indicators of conservation value (water quality, etc.);
- all presumed impacts on the integrity and cohesion of Natura 2000 areas, by virtue of:
  - interference with key relationships shaping the structure of the area;
  - interference with key relationships shaping the area's function;
- significance indicators of the identified impacts, expressed in terms of:
  - losses;
  - fragmentation;
  - interruptions;
  - interference;
  - changes in key elements of the area (e.g., water quality, etc.).

The assessment for the project in question was based on:

- the best available scientific knowledge and expertise;
- existing inventory materials of the area (results of pre-implementation environmental studies);
- existing experience from the implementation of other such projects;
- information on the objects of protection of individual Natura 2000 areas remaining in the zone of potential impacts of the project;
- factors that determine the cohesion and integrity of these areas.

4.3.13.1. Preliminary assessment stage - screening

At the stage of preliminary assessment of the impact on Natura 2000 areas, the assessment of the impact of OWF BIII on the environmental element was carried out analysis to answer the following questions:

- What is the zone of potential impacts of the modified BIII OWF on the environmental element?
- Are there Natura 2000 sites in the zone of potential impacts?
- Are species or habitats sensitive to the impacts of the modified BIII OWF the subject of the site's protection?
- Is the modified BIII OWF a project related to or necessary for the management of the area?
- Whether the modified BIII offshore wind farm may cause significant impacts on:
    - the object of protection of Natura 2000 sites located in the zone of its potential impacts?
    - the integrity of the areas within the zone of its impacts?
    - the coherence of Natura 2000 sites?
- What is the zone of potential impacts of the modified BIII offshore wind farm in conjunction with other projects on the environmental element?
- Are there Natura 2000 sites in the zone of potential impacts?
- Are species or habitats sensitive to the impacts of the modified BIII OWF in conjunction with the impacts of other projects the subject of the site's protection?
- Whether the modified BIII offshore wind farm, in conjunction with other projects, may cause significant impacts on:
    - the object of protection of Natura 2000 sites located in the zone of its potential impacts?
    - the integrity of the areas within the zone of its impacts?
    - the coherence of Natura 2000 sites?

4.3.13.2. Evaluation stage proper

In the case of an affirmative answer to question 5 or 9 above, while answering question 4 in the negative, it was necessary to perform a proper evaluation, which included analyses to answer the following questions:

- Which area's conservation objectives are likely to be significantly disrupted by the modified BIII OWF, either alone or in cumulation with other projects?
- What impacts of the modified BIII OWF, either alone or in cumulation with other projects, may cause significant impacts on the integrity, coherence or object of protection of Natura 2000 areas?
- Are there measures to minimize a given impact that can be effectively applied?
- Will the modified BIII offshore wind farm, alone or in cumulation with other projects, have a significant impact on the integrity, coherence or object of protection of Natura 2000 areas after the application of minimization measures?

4.3.13.3. Impact assessment of the update Projects

Due to the nature of the modification of the parameters of the Project, the impact assessment of the modification of the parameters of the Project could not result in changes that would mean a change in the significance of the impact in such a way that it could lead to an impact on the integrity, coherence and object of protection of Natura 2000 sites.

4.3.13.4. Method of presentation of the results of the Natura impact assessment 2000

The description of the assessment of the impact on the integrity, coherence and object of protection of Natura 2000 areas in the first stage (screening) is presented in the Report in sections on individual environmental elements in Chapter 12 of each assessment report included in Volume IV.

In the event that it is necessary to carry out an assessment specific to the possibility of significant impacts on the integrity, coherence or object of protection of Natura 2000 areas as a result of the impact of the modified BIII OWF on a particular environmental element, the course and results of this assessment, carried out taking into account the associated impacts on other environmental elements, were presented in Chapter 12 of the respective assessment report included in Volume IV. A summary of the assessment of impacts on Natura 2000 sites, summarizing all the results from the screening and proper assessment stage, as well as recommendations on the need for minimization measures, is presented in Volume V.

4.4. Stage applications

Conclusions as to the impacts caused by the BIII offshore wind farm after modifications in the implementation and operation of the Project first include prejudgments as to the impact of modifications on the nature, extent and intensity of impacts.

These conclusions were then the starting point for analyses of the conditions for implementation and operation of the remaining conditions specified in the Environmental Decision, as well as possible proposals for their modification.

For impacts that were not assessed in the 2015 Report due to lack of knowledge or a change in legal requirements in this regard, the unmodified methodology of the 2015 Report was used.

5. Literature and other sources

5.1. Literature

1. Directive 2001/42/EC on environmental assessment of certain plans and programs
2. Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010) - consolidated text (formerly Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds)

3. Directive 2014/52/EU of the European Parliament and of the Council of April 16, 2014 amending Directive 2011/52/EU on the assessment of the effects of certain public and private projects on the environment

4. Council Directive 92/43/EEC of May 21, 1992 on the conservation of natural habitats and wild fauna and flora (OJ L 206, 22.7.1992)

5. Engel J., Natura 2000 in environmental impact assessments of projects, Ministry of the Environment, 2009

6. Convention on Environmental Impact Assessment in a Transboundary Context, done at Espoo on February 25, 1991. (Journal of Laws No. 96, item 1110)

7. Assessment of plans and projects significantly affecting Natura 2000 sites, Methodological guidance on the provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC, European Commission - Directorate-General - Environment, 2001

8. Wind energy development and Natura 2000, European Commission Guidelines, 2010

9. Stryjecki M., Mielniczuk K., Guidelines for forecasting environmental impacts of wind farms, General Directorate for Environmental Protection, 2011

10. Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz. U. of 2021, item 2373, as amended).

5.2. Websites websites

1. http://natura2000.org.pl/e-szkolenia/e8-natura-2000-w-ocenach-oddzialywania-na-srodowisko/iv-przeprowadzanie-oceny-oddzialywania-na-obszar-natura-2000,
access date: 2022 r.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 1

Project characteristics

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Abbrevations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
EIA	Environmental Impact Assessment
POM	Polish maritime areas
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk

1. Introduction

The section presents the characteristics of the project, which consists of the construction of an offshore wind farm designated as the Baltic III OWF in modified parameters, proposed within the framework of the present proceedings to amend the decision on environmental conditions. At the same time, this characterization indicates those of the parameters whose modification is proposed and the scope of the proposed modification.

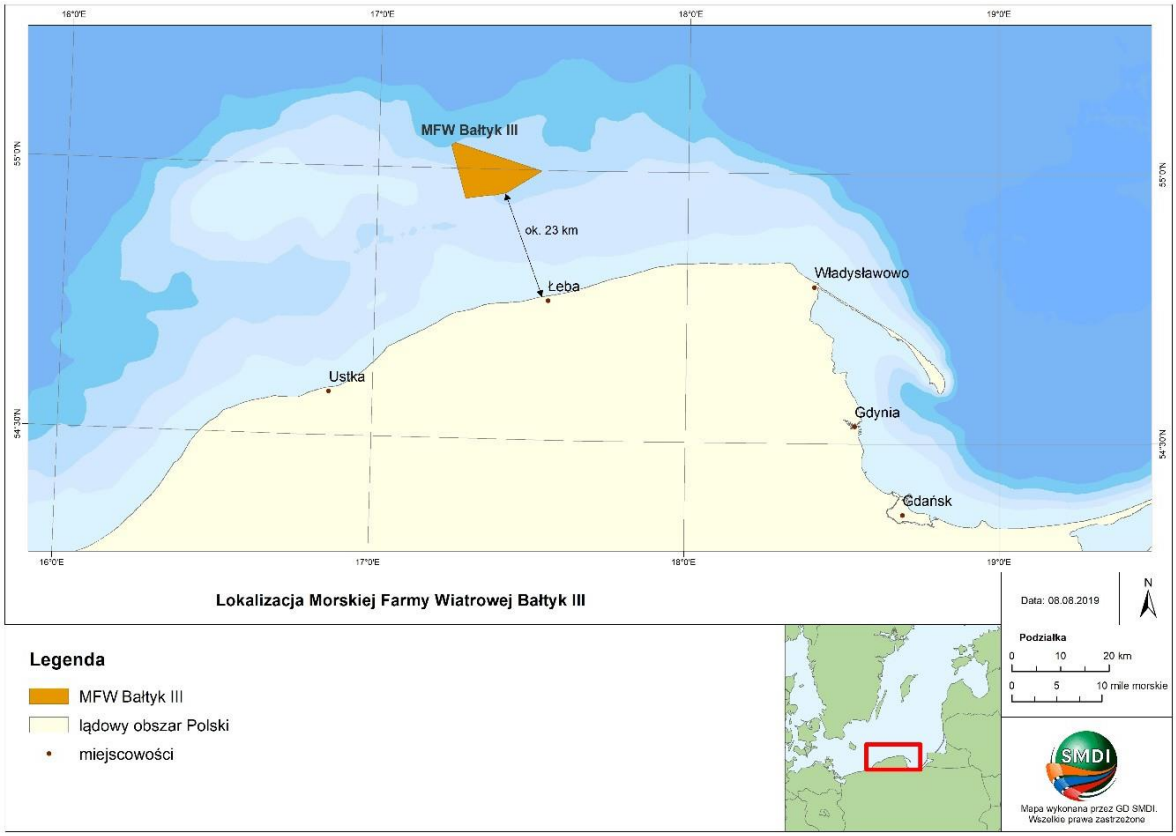
The following sections describe in detail the planned changes to the Project's implementation and operation conditions, as defined by the Environmental Decision. The variant approved by the Environmental Decision included the construction of 120 power plants, while the variant that is the subject of this Report provides for the construction of up to 60 power plants, with some power plant parameters increased beyond the provisions of the Environmental Decision issued. Accordingly, the changes in the project description are primarily related to modifying the parameters of the power plant so that they are in line with the state of the art and the latest solutions offered by technology suppliers. In addition, the changes are due to the progress of design work including the development of a preliminary plan for the farm and the narrowing of the scope of foundation technology. The changes presented will be the subject of both a description of the project and a reference point for conducting an impact assessment.

2. Location

The proposed OWF BIII will be located in the southern part of the Baltic Sea, in the Polish exclusive economic zone according to the location specified in the Environmental Decision[1]. The location of the project is shown in the figure below.

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016.

Figure 1. Location of OWF BIII



	OWF Baltic III
	Ustka
	Leba
	Wladyslawowo
	Gdynia
	Gdansk
	Location of Offshore Wind Farm Baltic III
	Legend
	OWF Baltic III
	land area of Poland
	villages
	Date: 08.08.2019
	Pitch
	nautical miles
	Map made by GD SMDI.
	All rights reserved

Source: Offshore wind farm Baltic Central II. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The geographic coordinates of the points marking the boundaries of the BIII offshore wind farm area, according to the obtained permitfor the erection and use of artificial islands, structures and devices in Polish maritime areas ("PSZW") No. OWF/2/2012 dated 30.03.2012, as amended by Decision No. OWF/2a/13 dated 29.04.2013, are presented in the table below.

Table 1 Geographical coordinates of the boundaries of the BIII OWF area.

Point	WGS 84 DD°MM'SS.sss''	
	Latitude	Longitude
A	54°56'42,424" N	17°16'57,430" E
B	55°02'35,801" N	17°14'00,653" E
C	55°02'52,125" N	17°14'45,028" E
D	54°59'55,268" N	17°31'37,853" E
E	54°57'24,641" N	17°24'47,597" E
F	54°57'09,443" N	17°22'42,654" E
G	54°57'05,517" N	17°21'25,617" E

Source: PSZW for OWF BIII

3. Basic elements farms

The Baltic III offshore wind farm will consist of up to 60 wind turbines and one internal offshore substation, as well as submarine power and telecommunications cables.

4. The area of the occupied basin

According to the PSZW, the area designated for the BIII offshore wind farm is about 119.52 square $^{\text{kilometers}}$. This permit includes a condition that elements of the OWF must not be located within a buffer of 500 meters from the inner boundary of the area designated for the farm. Within the boundaries of the area so delineated, all structural elements of the farm must be contained, so it determines the maximum external extent of the rotor, which further limits the area in which foundations can be set. The size of this constraint depends on the radius of the rotor.

The area designated for OWF BIII according to the findings of the Environmental Decision is about 117 $^{\text{km2}}$. According to the conditions set forth in the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas issued for the Project, elements of the OWF may not be located within a buffer of 500 m from the inner boundary of the area intended for the farm. Within the boundaries of the area so delineated, all structural elements of the farm must be contained, so it determines the maximum external extent of the rotor, which further limits the area in which foundations can be set. The size of this constraint depends on the radius of the rotor.

In addition, as a result of the analysis of potential impacts of the project on the environment, at the stage preceding the work on this EIA Report, the Investor made additional restrictions on the use of the OWF development area due to the possibility of a negative impact of the investment on seabirds, in the course of design works, a decision was made to leave the area located in the western-northern corner of the farm undeveloped with power plants, in such a way as to create an unobstructed 5 km wide

corridor undeveloped with power plants, crossing the areas of the Baltic III OWF and Baltica 2 and Baltica3 OWF farms in the SW-NE direction.

Taking the above into account, the Report assumes that the total area of the farm is about 117 ^{km2}, including:

- the area to be developed, according to the conditions set forth in the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas issued for the Project, is about 94 ^{km2};
- the area to be developed, taking into account the exclusion of part of the area of OWF BIII, for the purpose of creating an expensive migration corridor for birds between the groupings of wind power plants belonging to projects located on the northern and northeastern slopes of the Slupsk Shoal, is about 88 ^{km2}.

The aforementioned areas for development were designated in accordance with the regulations of the Law of July 7, 1994. - Construction Law (i.e. Journal of Laws 2021, item 2351, as amended).

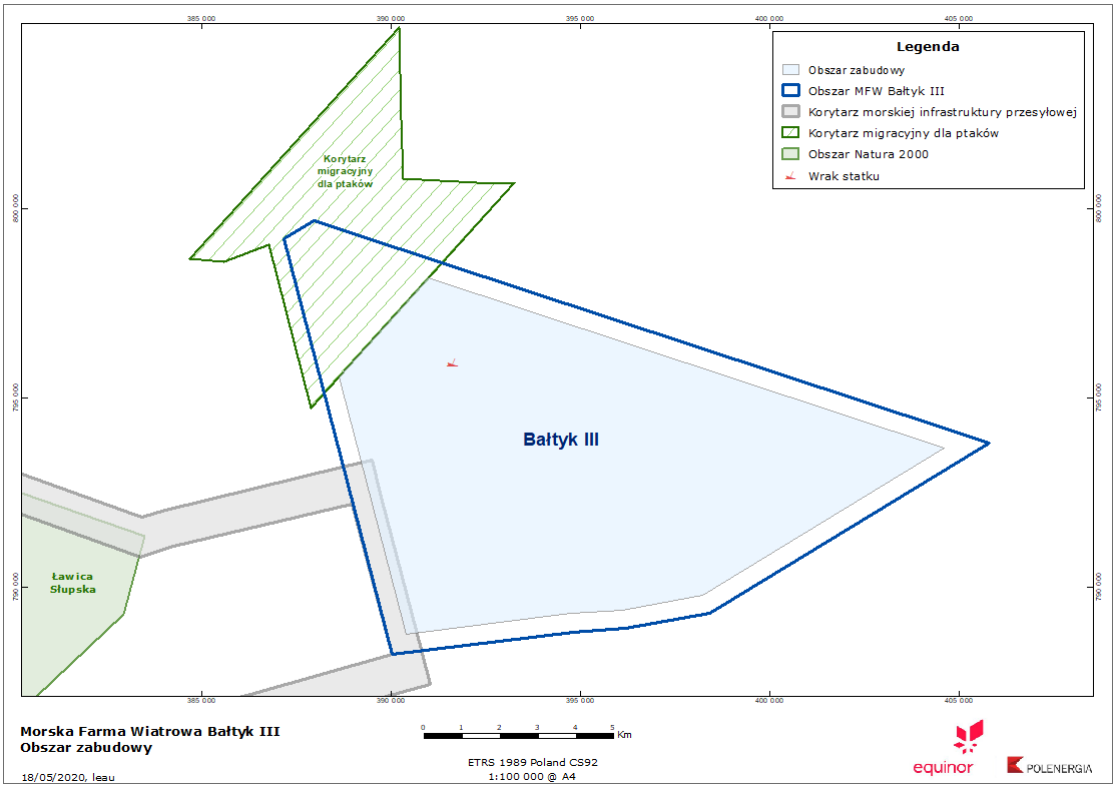
The table below gives the geographic coordinates of the boundaries of the farm development area.

Table 2 Geographical coordinates of the boundaries of the BIII OWF development area.

Point	ETRS89_Poland_CS92	
	Longitude	Latitude
1	17° 21' 21,473" E	54° 57' 21,518" N
2	17° 17' 17,639" E	54° 57' 0,529" N
3	17° 15' 28,399" E	55° 0' 39,156" N
4	17° 17' 36,907" E	55° 2' 5,406" N
5	17° 30' 31,280" E	54° 59' 50,060" N
6	17° 24' 36,771" E	54° 57' 39,861" N
7	17° 22' 38,491" E	54° 57' 25,473" N
8	17° 21' 23,133" E	54° 57' 21,632" N
9	17° 21' 22,998" E	54° 57' 21,625" N
10	17° 21' 22,510" E	54° 57' 21,596" N
11	17° 21' 22,023" E	54° 57' 21,562" N
12	17° 21' 21,537" E	54° 57' 21,524" N

source: provided by the Contracting Authority

Figure 2 BIII offshore wind farm development area



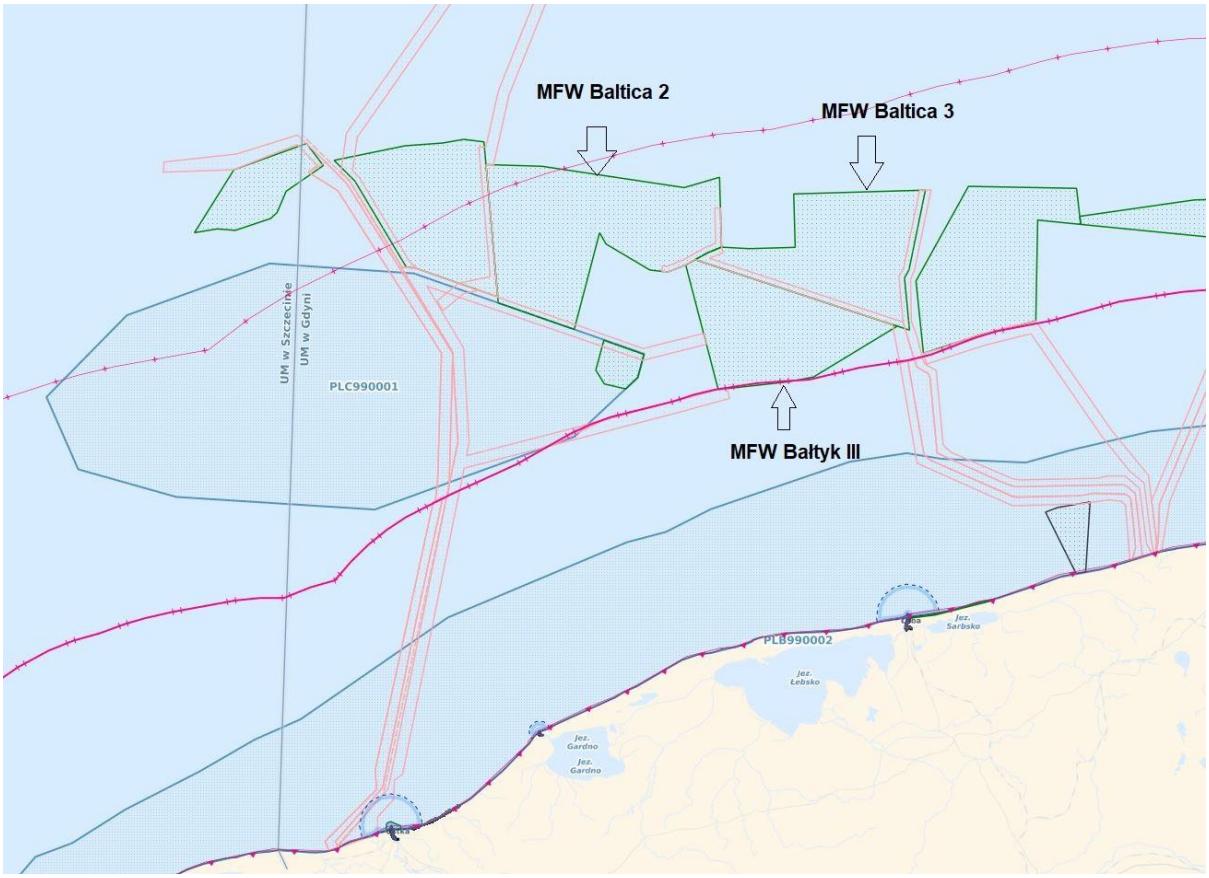
	Legend
	Development area
	Baltic III offshore wind farm area
	Offshore transmission infrastructure corridor
	Migration corridor for birds
	Natura 2000 area
	Shipwreck
	Slupsk Shoal
	Offshore Wind Farm Baltic III
	Baltic III

source: provided by the Contracting Authority

5. Changes in relation to the variant approved by the Decision Environmental Decision

In connection with the implementation of the design work and in view of the proceedings on environmental decisions and decisions in the form of issued environmental decisions for other offshore wind farms located in the vicinity, the ordering party specified in detail the area intended for the implementation of the BIII OWF. The northwestern corner of the area designated for the Project has been excluded from the development of elements of the Project, which will expand the development-free area located between the planned farm and the neighboring offshore wind farm OWF Baltica 2 and OWF Baltica 3.

Rysunek 3 Location of OWF BIII according to data from the Maritime Administration Spatial Information System



	IMF Baltica 2
	IMF Baltica 3
	IMF Baltica III
	UM in Szczecin
	UM in Gdynia
	Jez. Gardno
	Jez. Lebsko
	Jez. Serbsko

Source: www.sipam.gov.pl/geoportal

As indicated by the results of the impact assessments of the OWF projects carried out so far, such a corridor should be about 5 km wide along its entire length and should be located in such a way as to ensure free passage in the NE-SW direction between the power plants located on the northern and northeastern slopes of the Slupsk Shoal. In this regard, it should be emphasized that all the impact assessments of OWF projects carried out so far have been carried out using methodologies based on an envelope description of the parameters of the project and analysis of the most far-reaching scenarios, and the substantive conclusions in the discussed scope are the same.

Since the corridor is intended to reduce the cumulative impact of the projects of different investors, its boundaries should be agreed upon by those investors through whose projects such a corridor would pass, based on scientific considerations. This is due both to the methodological basis of the Natura 2000

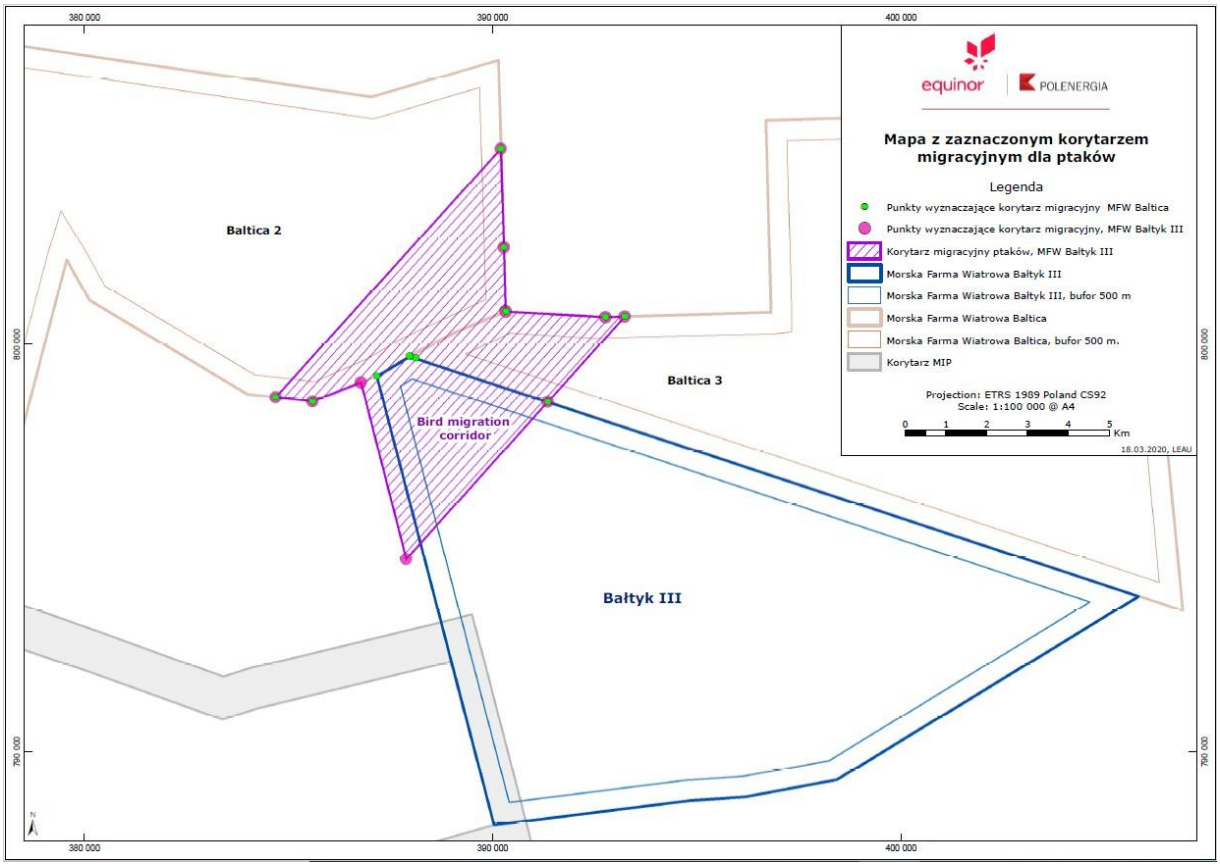
impact assessment, but also to the authority's approach to date, as expressed in the legally binding decisions on environmental conditions for the projects of the OWF Bałtyk Środkowy III (hereinafter: OWF BSIII) mark: RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016 and Polenergia Bałtyk II OWF (originally: Bałtyk Środkowy II OWF, now: IMF Baltic II; hereafter: IMF BII), sign: RDOŚ-Gd-WOO.4211.26.2015.KSZ.20 dated March 27, 2017 and the decision sign: RDOŚ-Gd-WOO.430.3.2021.KSZ.14zpo dated October 26, 2021. The designation of the corridor is to be based, according to the content of the cited decisions, on the guideline that the axis of the designated corridor should coincide with the line that demarcates these water bodies, or, if for scientific reasons the course of the corridor should be different, that the axis of this corridor should be determined in such a way that it causessimilar and comparable economic effects for farms in these water bodies, at the lowest possible cost to the environment. Due to the fact that the location of the corridor providing free passage in the NE-SW direction between the power plants located on the northern and northeastern slopes of Slupsk Shoal was determined in the content of the decision on environmental conditions issued for the project titled "The power plants of Slupsk Shoal". "Offshore Wind Farm Baltica", decision on environmental conditions mark: RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 on January 24, 2020, the designed and presented in this report exclusion area is a consequence and continuation of the conditions indicated in the cited decision, while guaranteeing the preservation of free passage of birds in the NE-SW direction towards the Slupsk Shoal slope. The space excluded from wind turbine development in the northwestern corner of the farm has been designated in consultation with the developer of OWF Baltica3 and OWF Baltica2.

The boundaries of the exclusion area are shown in Table 3 and Figure 4 below.

Table 3 Coordinates of the migration corridor for birds - the area excluded from wind turbine development.

Point No	WGS84_UTM33N		ETRS_1989_Poland_CS92	
	E	N	E	N
0	648215.63	6103660.52	392759.49	800657.02
1	648693.64	6103701.61	393238.86	800670.69
2	646925.73	6101508.27	391349.19	798582.95
3	643678.58	6097454.98	387877.01	794723.54
4	642328.90	6101722.99	386774.03	799060.04
5	641168.28	6101184.21	385584.95	798588.69
6	640263.09	6101235.78	384684.53	798691.91
7	645425.39	6107640.51	390202.62	804788.40
8	645632.93	6105224.24	390271.52	802365.22
9	645770.02	6103673.20	390319.63	800809.52
10	645778.29	6103653.86	390326.78	800789.74
11	648215.63	6103660.52	392759.49	800657.02

Figure 4 Map with marked migration corridor for birds - area excluded from wind turbine development.



	Baltica 2
	Baltica 3
	Baltic III
	Map with marked migration corridor for birds
	Legend
	Points marking the migration corridor of the Baltic offshore wind farm
	Migration corridor delineation points, offshore wind farm Baltic III
	Bird migration corridor, offshore wind farm Baltic III
	Offshore Wind Farm Baltic III
	Offshore Wind Farm Baltic III, 500m buffer
	Offshore Wind Farm Baltica
	Baltica Offshore Wind Farm, 500m buffer.
	MIP corridor

Source: Material Provided by IMF Baltic III.

In connection with the above findings, the area of the Project where wind turbines can be located has been restricted. This is the area where structural elements of the power plant can be located, including rotors. The area of the development area was determined in accordance with the regulations of the Construction Law and currently amounts to about 94 ^{km2}, while the area within which the actual foundation of wind power plants (the area of development of the power plants (structural elements) and the area of the range of rotor blades) will be possible - about 88 ^{km2}. According to the regulations

of the Construction Law, the development area of power plants should include all their structural elements including rotors, the development area indicated above includes in it the localized foundations of wind power plants and the area covering the width of the rotor radius.

It should be emphasized that, in contrast to the report on the environmental impact of the project[2] performed for the purposes of the proceedings on the decision on environmental conditions, in the course of which the Environmental Decision was issued, the area of the development area is understood as the area inside which all elements of the Project will be located, in the case of wind power plants delimited by the range of rotors, and not only the area that can be used for the foundation of foundations for wind power plants. The consequence of adopting this understanding (as required by the Construction Law) of the development area is a change in the area indicated as the development area in this report compared to the area indicated for the variant approved in the Environmental Decision. The area of development indicatedin the variant determined by the Environmental Decision, and determined taking into account the provisions of the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas issued for the Project (500 m buffer from the border of the farm without development), and also taking into account an additional buffer of 100 m in width (corresponding to the radius of the rotor) was about 89 ^{km2}. The area of development proposed in this environmental amendment proceeding is approximately 88 square ^{kilometers}, while this is the total area including not only the foundations of the wind turbines, but also the above-surface components of the wind turbines, including rotors, and without excluding the area of the safety zones around the wrecks. It should be emphasized that this change is due to the adjustment of the nomenclature to that used under the Construction Law, and it does not result in a real change in the area occupied by all elements of an offshore wind farm.

6. Conditions wind

Wind conditions are described in the Environmental Impact Report, Volume II, Section 1 Project Characteristics, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015, April 2015. In the subject area, the developer made new wind measurements in 2019, on the basis of which the developer decided on the possibility of making changes to the project planned for implementation.

7. Installed power farms

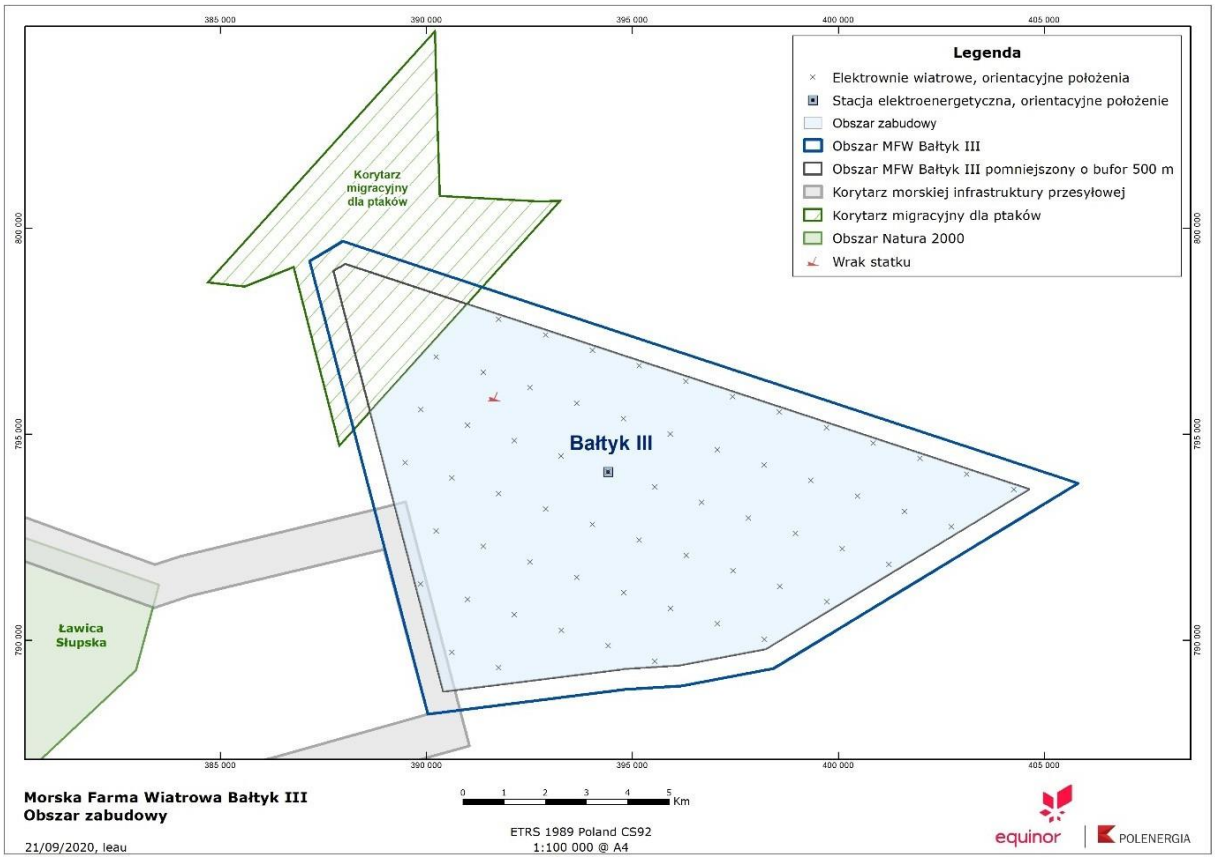
The farm's capacity will range from 720 MW to 1,200 MW. The final output of the farm will depend on the unit power of the generators used. It should be noted that the installed capacity of the farm is not a parameter that affects the type, scale and scope of impacts of the wind farm, unlike the number of power plants, their parameters (height, rotor diameter) and their productivity.

8. Setup power plants

A preliminary spacing of wind farm elements (development plan) has been developed for the Project in the variant selected for implementation, as shown in the figure below.

[2] Offshore wind farm Central Baltic III. Environmental Impact Report, SMDI Doradztwo Inwestycyjne Sp. Z o.o. 2015

Figure 5 Planned spacing of elements of the BIII offshore wind farm in the variant selected for implementation assuming construction of the maximum number of power plants requested (development plan).



	Legend
	Wind power plants, approximate locations
	Electricity substation, approximate location
	Development area
	Baltic III offshore wind farm area
	The area of the offshore wind farm Baltic III reduced by a buffer of 500 m
	Offshore transmission infrastructure corridor
	Migration corridor for birds
	Natura 2000 area
	Shipwreck
	Slupsk Shoal
	Offshore Wind Farm Baltic III
	Baltic III
	Slupsk Shoal

source: provided by the Contracting Authority

In developing the plan, the results of the following were taken into account: wind measurements and productivity analyses, preliminary geological studies, preliminary technical analyses, previous results of environmental impact assessments performed for the Project and neighboring projects.

The submitted development plan was prepared assuming the installation of the maximum number of power plants requested, i.e. 60 pieces.

The development plan is based on the following key assumptions:

- minimum distances between power plants - 800 m;
- placement of EW in such a way as to ensure the creation of corridors for the safe movement through the farm of vessels, service, rescue units;
- locating an internal marine substation ("MSE") in the central part of the farm;
- laying of internal connection cables along corridors radiating from the MSE to individual power plants, with the cables connecting five to six power plants within a single corridor; laying of an export cable in corridors connecting the internal MSE to the crossing points of the corridor created for the export cable (permission to lay and maintain submarine cables in the exclusive economic zone for the project titled "The MSE. "External connection infrastructure of offshore wind farm Baltic Central III issued by Decision No. MFWK/1/13 dated July 19, 2013 ref. GT7pb/62/14823/decision/2013) with the boundary of the BIII OWF as defined by the PSZW, without crossing the export cable with the internal cables of the farm;
- leaving the area located in the western-northern corner of the farm undeveloped with power plants in such a way as to create an unpaved 5-kilometer-wide corridor undeveloped with power plants, crossing the areas of the OWF Bałtyk Środkowy III and OWF Baltica farms in the SW-NE direction.

The outcome of consultations with the Maritime Search and Rescue Service to ensure safe corridors for passing and transiting maritime rescue units was also taken into account in developing the plan.

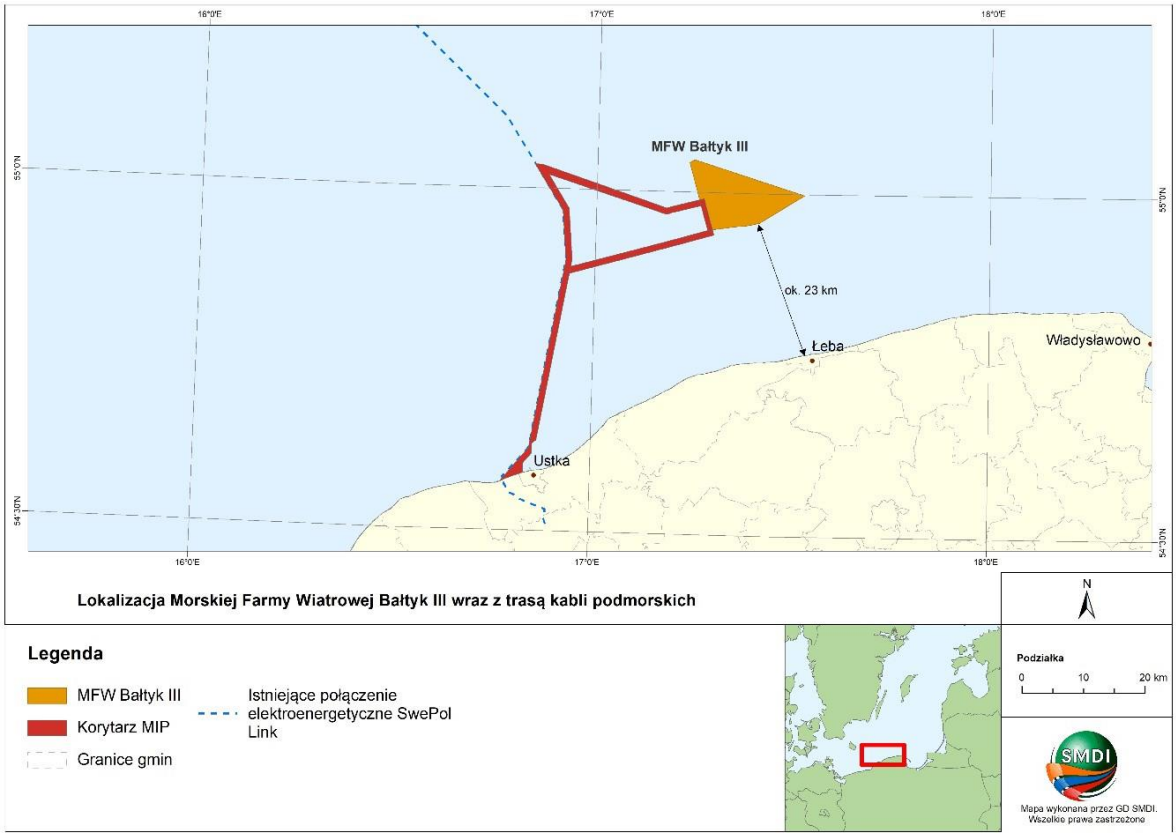
It should be emphasized that the presented development plan for the Baltic III OWF may be subject to change (in the case of a decision to build less than 60 number of wind power plants) or further detailing and modification, due to specific requirements to adapt the project to: the selected generators, the geotechnical conditions of the foundation in the places of the planned locations of the farm's elements determined in the full geological campaign, agreements with the competent authorities and institutions of the construction project including, technical expertise in the field of marine safety. However, the key layout assumptions of the farm's components, as defined above, will be maintained.

9. Transmission of electricity generated by farm

The BIII offshore wind farm does not include infrastructure for the transmission of electricity generated by the farm to land. A separate project, the Maritime Electricity Transmission Infrastructure ("MIP"), will be used for this purpose. For the project, a decision was issued by the Regional Director of Environmental Protection in Gdansk dated March 12, 2019, mark: RDOŚ-Gd-

WOO.4211.12.2016.KSZ/AJ.29 on environmental conditions for the implementation of the project to build offshore transmission infrastructure.

Figure 6 Corridor of the maritime part of the MIP route



	OWF Baltic III
	Ustka
	Leba
	Wladyslawowo
	approx. 23 km
	Location of the Baltic III Offshore Wind Farm along with the route of submarine cables
	Legend
	OWF Baltic III
	MP corridor
	Boundaries of Municipalities
	Existing SwePol Link power connection
	Pitch
	Map made by GD SMDI.
	All rights reserved

Source: Offshore wind farm Baltic Central II. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The investor also has an agreement on the location and methods of maintaining submarine cables in the Polish exclusiveeconomic zone[3] and a permit to lay and maintain cables in the Polish internal waters and territorial sea[4] and signed a connection agreement with the transmission operator (Polskie Sieci Elektroenergetyczne S.A.) on August 7, 2014.

10. Implementation stages project

As assumed in the project's impact report prepared for the proceedings under which the Environmental Decision was obtained, implementation of the Project may proceed in stages, with the first stage covering up to 720 MW of power. Implementation of the first phase is planned for 2024-2027. Implementation of subsequent phases will depend on investment decisions based on current market conditions. The total construction time for the first phase will be up to 3.5 years. The timing of construction of the next phases will depend on the decision on their size (number of power plants) and available technologies and equipment for the construction of offshore wind farms.

11. Literature and other sources

11.1. Acts legislation

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457).
2. Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz. U. of 2021, item 2373, as amended).
3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)

11.2. Literature, expert studies and administrative decisions administrative

1. Decision No. 4/14 of the Director of the Maritime Office in Slupsk dated March 19, 2014, authorizing the laying and maintenance of submarine cables within the limits of the territorial sea
2. Decision No. MFWK/1/13 of the Minister of Transport, Construction and Maritime Economy dated July 19, 2013, authorizing the laying and maintenance of submarine cables within the boundaries of the Polish Exclusive Economic Zone
3. Decision on environmental conditions issued by the Regional Director of Environmental Protection in Gdansk on July 7, 2016, under the sign RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project titled. "Construction of Polenergia Baltic III offshore wind farm"

[3] Decision No. MFWK/1/13 of the Minister of Transport, Construction and Maritime Economy dated July 19, 2013, as amended by the decision of the Minister of Infrastructure dated 11.02. 2022, case number DGM-3.530.65.2021

[4] Decision No. 4/14 of the Director of the Maritime Office in Slupsk dated March 19, 2014, amended by the decision of the Director of the Maritime Office in Gdynia dated April 27, 2022, case number INZ5DS.8104.20.3.2021.AGB

4. Decision on environmental conditions issued by the Regional Director of Environmental Protection in Gdańsk on March 12, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 for the project involving the construction of offshore transmission infrastructure.

5. Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas for the project OWF Bałtyk Środkowy III, decision of the Minister of Transport, Construction and Maritime Economy of March 30, 2012, ref. GT7/62/1170069/decyzja/2012

6. Decision of the Minister of Transport, Construction and Maritime Economy No. MFWK/1/13 dated July 19, 2013, authorizing the laying and maintenance of submarine cables within the Polish Exclusive Economic Zone, mark: GT7pb/62/14823/decyzja/2013.

7. Decision on environmental conditions issued by the Regional Director of Environmental Protection in Gdansk on January 24, 2020, mark: RDOŚ-Gd- WOO.4211.21.2017.MJ.PW.AJ.37 for the project titled. "Baltica Offshore Wind Farm."

8. Decision amending the decision on environmental conditions for the project titled. "Construction of offshore wind farm OWF Bałtyk II" issued by the Regional Director of Environmental Protection in Gdansk on October 26, 2021, mark: RDOŚ-Gd- WOO.430.3.2021.KSZ.14zpo.

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Figure 6 Corridor of the maritime part of the MIP route 15

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 2

Options for implementing the project

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Abbreviations and definitions

12+ MW	Turbines in the 12 MW class or larger
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
PSZW	Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection of July 7, 2016, ref. No.: RDOS-Gd-WOO.4211.12.2015.KP.22 (zpo)
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk
WA	Rational alternative
WR	Option selected for implementation

1. Introduction

The section presents an analysis of the variants of the Project, which involves the construction of the Baltic III offshore wind farm in parameters updated from those for which the Environmental Decision was issued. Since this Report is prepared for the purposes of the proceedings to amend the Environmental Decision, thus the Environmental Impact Report[1] - Report 2015, which was the basis for the issuance of the Environmental Decision, provides a reference point both in terms of the basis for comparing alternatives, as well as the principles for conducting an environmental impact assessment. The changes in the description of the Project are primarily related to modifying the parameters of the power plant so that they are in line with the state of the art and the latest solutions offered by technology suppliers. In addition, the changes are due to the progress of design work, including the development of a preliminary plan for the farm and the reduction of the considered foundation technologies for wind turbines. The presented changes in the conditions for implementation and operation of OWF BIII resulting from the Environmental Decision are the subject of both the description of the project and the basis for conducting an impact assessment.

2. Methodology of analysis options

The analysis of variants within the Report consisted in comparing the variant selected for implementation as part of the Environmental Decision (approved variant) and the variant created as a result of changes in the parameters of the Project resulting from the progress of design work, new knowledge that has been accumulated since the issuance of the Environmental Decision, as well as decisions on environmental conditions for other offshore wind farm projects implemented in the vicinity of Slupsk Shoal (variant selected for implementation-WR).

The variant selected for implementation is at the same time the best variant for the environment, and leaving the parameters of the BIII offshore wind farm in the form indicated in the Environmental Decision (approved variant) is a rational alternative (WA) allowed by the Environmental Decision.

The Environmental Decision is a decision that significantly determines the shape of the Project, as well as the scope and schedule of work related to its implementation. The Environmental Decision specifies the environmental boundary parameters.

Both analyzed variants of the Project, which were presented in the Report, are technically feasible, fall within the parameters specified in the permits obtained, and do not pose a threat of significant impacts on the environment, including in particular on the integrity, integrity and subject of protection of Natura 2000 areas, thus fulfilling the requirement for variants in accordance with the provisions of the Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments[2].

[1] Environmental Impact Report, SMDI Investment Advisory, April 2015.
[2] Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz.U. of 2020, item 283)

3. Methodology for describing variants

When assessing the environmental impact of a wind farm, it is essential to identify those technical parameters that actually affect the manner and scale of its impacts on the various elements of the ecosystem. In order to make an impact assessment, it is necessary to determine the values of these parameters in such a way as to be able to verify the environmental effects of applying the most far-reaching solutions, which are likely to cause the greatest negative impacts on individual, sensitive environmental elements.

Section 7 of Volume II of the Report presents a matrix of interrelationships of potential emissions and disturbances caused by the OWF, their sources, direct and indirect environmental impacts and the factors determining them, compared with the technological parameters of the furthest-reaching scenario used as the basis for the impact assessment for the BIII OWF in the 2015 Report - NIS 2015 and the proposed updated parameters of the Project approved in the Environmental Decision, and which are the subject of the impact assessment in this Report. As can be seen from this matrix, for an offshore wind farm, the key technical parameters affecting the occurrence and scale of environmental impacts are:

a) Height of structure above water level - possible impact on landscape. It depends on the height of the tower and the length of the rotor radius. The higher, the more far-reaching the impact. It is therefore necessary to determine the maximum amount.

b) Height of clearance between sea level and the lower limit of the rotor zone - possible impact on birds and bats. It depends on the height of the tower and the length of the rotor radius. The smaller it is, the greater the possible impact. It is necessary to determine the minimum height.

c) Rotor diameter - possible impact on birds. It depends on the length of the rotor radius of the generator used. The bigger it is, the greater the impact. It is necessary to determine the maximum diameter.

d) Number of wind turbines and indoor substations - possible impacts on benthic habitats, birds, sediment transport. It depends on wind, technological and economic efficiency. The bigger it is, the greater the impact. It is necessary to specify the maximum number.

e) Total rotor zone - possible impact on birds. It depends on the number of power plants and the diameter of the rotor. The bigger it is, the greater the impact. Specify the maximum size.

f) Occupation of the bottom surface by foundations of power plants and other structures (e.g., substations) - possible impacts on benthic habitats and fish. It depends on the number of power plants and the type of foundation. The larger, the greater the impact. It is necessary to determine the maximum value.

g) Length of cables of internal connection infrastructure - possible impact on benthos, fish, bottom sediments, sediment transport. It depends on the number of power plants, the distance between power plants, the number of internal substations. The greater the overall length, the greater the impact. It is expedient to specify the maximum length.

In addition to the technological parameters specific to the equipment used, some parameters related

to the installation process of the various technologies are important for the environment. Particularly relevant to the scale of impacts of an offshore wind farm at the stage of its construction and decommissioning are the following parameters:

Noise emissions during foundation placement and/or decommissioning - possible impacts on marine mammals, fish, birds. It depends on the type of foundation and the number of power plants. The bigger and longer, the more significant the impact. It is necessary to determine the maximum noise level and the maximum duration of continuous noise emissions at a certain distance from the borders of the farm and/or at the border of areas particularly sensitive to noise impacts.

Length of continuous construction process - possible impacts on birds, marine mammals, fish. The longer the continuous construction time, the greater the scale of impact during the construction phase. It depends on the number of power plants and the type of foundations, as well as the organization of the construction process and supply chain. It is necessary to determine the minimum lengths of interruptions in the continuous duration of construction, understood as the uninterrupted movement of construction units in the area of the farm.

Taking the above into account, the characterization of the different variants of the project will be based on the compilation and comparison of the above-mentioned key boundary parameters for the different technological elements of the offshore wind farm. All technical solutions, considered at this stage, that can be applied within the limiting parameters specified for the various alternatives are presented and described in detail in Section 3 of this Volume.

4. The considered variants of the OWF BIII

4.1. The variant approved through the Decision Environmental Decision

The approved variant, is the most favorable variant according to the Environmental Decision issued. This variant assumes the construction of no more than 120 wind turbines with a maximum rotor diameter of up to 200 meters.

Table 1. Basic parameters of BIII offshore wind farm - DSU approved variant

Parameter	Boundary values
Maximum total height of the power plant above sea level. [m]	275 m
Minimum clearance between the bottom position of the wing and the sea surface [m]	20 m
Maximum rotor diameter [m]	200 m
Maximum number of power plants [pcs.]	120 pcs.
Maximum zone of a single rotor [m2]	31 400 m2
Maximum total rotor area [m2]	3 768 000 m2
Maximum number of foundations of supporting	6

Parameter	Boundary values
infrastructure[3] [pcs]	
Types of power plant foundations considered	Foundations: monopile, tripod, jacket (truss) and gravity foundations
Maximum bottom area occupied by 1 foundation [m^2] (gravity foundation, 50 m diameter)	1 257^{m2}
Considered types of supporting infrastructure foundations	Foundations: monopile, tripod, jacket (truss) and gravity foundations
Maximum bottom area occupied by all foundations [m^2]	158 382^{m2}
Maximum cable length of internal farm connection infrastructure [km]	200 km

Source: DŚU dated July 7, 2016, marked RDOŚ-Gd-WOO.4211.12.2015.KP.22

4.2. The option selected for implementation implementation

The variant chosen by the Investor for implementation is the variant based on turbines of the largest capacity announced for launch in 2024-2027, when the BIII offshore wind farm is planned. These will be 12+ MW class turbines. The project involves the construction of no more than 60 wind turbines.

The rationale for choosing this variant is that it provides the maximum degree of realization of the Project's objective, i.e. the highest efficiency of electricity production, while optimizing costs associated with the construction of a smaller number of power plants, shorter construction time, the need for fewer vessels, construction facilities, and, at the operation stage, fewer maintenance needs. Also, decommissioning a farm with fewer power plants will be less costly. Greater energy production also means achieving a greater environmental effect in terms of fossil fuel substitution and CO2 emission reductions by the energy sector (see Section 14, Volume IV).

Key parameters of the Project that affect the scale and type of environmental impacts are shown in Table 2. In order to determine the limits for the technical parameters of the power plant, the technologies available on the market and the technical conditions of their application were analyzed, including the technological relationships between the various components, such as the rotor - tower - foundation. The maximum capacity of the farm, which was limited in the PSZW to 1,200 MW, was also taken into account.

Table 2. Basic parameters of the BIII offshore wind farm - the variant selected for implementation

Parameter	Option selected for implementation
Maximum total height of the power plant above sea level. [m]	310

[3] Offshore substations

Parameter	Option selected for implementation
Minimum clearance between the bottom position of the wing and the sea surface [m]	20
Maximum rotor diameter [m]	250
Maximum number of power plants [pcs.]	60
Maximum zone of a single rotor [m2]	49088
Maximum total rotor area [m2]	2945244
Maximum number of foundations of supporting infrastructure [pcs]	1
Types of power plant foundations considered	Foundations: monopile and jacket (truss) type
Maximum bottom area occupied by 1 power plant foundation [m2]	79
Considered types of supporting infrastructure foundations	Foundations: monopile, tripod, jacket (truss) and gravity foundations
Maximum bottom area occupied by 1 foundation of supporting infrastructure [m2]	1964
Maximum bottom area occupied by all foundations [m2]	6676
Minimum distance between power plants (counting from the axis of individual structures) [m]	800
Maximum cable length of internal farm connection infrastructure [km]	200

**- the parameter was replaced by the minimum distance between power plants (counting from the axis of each structure)

Source: investor data

The variant selected for implementation is ultimately the same as the most environmentally favorable variant, as it ensures the achievement of the stated business objectives while having the least impact on the environment. Possible modifications and fine-tuning of some technical parameters will take place in the selection of individual technological solutions at the stage of design and contracting of supplies. However, these parameters will not exceed the boundary environmental conditions that were determined for the environmentally most favorable variant.

The changes in the description are primarily related to changes and refinement of some parameters of the variant selected for implementation ("WR"), resulting from technological advances, the progress of design work, including the development of a preliminary plan for the farm area and the selection of foundation technology. It should be noted that the vast majority of the parameters of the project are within the limits specified in the characteristics of the Project, which is an appendix to the

Environmental Decision, with the exception of the total height of the wind power plant, rotor diameter and the maximum area of a single rotor - which results from the assumption of using 12+ class turbines allowing at the same time to significantly reduce the number of power plants without losses in terms of installed power, and the maximum area of the bottom occupied by 1 foundation of the associated infrastructure - this change results from a radical reduction in the number of associated infrastructure from 6 to 1, which, however, is associated with the need to increase the area occupied by a unit foundation for the associated infrastructure. The parameters of the area of the actually buildable surface on which the power plant can be sited are also being changed, but this is not due to actual changes in the scope of the planned project, but to adjust the concepts of the development area so that it is consistent with the concepts used under the Construction Law, and includes all elements of the wind farm, including those above the surface - see also Section 1 of this volume.

4.3. Comparison of the parameters of the different variants variants

The implementation variant ("WR") for the BIII offshore wind farm will consist of the following:

- a maximum of 60 wind power plants of 12 MW+ class, whose basic elements are the foundation, tower, nacelle with power generator and rotor;
- 1 internal marine electrical substation ("MSE");
- submarine power and telecommunications cables, connecting:
    - power plants among themselves (into cable circuits),
    - a group of power plants with an internal marine substation.

The parameters of the proposed variant selected for the BIII OWF, compared with the parameters of the parameters of the Project approved by the Environmental Decision, are presented in the Table below.

Table 3. Parameters of the proposed variant selected for implementation of the BII offshore wind farm, compared with the parameters of the variant approved by the DSU

Parameter	Option selected for implementation- WR	DSU-WA Approved Variant
Maximum total height of the power plant above sea level. [m]	310	275
Minimum clearance between the bottom position of the wing and the sea surface [m]	20	20
Maximum rotor diameter [m]	250	200
Maximum number of power plants [pcs.]	60	120
Maximum zone of a single rotor [^{m2}]	49088	31400

Parameter	Option selected for implementation- WR	DSU-WA Approved Variant
Maximum total rotor area [m^2]	2945244	3768000
Maximum number of foundations of supporting infrastructure [pcs]	1	6
Types of power plant foundations considered	Foundations: monopile and jacket (truss) type	Foundations: monopile, tripod, jacket (truss) and gravity foundations
Maximum bottom area occupied by 1 power plant foundation [m^2]	79	1257
Considered types of supporting infrastructure foundations	Foundations: monopile, tripod, jacket (truss) and gravity foundations	Foundations: monopile, tripod, jacket (truss) and gravity foundations
Maximum bottom area occupied by 1 foundation of supporting infrastructure [m^2]	1964	1257
Highest density of power plants [pcs/km^2]	not applicable*	1.35
Minimum distance between power plants (counting from the axis of individual structures) [m]	800	parameter is not specified in the decision
Maximum bottom area occupied by all foundations [m^2]	6676	158382
Maximum cable length of internal farm connection infrastructure [km]	200	200

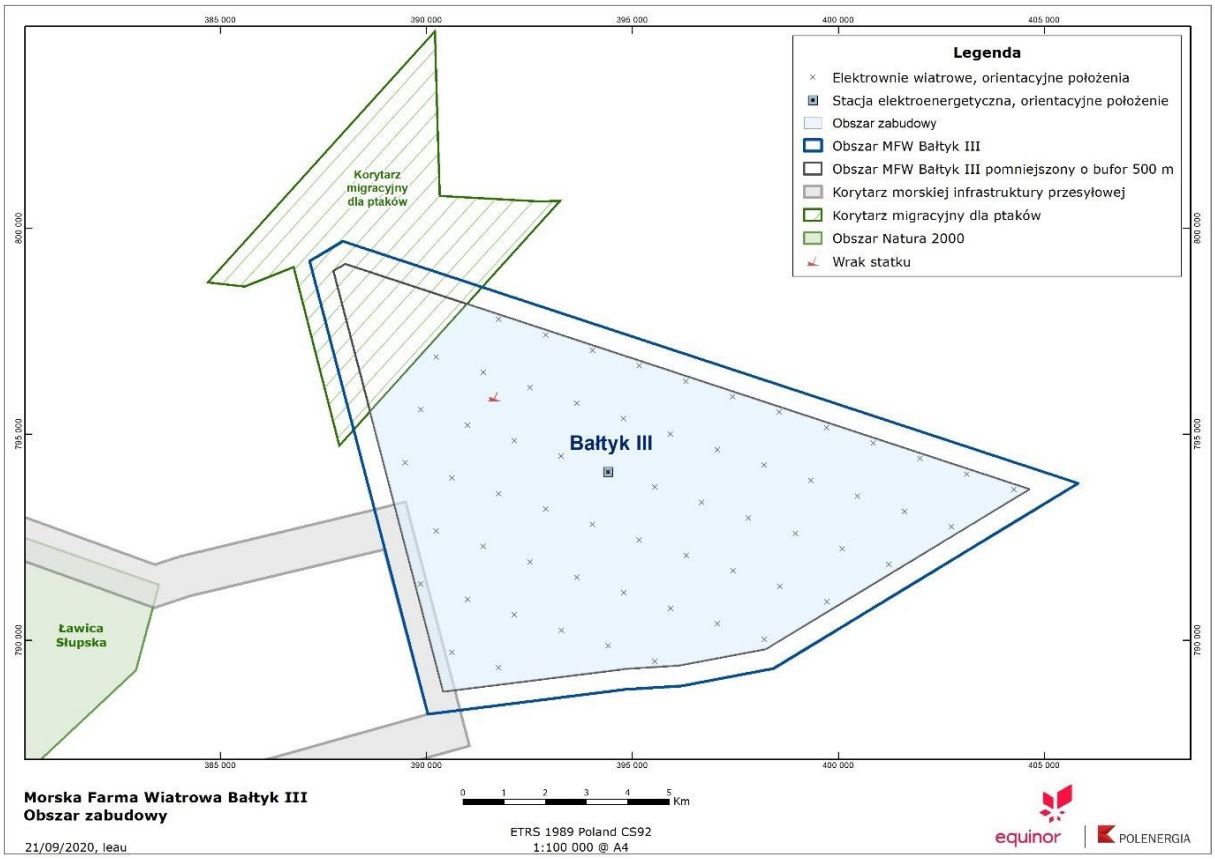
* parameter has been replaced by the minimum distance between power plants (counting from the axis of each structure) source: provided by the Employer

In the variant selected for implementation, the use of monopile foundations is planned for all wind turbines in the Project. If it is not technically possible to install this type of foundation for any of the planned power plants, the use of jacket (truss) foundations is envisaged. In the case of an offshore substation, it is not possible at this stage to limit the type of foundations considered. Accordingly, a marine substation can be placed on a foundation: monopile, tripod, jacket (truss) or gravity foundation. The final decision on the foundation method will be made in the construction project, based on verified studies of geotechnical conditions adapted to the selected types of generators and stations. It is important to emphasize the fundamental reduction in the number of foundations for supporting infrastructure from 6 to 1, with the maximum area to be occupied by a foundation for infrastructure being unitarily larger, while the total area to be occupied by foundations for supporting infrastructure is 3.8 times smaller.

Figure 1 below shows the planned spacing of the BIII offshore wind farm elements (development plan)

in the variant selected for implementation.

Figure 1 Planned spacing of OWF BIII elements in the variant selected for implementation assuming construction of the maximum number of power plants requested (development plan)



	Slupsk Shoal
	Migration corridor for birds
	Baltic III
	Legend
	Wind power plants, approximate locations
	Electricity substation, approximate location
	Development area
	Baltic III offshore wind farm area
	The area of the offshore wind farm Baltic III reduced by a buffer of 500 m
	Offshore transmission infrastructure corridor
	Migration corridor for birds
	Natura 2000 area
	Shipwreck
	Offshore Wind Farm Baltic III
	Development area

source: provided by the Contracting Authority

4.4. Justification of the applicant's proposed variant

The option selected for implementation fulfills the investment objectives of the Project. It allows to achieve a better economic result, by using a smaller number of larger power plants and thus achieve optimal use of the energy potential of the area designated for the construction of the farm, as well as shorten the construction time. At the same time, by reducing the number of power plants, the project's key parameters for the scale of environmental impacts, such as the total rotor zone and seabed occupation, will decrease.

The change that deviates from the conditions set forth in the 2016 environmental decision is the increase in the maximum overall height of the power plant from 275 meters to 310 meters and, which is related to the adoption of the use of modern technological solutions and the implementation of 12+ class turbines. Regardless of the change, the minimum clearance between the lower wing position and the sea surface - 20 m - will be maintained, and the maximum total rotor zone will be changed, ensuring that the impact of the variant selected for implementation will be less than the variant approved through the Environmental Decision (WA).

The most significant difference in the option selected for implementation, compared to the rational alternative, is the reduction in the number of power plants by 50%, i.e. to a maximum of 60 units, compared to the 120 units originally envisioned for implementation, and 70% compared to the furthest-reaching scenario, the 2015 NIS, which forms the basis of the environmental impact assessment in the 2015 Report, assuming up to 200 power plants allowed in the area according to the PSZW.

Reducing the number of power plants and limiting the types of their foundations (monopile and jacket (truss) foundations) in the implementation variant is essential from the point of view of the farm's impacts on key environmental elements, since it is decreasing with it:

the area of the bottom occupied by foundations in relation to the variant approved by the Environmental Decision by about 95.8% , as well as the volume of bottom sediments disturbed during construction and moving with sea currents and the destruction of benthic organisms during installation work, the total area of rotors in relation to the variant approved by the Environmental Decision by about 21.8%, and thus the potential mortality of birds and bats as a result of collisions with working power plants,

the total installation time of the foundations, and thus the period during which underwater noise will be emitted, which can cause hearing damage and scaring (in extreme cases even death) of fish and marine mammals.

Thus, the variant selected for implementation is more environmentally safe than the original implementation variant approved by the Environmental Decision.

5. Literature and other sources

5.1. Acts legislation

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457).

2. Act of October 3, 2008 on the provision of information on the environment and its protection,

public participation in environmental protection and environmental impact assessments (consolidated text Dz. U. of 2021, item 2373, as amended).

3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)

5.2. Literature, expert studies and administrative decisions administrative

1. Environmental Impact Report, Volume II, Chapter 2 Project Alternatives, SMDI Investment Advisory, April 2015,

2. Decision on environmental conditions for implementation issued by the Regional Director of Environmental Protection in Gdansk on July 7, 2016, under the sign RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project titled. "Construction of Polenergia Baltic III offshore wind farm"

3. Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas for the project OWF Bałtyk Środkowy III, decision of the Minister of Transport, Construction and Maritime Economy of March 30, 2012, ref. GT7/62/1170069/decyzja/2012

4. Decision of the Minister of Transport, Construction and Maritime Economy No. MFWK/1/13 dated July 19, 2013, authorizing the laying and maintenance of submarine cables within the Polish Exclusive Economic Zone, mark: GT7pb/62/14823/decyzja/2013.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 3

Description of the technology

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Abbreviations and definitions

AC	Alternating current
DC	Direct current
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
EW	wind power plant
HVAC	High-voltage alternating current
HVDC	High-voltage direct current
NPS	National Energy System
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
MIP	Offshore Transmission Infrastructure
MSE	Marine Power Station
NN	Highest voltage
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection of July 7, 2016, ref. No.: RDOS-Gd-WOO.4211.12.2015.KP.22 (zpo)
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk
WN	High voltage

1. Introduction

The section presents a description of the technology for the Project, which consists in the construction of an offshore wind farm designated as OWF Baltic Central III in parameters updated in relation to the variant for which the Environmental Decision was issued. Since this Report is prepared for the purposes of the proceedings to amend the Environmental Decision, thus the Environmental Impact Report[1] - Report 2015, which was the basis for the issuance of the Environmental Decision, provides a reference point both for the comparison of alternatives and the basis for conducting the environmental impact assessment. The changes in the project description are primarily related to modifying the parameters of the power plant so that they are in line with the state of the art and the latest solutions offered by technology suppliers. In addition, the changes are due to the progress of design work, including the development of a preliminary plan for the farm and the reduction of the considered foundation technologies for wind turbines. The presented changes - modifications to the parameters of the BIII OWF approved by the Environmental Decision are the subject of both the description of the project and the basis for conducting an impact assessment.

After additional analysis, the variant selected for implementation plans to use monopile foundations for all wind turbines in the Project. If it is not technically possible to install this type of foundation, which may apply only to a portion of the planned power plants, it is envisaged to use jacket (truss) foundations. In the case of an offshore substation, it is not possible at this stage to limit the type of foundations considered. Accordingly, a marine substation can be placed on a foundation: monopile, tripod, jacket (truss) or gravity foundation. The final decision on the foundation method will be made in the construction project, based on verified studies of geotechnical conditions adapted to the selected types of generators and stations.

The above changes did not affect the type of project implementation technology used and will not affect the implementation of the overall project. The description of basic elements is based on the 2015 Report Volume II, Section 3 Description of Technology.

2. Turbines

2.1. Introduction

The selection of the wind turbine model will take place at the stage of preparation of the construction project and will be based primarily on technical and economic criteria, as well as the environmental conditions for the implementation of the project, as indicated in the environmental decision. Technical criteria for turbine selection include, in particular, wind, currents, wave action, sea level, climatic conditions, temperature, ice cover, seabed conditions, as well as the target installed capacity of the farm, the planned spacing of the power plant and existing environmental constraints. Financial criteria are related to, among other things, optimization of production, construction and operation costs of the investment, and risk factors such as quality, acceptability by financial institutions, contractual conditions, conditions of the RES investment support system by the state, etc. The key parameters of offshore wind turbines that affect the scale and type of environmental impacts are rotor diameter, rotor zone, rotor location in space, number of rotors, and thus the total rotor zone and distances between individual rotors.

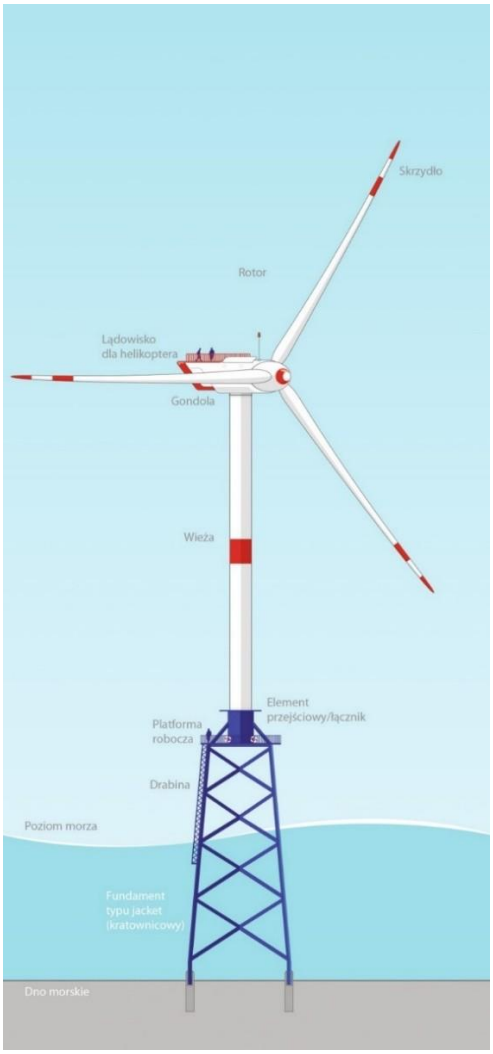
[1] Environmental Impact Report, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015.

2.2. Description technical

A standard wind turbine has a rotor consisting of three blades and a hub located at the front of the nacelle. Inside the nacelle most of the turbine equipment is placed. The rotor is attached to the main shaft supported by bearings. The shaft transfers the energy of rotation through a gearbox to a generator, which converts it into electricity. The transformer, which increases the voltage level before it is sent to the substation, is usually mounted inside the nacelle or at the base of the tower. The wind turbine is mounted on a tower, consisting of steel or concrete pipes with an average diameter of about 8 meters (depending on the model). Helicopter landing pads can be installed on the power plant's nacelles. The power plant's wings rotate at a rate of 4 to 30 times per minute.

A diagram of an offshore wind power plant is shown in the figure below.

Figure 1. Diagram of an offshore wind power plant



	Wing
	Rotor
	Helicopter landing pad
	Gondola
	Tower
	Transition piece/connector
	Working platform
	Ladder

	Sea level
	Jacket (truss) type foundation
	Seabed

source: provided by the Contracting Authority

Photo 1. Offshore wind power plant

source: provided by the Contracting Authority

The basic parameters of the wind turbines planned for installation at OWF BIII are shown in the table below.

Table 1. Basic technical parameters of wind power plants in the variant selected for implementation

Parameter	Option selected for implementation
Maximum total height of the power plant above sea level. [m]	310
Minimum clearance between the bottom position of the wing and the sea surface[2] [m]	20
Maximum rotor diameter [m]	250
Maximum zone of a single rotor [m^2]	49088

source: provided by the Contracting Authority

[2] Sea surface understood as mean sea level

It should be noted that one or more power plant models with the above parameters can be installed on a single farm. Decisions on this issue will be made at the design stage of each phase of the investment.

Information on the basic materials used in the construction of wind turbines is shown in the table below. It should be noted that the use of particular materials depends on the manufacturer in question.

Table 2. Basic materials used in the construction of wind power plants

Component	Basic materials
Rotor (wings AND hub)	Wings: epoxy, polyester resins, carbon fiber, fiberglass, laminates, composites (under development), metal lightning conductors Hub: cast iron, steel
Gondola	Steel, cast iron, copper, lead, glass reinforced plastics (GRP), epoxy, polyester, fiberglass
Tower	Steel and other materials such as plastics and aluminum used, for example, in ladders, platforms, etc.
Foundations	Steel (monopile, jacket, tripod), concrete (gravity) Steel and aluminum used in connector, access systems, platform, J-tubes, cranes, etc.
Other	About $1^{m3\ of}$ oil in the main gearbox, 0.25 $m3^{of}$ hydraulic oil, 0.02 $m3^{of}$ oil in auxiliary gearboxes and about 1.5 - $2.5^{m3\ of}$ transformer oil Copper, aluminum, plastics for cables and electrical components Paints and coatings Steel

source: provided by the Contracting Authority

2.3. Possible examples turbines

As indicated earlier, the turbine model can be determined only at the stage of the construction project. As wind class I was found in the area of the proposed farm, turbine models that could theoretically be used in the project were selected.

Examples of offshore turbines that were considered in defining the Project's alternatives are shown in the table below. Some of these turbines are already on offer from manufacturers, while others are prototypes in the testing stage. There is also a possibility that other turbine models available during the construction period of the Central Baltic III OWF will be selected for the project.

Table 3 Examples of turbine models likely to be available on the market during the construction period of OWF BIII

Model	Power of a single turbine [MW]	Rotor diameter [m]
MHI Vestas V-164	8.0	164
MHI Vestas V174	9.5	174
Siemens SG 10.0-193 DD	10.0	193
SeaTitan 10 MW	10.0	190
Sway ST10	10.0	164
GE Haliade-X 14	14	220
Siemens 14-236 DD	14	236
Vestas V236-15	15	236

source: provided by the Contracting Authority

3. Towers

3.1. Introduction

The tower is a component of the power plant, on which a gondola with a rotor and generator is mounted. The tower is mounted on the foundation with a transition piece (connector). The height of the tower depends on the turbine model chosen and local wind conditions. The towers can be made of steel or concrete and consist of several sections that are assembled either at the construction port or at the power plant site. Inside the tower there is a communication line between the platform located on the foundation and the gondola (elevator, ladder), cables are placed to transmit electricity from the generator and other elements necessary for the operation and functioning of the power plant.

The height of the tower, along with the diameter of the rotor, determines two important parameters of a wind turbine that affect the scale of its impacts - the height of the clearance between the bottom edge of the rotor and the sea surface and the total height of the turbine.

3.2. Description technical

The key parameters of the towers are height and diameter. At IMF BIII, towers consisting of steel or concrete pipes up to 175 meters high and with diameters ranging from 20 meters at the base to 4 meters at the top may be used.

4. Foundations

4.1. Introduction

Each of the proposed wind turbines, as well as the offshore transformer station, will be placed on a foundation. There are many types available on the market, the most common of which are:

- monopiles *(monopile foundation);*

- *tripod* type foundations *;*
- jacket *(truss)* type foundations *;*
- *gravity-based structure (GBS)* foundations *;*
- suction *bucket / suction can* foundations - not considered at the site in question;
- *floating foundations (floating foundations)* - not considered at the site in question.

The selection of BIII OWF foundations depends on a number of factors in the area of the planned farm: depth, bottom sediments, geological structure, wave and sea currents, windiness, ice cover and others.

At the current stage of the project, the technical advisor ruled out the use of a suction can foundation, due to the presence of rocks and boulders in part of the project area, and floating foundations - due to the possibility of ice cover and depth. Other types of foundations can be used and are therefore described below. It was assumed at the stage of the Environmental Decision that the final selection of the type of foundation would be made at the stage of the construction project, after taking into account, in particular, such factors as data on the seabed, the depth of the foundation or the dimensions of the selected power plant model, given the geotechnical studies of the subsoil, which will be decisive in the question of foundation selection.

Nevertheless, after additional analysis, the variant selected for implementation plans to use monopile foundations for all wind turbines in the Project. If it is not technically feasible to install this type of foundation, jacket foundations are envisioned for some wind power plants. In the case of the internal marine substation, at this stage there are no plans to limit the type of foundations considered. Accordingly, an indoor marine substation can be placed on a foundation: monopile, tripod, jacket (truss) or gravity foundation. The final decision on the method of foundation will be determined in the construction project, on the basis of verified studies of geotechnical conditions adapted to the selected types of generators and substations, however, it should be emphasized that this applies to the method of foundation in relation to one object in the area of the entire OWF Baltic Central III, which also results from the limitation of the planned number of offshore substations.

The key parameter of foundations, from the point of view of the scale and significance of environmental impacts, is the bottom area occupied by a given foundation. At the construction stage, the critical parameter affecting the magnitude of the environmental impact of foundations is the level and timing of noise emissions associated with foundation placement and the magnitude of the impact on the bottom in the process of preparing for foundation placement. Noise is associated with the driving of the foundation or piles fixing the foundation into the bottom, and the level of emissions will depend on the type of foundation, its diameter, the number of fixing piles and their diameter, and the depth of driving into the bottom. The timing of noise emissions will depend on the number of power plants and the type of foundations. The time required for the installation of the different types of foundations considered is given below, when describing the various technical solutions.

Large amounts of bottom sediment may appear during the implementation of foundation preparation work. These sediments will periodically cause an increase in point sediment agitation. Sediments removed from the bottom during its preparation for the foundation, including gravity foundations, will be managed within the boundaries of the Project area. The sediments will not be moved outside the Project area, but only relocated away from the direct foundation site. If gravity foundations are used, requiring the removal of a significant amount of sediment, it will also be possible to use them to fill (load) the structure of the foundations in question (as ballast) or to shape the bottom near them.

4.2. Monopiles

Monopiles are currently the most commonly used foundations in offshore wind farms. So it is a tried and tested concept, and many companies have experience with these foundations. The advantages of monopiles are fairly simple production, easy transportation, relatively quick installation in the seabed. However, monopiles, due to their relatively large diameter, are subject to high hydrodynamic loads, which can cause damage to the joints inside their structure. Due to their massive steel construction, they are expensive. The monopiles currently in production are also dedicated (and cost-effective) for depths of up to 38 meters, while the BIII offshore wind farm project will be built in an area under development with depths of about 25 to 40 meters. This depth does not preclude the use of new-generation monopiles on part of the BIII OWF surface. In addition, at the current stage of the project, it is permissible to also place a power substation on this type of foundation.

4.2.1. Description technical

The steel monopal is constructed of steel welded cylinders. The length of the monopile can reach 120 meters. Its lower part has an average diameter of 5 - 10 meters and is placed in the seabed at depths of up to several tens of meters. The diameter depends on factors such as turbine size, seabed conditions, and hydrodynamic forces at the site.

The monopal protrudes above the sea surface and is connected to the tower by a transition piece/connector (transition piece), of varying lengths, mounted outside the monopal (the most common solution) or inside. The connection between the monopile and the fastener is usually made with a bonding agent. The connector is initially placed on temporary supports and aligned to a vertical position. The binder is then pumped between the foundation surface and the fastener surface and allowed to solidify. For more information on the use of the binder, see the following section.

Some deformation of the pile may occur during driving. By using a binder, the gaps and stresses created by the aforementioned deformations can be bridged.

The above components can also be bolted together using a flange connection or welded together.

There are also additional elements on the connector, such as the anchorage of service vessels, ladders, an intermediate platform, a working platform, as well as elements of the power infrastructure (flexible cable covers called J-tubes and power and telecommunications cables).

Monopiles require the construction of a layer around them, on the bottom, to prevent leaching, by placing a layer of, for example, stones at the location of the pile in question. It can be laid before or after the pile is driven into the seabed. For more information on the use of a leaching protection layer, see below.

It is also possible to use reinforced concrete monopiles, which are not driven into the bottom, but installed by drilling a suitable hole in the seabed. It is a relatively new technology. Reinforced concrete piles are constructed of prefabricated rings, forming the entire foundation when connected. Its basic parameters are described in the table below, noting that it is not subject to evaluation in the following section of the study (it was not indicated by the technical advisor).

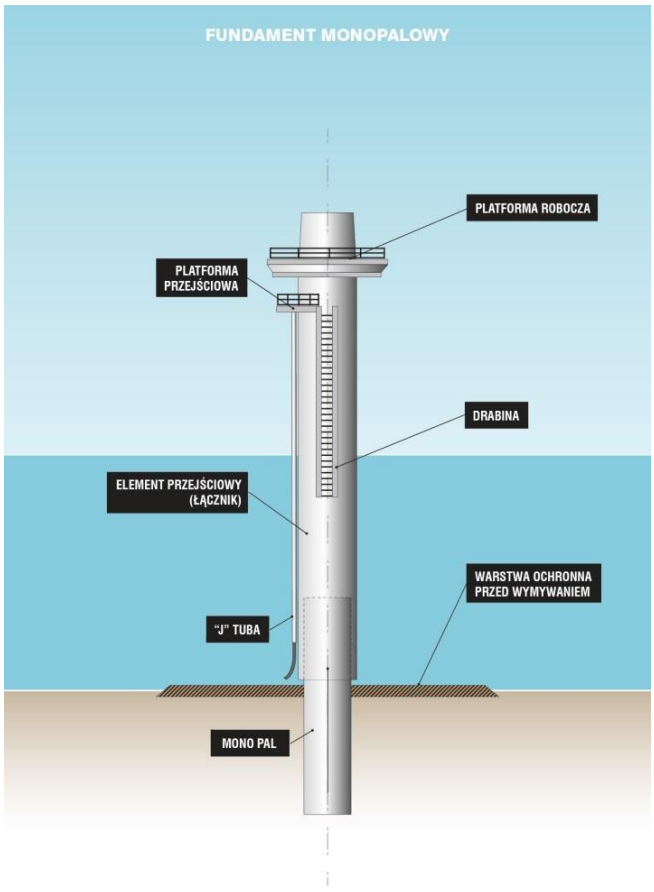
Table 4. Parameters of reinforced concrete monopile foundation

Parameter	Value
Inner diameter (max)	10,5 m
Outer diameter (max)	11,1 m

Length (max)	No data available
Seabed penetration (max)	60 m
Width of leaching protection layer calculated from the foundation perimeter (¶)	20 m
Depth of the protective layer against leaching (¶)	1,5 m
Installation time per foundation (¶)	2 - 4 days

source: provided by the Contracting Authority

Figure 2. Monopal foundation



	MONOPILE FOUNDATION
	WORK PLATFORM
	TRANSITION PLATFORM
	TRANSITION ELEMENT (CONNECTOR)
	DRABIN
	PROTECTIVE LAYER AGAINST LEACHING
	"J" TUBA
	MONO PAL

source: provided by the Contracting Authority

Typical technical parameters of monopiles that may be applicable to the types of turbines under consideration are shown in the table below.

Table 5. Basic parameters of the monopal foundation type

Parameter	Value
Diameter (max)	10,0 m
Length (max)	120 m
Weight of foundation (max)	1500 tons
Weight of the connector (max)	500 tons
Width of leaching protection layer calculated from the foundation perimeter (¶)	25 m
Depth of the protective layer against leaching (¶)	1,5 m
Effective piling time of one foundation (¶)	6 h
Continuous piling time, assuming that all foundations are built, one by one, without downtime (2 working vessels) (¶)	360 h
Power of jackhammer (max)	4500 kJ
Number of air hammer blows per 1 hour	2800
Number of air hammer blows per pile	8400

source: provided by the Contracting Authority

4.3. Jacket foundations

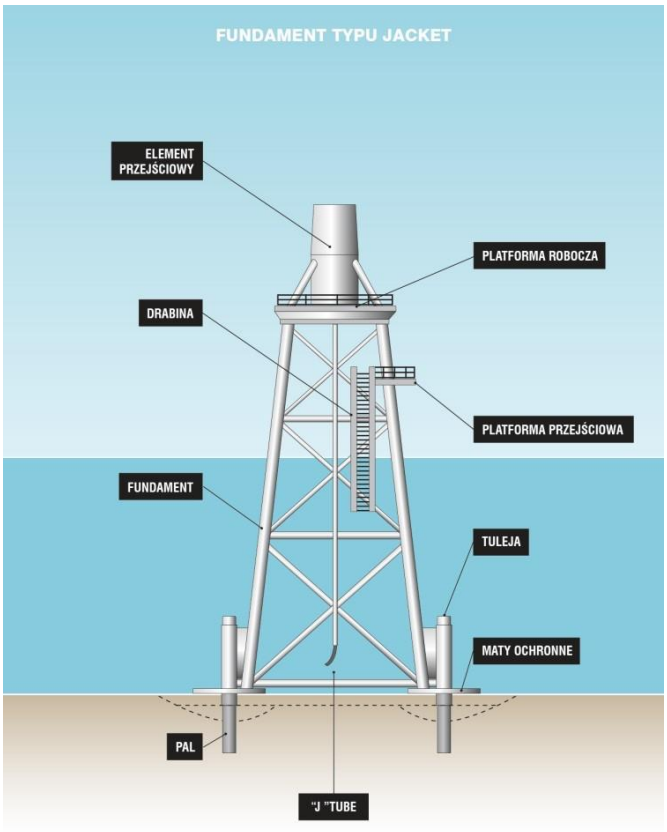
Jacket foundations have long been used in the Oil&Gas sector, with large foundation depths (even over 100 m). Therefore, they are dedicated to wind turbines planned for deeper waters (30 - 50 m). Jacket foundations are less sensitive to scour and seabed geotechnical conditions than monopiles, and are lighter and more stable than them. Disadvantages include a relatively high price, more difficult transportation and installation, more complicated construction requiring welding of numerous connections between its components. In addition, at the current stage of the project, it is permissible to also place a power substation on this type of foundation.

4.3.1. Description technical

The jacket-type foundation is constructed of four steel legs connected and reinforced by cross-mounted pipe brackets. Therefore, it is also called a truss foundation. At its top is a connector (transition piece), which allows the foundation to be connected to the power plant tower. These foundations are fixed to the bottom with 4 piles with a diameter of 1.8 - 3 m and a length of up to 70 m. There are also special mats (mud mats) at the bottom of each foundation leg to hold the structure in position on the bottom and prevent settlement of the structure before it is attached to the bottom with piles.

The surface part of the jacket-type foundation also contains additional elements, such as an anchorage area for service vessels, a ladder, an intermediate platform, a working platform, as well as elements of the power infrastructure (J-tubes, cables). A protective layer against leaching is also sometimes used.

Figure 3. Jacket foundation



	JACKET FOUNDATION
	INTERIM
	WORK PLATFORM
	DRABIN
	TRANSITION PLATFORM
	FUNDAMENT
	TULEY
	PROTECTIVE MATS
	PAL
	"J" TUBE

source: provided by the Contracting Authority

Typical technical parameters of jacket foundations that may be applicable to the types of turbines under consideration are shown in the table below.

Table 6. Basic parameters of jacket foundations

Parameter	Value
Distance between foundation legs (max)	40 m
Number of foundation legs (max)	4 pcs.
Diameter of foundation legs (max)	3 m
Pile diameter (max)	3 m
Pile length (max)	70 m
Weight of foundation (without piles, max)	800 tons

Parameter	Value
Weight of a single pile (max)	250 tons
Width of leaching protection layer calculated from the edge of a single pile (max)	10 m
Depth of the protective layer against leaching (¶)	1,5 m
Power of jackhammer (max)	2300 kJ
Effective piling time - one foundation (¶)	18 h
Continuous piling time, assuming that all foundations are built, one by one, without downtime (2 working vessels) (¶)	1080 h
Number of air hammer blows per 1 hour	2800
Number of air hammer blows per pile	8400

source: provided by the Contracting Authority

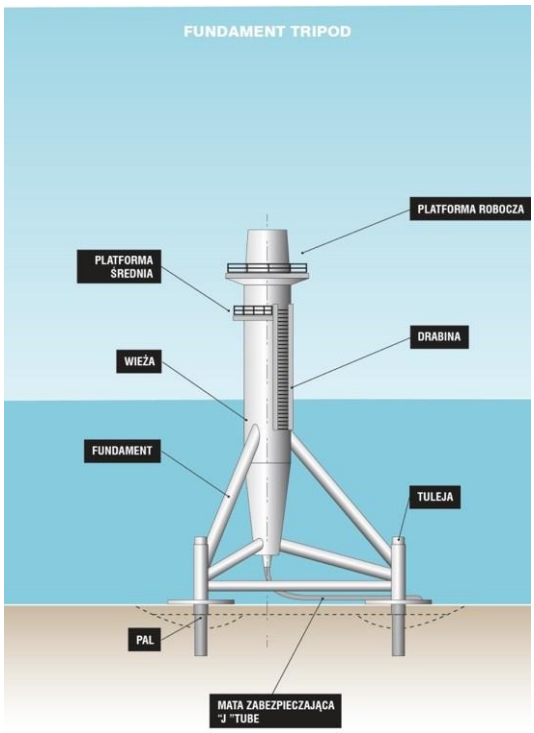
4.4. Foundations of the type tripod

Tripod foundations are used relatively infrequently in offshore wind farm projects. They are dedicated to depths of more than 30 m. They are characterized by high rigidity. However, it is a highly stressed structure, and its complex connections are prone to damage. In the case of the project in question, the foundation in question is allowed only for the marine substation.

4.4.1. Description technical

The tripod structure consists of one main member (1st stage), which is the base for the link and tower, and three 2nd stage members, which are the legs of the foundations. The tripod's legs are provided with bushings for attaching piles. There are also special mats (mud mats) at the bottom of each foundation leg to hold the structure in position on the bottom and prevent settlement of the structure before it is attached to the bottom with piles. There are also additional elements on the foundation, such as J-tubes, boat anchorages, transition platform, ladder, etc. A protective layer against leaching is also sometimes used.

Figure 4. Tripod type foundation



	TRIPOD FOUNDATION
	WORK PLATFORM
	MEDIUM PLATFORM
	DRABIN
	TOWER
	FUNDAMENT
	TULEY
	PAL
	SAFETY MAT "J" TUBE

source: provided by the Contracting Authority

Typical technical parameters of tripod foundations that may be applicable to the substation under consideration are shown in the table below.

Table 7. Basic parameters of tripod foundations

Parameter	Value
Distance between foundation legs (max)	40 m
Number of foundation legs (max)	3 pcs.
Diameter of the main foundation column (max)	7 m
Diameter of side pipes (max)	5 m
Pile diameter (max)	2,5 m
Pile length (max)	60 m
Weight of foundation (without piles, max)	900 tons
Weight of a single pile (max)	300 tons
Width of leaching protection layer calculated	10 m

Parameter	Value
from the edge of a single pile (¶)	
Depth of the protective layer against leaching (¶)	1,5 m
Power of jackhammer (max)	2300 kJ
Effective piling time - one foundation (¶)	18 h
Continuous piling time, assuming that all foundations are built, one by one, without downtime (2 working vessels) (¶)	1080 h
Number of air hammer blows per 1 hour	2800
Number of air hammer blows per pile	8400

source: provided by the Contracting Authority

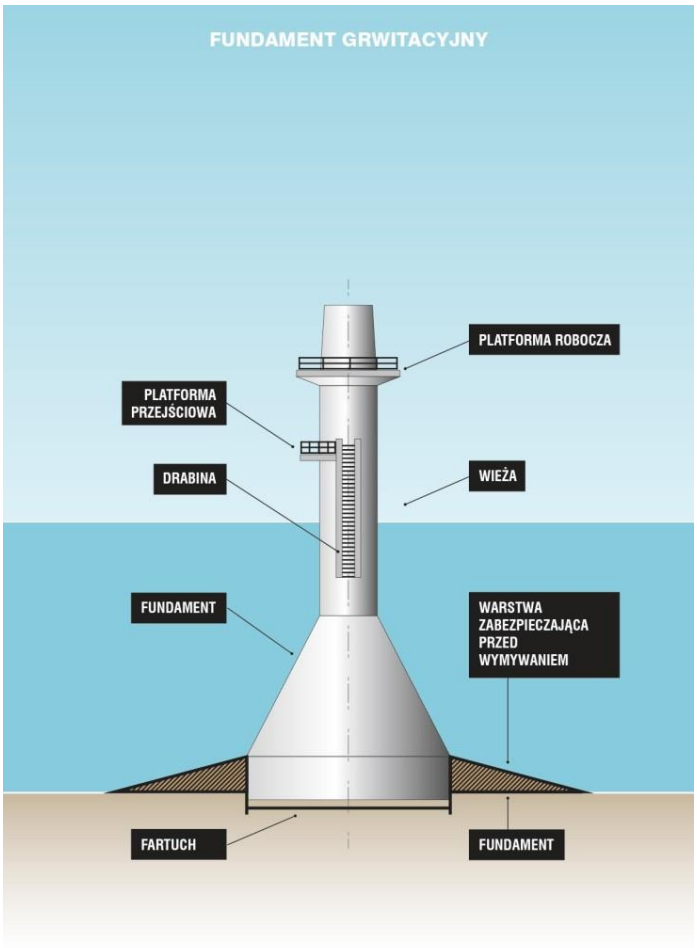
4.5. Foundations gravity

Gravity base structure (GBS) foundations are cost-effective at depths of 5 to 40 meters. They can withstand heavy mechanical loads, such as those associated with ice cover, and are relatively inexpensive. The disadvantages of these foundations are the long production cycle (about 3 months) and the relatively large site required. A foundation of this type is being considered for use only potentially as an optional foundation for a substation only.

4.5.1. Description technical

The gravity foundation is a reinforced concrete structure. Its concept is based on using a large mass to support the power plant's structure. The gravity foundation consists of a main shaft and a base. The base can be conical or flat (octagonal, hexagonal, circular, etc.). The foundation can additionally be equipped with a special "apron" (skirt), which can penetrate up to about 5 meters deep into the seabed (depending on substrate conditions) and additionally cause resistance to horizontal movements and reduce scour. The gravity foundation is filled with ballast. During its installation, cement mortar is injected below the base of the foundation to ensure permanent contact between the foundation and the supporting surface. A protective layer against leaching is also used.

Figure 5. Gravity foundation



	GRAVITY FOUNDATION
	WORK PLATFORM
	TRANSITION PLATFORM
	DRABIN
	TOWER
	FUNDAMENT
	LEACHING PROTECTION LAYER
	FARTUCH

source: provided by the Contracting Authority

Typical technical parameters of gravity foundations that may be applicable to a substation are shown in the table below.

Table 8. Basic parameters of gravity foundations

Parameter	Value
Base diameter (max)	50 m
The diameter to which the bottom is dredged (max)	70 m
Depth to which the bottom is dredged (max)	3 m
Weight of foundation (without ballast, max)	4,000 tons

Parameter	Value
Weight of ballast (max)	3000 tons
Width of leaching protection layer from the foundation perimeter (¶)	15 m
Depth of the protective layer against leaching (¶)	1,5 m
Foundation column diameter (max)	7,5 m
Bottom dredging time for 1 foundation (¶)	24 h
The assumed number of foundations for which the bottom will be dredged simultaneously	1 pc.

source: provided by the Contracting Authority

5. Internal power lines and telecommunications

5.1. Introduction

The internal power and telecommunications network of the BIII offshore wind farm will consist of submarine cables, connecting:

- power plants ("EW") among themselves (into cable circuits),
- a group of power plants with an internal marine substation ("MSE"),
- internal MSE with an external (which is part of another project) marine substation (optional).

At the current stage, it has been assumed that internal connection cables will be laid along corridors radiating from the MSE to individual power plants, with these cables connecting five to six power plants within a single corridor; the laying of an export cable in corridors connecting the internal MSE to the crossing points of the corridor created for the export cable (permit for laying and maintaining submarine cables in the exclusive economic zone for the project titled "The MSE of the MSE"); and the laying of an export cable in corridors connecting the internal MSE to the crossing points of the corridor created for the export cable. "External connection infrastructure of offshore wind farm Baltic Central III issued by Decision No. MFWK/1/13 dated July 19, 2013 ref. GT7pb/62/14823/decision/2013) with the boundary of the BIII OWF as defined by the PSZW, without crossing the export cable with the internal cables of the farm. The details will be determined only at the stage of the construction project, taking into account the provisions of the environmental decision. A parameter that can affect the magnitude of impacts of the internal connection infrastructure is the total length of the cables.

5.2. Description technical

Connections between EW and MSE will be made using 33 kV or 66 kV cables. Today, 33 kV, three-core cables are most commonly used, consisting of three insulated and shielded copper conductors, in steel wire armament and with additional insulation and an outer protective sheath. Usually, inside the cable, between the conductors, there is a telecommunications cable (optical fiber) for data transmission from the OWF area. If the cable is to be laid in an area characterized by high activity of other users, such as fishing or shipping, which significantly increases the risk of its failure and damage (mechanical damage related to anchoring of ships or hooking and tearing of the cable by fishing gear

used in fishing, such as trawls), cables with additional protective elements, such as additional reinforcement, are used. The 66 kV cable has a similar design, but has a higher transmission capacity compared to a 33 kV cable with the same conductor cross-section. The cross-sectional area of the cables will depend on the operating voltage and cross-section of the working conductor and will be 150 - 180 mm. The weight of such a cable is about 71 Mg/km on average.

The number of power plants included in a single cable circuit will depend on their power and will be determined at the stage of the construction permit. For example, in the case of a 12 MW power plant, it should be no more than 5 power plants. The smaller the number of power plants connected to a single circuit, the lower the risk, resulting from potential cable damage.

Possible interconnections between offshore substations will be made with 110 - 450 kV cables, similar in construction to those described above, with a cross section of up to 300 mm.

The number of cable sections, i.e., the sections between the various elements of the farm, will depend on the number of power plants and substations. Their maximum currently projected length is about 200 kilometers.

5.3. Intersections cables

Seabed surveys carried out for the BIII offshore wind farm have ruled out the presence of linear structures in its area, such as active submarine cables or pipelines. However, the creation of such facilities in the future or the need to cross internal cables belonging to the farm cannot be ruled out.

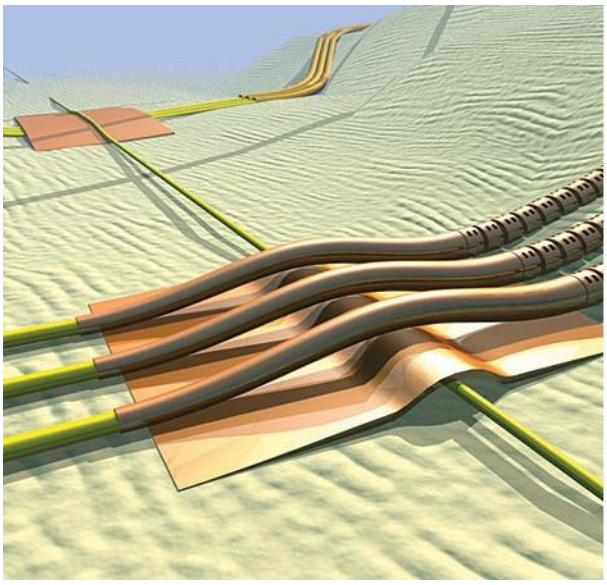
In such cases, safeguards are commonly used to allow collision-free crossing of linear objects on the seabed. There are a great many technical solutions and more are constantly being developed. Among the most popular are:

- precast concrete shoring or mattresses, covering existing linear structures,
- covering existing structures with a layer of stones, either loose or placed in bags,
- plastic safety mats,
- prefabricated steel enclosures,
- special plastic profiles fastened around newly laid cables.

All of the above-mentioned protections are manufactured from environmentally inert and seawater-resistant materials.

Examples of the solutions described above are shown in the drawings and photos below.

Figure 6. Plastic safety mats



Source: publicly available materials www.subseacableprotection.com available as of 09.2020.

Photo 2. Plastic profiles fastened around newly laid cables

Source: publicly available materials www.trelleborg.com, available as of 09.2020.

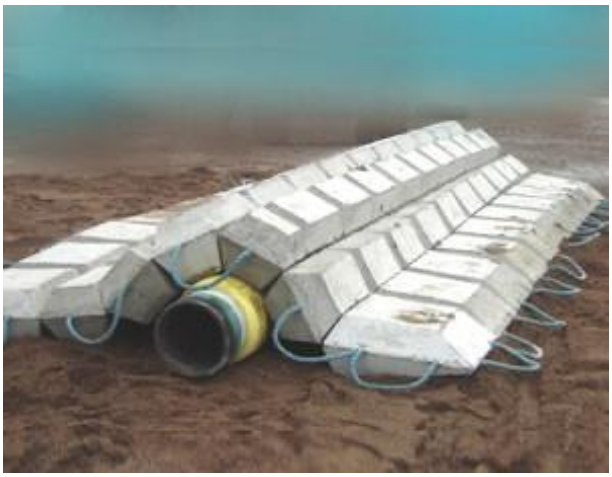
Photo 3. Precast concrete enclosures to protect existing linear structures

Source: publicly available materials www.sps.gb.com available as of 09.2020.

Photograph 4. Flexible concrete mattresses

Source publicly available material www.sps.gb.com available as of 09/20/20.

Figure 7. Flexible concrete mattress laid over existing pipeline



Source: publicly available materials www.sps.gb.com available as of 09.2020.

Photo 5. Bags filled with stones or gravel

Source: publicly available materials www.sps.gb.com available as of 09.2020.

The above-described protections are laid by means of installation vessels at the previously identified collision points of linear structures. Newly laid cables or pipelines are placed on the protections described above. Such protections can also be used on some sections of internal cables as protection against possible damage, such as ship anchors.

6. Marine substation power station

6.1. Introduction

Electricity generated by EWCs belonging to OWF BIII will be prepared at the farm for further transmission. For this purpose, an internal marine substation ("MSE") will be built in the central part of the farm. The construction of the substation will make it possible to reduce the number of export cables carrying electricity from the wind farm to the land, and will also result in a significant reduction in transmission losses.

Within the BIII offshore wind farm, a substation will be built that performs either a transformer function - receiving*alternate current* (AC) from the wind farms and then changing its voltage (33 or 66 kV) to a correspondingly higher level, allowing its further transmission in alternating-current technology; or a substation combining a transformer function with a converter function (AC/DC) - converting alternating current (AC) to direct current (DC), allowing its further transmission in direct-current technology. At this stage of the project, it has not yet been decided whether energy will be transmitted to the mainland using DC or AC technology. Accordingly, the following section characterizes both technologies and both types of stations.

The internal MSE described in this chapter will be located within the boundaries of the BIII OWF. At the current stage of investment, the approximate location of the MSE has been determined, indicated in Figure 4.

It should be emphasized that the infrastructure for the transmission of energy to land (i.e., offshore and onshore export cables, the onshore substation and possible additional offshore substations is a stand-alone, independent project involving the construction of the Offshore Transmission Infrastructure covered by a separate environmental impact assessment procedure. The information on the MIP contained in this report is only for the purpose of performing an analysis of possible cumulative impacts of the BIII OWF and the MIP. A description of both technologies is included in the chapter on offshore transmission infrastructure.

For the variant adopted for implementation, the construction of one offshore substation was assumed.

6.2. Description technical

6.2.1. Transformer station (AC)

Offshore alternating-voltage (AC) substations are designed to connect power cables transmitting electricity from EW, receive power produced by EW at a voltage level of 33 or 66 kV, increase the voltage level to send it directly to land or to another offshore substation (AC or AC/DC). In addition, control and safety systems will be installed at the station.

The offshore substation (AC or AC/DC) will also serve as an operations center, used during the life of the power plant.

The MSE AC will be built on a platform based on a monopal, jacket, tripod or gravity-type foundation. On the working platform will be installed the necessary power infrastructure, as well as social infrastructure.

Typical MSE AC equipment consists of the following:

- indoor switchgear,
- power transformers,
- mV and HV switchgear,
- chokes and capacitors for reactive power compensation,
- transformers or generators to provide backup power,
- grounding system,
- indoor plant control panel,
- low-voltage distribution equipment for auxiliary equipment and protection of the control and instrumentation system,
- uPS uninterruptible power supply,
- sCADA system devices,
- accommodation of service crews,
- rest rooms and social areas,
- material storage,
- workshop,
- boat harbor,
- helipad,
- safety and emergency equipment, including diesel generators, emergency lighting, and lifeboats.

Cable circuits connecting individual turbines will be connected to the MV switchgear. The standard nominal voltage level of internal cables is 33 kV. Metal, air-insulated or gas-insulated (SF6) switchgear will be used. The medium-voltage switchgear contains circuit breakers, one for each cable circuit, which allow them to be selectively switched off in the event of a disturbance on one of the cable circuits.

Transformers convert voltage from medium (MV) to high (HV) or highest (LV) voltage required by the transmission system. Transformers will most likely be insulated with oil.

The purpose of the HV or LV switchgear is to receive power from the transformers for onward transmission via the export cable, as well as to protect them by allowing one (or all) of them to be shut down in the event of a disturbance, such as an overload or short circuit, or during maintenance. A gas-insulated (SF6) MV or LV switchgear will most likely be used.

The substation can also be used as an installation site for environmental measurement and monitoring equipment, such as meteorological data or wave information.

Photo 6. Offshore substation

source: provided by the Contracting Authority

6.2.2. Converter station (AC/DC)

The marine AC/DC converter station will be built in addition to the transformer station described above, in case the developer decides to use DC transmission. It can be built as a separate facility or as an additional component of the AC substation, which will be the case if such transmission technology is chosen.

Electricity will be sent to the AC/DC converter station from the AC transformer stations. The station's task will be to convert alternating current (AC) to direct current (DC) and possibly raise the voltage in preparation for further transmission to land.

The AC/DC converter station will be built on a platform based on a monopal, jacket, tripod or gravity-type foundation. The necessary power infrastructure will be installed on the work platform, in particular equipment for converting AC to DC power, called "HVDC light" or "HVDC plus" depending on the manufacturer.

Among the main components of the converter station are:

- converter transformers,
- converter thyristors,
- harmonic filters,
- capacitor batteries,
- reactive power compensation chokes,
- external pumping station (cooling system).

It cannot be ruled out that in the future it will be possible to build AC/DC stations with higher capacity, which may at the same time change the parameters given above.

7. Offshore transmission infrastructure (not part of the Project)

The BIII offshore wind farm does not include infrastructure to transmit electricity generated by the farm to land. However, it may cause cumulative impacts with the Project in some areas of the marine part. The parameters of the Offshore Transmission Infrastructure are given on the basis of the Decision on Environmental Conditions dated March 12, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director of Environmental Protection in Gdańsk

"In the marine part, the MIP corridor will be a strip of about 1 km wide. It will begin at the interface between land and sea, about 3 km west of Ustka, and will reach a maximum of 49.5 km north of the coastline. In a section of about 13 km, the corridor will be widened to 2 km for safety reasons. The total length of the corridor is 109 kilometers, and the area is about 123 square kilometers. In the land part, the infrastructure corridor will run through the territories of 2 municipalities: the municipality of Ustka and the municipality of Slupsk, located in Slupsk County, Pomorskie Voivodeship. The underground cable line will cross the above municipalities for about 15 km south of the coastline. Depending on the number of cables to be laid, the width of the corridor at the operational stage can be up to 50 m.

The point of contact between the marine and land parts will be in Modlinek, along 235-238.75 km of the coast.

The MIP will consist of the following:

- In the marine section:
  - Submarine HV or LV cables with the parameters indicated below:
    - Number of cables 19 or 12;
    - Transmission voltage up to 500 kV;
    - Connection capacity of up to 1440 MW;
    - Cable thickness up to 300 mm;
  - Fiber optic lines with a diameter of 17-50 mm, which can be an integral part of submarine cables.
- In the land part:

- Overland MV or LV cables with the parameters indicated below:
  - Number of cables 19 or 12;
  - Transmission voltage up to 500 kV;
  - Connection capacity of up to 1440 MW;
  - The way the cables are laid flat or triangular;
- A land-based GPZ substation with an input voltage of 110 kV/400 kV and an output voltage of 400 kV;
- Possible overhead line of high or highest voltages with a transmission voltage of 110 kV - 500 kV;
- Fiber optic lines (17-50 mm in diameter, either laid next to the cable line trench or suspended from the poles of a possible overhead line)"[3].

Electricity generated in an offshore wind farm can be taken onshore, to the National Electricity System, via high-voltage or highest-voltage submarine cables in either direct current ("HVDC") or alternating current ("HVAC") technology. At this stage, the developer is unable to definitively indicate the technology in which the infrastructure will be built. The decision in this regard will depend primarily on the amount of energy that will need to be brought onshore, i.e. the number and capacity of the farms planned to be connected, as well as economic considerations (e.g. the cost of HVDC and HVAC technologies for a given length of infrastructure, estimated transmission losses for each technology, availability of components, etc.).

Undersea MV or LV cables will be laid using specialized vessels (so-called cable-layers) by sinking into the seabed, usually to a depth of no more than 3 meters (in some sections it may be necessary to sink to a greater depth, for example, due to intensive shipping and the high risk of cables being damaged by ship anchors). The technology and depth of cable laying depends on several factors, including the depth of the water, the type and characteristics of the substrate and environmental conditions. A plowing method using a trailing plow behind the ship from which the cables are fed is indicated for implementation. The cable is inserted by the plow into the created trench directly to the desired depth, and then backfilled with material that has been previously lifted by the plow to create a furrow and falls spontaneously to the bottom by gravitational forces after its passage. Other methods of laying cables, such as using specialized sleds, involve digging the cable into the seabed first (as opposed to the principle of the plow, which creates a furrow into which it simultaneously plunges the cable). In the case of rocky or stony ground, the cable is placed to the desired depth in a groove, which is created using specialized cutting equipment. Laying cables requires anchoring the installation vessel. It is estimated that an average of about 100 - 200 meters of cable can be laid at one anchor position, then the vessel must move and anchor again.

The choice of technology and the location of the landfall of the submarine cables (and in particular its distance from the shore) will depend primarily on the morphodynamic characteristics of the shore at the site of the planned cable landing and the possibility of further routing of the cables in the onshore part. A decision in this regard will be made at a later stage, taking into account the results of environmental studies, including the properties of the ground, which will be carried out in the zone of the planned landing. Typically, steerable drilling technology is used and bentonite-based drilling mud, which is inert to the environment, is used.

[3] Decision on environmental conditions dated March 2, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director of Environmental Protection in Gdansk for the project involving the construction of offshore electricity transmission infrastructure

Depending on the nature of the use of the maritime area through which the MIP route will pass, the depth at which the cables will be laid, the characteristics of the substrate, and the need to cross other existing cables or pipelines, additional protection of transmission cables may be necessary. Nowadays, for example, concrete mattresses or bags filled with cement or sand are used to cover cables, systems of additional cable covers (such as the Uraduct system) and others. Among other things, they provide protection against leaching from the layer of sediment with which the buried cables were covered, as well as additional protection, such as from anchors or fishing gear. Additional protection may be required only on certain sections of the MIP route, those with a higher risk of damage. In sections that cross shipping routes, the cable may need to be buried to a greater depth than on the rest of the MIP route.

Crossing the coastal zone can be done by trenchless methods - such as guided drilling or hydraulic jacking.

8. Progress technology

The characteristics of the project contained in this chapter have been made to the best knowledge of its authors and the Investor. However, the offshore wind industry is growing rapidly. Thus, it is not excluded that technical solutions other than those described will appear at the design stage. In the opinion of the report's authors, they will also be feasible, as long as their main technical parameters are similar to those given in this chapter and their environmental impact is no greater than that described in the report and considered acceptable.

9. Literature and other sources

9.1. Acts legislation

- Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457)
- Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Journal of Laws of 2021, item 2373, as amended)
- Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)

9.2. Literature, expert studies and administrative decisions administrative

- Environmental Impact Assessment Report Volume II, Section 3 Description of Technology, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015
- Decision on environmental conditions for implementation issued by the Regional Director of Environmental Protection in Gdansk on July 7, 2016, under the sign RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project titled. "Construction of the Polenergia Baltic Central III offshore wind farm"
- Decision on environmental conditions dated March 12, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director of Environmental Protection in Gdansk for the project consisting of "construction of offshore electricity transmission infrastructure"
- Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas for the project OWF Bałtyk Środkowy III, decision of the Minister of Transport, Construction and Maritime Economy of March 30, 2012, ref. GT7/62/1170069/decyzja/2012
- Polenergia offshore wind developments for projects Middle Baltic II and Middle Baltic III. High level technical design options study. Version 1, with additions. Royal Haskoning DHV Nederland B.V., 2013

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions

for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 4

Offshore wind farm execution stage

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named “Construction of the Bałtyk III Offshore Wind Farm”
DEC	Decision on environmental conditions for the project
EEZ	Exclusive Economic Zone
NPS	National Power System
BIII OWF / Project	Bałtyk Środkowy III Offshore Wind Farm
OS	Offshore substation
OTI	Offshore Transmission Infrastructure
WCS 2015	The worst case scenario from the Report 2015, which is a set of the parameters of the project causing the worst case impacts, and which was the basis for conducting the environmental impact assessment during the procedure concluded with the issuance of the Environmental Decision.
EIA	Environmental Impact Assessment
POM	Polish maritime areas
PSZW	Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection of July 7, 2016, ref. No.: RDOS-Gd-WOO.4211.12.2015.KP.22 (zpo)
Report/ EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director for Environmental Protection in Gdańsk
EIA Act	Act of October 3, 2008 *on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments*(consolidated text, Journal of Laws of 2022, item 1029).

1 Introduction

The section presents the execution stage of the Project, which consists in the construction of an offshore wind farm designated as Bałtyk Środkowy III OWF, with parameters modified in relation to the option for which the Environmental Decision was issued[1]. Since this Report is prepared for the purposes of the procedure for changing the decision on environmental conditions, the Report 2015[2], which was the basis for issuing the Environmental Decision, is a reference point for both the comparison of options and the basis for conducting the environmental impact assessment.

In the case of the option applied for implementation on the basis of the amendment to the Environmental Decision, it should be considered that most of the information contained in the Report 2015 concerning the project implementation phase remains adequate also in the procedure in question concerning the amendment to the Environmental Decision. This results from the fact that admittedly some parameters of the Project change, in particular its parameters related to the number of wind turbines decreasing by 50% compared to the Environmental Decision, some parameters are clarified or specified to the extent allowed by the Environmental Decision, e.g. the foundation method, but the vast majority of parameters remain the same. As a consequence, the specificity of the works carried out at the construction stage described in the Report 2015 does not change, whereas some of the modified parameters of the Project may affect the magnitude of impacts due to the number of planned wind turbines, and which also affects the time necessary to perform individual tasks as part of the construction stage.

After additional analyses, in the option selected for implementation, it is planned to use monopile foundations for all wind turbines within the Project. If it is not technically possible to construct such foundations for any of the planned wind turbines, it is planned to use jacket foundations. In the case of the internal offshore substation, at the current stage it is not possible to limit the type of the considered foundations. In view of it, the internal offshore substation may be founded on a monopile, tripod, jacket (truss) or gravity-base foundation. The final decision on the foundation method will be specified in the building permit design, based on verified surveys of geotechnical conditions adapted to the selected types of generators and substations.

The above changes did not affect the type of the applied technology of project implementation and will not affect the implementation of the entire project. The description of the execution stage was prepared on the basis of the Environmental Impact Assessment Report, Volume II, Chapter 4 Description of the construction process, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015.

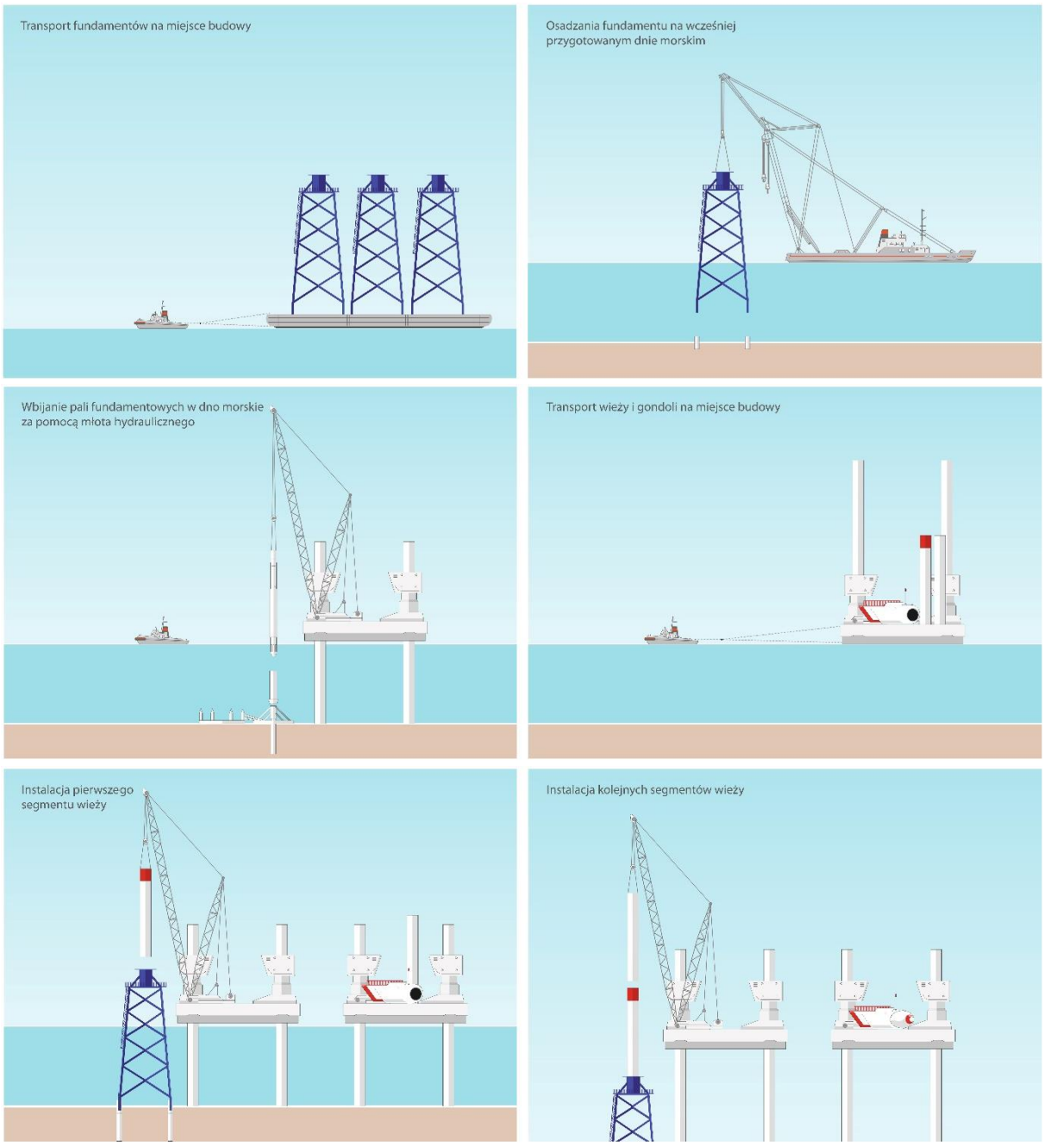
[1] Decision of the Regional Director for Environmental Protection in Gdańsk, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22 of July 7, 2016.

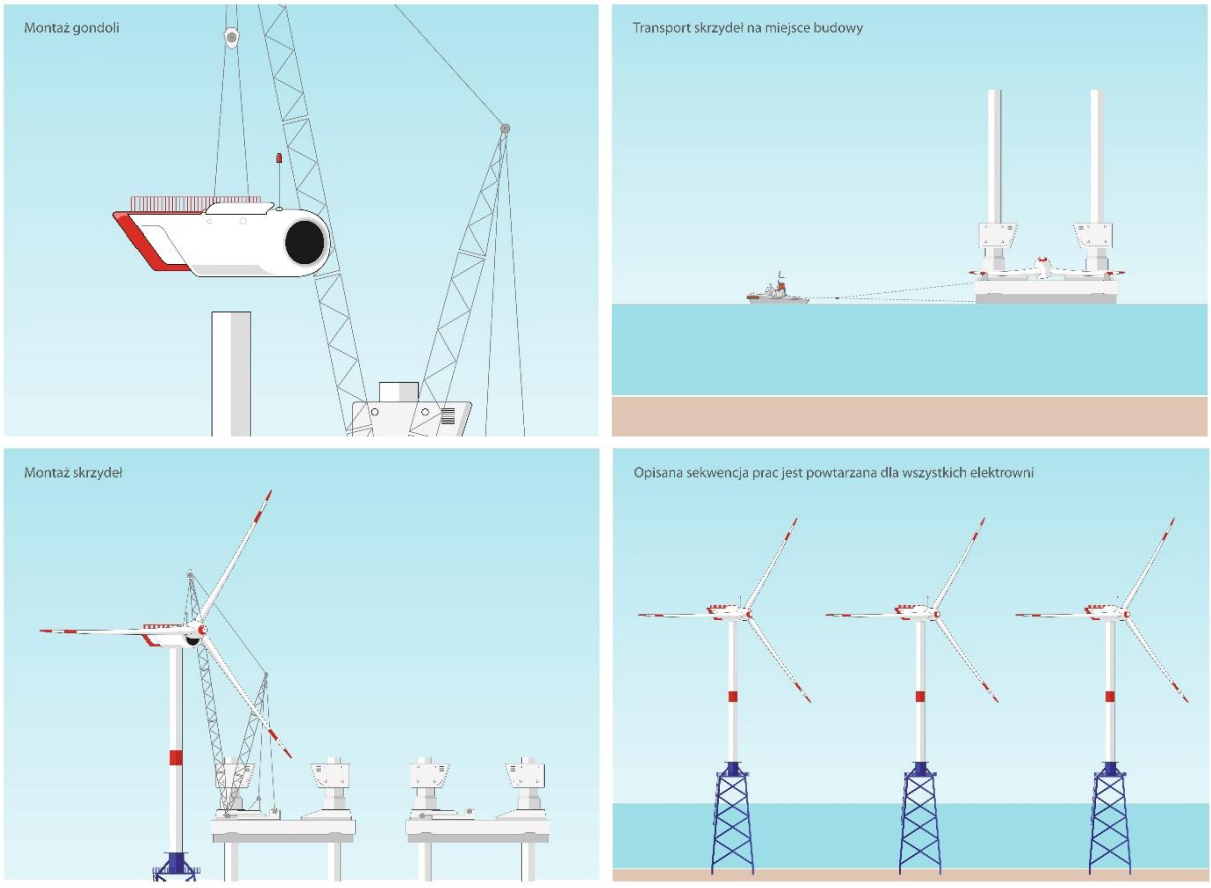
[2] Bałtyk Środkowy III Offshore Wind Farm. Environmental Impact Assessment Report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

2 Construction of the wind farm

The implementation of the Project may be carried out in stages, of which the first stage will cover the capacity in the range of 600–720 MW. The first stage is planned for implementation in the years 2024–2027. Implementation of subsequent stages will depend on the investment decisions made based on the current market conditions. The total construction time for the first stage will be up to 3.5 years. The time of construction of subsequent stages will depend on the decision regarding their size (number of wind turbines) and available technologies and equipment for the construction of offshore wind farms.

Figure 1. OWF construction process





Source: provided by the Employer

PL	EN
Transport fundamentów na miejsce budowy	Transport of foundations to the construction site
Osadzania fundamentu na wcześniej przygotowanym dnie morskim	Foundation setting on a previously prepared seabed
Wbijanie pali fundamentowych w dno morskie za pomocą młota hydraulicznego	Driving foundation piles into the seabed using a hydraulic hammer
Transport wieży i gondoli na miejsce budowy	Transport of the tower and nacelle to the construction site
Instalacja pierwszego segmentu wieży	Installation of the first tower segment
Instalacja kolejnych segmentów wieży	Installation of subsequent tower segments
Montaż gondoli	Installation of the nacelle
Transport skrzydeł na miejsce budowy	Transport of blades to the construction site
Montaż skrzydeł	Installation of blades
Opisana sekwencja prac jest powtarzana dla wszystkich elektrowni	This sequence of works is repeated for all wind turbines

2.1 Construction and assembly ports

Prior to commencement of the construction works, the Investor will select the construction and assembly port. It will mainly serve the following tasks:

- unloading of farm components from delivery vessels;
- storage of farm components so as to ensure continuity of deliveries to the installation site during favorable weather conditions;

- installation of nacelles, rotors, towers;
- loading of single elements or partially assembled components onto jack-up vessels or other installation vessels.

The construction and assembly port should meet a number of requirements indicated in the table below.

Table 1. Requirements for the construction and assembly port

General requirements	
Typical terminal area	8 - 38 ha
Quayside length	300 m
Minimum depth	10 m
General requirements	
Clearance	> 10 m
Minimum soil capacity	15-20 Mg/m^2
Office, canteen, amenities	approx. 500 m^2
Separated areas for contractors	+
Accommodation for personnel, locker rooms, parking area	+
Access from the sea	
Availability for service, transport, medium jack-up vessels	+
Availability for large jack-up vessels, cable-laying vessels, large transport vessels	+
Port basin available for vessels with appropriate dimensions (length, width)	150 m, 45 m
Port facilities	
Fuel storage	+
Tugboat services	+
Transshipment services	+
Crane	+
Port infrastructure	
Crane trucks, crawler cranes up to 1,000 Mg	+
No high obstacles, e.g. masts	+

Source: RHDHV technical concept

Based on the above criteria, three potential construction and assembly ports for the BIII OWF can now be indicated. They are presented in the table below. It cannot be excluded that, until the commencement of the construction of the BIII OWF, there will be changes, e.g. alteration of ports, changes in technologies that will enable the use of other ports.

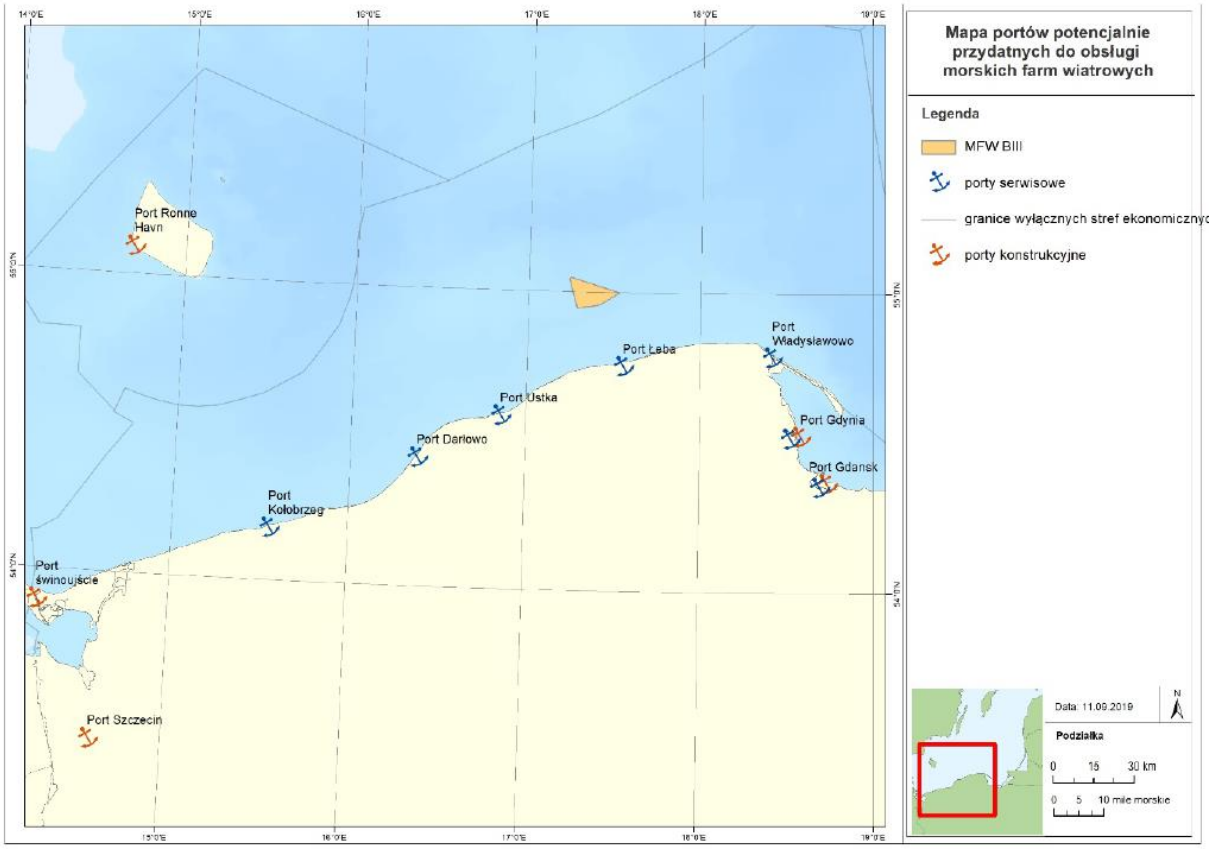
Table 2. Usable construction and assembly ports

Name of the port	Distance from the BIII OWF [km]	Depth [m]
Gdańsk	170	15
Gdynia	170	13
Świnoujście	210	12.8
Ronne Havn (Denmark)	145	8

Source: RHDHV technical concept

Usable construction ports are marked in red in the following figure.

Figure 2. Usable construction and assembly ports



Source: provided by the Employer

PL	EN
Port Ronne Havn	Rønne Havn Port
Port Świnoujście	Port of Świnoujście
Port Kołobrzeg	Kołobrzeg Port
Port Darłowo	Port of Darłowo
Port Ustka	Port of Ustka
Port Łeba	Port of Łeba
Port Władysławowo	Port of Władysławowo
Port Gdynia	Port of Gdynia
Port Gdańsk	Port of Gdańsk
Port Szczecin	Port of Szczecin

Mapa portów potencjalnie przydatnych do obsługi morskich farm wiatrowych	Map of ports potentially useful for operation of offshore wind farms
Legenda	Legend
MFW BIII	BIII OWF
porty serwisowe	service ports
granice wyłącznych stref ekonomicznych	boundaries of the Exclusive Economic Zones
porty konstrukcyjne	construction ports
Data: 11.09.2019	Date: September 11, 2019
Podziałka	Scale
mile morskie	nautical miles

2.2 Expected types of vessels and vessel traffic

It should be emphasized that the types and traffic of vessels will depend on numerous, currently unknown factors, such as, e.g., the number, type and size of turbines installed at a given stage, manufacturer, availability of construction and service vessels, economic conditions at the construction stage, etc. **Therefore, only approximate data is presented below, based on previous experience in the implementation of similar projects, in order to illustrate the possible scale of the project.** Final assumptions concerning vessel traffic for the BIII OWF may be made at a later stage, when the building permit design is prepared and the final concept of organization at the construction stage is developed. At the same time, it should be emphasized that the reduction of the number of construction and service vessels and the minimization of their stay at sea is one of the main directions of actions aimed at reducing investment costs in the offshore wind energy sector. Larger and larger vessels are being built, which can transport and build an increasing number of wind turbines simultaneously and without the support of additional vessels. Therefore, it should be expected that the values specified below may be reduced and not increased.

It is expected that vessels similar or more modern than those described below will be used for the construction of the BIII OWF. The condition presented and subject to impact assessment in the further part of the report is the worst case scenario as the development of technology will allow the shortening of the construction time and the reduction of pressure on the environment by decreasing the number of construction units. This also applies to potential cumulative impacts with other projects of this type – during their implementation, similar technologies will be used which, as technology advances, have an increasingly smaller impact on the environment.

Table 3. Use of vessels for installation of foundations of one substation

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
statek transportowy *(transport vessel)*	5 business days	10 MW	1.25 - 2.5 m^3/h
duży holownik *(large tug boat)*	5 business days	10 MW	1.25 - 2.5 m^3/h
mały holownik *(small tug boat)*	5 business days	2 MW	0.25 - 0.5 m^3/h
duży statek typu jack-up *(large jack - up vessel)* do instalacji fundamentów	5 business days	21 MW	2.63 - 5.25 m^3/h
statek pomocniczy *(support vessel)*	5 business days	2 MW	0.25 - 0.5 m^3/h
statek hotelowy *(hotel*	5 business days	14 MW	1.75 - 3.5 m^3/h

vessel)			

Source: RHDHV technical concept

Table 4. Use of vessels for transport and installation of the working platform of one substation

Type of vessel	Operating time per station	Engine power	Fuel consumption
statek do przewozu ładunków wielkogabarytowych *(heavy lift vessel)*	5 business days	4.5 MW	0.56 - 1.12 m^3/h
duży statek typu jack-up *(large jack - up vessel)* do instalacji platformy	5 business days	21 MW	2.63 - 5.25 m^3/h
statek pomocniczy *(support vessel)*	10 business days	2 MW	0.25 - 0.5 m^3/h
statek hotelowy *(hotel vessel)*	5 business days	14 MW	1.75 - 3.5 m^3/h

Source: RHDHV technical concept

Table 5. Use of vessels for transport of one tripod foundation

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
statek do przewozu ładunków wielkogabarytowych *(heavy lift vessel)*	1 business day	4.5 MW	0.56 – 1.12 m^3/h

Source: RHDHV technical concept

Table 6. Use of vessels for installation of one tripod foundation

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
statek do przewozu ładunków wielkogabarytowych *(heavy lift vessel)*	1 business day	4.5 MW	0.56 - 1.12 m^3/h
statek pomocniczy *(support vessel)*	2 business days	2 MW	0.25 - 0.5 m^3/h
statek hotelowy *(hotel vessel)*	1 business day	14 MW	1.75 - 3.5 m^3/h

Source: RHDHV technical concept

Table 7. Use of vessels for transport of one jacket foundation

Type of vessel	Operating time per	Engine power	Fuel consumption

	foundation		
statek transportowy *(transport vessel)*	1 business day	10 MW	1.25 – 2.5 m^3/h

Source: RHDHV technical concept

Table 8. Use of vessels for installation of one jacket foundation

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
duży statek typu jack-up *(large jack - up vessel)*	1 business day	21 MW	2.63 – 5.25 m^3/h
statek pomocniczy *(support vessel)*	2 business days	2 MW	0.25 – 0.5 m^3/h
statek hotelowy *(hotel vessel)*	1 business day	14 MW	1.75 – 3.5 m^3/h

Source: RHDHV technical concept

Table 9. Use of vessels for transport of one gravity-base foundation

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
statek transportowy *(transport vessel)*	1 business day	10 MW	1.25 - 2.5 m^3/h
duży holownik *(large tug boat)*	1 business day	10 MW	1.25 - 2.5 m^3/h
mały holownik *(small tug boat)*	1 business day	2 MW	0.25 - 0.5 m^3/h

Source: RHDHV technical concept

Table 10. Use of vessels for installation of one gravity-base foundation

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
duży statek typu jack-up *(large jack - up vessel)*	1 business day	21 MW	2.63 - 5.25 m^3/h
statek pomocniczy *(support vessel)*	2 business days	2 MW	0.25 - 0.5 m^3/h
statek hotelowy *(hotel vessel)*	1 business day	14 MW	1.75 - 3.5 m^3/h

Source: RHDHV technical concept

Table 11. Use of vessels for transport of one monopile foundation

Type of vessel	Operating time per	Engine power	Fuel consumption

	foundation		
statek transportowy *(transport vessel)*	1 business day	10 MW	1.25 - 2.5 m^3/h
duży holownik *(large tug boat)*	1 business day	10 MW	1.25 - 2.5 m^3/h
mały holownik *(small tug boat)*	1 business day	2 MW	0.25 - 0.5 m^3/h

Source: RHDHV technical concept

Table 12. Use of vessels for installation of one monopile foundation

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
duży statek typu jack-up *(large jack - up vessel)*	1 business day	21 MW	2.63 - 5.25 m^3/h
statek pomocniczy *(support vessel)*	2 business days	2 MW	0.25 - 0.5 m^3/h
statek hotelowy *(hotel vessel)*	1 business day	14 MW	1.75 - 3.5 m^3/h

Source: RHDHV technical concept

Table 13. Use of vessels for transport of elements of one wind farm (tower, blades, nacelle, etc.)

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
statek do przewozu ładunków wielkogabarytowych *(heavy lift vessel)*	1 business day	4.5 MW	0.56 – 1.12 m^3/h

Source: RHDHV technical concept

Table 14. Use of vessels for installation of elements of one wind farm on the foundation (tower, blades, nacelle, etc.)

Type of vessel	Operating time per foundation	Engine power	Fuel consumption
duży statek typu jack-up *(large jack - up vessel)*	1 business day	21 MW	2.63 - 5.25 m^3/h
statek pomocniczy *(support vessel)*	2 business days	2 MW	0.25 - 0.5 m^3/h
statek hotelowy *(hotel vessel)*	1 business day	14 MW	1.75 – 3.5 m^3/h

Source: RHDHV technical concept

Table 15. Use of vessels for cable installation

Type of vessel	Operating time per cable section	Engine power	Fuel consumption
kablowiec *(cable laying vessel)*	20–25 hours per section (i.e. cable section between individual elements of the farm)	10 MW	1 – 2.5 m^3/h

Source: RHDHV technical concept

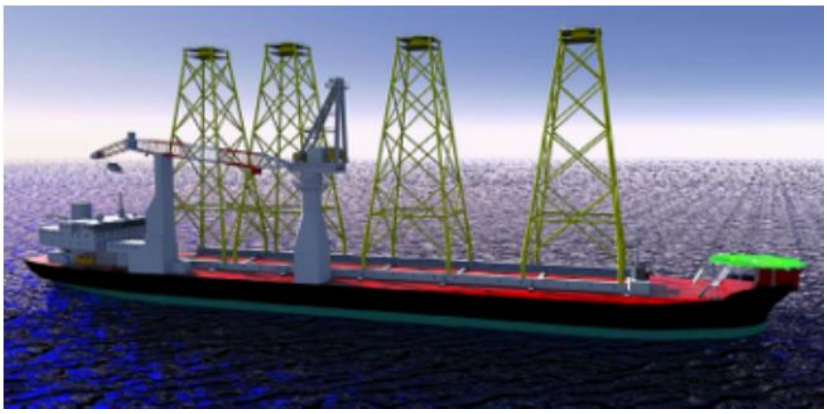
Vessels or jack-up barges are a type of mobile platform consisting of a floating hull equipped with several movable legs to lift the hull above sea level. The jack-up vessel moves independently, while the jack-up barges are transported to the project site by means of tugboats. Once the desired location is reached, the vessel legs are lowered to the seabed, which stabilizes its position. Large jack-up vessels have a lifting capacity of up to 1,200 Mg and 26 m and average dimensions of 150 m (length) x 40 z (width) x 4.5 m (draft).

Photo 1. Jack-up vessel

Source: www.seajacks.com [accessed: March 2022]

Heavy lift vessels can be used for transport as well as (depending on the equipment) for installation of some elements of the farm, e.g. jacket foundations (in the photo).

Photo 2. Large cargo vessel



Source: www.4coffshore.com [accessed: March 2022]

During periods of intensive works, the accommodation of service crews at sea is often used. These may be smaller vessels dedicated to work on wind farms, with the possibility of accommodation of 30 to 100 persons, or larger **hotel vessels**.

Photo 3. Floating hotel used at Borkum Riffgrund 1 & 2 and Gode Wind 1 & 2 farms (Germany)

Source: www.orested.com [accessed: March 2022]

Support vessels will be used for various types of installation works, transportation of equipment, crews, tools, spare parts, etc. These are mostly small fast vessels (25–30 knots), with a capacity of 1–2.5 Mg/up to 12 persons and typical dimensions of 25 m (length) x 6 m (width) x 1.1 m (draft). Single hull vessels, catamarans, SWATH vessels are used in this role.

Photo 4. Support vessel

Source: www.4coffshore.com [accessed: March 2022]

In addition to the above-mentioned basic units, depending on the selected farm components, the following may be used during the construction of the wind farm:

- dredgers used to prepare the seabed for gravity-base foundations (average engine power of 1.5 MW, 200–500 business days),
- barges used for transport of equipment for preparation of the seabed for foundations (average engine power of 1.5 MW, 200–500 business days),
- barges used for removal of excavated material (it is expected that it will be left rather at the project site) (average engine power of 1 MW, 200–400 business days),
- vessel for transport of stones/boulders used to prepare the seabed for gravity-base foundations (average engine power of 6.5 MW, 200–500 business days),
- vessel used for the discharge of stones/boulders at the project site (average engine power 3.7 MW, 200–500 business days),
- pump and generator used for pumping cement binder, e.g. when installing monopiles (average engine power of 1 MW, 100–200 business days),
- barge used for transport of binder and binding equipment (average motor power of 1 MW, 100–200 working days),
- vessel for transport of stones/boulders used for scour protection (average engine power of 6.5 MW, 300–600 business days),
- vessel for the discharge of scour protection stones/boulders (average engine power 3.7 MW, 300–600 business days).

2.3 Transport and installation of farm elements

It is currently impossible to determine the manufacturers of individual elements that may be used in the design. Depending on the place of production, they will be transported either directly to the area of the wind farm location or will be stored in a selected port that will serve the construction of the farm, in the amount necessary to construct a given stage of the project.
Installation of farm elements may take place only under good weather conditions, i.e. slight wave motion. In practice, this means that installation works should be planned for the period from March to October, with waiting periods for the occurrence of favorable weather conditions to be taken into account.

2.3.1 Monopile foundations

Transport and installation of steel monopiles include the following works:

1) transport from the manufacturer or from the place of storage on vessel, barge or by floating (by means of a tugboat);
2) seabed preparation (if necessary);
3) positioning of the installation vessel in the desired position and then properly anchoring or lowering the legs to the seabed (in the case of a vessel or jack-up barge);
4) positioning of the pile by the installation vessel in the vertical position and lowering the pile to the seabed; the pile is partially driven into the seabed under its own weight;
5) placement of the pile at the required depth in the bottom by one of the available methods (hammering, drilling or combination of these techniques), depending on the local, technical and economic conditions;
6) installation of the connector and fastening it on the pile (usually by means of cement binder, bolts or welding);
7) installation of additional elements such as cable shields *(J-tubes),* cables, places of anchoring of boats, intermediate platform, ladder, etc.;
8) placement of a scour protection layer around the pile (this operation can also be performed before driving the pile).

The installation time of one steel monopile is estimated at 2 days, excluding bad weather conditions, of which the time of active pile driving is maximum 6 hours (worst case scenario). The described scope of works is repeated for each foundation.
Sometimes driving piles into the seabed may be difficult due to its design. In this case, in the first place, e.g. drilling may be used, which will enable further installation of the pile using standard methods. It is impossible to determine the duration of drilling at this stage as it will depend on site conditions.
If reinforced concrete monopiles are used, the sequence of works is similar. However, pile driving is not used. It is placed in a vertical position on the bottom and penetrates it to a certain depth under its own mass. Then, the pile is driven into the seabed by drilling, which takes place inside the rings forming the pile. Cuttings are usually left in the project area. As mentioned earlier, this technology is unlikely to be used.

2.3.2 Jacket foundations

Transport and installation of jacket foundations include the following works:

1) transport of the foundation from the manufacturer or from the storage place by means of a vessel or barge; the connector and additional infrastructure (e.g. boat access point) are most often already installed in the shipyard;
2) preparation of the seabed at the place of installation – driving of piles into the seabed with the use of template, which allows their precise location; the piles are driven most often by means of a hydraulic hammer or drilling; a reverse sequence is also possible (i.e. piles are driven after placing the foundation on the seabed);
3) lowering of the foundation to the seabed by means of a jack-up vessel;
4) fixing of the foundation to the piles by means of cement mortar or swelling;
5) possible installation of additional elements such as *J-tubes,* places of anchoring of boats, intermediate platform, ladder;
6) placement of a scour protection layer around the foundation;

The installation time of one jacket foundation is estimated at 4–7 days, excluding bad weather conditions, of which the time of active pile driving is maximum 18 hours (worst case scenario).

2.3.3 Tripod foundations

Transport and installation of tripod foundations include the following works:

1) transport of the foundation from the manufacturer or from the storage place by means of a vessel or barge; the connector and additional infrastructure (e.g. boat access point) are most often already installed in the shipyard;
2) lowering of the foundation to the seabed by means of a jack-up vessel;
3) driving of piles into the seabed through sleeves fixed on the tripod legs; the piles are usually driven using a hydraulic hammer or drilling;
4) fixing of the foundation to the piles by means of cement mortar or swelling;
5) possible installation of additional elements such as J-tubes, places of anchoring of boats, intermediate platform, ladder;
6) piles can also be placed in the seabed before tripod installation using a template; this procedure is similar to the installation of jacket foundation;
7) placement of a scour protection layer around the foundation;

The installation of the tripod foundation lasts on average 4–7 days and may be extended depending on weather conditions, of which the time of active pile driving is maximum 18 hours (worst case scenario).

2.3.4 Gravity-base foundations

Transport and installation of gravity-base foundations include the following works:

1) transport of the foundation from the manufacturer by means of a barge or by floating (by means of a tugboat) (if this is a floating structure) to the project site;
2) preparation of the seabed by removal (e.g. using an underwater excavator) of a layer of light, moving sediments with a depth of approx. 3 m and a width corresponding to the foundation base (up to 50 m), increased by a strip used to lay a scour protection layer, leveling the surface using a suction dredger and then filling this space with stones (gravel) and concrete;
3) lowering of the foundation to the seabed by means of a jack-up vessel;
4) pumping of cement mortar below the foundation base in order to ensure constant contact of the foundation with the load-carrying surface; injection is usually carried out by means of a flexible hose and a pre-installed pipe system;
5) filling of the foundation with ballast by pumping sand into it or ejecting iron rocks/ores from the ballast barge;
6) placement of scour protection materials around the base;
7) connector installation (the wind turbine tower can be connected to the foundation shaft also directly by means of a screw flange);
8) possible installation of additional elements such as *J-tubes,* places of anchoring of boats, intermediate platform, ladders; accessories can be installed onshore or installed on site; cable shields *(J-tubes)* can be installed outside or inside the foundation structure, depending on the design and ballast used.

Unlike other types of foundations, gravity-base foundations require no piling, so their installation is not a source of significant underwater noise.
The time of erection of a single gravity-base foundation is estimated at 4–7 days, excluding breaks caused by bad weather.

2.3.5 Wind turbines

The typical offshore wind turbine construction sequence is presented below:

1) towers and turbines are delivered by land or sea to the port from which the construction will take place;
2) towers and turbines are loaded onto a vessel or a barge and delivered to the project implementation site;
3) the above-mentioned elements can also be delivered directly from the manufacturer to the project implementation site;
4) turbine installation is usually carried out using a jack-up vessel, but other equipment can also be used;
5) turbines and towers are usually delivered to the project implementation site in sections and installed at sea, but it is also the case that these elements are installed onshore and delivered in such a form to the OWF construction site;
6) in the case of installation of individual sections at sea, the first part is mounted on the foundation by means of a connector and subsequent sections are attached to it;
7) the nacelle is mounted on the highest part of the tower;
8) the rotor and blades are lifted and mounted on the main shaft;
9) the process is repeated for each turbine.

Installation of a single turbine takes approx. 2–3 days, excluding bad weather breaks.
Once all turbines are installed and internal MV cables are connected, their tests and technical acceptance are performed. The tests include checking the generator, switchgear, gear box, transformer, cabling, meteorological equipment, turbine control systems, safety systems, etc. This process may take up to 10 days for one wind turbine.

2.3.6 Substations

Substations will be installed in a manner similar to wind turbines:

1) the substation foundation will be transported using an appropriate vessel or barge to the substation placement site;
2) the foundation will be lifted off the vessel and placed on the seabed using a jack-up vessel-mounted crane;
3) the foundation will be installed on the seabed (the installation method will depend on the foundation type);
4) the station platform will be delivered on a transportation vessel or barge, probably with already installed equipment;
5) the platform will be placed using a crane onto the foundation and fixed to the same;
6) the cables will be connected to the corresponding substation equipment (the method is described in the chapter related to cable infrastructure).

However, it is not planned to construct a separate measuring and survey station. Environmental survey equipment will most likely be installed on the substation.
It should be added that new solutions may also be applied in the farm in the form of substations installed on a jack-up platform. Such a platform is floated to the project implementation site and then its legs are lowered onto the seabed and fixed to it.
It should be emphasized that the parameters of the foundations planned to be used for the implementation of the Project are the most important from the point of view of carrying out the environmental impact assessment. It is assumed that the parameters of the AC/DC substation foundations will not exceed the values indicated in Volume II, Chapter 3 of the Report.

In the case of LIDAR measuring stations on floating structures, the installation process depends on the type of support structure, but most often it consists in appropriate anchoring and does not require involvement of large installation vessels, which makes it less sensitive to weather conditions.

Photo 5. Installation of the substation platform on a monopile foundation

Source: www.4coffshore.com, accessed: March 2022

2.3.7 Submarine cables

Submarine power cables are laid using specialized vessels (so-called cable-laying vessels) by sinking the cable into the seabed, usually no more than 3 m deep. At some sections, it may be necessary to lay cables at a greater depth.

The characteristic feature of the cable-laying vessels is the loading surface in the form of a drum, which can accommodate large amounts of submarine cables. Depending on the equipment of the vessels, they shall have one or more places of loading on the deck. When laying the cable, it is discharged into the water from the drum, where the device dragged behind the vessel lays it into the seabed. It is also possible to connect more cables from different drums into systems.

The loading capacity of commonly used cable-laying vessels is several thousand tonnes. For example, 3,900 Mg of 40 to 48 km of a submarine cable can be loaded on the Sea Spider cable-laying vessel, assuming 80 to 100 kg per meter of cable. The Sea Spider vessel is 86 m long and 24 m wide. The draft of the vessel, depending on the load, is 2.00 m to 4.30 m.

Photo 6. Sea Spider cable-laying vessel

Source: www.schottel.de, accessed: March 2022

The cable-laying vessels have special positioning and maneuvering systems that enable them to lay cables in the sea exactly in the desired position. In addition, such vessels have the appropriate lifting technology to manipulate from the deck the devices for laying cables, sinking them into seabed and taking out.

The technology and depth of cable laying depends on several factors, including water depth, type and properties of the substrate and environmental conditions. Submarine cables can be laid directly on or under the seabed at a suitable depth. In the latter case, different devices can be used to create chases in the seabed and to sink the cable; these include:

- **a plow dragged behind a vessel** – the operation principle is similar to that of a conventional plow. The plow is dragged behind the vessel and the plow blade forms a narrow chase in which the cable is laid; everything is done in one operation because the cable is routed inside the plow structure and is laid immediately after a chase is formed. Then, the chase falls in by itself under gravity forces.
- **mass flow excavator** – the chase for laying cables is excavated in the seabed using high-pressure water jets. The excavator (known also as excavating blade) provides fluidization of the material from the substrate along the excavating blade using high-pressure water nozzles and high-pressure water jets flowing out of them. Visually there is no trench, but the substrate becomes boggy. The cable is sinking into it under the influence of its weight. In this manner, the cable may be sunk into the seabed to the desired depth. Sedimentation and compaction processes that occur automatically after the cable laying equipment has completed its work will cause the chase to collapse immediately.
- **cable milling machine** – used in the case of more stable substrate. The laying chase is formed by cutting technology in a similar way as the chain saw works. The cutting and machining elements ensure that the seabed material is transported, and thus a chase for laying the cables is created. At the same time, the cable is laid in the chase at the required depth. Sedimentation processes cause backfilling of the chase after the cable laying equipment has passed. In some cases, it may be necessary to backfill the chase mechanically.

Photo 7. Cable plow

Source: UK Department for Business Enterprise & Regulatory Reform[3]

Photo 8. Mass flow excavator

Source: UK Department for Business Enterprise & Regulatory Reform[4]

The cable-laying equipment can be controlled and powered by the cable connected to the vessel or can be equipped with its own power supply. Special sonar and video technology, as well as monitoring systems, support the control of cable laying, also enabling observation of works carried out underwater.

In order to facilitate the location of the laid cables, a reference marker can be placed on the magnetic reinforcement of the cable during laying in such a way that special instruments can subsequently locate, analyze and accurately determine the location.

If the fiber optic line is not an integral part of the cable, it is laid next to the power cable. Cable laying

[3] Review of cabling techniques and environmental effects applicable to the offshore wind farm industry, 2008.
[4] Review of cabling techniques and environmental effects applicable to the offshore wind farm industry, 2008.

requires the installation vessel to be anchored. It is estimated that on average approx. 100–200 m of cable will be laid on one position of the anchor, then the vessel must move and anchor again.

Burying cables in the seabed is to protect them against the risk of damage, e.g. by vessel anchors and against their movement on the seabed. Moreover, cable burial reduces potential impacts related to the emission of heat and electromagnetic field and radiation.

The standard sequence of laying OWF inner array cables is described below:

1) the cable is usually loaded directly onto the cable-laying vessel at the manufacturer's;
2) the cable is stored on special drums;
3) the cable-laying vessel approaches the foundation of the first wind turbine;
4) the cable is lowered from the vessel and its end is moved closer to the foundation structure using a barge;
5) the cable is pulled through J-tubes installed mostly outside the foundation (with a ROV or by divers) and installed on the first wind turbine;
6) an underwater plow or ROV equipped with a set of cable-laying equipment is dropped from the cable-laying vessel onto the seabed;
7) the plow or ROV lays the cable on the seabed;
8) when the barge reaches another turbine, the cable laying equipment is loaded onto the vessel, and then the cable end is lowered from the vessel and floated towards the next turbine (or offshore substation). The connection of the second turbine is established similarly to the first one;
9) the aforesaid procedure is repeated until all connections are established.

Depending on the specificity of use concerning the offshore area where the cable will be routed, the depth at which the cables will be laid, the properties of the substrate, as well as the need to cut other already existing cables or pipelines, it may be necessary to apply additional cable protection. Currently, e.g. concrete mattresses or bags filled with cement or sand are used to cover cables, systems of additional cable shields (e.g. Uraduct system) and others. They provide, among others, scour protection of the layer of sediments covered by buried cables and additional protection, e.g. against anchors or tools used in fishing. Protections can be used both at the farm construction stage and later if as a result of the cable inspection it turns out that there is such a need.
At the current stage of the project, the final technology of laying submarine cables cannot be indicated. Selection of one or more methods will be made only after determination of cable parameters, detailed identification of substrate properties and other environmental conditions, as well as after selection of the contractor and verification of availability of installation equipment within the selected time frame.

It is estimated that laying one cable section (e.g. between two wind turbines) may take 20–25 hours. However, this will depend on many factors, such as weather conditions, that cannot be predicted at the report stage.

2.3.8 Installation of scour protections

2.3.8.1 Bottom sediment scouring processes

The seabed surface in the BIII OWF area is mainly formed by fine and medium-grained recent sea sands. They constitute the so-called dynamic layer. The thickness of these sediments varies and ranges on average from 0.2 to 3 m.
This seabed structure causes that water flowing through the foundation structure may result in scouring of bottom sediments located around the base. A similar phenomenon may also apply to submarine cables buried in the seabed.
The scale of scouring will also depend on sea currents occurring in the farm area and wave motion. More information on this subject can be found in the chapter presenting the results of seabed surveys (Volume III, Section 3 of the EIAR).

It should be expected that scouring will be limited in most of the farm area mainly to the dynamic sediment layer with a thickness of approx. 3 m.

2.3.8.2 Scour prevention methods

It is possible to apply a number of solutions protecting against scouring of sediments around foundations bases and cables, in particular:

- dumping rocks and gravel (in bulk or in bags) around foundation bases;
- mattresses filled with sand or gravel;
- protective aprons (e.g. in gravity-base foundations);
- flow energy dissipation devices.

The final selection of scour protection methods and the necessity to use them for individual wind turbines will be made at the stage of the building permit design. It will depend on the exact location of a given wind turbine and the seabed conditions prevailing in a given location. In addition, decisions on the source of the rock material and gravel used for erection works will be made at the construction stage by the contractor and will depend, apart from environmental conditions, also on a number of other factors, including technical conditions specified in the building permit design and economic account. It will not be any material from the seabed and will correspond to the normal characteristics of construction materials (products).
Hydrotechnical stone obtained from granite, dolomite, sandstone or basalt rock is commonly used in hydraulic engineering. It is used, among others, in the construction and modernization of breakwaters, coasts, banks and beds of water channels, revetments of the beds and slopes of river channels (as flood protection), ripraps, foundations, as well as port facilities, and yacht and ferry harbors. A good example of using hydrotechnical stone can also be the construction of an artificial reef in Ustka carried out by the Maritime Office in Słupsk. This project protects the beach in Ustka against erosion as a result of sea waves and includes the construction of underwater sills and habitat modules, restoration and construction of a set of groins and alternation of the sea bank. For more information, including photographic and video documentation, please visit the website: of the city of Ustka[5].

It should be noted that all elements of the farm (also cables) will be monitored at the farm operation stage. As a result, additional scouring protection needs may arise, which would not be foreseen earlier, e.g. the need to protect power cables being scoured out of the seabed. In this case, the same methods as described above will be used.

The environmental impact of the scour protection layer consists primarily in increasing the seabed surface from which bottom sediments are removed. The protective materials used are environmentally neutral.

2.3.8.3 Installation of scour protections

Vessels or barges with equipment enabling such an operation are used to lay scour protection materials on the seabed. For this purpose, e.g. pipe systems are used to dump bulky material onto the seabed (sometimes using ROVs) or cranes if the protective material is in bags, for example.

During the placement of the protective layer, the correctness of its placement, including the thickness of the layer, is checked. A sonar, ROV or divers can be used for this purpose.
The thickness of the scour protection layer is 1–2 m. Its maximum width (calculated from the foundation periphery) is presented in the table below.

[5] Source: www.ustka.pl [accessed: March 2022]

Table 16. Maximum width of the scour protection layer

Foundation type	Maximum width of the scour protection layer from the foundation periphery
Monopiles	**20 m**
Jacket foundations	**10 m (around each pile)**
Tripod foundations	**10 m (around each pile)**
Gravity-base foundations	**15 m**

Source: RHDHV technical concept

Decisions on the source of the rock material and gravel used for erection works will be made at the construction stage by the contractor and will depend, apart from environmental conditions, also on a number of other factors, including technical conditions specified in the building permit design and economic account. It will not be any material from the seabed and will correspond to the normal characteristics of construction materials (products). Please note that hydrotechnical stone obtained from granite, dolomite, sandstone or basalt rock is commonly used in hydraulic engineering. It is used, among others, in the construction and modernization of breakwaters, coasts, banks and beds of water channels, revetments of the beds and slopes of river channels (as flood protection), ripraps, foundations, as well as port facilities, and yacht and ferry harbors. A good example of using hydrotechnical stone can be the construction of an artificial reef in Ustka carried out by the Maritime Office in Słupsk. This project protects the beach in Ustka against erosion as a result of sea waves and includes the construction of underwater sills and habitat modules, restoration and construction of a set of groins and alternation of the sea bank.

2.3.8.4 Pointing

The spaces between some elements of the wind turbine structure, in particular between the foundation and the connector, between the piles and the foundation base (jacket, tripod), between the base of the gravity-base foundation and the load-carrying surface can be filled with bonding compounds (binder, sealant). The purpose of using sealant is to connect the two structures and seal the spaces between them.

Due to high stress at the joints, high-strength and low-shrinkage cement binders are usually used to bind offshore wind turbine elements, but other materials can also be used.

Mortar can be transported to the project implementation site by a transport vessel in ready form from shore and may be mixed on board, immediately before the binding operation. Then, the mortar is pumped to the place where binding is performed, e.g. in the case of monopiles – into the space between the pile surface and the connector surface, protected from below with a special gasket preventing excessive amounts of the binder from escaping into the sea. Average quantities of binder used during the installation of offshore wind turbines are presented below.

Table 17. Expected binder consumption during erection of the wind turbine

Foundation type	Binder consumption per foundation
Monopiles	25 m^3
Jacket foundations	50 m^3
Tripod foundations	50 m^3
Gravity-base foundations	125 m^3

Source: RHDHV technical concept, own materials

2.3.9 Corrosion protection

2.3.9.1 Corrosion phenomenon

Corrosion is a process of destruction of metals and alloys as a result of their reaction with the surroundings (corrosive environment). Metal elements of offshore wind turbines are exposed to corrosion due to aggressive action of seawater, which is electrolyte (water corrosion, electrolytic corrosion).
Corrosive processes result in the destruction of metal, which is observed mainly on surfaces in the form of accumulated solid reaction products such as oxides, rust and scale. If the reaction products fall off from the metallic substrate, roughness of the originally smooth surface or pitting is observed. Corrosive soluble products (metal ions) that contaminate the environment can also form.

2.3.9.2 Corrosion protection methods

In offshore wind turbines, corrosion protection systems are commonly used, most often by means of properly selected **insulation coatings connected to galvanic cathodic protection**. They are used for elements permanently immersed in water, as well as those exposed to water splashing.

Cathodic protection is one of the methods of electrochemical protection consisting in changing the electrode potential of metal in order to prevent or limit its dissolution.

Cathodic protection means that the protected object acts as a cathode in a corrosive galvanic cell. The electrode potential of the protected metal shifts towards negative values, so the oxidation of this metal is limited. Metal is protected by the cathode on which only reduction reactions can take place.

Galvanic cathodic protection, often called sacrificial protection, takes place without any use of an external source of current. The protected object is a cathode of the galvanic cell, the anode of which is a less noble metal (Hg, Zn, Al) to be lost intentionally, called a sacrificial anode. The sacrificial anode dissolves to protect the object to be protected. The protector may be in the form of a coating on protected metal (e.g. galvanized steel) or appropriately arranged anode plates[6].

Anode plates are fixed to foundation structural members, most often by welding. The method of fixing will be specified in the building permit design. The expected required anode mass for individual foundation types is indicated in the table below. Once installed, anodes are most often sufficient for the entire lifetime of the farm.

Table 18. Expected required mass of zinc or aluminum anode plates for individual types of foundations

Foundation type	Expected required anode mass per foundation
Monopiles with additional protective coating	**Approx. 6 Mg Al-In-Zn anodic material, including 5% Zn**
Monopiles without additional protective coating	**Approx. 13 Mg Al-In-Zn anodic material, including 5% Zn**
Jacket foundations with additional protective coating	**Approx. 7.5 Mg Al-In-Zn anodic material, including 5% Zn**
Jacket foundations without additional protective coating	**Approx. 22.5 Mg Al-In-Zn anodic material, including 5% Zn**
Tripod/quadropod foundations with additional protective coating	**Approx. 10.7 Mg Al-In-Zn anodic material, including 5% Zn**

[6] Source: Krystyna Moskwa, Bogusław Mazurkiewicz: Korozja i ochrona przed korozją [Corrosion and corrosion protection]. In: AGH script [on-line]. www.chemia.odlew.agh.edu.pl [accessed: January 26, 2014]

Tripod/quadropod foundations without additional protective coating	**Approx. 32 Mg Al-In-Zn anodic material, including 5% Zn**

Source: own study based on Kirchgeorg et al. (2018).

The above amounts of Zn or Al are released gradually into the marine environment during the entire operation of the wind turbine.

Photo 9. Fragment of jacket foundation structure with welded anodes

Source: http://en.wikipedia.org/wiki/Cathodic_protection [accessed: September 2020]

2.4 Safety zones

Safety zones will most likely be created around OWF elements (wind turbines, substation under construction, etc.), with limited access of vessels not belonging to the farm operator. The creation of such a zone is aimed at reducing the risk of their collision with farm facilities and, consequently, hazard to human health and life, environmental pollution (including with hazardous substances) and major material losses. The range of possible safety zones and the rules of movement in these zones will be determined at a later stage of the project.

The decision on establishing a safety zone in the area of the wind farm is made by the director of the competent maritime office on the basis of the provisions of the Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text: Journal of Laws of 2020, item 2135). A possible need to indicate any limitations in the scope of making the farm area available during the construction in the decision on environmental conditions may be indicated by the competent Maritime Office during arrangements as part of the environmental impact assessment.

Moreover, the issues of limiting access for fishermen and other users of the BIII OWF area are the subject of consultations between the Investor and interested groups and the Maritime Office.

2.5 Obstacle marking and warning systems

Wind turbines, substations and possibly other farm facilities under construction will be properly painted, illuminated and equipped with warning systems, in accordance with the requirements of Polish aviation and maritime regulations. More relevant information is presented in Section 11 of Volume IV containing an assessment of the impact on other sea users, including maritime navigation and aviation.

3 Emissions during the OWF construction stage

The anticipated time necessary to build the BIII OWF is approx. 3.5 years, with the farm construction process divided into at least 2 stages separated by several years. The construction cycle time for each of the stages will therefore be shorter and it is unlikely to exceed 2 years. The construction time, and in particular uninterrupted activity of construction vessels in the farm area, will depend on many factors, mainly on planning and efficient management of the supply chain of individual elements of the farm, financing schedule, delivery dates of equipment, availability of specialized equipment used for their construction, and above all weather conditions, etc. The conditions indicated in the environmental decision may also affect the construction period. Therefore, it should be taken into account that the emissions described in this section will be spread over time and, at this stage, it is not possible to determine the exact time of occurrence of individual emissions.

In the option being the subject of this Report, approx. 70% less wind turbines will be built than planned in the set of parameters being the worst case scenario – WCS 2015 and twice less than specified in the Environmental Decision.

Individual stages of the Project implementation will be carried out in shorter periods than those assumed in the Report 2015, thus it should be considered that the Project will cause lower impacts during the implementation phase both than those constituting the basis for conducting the impact assessment in the Report 2015 and described by the set of parameters being the worst case scenario – WCS 2015, as well as from the option approved by the Environmental Decision.

3.1 Manufacturing of wind farm elements

The manufacturing of elements and subassemblies at this stage will take place in manufacturing shipyards and other onshore plants.

Emissions generated in the process of manufacturing of wind farm elements are not assessed in this report. The manufacturing of wind farm elements is carried out in manufacturing plants whose construction and manufacturing processes are subject to separate environmental impact assessment procedures and relevant environmental protection regulations appropriate for the location of a given plant.

Table 19. Emissions related to the manufacturing of wind farm elements

Emissions related to the manufacturing of wind farm elements	
Potential emissions and environmental disturbances	• use of environmental resources for manufacturing (increase in demand for energy, raw materials and structural materials) • noise emission • emission of pollution into the atmosphere • water abstraction • wastewater generation • waste generation
Emission sources	Manufacturing machinery and equipment Means of transport:
Emission range	Area of a manufacturing shipyard, adjacent areas (if any)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction and approx. 1 year before its commencement
Reversibility of emission	Reversible

Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	Manufacturing plants must operate and operate in accordance with the applicable environmental regulations. Manufacturing should be carried out in accordance with the applicable environmental standards (e.g. emission of pollutants into the atmosphere or water, waste storage, etc.). Preventive, minimizing or mitigation measures will be taken depending on the existing needs in this respect.
Additional notes	Emissions generated in the process of manufacturing of wind farm elements are not assessed in this report. It is the liability of manufacturers, not the Investor of the BII OWF.

Source: RHDHV technical concept, own materials

3.2 Sea transport of wind farm elements to the construction and assembly port

The Investor will select the manufacturers of individual OWF elements not sooner than at the stage of the building permit design. Therefore, at the stage of preparation of the EIAR, it is not possible to provide any information on this transport. In the worst case scenario, components of most wind farm facilities will be transported by sea. This is the most likely scenario.

Table 20. Emissions related to sea transport of wind farm elements to the construction and assembly port

Emissions related to sea transport of wind farm elements to the construction and assembly port	
Potential emissions and environmental disturbances	• increased vessel traffic • noise emission • emission of pollutants into the atmosphere • wastewater generation • waste generation
Emission sources	Vessels (ships, barges, etc.)
Emission range	Transport route of farm elements
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	High
Preventive, minimizing or mitigation measures	Not planned
Additional notes	None

Source: RHDHV technical concept, own materials

3.3 Storage of wind farm elements in the construction and assembly port

Table 21. Emissions related to storage of wind farm elements in the construction and assembly port

Emissions related to storage of wind farm elements in the construction and assembly port	
Potential emissions and environmental disturbances	Landscape disturbance
Emission sources	Farm elements stored in the construction and assembly port
Emission scale	Local (industrial port area, its closest vicinity – if any)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	Not planned
Additional notes	None

Source: RHDHV technical concept, own materials

3.4 Movement of installation and transport vessels from the port to the project site

Table 22. Emissions related to the movement of installation and transport vessels from the port to the project site

Emissions related to the movement of installation and transport vessels from the port to the project site	
Potential emissions and environmental disturbances	• increased vessel traffic • noise emission • emission of pollution into the atmosphere • wastewater generation • waste generation
Emission sources	Vessels and helicopters used during construction
Emission scale	Local (industrial port area, transport route, project implementation site)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	They are described later in the report in a section containing the environmental impact assessment.
Additional notes	None

Source: RHDHV technical concept, own materials

3.5 Sea transport of farm elements and subassemblies to the project site

Table 23. Emissions related to sea transport of farm elements and subassemblies to the project site

Emissions related to transport of farm elements and subassemblies to the project site	
Potential emissions and environmental disturbances	• noise emission • emission of pollution into the atmosphere • wastewater generation • waste generation
Emission sources	Vessels and helicopters used during construction
Emission scale	Local (industrial port area, transport route, project implementation site)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	They are described later in the report in a section containing the environmental impact assessment.
Additional notes	None

Source: RHDHV technical concept, own materials

3.6 Operation of installation vessels at the project implementation site

Table 24. Emissions related to the operation of installation vessels at the project implementation site

Emissions related to the operation of installation vessels at the project implementation site	
Potential emissions and environmental disturbances	• noise emission • emission of pollution into the atmosphere • wastewater generation • waste generation
Emission sources	Vessels and helicopters used during construction
Emission scale	Local (project implementation site)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	They are described later in the report in a section containing the environmental impact assessment.
Additional notes	None

Source: RHDHV technical concept, own materials

3.7 Seabed preparation for foundations

Table 25. Emissions related to seabed preparation for foundations

Emissions related to seabed preparation for foundations	
Potential emissions and environmental disturbances	• noise emission • emission of pollution into the atmosphere • wastewater generation • waste generation • increase of water turbidity due to the disturbance of the bottom sediments
Emission sources	Vessels and helicopters used during construction, dredgers
Emission scale	Local (project implementation site)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	They are described later in the report in a section containing the environmental impact assessment.
Additional notes	None

Source: RHDHV technical concept, own materials

3.8 Installation of the foundations

Table 26. Emissions related to installation of foundations

Emissions related to installation of foundations	
Potential emissions and environmental disturbances	• noise and vibration emission, in particular caused by driving of foundation piles • emission of pollution into the atmosphere • wastewater generation • waste generation • increase of water turbidity due to the disturbance of the bottom sediments
Emission sources	Vessels and helicopters used during construction
Emission scale	Local (project implementation site)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	They are described later in the report in a section containing the environmental impact assessment.

Emissions related to installation of foundations	
Additional notes	None

Source: RHDHV technical concept, own materials

3.9 Installation of elements of wind turbines, substations

Table 27. Emissions related to the installation of elements of wind turbines, substations

Emissions related to installation of foundations	
Potential emissions and environmental disturbances	• emission of surface noise • emission of pollution into the atmosphere • wastewater generation • waste generation • disruption of the landscape (by the occurrence of new elements)
Emission sources	Vessels and helicopters used during construction Newly built farm facilities
Emission scale	Local (project implementation site)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	They are described later in the report in a section containing the environmental impact assessment.
Additional notes	None

Source: RHDHV technical concept, own materials

3.10 Transport, recovery or neutralization of waste and wastewater from vessels

Table 28. Emissions related to transport, recovery or neutralization of waste and wastewater from vessels

Emissions related to transport, recovery or neutralization of waste and wastewater from vessels	
Potential emissions and environmental disturbances	• potential irregularities related to transport, recovery or neutralization of waste and wastewater
Emission sources	Vessels used during construction, vehicles used for transport of waste, places of its recovery or neutralization
Emission scale	Local
Frequency of emission occurrence	Repeatable (during construction)

Emissions related to transport, recovery or neutralization of waste and wastewater from vessels	
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Low
Preventive, minimizing or mitigation measures	Not planned
Additional notes	None

Source: RHDHV technical concept, own materials

3.11 Laying of submarine cables

Table 29. Emissions related to laying submarine cables

Emissions related to laying submarine cables	
Potential emissions and environmental disturbances	• emission of surface noise • emission of pollution into the atmosphere • wastewater generation • waste generation • water pollution during normal operation of vessels • increase of water turbidity due to the disturbance of the bottom sediments
Emission sources	Vessels used during construction, remotely operated vehicles (ROVs), cable-laying excavator, etc.
Emission scale	Local (project implementation site)
Frequency of emission occurrence	Repeatable (during construction)
Duration of emission	Duration of construction
Reversibility of emission	Reversible
Probability of occurrence	Very high
Preventive, minimizing or mitigation measures	They are described later in the report in a section containing the environmental impact assessment.
Additional notes	None

Source: RHDHV technical concept, own materials

3.12 Expected level of pollutant emission into the air

Vessel traffic (at each stage of the project) will involve emission of pollutants into the air, with average levels as follows:

- NOx: 20–50 kg/m^3 of fuel,
- PM10: 1–2.6 kg/m^3 of fuel,
- SO2: 1.7–17 kg/m^3 of fuel.

3.13 Expected level of underwater noise emission

Sound can be generated during all stages related to the construction, operation and decommissioning of the offshore wind farm. The greatest concern is, however, related to underwater noise emitted during the construction due to high sound levels generated when driving piles into the seabed (piling). Forms of marine life such as fish or marine mammals are sensitive to sound, and therefore the noise accompanying activities related to the construction of wind farms may affect them at significant distances. Wind farm construction methods differ for specific projects, and thus generate sounds with different characteristics into the marine environment.

In the area of the Project, several models of underwater noise propagation related to the installation of foundations of the offshore wind farm have been carried out in recent years. The results of these modeling were presented in the environmental impact assessment reports for the BSIII OWF project (SMDI 2015a), BSII OWF project (SMDI 2015b) and Baltica OWF project (IMG/MEWO 2017).

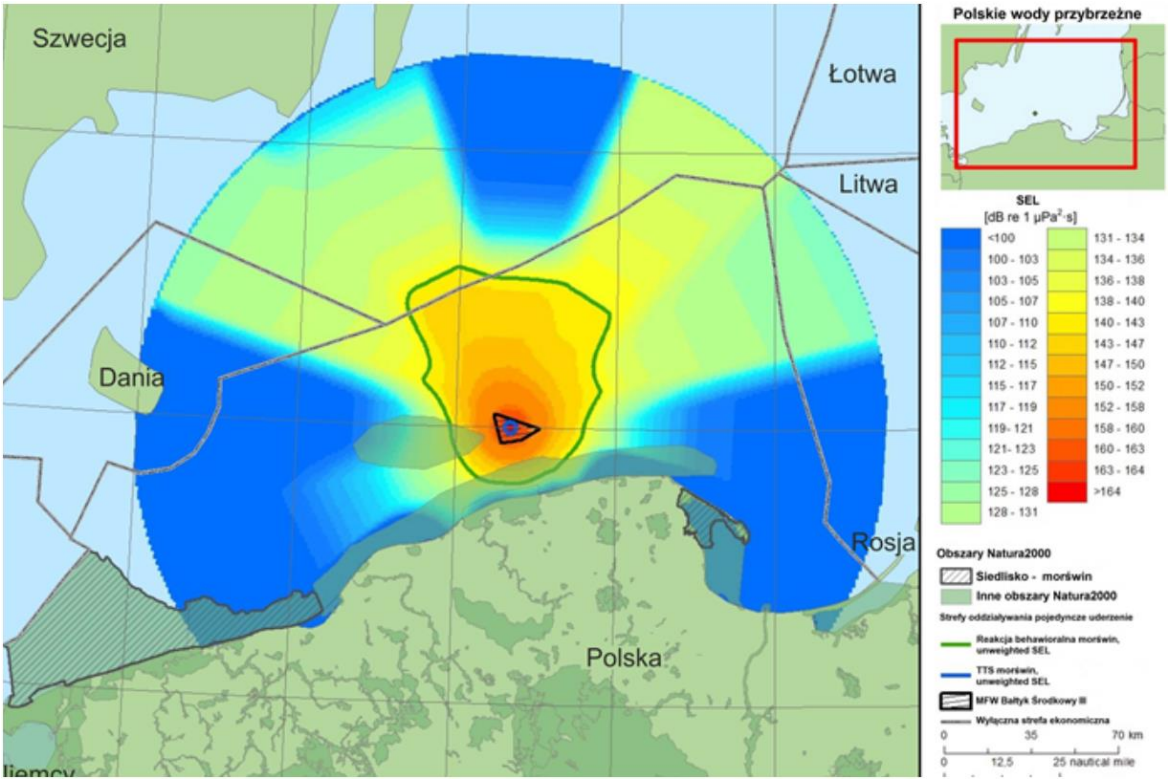
In all studies, the use of a monopile foundation driven into the seabed was assumed as the worst case scenario generating the highest ranges of sound propagation. The modeling performed at the location in question for the purposes of the Report 2015 assumed the use of a foundation with a maximum diameter of 10 m, and for the Bałtyk Środkowy II and Baltica farms – 12.5 m. Currently, for the BIII OWF, it is also assumed to use a monopile foundation with a maximum diameter of 10 m (see Volume I Chapter 3). For the purposes of the submitted report, noise propagation modeling was repeated – “Sound Simulation Pile Driving for Baltyk WF- Baltyk II; Baltyk III, pile driving noise modeling”.

Based on the directions of noise propagation specified in the modeling for the BIII OWF, as well as the maximum ranges for the monopile with the diameter of 12.5 m (BII OWF), the noise impact zones on marine mammals (seals and porpoises) and fish occurring in the BIII area, in which bodily injury, temporary threshold shift and behavioral reaction consisting in avoidance may occur, were estimated. Directions and ranges of impacts so determined were subject to comparative verification on the basis of results obtained for the project directly adjacent to BIII – Baltica OWF. The assessment also used the results of modeling of cumulative impacts for the case of parallel piling on BIII OWF and Baltica OWF farms (SMDI 2015a, MIG/MEWO 2017). It should be emphasized that the said modeling was performed assuming similar geological conditions prevailing in the aforementioned areas of individual projects (boulder clays with sand and gravel cover). Therefore, this chapter constitutes the technical basis for the EIA for marine mammals and fish in this respect.

Noise propagation directions

Modeling results indicate that sound transmission is highly frequency-dependent, where higher frequencies (i.e. above 2 kHz) are attenuated much faster than low frequency sounds. Attenuation was also bathymetry dependent, which results in differences in the direction of sound intensity – sound levels are lower towards the Puck Bay, the Słupsk Bank and the South Middle Bank, mainly caused by shallowing in these directions. Sound propagates to the greatest distances in the NW and NE directions (see **Error! The reference source cannot be found**.).

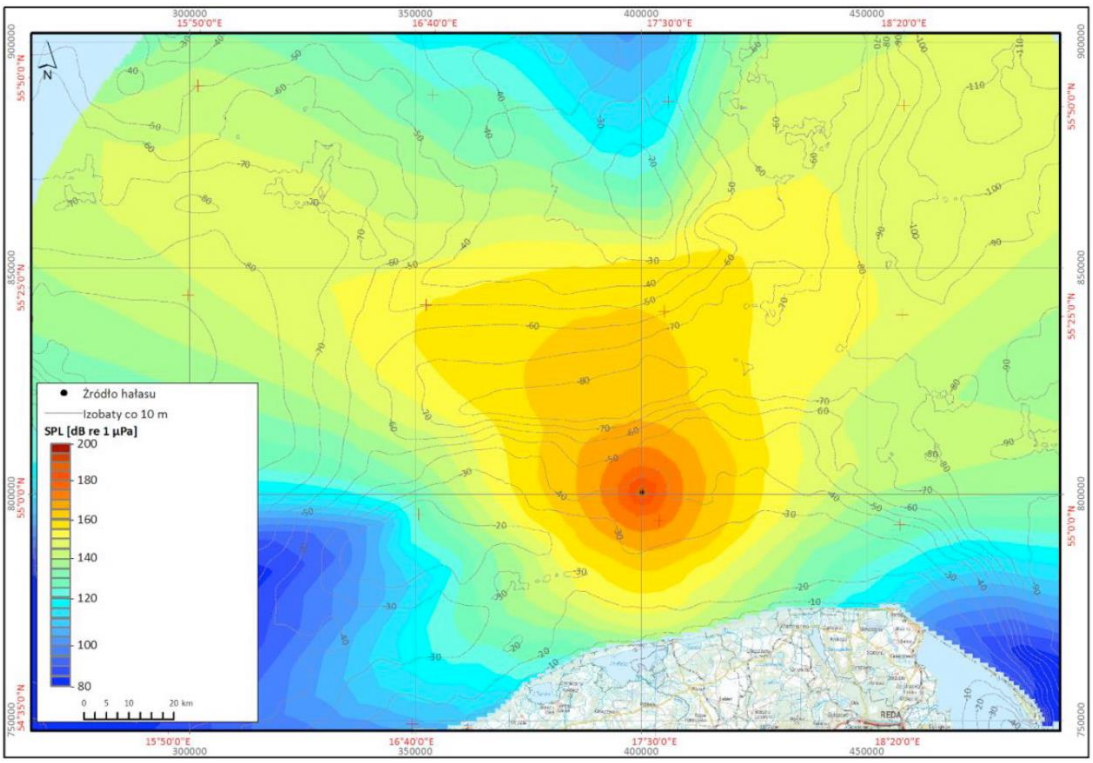
Figure 3 Directions of underwater noise propagation caused by piling the foundation at the BIII (source: SMDI 2015a)



PL	EN
Szwecja	Sweden
Dania	Denmark
Łotwa	Latvia
Litwa	Lithuania
Rosja	Russia
Polska	Poland
Niemcy	Germany
Polskie wody przybrzeżne	Polish coastal waters
SEL	SEL
Obszary Natura2000	Natura 2000 site
Siedlisko – morświn	Habitat – porpoise
Inne obszary Natura2000	Other Natura 2000 sites
Strefy oddziaływania pojedyncze uderzenie	Impact zones – single impact
Reakcja behawioralna morświn, unweighted SEL	Behavioral reaction – porpoise, SEL unweighted
TTS morświn, unweighted SEL	Porpoise TTS, SEL unweighted
MFW Bałtyk Środkowy	Bałtyk Środkowy OWF
wyłączna strefa ekonomiczna	Exclusive Economic Zone

These directions are confirmed by the modeling carried out for the EIA of the Baltica OWF project, when analyzing the propagation of noise caused by piling of the 12.5 m diameter monopile foundation (IMG/MEWO 2017) located approx. 10 km in the NE direction, in relation to the location taken into account in the modeling performed for the BSIII OWF (see **Error! The reference source cannot be found**.).

Figure 4 Directions of noise propagation related to driving the monopile foundation at the Baltica OWF (source: IMG/MEWO 2017)



PL	EN
Źródło hałasu	Noise source
Izobaty co 10m	Isobaths every 10 m
SPL [dB re 1 µPa]	SPL [dB re 1 µPa]

For the purpose of preparing the submitted Report, a repeated modeling of noise propagation was performed for the installation of monopile foundations with a diameter of 10.0 m.
The dBSea tool (Irwin Carr Consulting) was used to model sound propagation. This tool can be used to model sound propagation within the full range. It also offers several mathematical solutions (solvers) for modeling sound propagation. For frequencies lower than 400 Hz, a solver using parabolic wave equation was applied. For frequencies above 400 Hz, a solver with a ray-tracer was applied.

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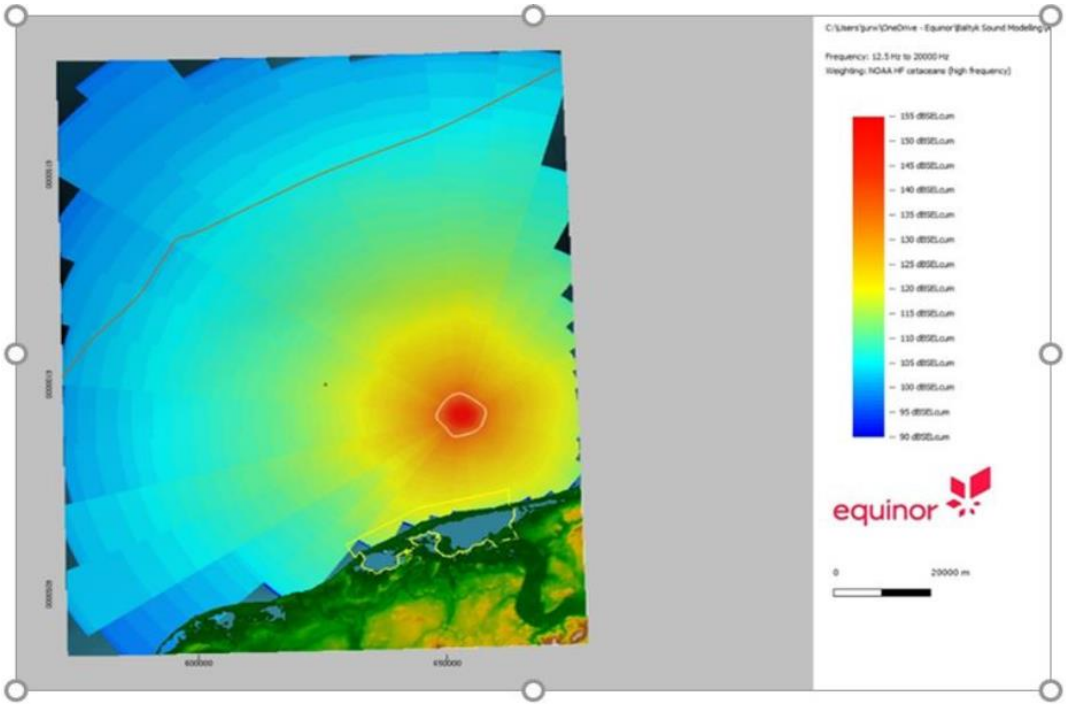
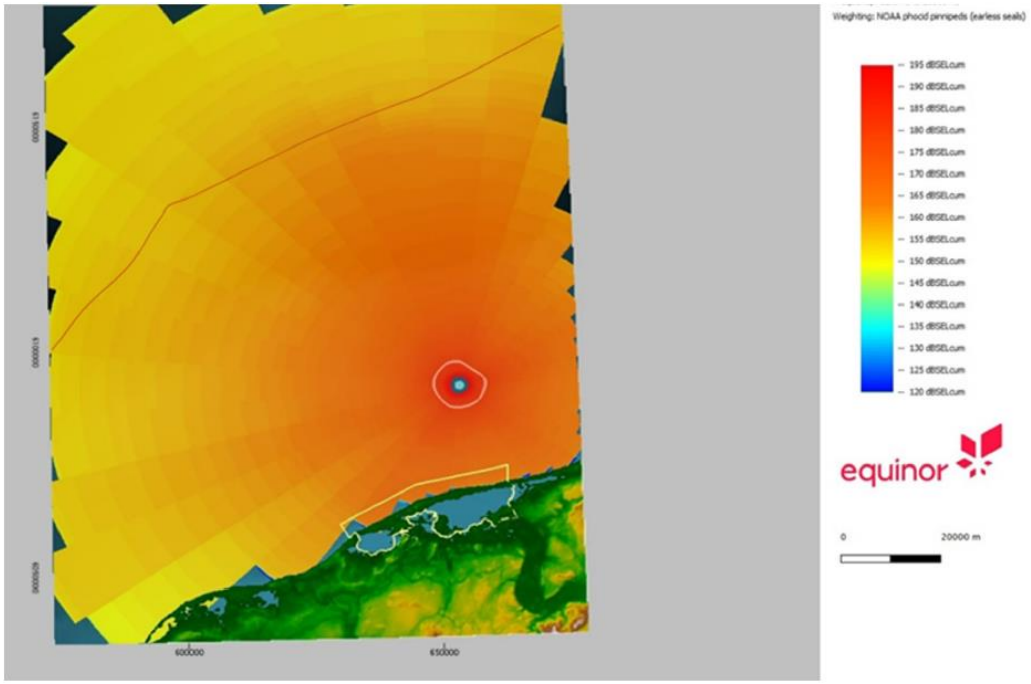
The results were calculated along 36 radial slices (10 degrees per slice). Along each slice, sound properties were calculated at a distance of 60 m (2400 range points). The depth resolution was 2 m. For the graphical display, the calculated results were displayed/extrapolated using a 60 m resolution mesh. To calculate and display the range distance, the highest values found at the projection point on the surface were used.
Sound sources were introduced into the propagation model as spot sources at half of the water depth, i.e. 13 m for Bałtyk III WTG60.
With the application/introduction of a damping effect of one bubble curtain and appropriate reduction of SEL and SPL at source, it resulted in a situation where none of the threshold values was exceeded at the boundary of the Słowińska Refuge Natura 2000 site (Figure 5 and Figure 6 – the results of modeling with and without the use of a bubble curtain are presented in Chapter 9 of this Volume of the Report).

Figure 6 Bałtyk III monopile with a diameter of 10 m, 4,500 kJ reduced by 11 dB with the use of a bubble curtain, SELcum 16,800 m impacts; the white line indicates the TTS level of 140 dB for whale VHFs. The yellow line indicates the boundary of the Słowińska Refuge Natura 2000 site and the boundary of the Polish EEZ is marked with the brown line.



Source: provided by the Employer

Figure 5 Monopile with a diameter of 10 m, 4,500 kJ, reduced by 11 dB with the use of bubble curtain, SELcum 16,800 impacts. The white line indicates the TTS level of 170 dB level for seals (PW). The yellow line marks the boundary of the Słowińska Refuge Natura 2000 site.



Source: provided by the Employer

Sound propagation modeling involves some uncertainty and the determination of impact zones with a numerical resolution of one meter is not an indicator of the total accuracy and precision of the results. However, the results of the model study indicate that none of the threshold values of potential impact on

porpoises and seals (TTS, PST) will be exceeded at the boundary of the Słowińska Refuge Natura 2000 site if mitigation techniques are applied. Model calculations showed that one bubble curtain would be sufficient to achieve the desired results. The hammer energy of 4,500 kJ can also be seen as the worst case scenario, and therefore additional mitigation measures can be achieved by using less hammer energy, if possible.

Range of impact

The following were considered as impacts related to underwater noise emission caused by driving foundations into the seabed:

- Permanent Threshold Shift (PTS);
- Temporary Threshold Shift (TTS);
- behavioral response (avoidance).

In order to determine the zones of potential impact, various types of noise exposure criteria were used both for marine mammals and fish, on the basis of which the average and maximum distances for sound levels high enough to meet the given criteria were calculated. Most of them come from an extensive publication by Southall et al., 2007 (more on the sensitivity of marine mammals and fish to noise impacts can be found in Volume IV. Chapter 4 and Chapter 6 of the EIAR).

The determination of potential impact zones took into account the results of modeling with the use of mitigation measures against noise propagation in the form of a bubble curtain or other measure of no lesser degree of noise propagation reduction. The use of such actions as a mandatory recommendation is included in the conclusions of the Report.

The impact zones were determined in accordance with the precautionary principle, taking into account the worst result from the modeling carried out in the project implementation area – see Table 30.

Table 30. Zones of potential impacts on marine mammals and fish caused by noise emission during piling of the monopile foundation (based on SMDI 2015a, SMDI 2015b, IMG/MEWO 2017)

Impact	Maximum threshold range (cumulated strokes when driving 1 foundation for 1 hour) [km]		
	BII	BIII	Baltica 3
Porpoise PTS [SEL 155 dB re 1 µPa^{2}s]	0.8	0.4	9.4
Porpoise TTS [SEL 140 dB re 1 µPa^{2}s]	5.6	3.5	26.3
Porpoise avoidance [SEL 140 dB re 1 µPa²s]	32.4	15.7	46
Seals PTS [SEL 185 dB re 1 µPa^{2}s]	5.1	1.2	0.8
Seals TTS [SEL 170 dB re 1 µPa^{2}s]	29.7	20.7	6.7
Seals avoidance*	29.7*	20.7*	6.7*
Fish PTS [SEL 203–216 dB re 1 µPa^{2}s]	0.7	0.3	1
Fish TTS	**14.7**	5	9.2

[SEL 186 dB re 1 μPa^{2}s]			
Fish avoidance [SEL 135-142 dB re 1 μPa^{2}s]	32.4	15.7	**32.6**

*the avoidance zone for seals was determined on the basis of the latest literature – see below.

Many studies to date have shown that behavioral reactions of seals, such as avoidance reaction, are rare. This statement is consistent with the observations of harbor seals and gray seals which did not react to the noise related to the structure in places of their rest and are known for fast habituation capabilities, even at relatively high levels of sound intensity (Edrén et al., 2010). However, the studies from recent years show that gray seals react to sonar signals (with a frequency of 200 and 375 kHz), remaining longer above the water surface (at 200 kHz) or avoiding a given area (at 375 kHz) (Hastie et al., 2014). Southall et al. (2007) suggests applying a behavioral reaction criterion based on TTS values; this criterion was adopted in this report.

For seals ((Southall et al., 2007) indicates a PTS limit equal to 218 dB re 1 μPa peak (186 dB re 1 μPa^{2}s SEL), and a TTS limit of 212 dB re 1 μPa (171 dB re 1 μPa^{2}s SEL) underwater. TTS for the harbor seal exposed to sound for a longer period was examined by (Kastelein et al., 2012). TTS of approx. 6 dB was achieved after 60 minutes of exposure of the animal to sound with a one octave bandwidth, with a center frequency of approx. 4 kHz at the intensity equal to 136 dB re 1 μPa.

3.14 Expected level of sediment agitation and redeposition

The worst case scenario constituting the basis for the impact assessment in the Report 2015, i.e. WCS 2015, in the context of impacts relating to disturbance of bottom sediments and their distribution and restoring, was the installation of 200 gravity-base foundations in the reasonable alternative option. Assuming such a scenario as the worst case scenario was related to the necessity to precede the installation of such foundations with dredging works. It is assumed in the Report 2015 that, for the purpose of installation of a single gravity-base foundation, the seabed would require to be dredged at a diameter of up to 70 m and a depth of up to 3 m, which would result in significant agitation of bottom sediments. The expected ranges and level of sediment disturbance and its subsequent restoring in connection with the construction of the BIII OWF in the worst case scenario are presented in Appendix A to the Report.

In the currently requested option selected for implementation, in relation to wind turbines, the use of gravity-base foundations was excluded, whereas this type of foundation may be used for the purposes of construction of an internal offshore substation. In this option indicated for implementation in this procedure, wind turbines can be founded in the BIII OWF development area only on monopile and jacket foundations. Installation of these types of foundations does not require prior preparation of the seabed (dredging), which is necessary in the case of gravity-base foundations. The related disturbance of the seabed will occur mainly during the setting (driving) of foundation piles, foundation of jacket structures and laying of scour protection layers. These activities may cause the disturbance of bottom sediments in the direct vicinity of the place of works, whereas the amount of removed sediments will be incomparably lower than in the case of seabed dredging for the purpose of installation of gravity-base foundations. In turn, this will result in a dramatic reduction of potential emissions of pollutants and biogenic substances that may be released from agitated sediments.

At the construction stage, during laying cables between wind turbines in the seabed and during preparation of the seabed for installation of foundations (if gravity-base foundations are used), sediments deposited on the seabed will be agitated. Sediments will also be uplifted into the water column during the laying of the export cable from the location of the offshore substation. The agitated sediment will form, for some time, suspended matter in the water column, which will move in accordance with sea currents at short distances, and then the sediment will reach again on the seabed, in another place (sediment redeposition).

The formation of suspended matter in the water column will cause changes in water quality, and thus secondary impacts on aquatic organisms. However, sediment fallout may affect benthic organisms as well as fish eggs and larvae. Potential impacts on living organisms, sediment structure and water quality are described in Volume IV of the Report.

The displacement of sediments during the construction of the wind farm depends primarily on the volume of sediments stirred during the works (e.g. monopile foundations do not require any dredging works). The selection of gravity-base foundations results in an increase in the volume of sediments removed as part of dredging, and thus in an increase in the rate of sediment drift. Approximately 70% less foundations will be built in the option which is the subject of this Report than envisaged for the set of Project parameters representing the most worst case scenario – WCS 2015, and twice less than specified in the Environmental Decision. The use of gravity-base foundations for the wind turbines was excluded, so the bottom sediment structure will be disturbed over a correspondingly smaller area.

In view of the above, the impacts relating to the disturbance and subsequent restoring of sediments connected with the installation of foundations for wind turbines in the option approved by the Environmental Decision, both direct (such as an increase in the suspended matter content in water resulting in a reduction in its transparency) and indirect (such as a change in the living conditions of marine organisms, e.g. backfilling of benthic organisms) will occur only on a local scale. The intensity and size of the expected impacts will be incomparably lower than in the case of installation of gravity-base foundations. Impacts associated with the installation of the gravity-base foundation may occur only in relation to the internal substation (if such a foundation is selected). Due to the planned location of the substation in the central part of the OWF area, it is not expected that they may extend beyond this area.

Due to the reduction in the number of foundations planned for installation in the option selected for implementation, the number of locations where the bottom sediments will be disturbed, in connection with anchoring of vessels involved in the construction of the farm, will also be limited. Since the expected maximum length of the cable infrastructure in the option selected for implementation has not changed, the scale of sediment disturbance relating to its installation described in the Report remains unchanged.

3.15 Expected level of emissions of pollutants from sediments

The agitation (disturbance) of the bottom sediments related to the construction (placement) of foundations for the farm facilities, anchoring of vessels or burying of the cable is a process which favors the transfer of pollutants from the sediments to the water column (Uścinowicz, 2011; Bojakowska, 2001; Frostner, 1980; Bourg and Loch, 1995; Dembska, 2003).
In this way, it can be penetrated by the following:

- pollutants, including heavy metals as well as PAHs and PCBs;
- biogenic elements – nitrogen and phosphorus.

The phenomenon of depletion of the sediment surface layer in places of sediment agitation is confirmed by scientific research. This process was observed by Bolałek and Pustelnikovas (1995) in the Port of Klaipėda at the point of return of hydrofoil crafts and vessels, as well as by Protasowicki et al. (1992) during surveys of the bottom sediments of the waterway in the Szczecin Lagoon.

The most unfavorable situation may occur in the case of sediments featuring an increased content of harmful and biogenic substances, and a large number of fine fractions (clayey and silty fractions). In this case, the water quality may deteriorate significantly as a result of an increase in the concentration of harmful and biogenic substances (as a result of transfer from the sediments to the water column as a result of sediment stirring processes). These sediments will also contribute to the formation of a larger amount of suspended matter, which will remain in the water column for a long time. Intensive resuspension may cause the release of biogenic substances immobilized in the sediment and contribute to eutrophication.

In the case of sandy sediments with a small content of organic matter (e.g. coarse sandy sediments), the described processes will be less intensive. These sediments are generally characterized by a small amount of fine-grained fractions and a low concentration of metals and persistent organic pollutants.

The worst case scenario constituting the basis for the impact assessment in the Report 2015, i.e. the WCS 2015, in the context of releasing metals, pollutants and biogenic substances from sediments into the water column, was the use of gravity-base foundations with a diameter of 50 m during the implementation of the Project. Their construction requires preparation of the seabed, which involves the removal of the bottom sediment layer, not only in the foundation placement area, but also in its direct vicinity. Given the above, in the Report 2015, it was assumed that in the worst case scenario, a sediment layer with a depth of 3 m and

a diameter of 70 m (50 m of the foundation diameter + 20 m strip from the protective layer) will be removed, which gives 11,545 m^3 of agitated sediments per foundation. Approximately 70% less foundations will be built in the option which is the subject of this Report than in the worst case scenario – WCS 2015, and twice less than specified in the Environmental Decision. The use of gravity-base foundations for the wind turbines was excluded, so the bottom sediment structure will be disturbed over a correspondingly smaller area.

For other technologies analyzed (monopile, tripod, jacket), the volume of disturbed sediments will be many times smaller, which is related to the fact that they do not require seabed preparation in most cases, as well as to the fact that the diameter of the foundation piles driven will be many times smaller than the diameter of gravity-base foundation. The sediments around the piles driven will liquefy as a result of vibrations caused by the operation of the pneumatic hammer.
Additionally, regardless of the type of foundation selected, the sediments will be stirred during cable laying. The width of the cable trench is approx. 1.5 m, average depth – up to 1.5 m, length – up to 200 km, which gives a total of 450,000 m^3 of stirred sediments (for the entire inner array cable network).

Moreover, during the placement of foundations and installation of towers, stirring of the bottom sediments will be observed due to anchoring of vessels. The anchoring process itself is short-term, covers a small area (spot process), and will be conducted at a depth of approx. 3 m, so the volume of sediments disturbed will also be small. Also in this case, due to the reduced number of wind turbines, i.e. by 50% in relation to the Environmental Decision and 70% in relation to the WCS 2015, the number of necessary vessel anchoring operations will be significantly reduced.

3.16 Expected level of emission of Al released to the environment in the case of monopile foundations

For offshore structures, primary Al-based anodes are used for cathodic galvanic protection, which, depending on the specific alloy, manufacturer and applied standard, also contain Zn (2.5–5.75%) and In (0.015–0.04%). The amount of anodic material necessary to protect offshore wind farm steel structures against corrosion depends primarily on the type of foundations (their surface), planned service life (e.g. at least 25 years), sea water conditions, arrangement of anodes and possible application of additional methods of anticorrosive protection, e.g. epoxy resin or polyurethane coatings. Chemical emissions are similar to the amount of anodic material used, assuming that its predominant part will be “used” during 25 years of operation and will enter the marine environment (Kirchgeorg et al., 2018). Simplified calculations of the necessary amounts of Al-Zn-In anodic material made on the basis of the DNVGL-RP-B401 (2017) standard by Kirchgeorg et al. (2018) were used to estimate potential Al and Zn emissions relating to the Project for various foundation structures used in offshore wind farms, in the option with and without additional coating. According to these calculations, for foundations without additional coating, the required amount of anodic material ranges from 13.0 Mg (monopile) to 32.0 Mg (tripod), whereas the additional coating causes its significant reduction to 6.0 and 10.7 Mg, respectively. It should be noted that the indicated calculations do not include additional factors, such as the distribution of anodes over the entire structure, which must be taken into account when designing the anticorrosive protection and which may change the total required number of anodes. The results of estimation of the expected emissions from anticorrosive protection for the Project are presented in the table below.

Table 31 Al and Zn amounts that may potentially be released to the environment during 25 years of operation of the Project as a result of application of the galvanic cathodic protection against corrosion, assuming 5% of Zn content in the Al-Zn-In anodic material in the worst case scenario.

Foundation type	Additional protective coating	Weight of the Al-In-Zn anodic material, including 5% Zn [Mg]	Amount of released Al and Zn	
			1 foundation, the amount of element released during the entire operation of the farm (25 years)	Worst case scenario (200 foundations), amount of released element per year by the entire farm

Monopile	no	approx. 13.0	approx. 12.35 Mg Al approx. 0.65 Mg Zn	approx. 98.8 Mg Al approx. 5.2 Mg Zn
	yes	approx. 6.0	approx. 5.70 Mg Al approx. 0.30 Mg Zn	approx. 45.6 Mg Al approx. 2.4 Mg Zn
Jacket	no	approx. 22.5	approx. 21.38 Mg Al approx. 1.13 Mg Zn	approx. 171.04 Mg Al approx. 9.04 Mg Zn
	yes	approx. 7.5	approx. 7.13 Mg Al approx. 0.38 Mg Zn	approx. 57.04 Mg Al approx. 3.04 Mg Zn
Tripod	no	approx. 32.0	approx. 30.40 Mg Al approx. 1.60 Mg Zn	approx. 243.2 Mg Al approx. 12.8 Mg Zn
	yes	approx. 10.7	approx. 10.17 Mg Al approx. 0.54 Mg Zn	approx. 81.36 Mg Al approx. 4.32 Mg Zn

Source: own study based on Kirchgeorg et al. (2018).

The prepared estimation shows that the highest annual Al and Zn emissions resulting from the implementation of the Project will take place in the case of using tripod foundations.

The estimated Zn emission relating to the Project, amounting in the worst case scenario (without additional coating) to approx. 9.79 Mg/year is negligible in relation to the load of this element penetrating annually into the waters of the Baltic Sea with the rivers. In 2006, a total of 3,157.3 Mg of Zn was discharged to the Baltic Sea with water, of which 256.65 Mg originated from Poland (HELCOM, 2011). The expected Zn emission in the worst case scenario is therefore only approx. 0.3% of this load.

The use of Zn-based anodes for the needs of the Project would increase the total annual emission from anticorrosive protection due to their lower current capacity compared to Al-based anodes, and consequently the need to use a larger amount of anodic material. For this type of anodes, 99% of emissions are Zn emissions. Although Zn anodes are technically suitable for offshore wind farms, their higher required number causes structural difficulties. Therefore, Zn anodes are currently not used in offshore wind farms in the German exclusive economic zone (Kirchgeorg et al., 2018).

It is worth mentioning that recently information has appeared on the use of metallic coating (Al, 350 pm) applied by thermal spraying in combination with organic coatings for the wind farm in the Baltic Sea as an alternative technique allowing for avoiding the use of anodes and thus reducing metal emissions (Kirchgeorg et al., 2018).

Taking into account the above, I would like to emphasize that in the case the Applicant decides to use cathodic protection for the needs of the Project, it plans to include it in the design of additional protective coatings or other similar solutions aimed at limiting the necessary amount of anodic material, and thus the emission from this protection. Detailed solutions in the said scope shall be determined at the stage of designing the anticorrosive protection of the Project.

In the currently requested option selected for implementation, the total number of foundations and types of foundations on which wind turbines can be installed was limited. In this option, as part of the Project, only monopiles and jacket foundations may be used for the needs of installation of wind turbines. If a galvanic cathodic protection is used, a reduction in the number of foundations of the BIII OWF, as well as the exclusion of tripod foundations (which require potentially the largest number of anodes) from further considerations concerning the foundation of wind turbines, will allow for reducing the total necessary amount of the anode material, and thus the emission to the marine environment.
Therefore, the impact in this respect will remain insignificant.

4 References and other sources

4.1 Legal regulations

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3. Regulation of the Council of Ministers of September 10, 2019 on projects which may have significant environmental impact (Journal of Laws of 2019, item 1839)

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 5

The process of operating a wind farm

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
NPS	National Electricity System
OWF BII/ Project	Bałtyk Środkowy III Offshore Wind Farm
MIP	Offshore Transmission Infrastructure
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection of July 7, 2016, ref. No.: RDOS-Gd-WOO.4211.12.2015.KP.22 (zpo)
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF

1. Introduction

The section presents a description regarding the operation stage of the project, which consists in the construction of an offshore wind farm designated as OWF Bałtyk Środkowy III in parameters modified in relation to the variant for which the Environmental Decision was issued[1]. Since this report is prepared for the purposes of the proceedings to amend the Environmental Decision, thus the Environmental Impact Report[2] - Report 2015, which was the basis for the issuance of the Environmental Decision, is the reference point both for comparing alternatives and for the basis for conducting the environmental impact assessment. Changes in the description of the project are primarily related to the refinement of the approved variant, resulting from technological advances, the progress of design work, including the development of a preliminary plan for the farm and the selection of foundation technology. The presented changes - modifications to the parameters of the BIII OWF approved by the Environmental Decision are the subject of both the description of the project and the basis for conducting an impact assessment.

The above changes did not alter the operation of the project. The description of the operation stage was prepared on the basis of the Environmental Impact Assessment Report Volume III, Section 5 Operation Process, SMDI Doradztwo Inwestycyjne Sp. z o.o. April 2015, and the changes introduced in the currently discussed Contractor's preferred option were taken into account.

The expected life of the investment is about 25 to 30 years. At this stage, it is anticipated that the IMF will require permanent maintenance.

2. The main characteristics of the processes production

Wind power plants will convert the kinetic energy of the wind into electricity as a result of the manufacturing process. The operation of a wind turbine unit is based on a process in which a stream of air creates a buoyant (lifting) force on the aerodynamically formed rotor blades and sets the rotor in rotary motion. The rotating rotor drives a generator that converts the rotor's mechanical energy into low-voltage electricity. The turbine of the wind turbine generates electricity with a voltage of about 400 - 710 volts, which is increased to medium voltage (MV) by the power plant's transformer. The generated electricity is transmitted via submarine MV cable lines to an internal substation. Here the transmitted energy is transformed to the high (HV) or highest (LV) voltage level for transmission to the National Electricity System (NES).

Electricity generation by a wind farm does not require the use of any raw materials or fuels. As a result, air pollutants released during the combustion of such media in conventional power plants are not generated. During the operation of wind turbines, only in situations of windless weather is there a small demand for electricity.

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22z dated July 72016.
[2] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

3. Command and control system farms

The BIII offshore wind farm will be controlled by a SCADA (Supervisory Control and Data Acquisition) system, supplied by the turbine manufacturer and overseeing the production process at the farm. The SCADA system collects actual data (measurements), prepares their visualization, controls the production process, reports, as well as alerts (e.g., it can report the need for scheduled or unscheduled equipment maintenance or inspection, or even shut down a damaged power plant automatically) and archives the data. Meteorological monitoring will also be carried out, providing data on sea state and windiness to help plan maintenance work on the farm's equipment, as well as verify wind turbine performance and forecast production. SCADA can also be applied in the transmission of data from ornithological monitoring, if such will be carried out by devices installed on the farm facilities (e.g. radars or cameras). The control systems located at the individual farm facilities will be connected via fiber optic cables (which are part of submarine cables) and, in addition, by radio to a monitoring and control center probably located at the internal substation. The substation, in turn, will be connected to the mainland via cables belonging to the Maritime Transmission Infrastructure (MIP), which is a separate project.

During the life of the farm, systematic, periodic inspections of individual farm components will be carried out in accordance with the Maintenance Plan specified in the contract with the turbine manufacturer. Planned (preventive) and unplanned (corrective) maintenance of the farm will be carried out. In the first years of the farm's operation, this will be a warranty service provided by the equipment manufacturer.

Depending on the cost-benefit analysis, day-to-day farm maintenance activities can be carried out from land (the distance of the chosen port from the farm is a decisive factor), but during periods of intensive work, offshore accommodation of maintenance crews is often used. These can be smaller vessels dedicated to wind farm work, with accommodation for 30 to 100 people, or larger hotel ships. With the planned size of the OWF and the fact that it is being designed within 50 Mm of several seaports, or about 2 hours of transit, it is more likely that most of the work will be carried out from land, using ships and helicopters. Accommodations for maintenance crews can also be made at substations.

It should be added that in connection with the development of offshore wind power, concepts are emerging for the creation of offshore farm management centers, most often placed on a permanent foundation or on specially adapted jack - up platforms, equipped with a helipad, access areas for work boats and ships, and equipped with accommodation for crews and control systems rooms. Thus, it cannot be ruled out that such a solution will be applied in the case of IMF BIII.

An example is the Danish wind farm Horns Rev 2, owned by Ørsted. It is located more than a 2-hour voyage from the coast, while ongoing turbine maintenance work continues throughout the year. As a result, a decision was made to build a residential platform. The platform weighs 422 tons, is three stories high and has 750$^{\text{square meters of}}$ space. It can accommodate 24 employees at a time.

The impacts associated with the construction and decommissioning of the residential platform are similar to those of substations. On the other hand, issues related to the production of domestic sewage and municipal waste will be resolved in accordance with the regulations of international conventions, in the case of the Baltic Sea it is the MARPOL Convention.

Photo 1. Residential platform built for Horns Rev 2 farm (Denmark)

Source: www.orested.com available 03/2022.

4. Ports exploitation

A preliminary analysis of available ports where a farm management center could be located was made. The operating port should be suitable for short-term maintenance and rapid response work.

The operating port should meet a number of requirements, as indicated in the table below.

Table 1. Requirements for the operating port

General requirements	
Transport time to / from the farm or distance	< 2 h or < 50 Mm
Wharf length	80 m
Minimum depth	4 m
Minimum bearing capacity of the soil	5 Mg /^{m2}
Office space, canteen, etc.	approx. 500^{m2}
Accommodation for staff, locker rooms, parking, etc. (social facilities)	for about 15 - 20 people
Availability for service vessels, crew transport vessels, medium-sized jack - up vessels	+

Harbour basin suitable for ships 55 m long and 32 m wide	+
Fuel storage	+
Workshop facilities	+
Helicopter landing pad	+

source: provided by the Contracting Authority

Guided by the above criteria, the technical advisor identified 6 potential operating ports for the BIII offshore wind farm. These are shown in the table below, with the technical advisor stipulating that the ports of Ustka and Darlowo have entrances that are too narrow (both about 40 meters each) to accommodate all vessels used for operations (this is especially true for medium-sized jack - up vessels/barges). However, these ports can be used for personnel transport and emergency response. It cannot be ruled out that by the time the BIII OWF begins operation, there will be changes, e.g. port conversions, changes in technology, which will enable full use of the Ustka and Darłowo ports at the stage of the farm's operation. It cannot be ruled out that other ports, such as Leba, will also be available.

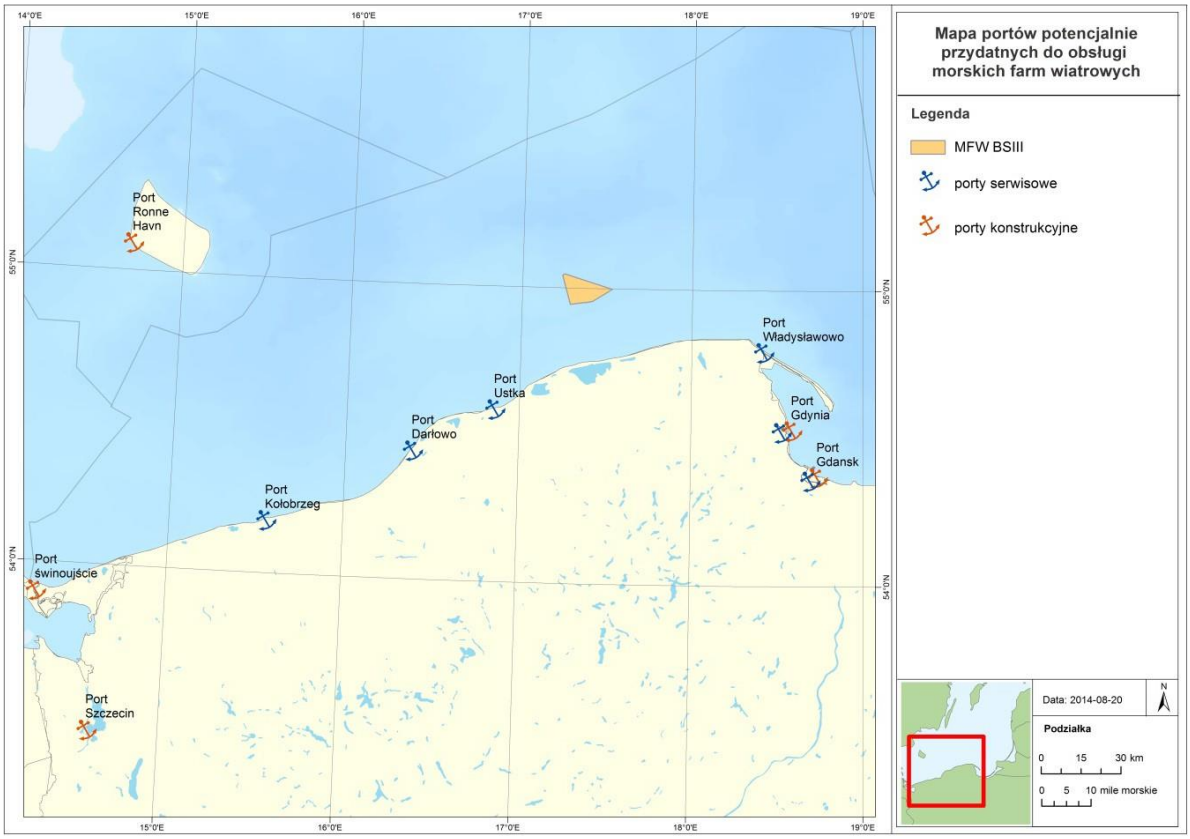
Table 2. Possible operating ports

Port name	Distance from IMF BIII [km]	Depth [m]
Ustka	54	4.5
Darlowo	85	< 5,5
Wladyslawowo	75	4
Kolobrzeg	145	5 - 6
Gdansk	140	15
Gdynia	140	13

source: provided by the Contracting Authority

Possible service ports are marked in dark blue on the map below.

Figure 1. Possible service ports



	Prot Ronne Havn
	Port of Swinoujscie
	Port of Szczecin
	Port of Kolobrzeg
	Darlowo port
	Port of Ustka
	Port of Gdynia
	Port of Wladyslawowo
	Port of Gdansk
	Map of ports potentially suitable for offshore wind farms
	Legend
	IMF BSIII
	Service ports
	Construction ports
	Date: 2014-08-20
	Pitch
	Sea miles

source: provided by the Contracting Authority

4.1. Anticipated types and traffic vessels

It is expected that for the operation of the BIII offshore wind farm, the vessels described below will be used.

The following are approximations, based on past experience, to illustrate the possible scale of the venture. The final assumptions on ship traffic for the BIII OWF will be made at a later stage, when the construction project is developed and the final concept of organization during the construction phase is worked out. At the same time, it should be emphasized that reducing the number of service units and minimizing their time at sea is one of the main courses of action to reduce the cost of servicing offshore wind farms. Less fail-safe power plants are being built, adapted to marine conditions, and faster and more efficient service units are being developed. Thus, the possibility of a reduction in the figures given below should be expected, not an increase. This includes potential cumulative impacts - operators of other offshore wind farms will very likely use the same or similar state-of-the-art technical solutions offered on the market.

Table 3. Use of ships for substation inspections

Type of ship	Working time	Engine power	Fuel consumption
Auxiliary vessel (support vessel)	6 - 10 inspections per year of each station	1.4 MW	0.17 - 0.35$^{m3/h}$

source: provided by the Contracting Authority

Table 4. Use of cable inspection vessels

Type of ship	Working time	Engine power	Fuel consumption
Small research vessel (small surveying vessel)	1 cable inspection per year, at a speed of 1 km/h	1 MW	0.1 - 0.25$^{m3/h}$

source: provided by the Contracting Authority

Table 5. Use of ships to inspect power plants

Type of ship	Working time	Engine power	Fuel consumption
Auxiliary vessel (support vessel)	2 inspections per year of each turbine, an average of 4 turbines per day + inspections of the entire farm	1.4 MW	0.17 - 0.35$^{m3/h}$

source: provided by the Contracting Authority

Some tasks, especially those related to transporting service teams and equipment, can also be performed by helicopters.

5. Facilities service farms

5.1. Service turbines

During the inspection, ongoing repairs and maintenance will be performed, including replacement of lubricants and hydraulic oils. Based on the results of the inspection, further maintenance work will also be planned. Turbine service vessels will primarily be used to service the turbines. Helicopters may also

be used. If the need for major repairs, such as replacing wings, is identified, it may be necessary to mobilize appropriate equipment, such as ships or jack - up barges.

5.2. Service foundations

The foundations and their equipment will most often be inspected at the same time as the turbines, reducing costs. Ongoing repairs and maintenance will be performed during the inspection. Based on the results of the inspection, further maintenance work will also be planned. Ships will be used to service the foundations, as well as ROVs and divers.

5.3. Substation service power station

The purpose of the inspection will be, in particular, to check the circuits, transformer oil, safeguards. Ongoing repairs and maintenance will be performed during the inspection. Based on the results of the inspection, further maintenance work will also be planned. Ships will be used to service the substation, as well as helicopters. If the need for major repairs, such as replacing transformers, is identified, it may be necessary to mobilize appropriate equipment, such as ships or jack - up barges.

Hazardous substances will be used at substations. The expected types and quantities of these substances are indicated in the table below.

Table 6. Anticipated types and quantities of hazardous substances used in substations

Type of substance	Anticipated quantity
Cooling oil (transformers, chokes)	25 - 40 Mg per 1 transformer 50 - 80 Mg per 1 station of 200 - 300 MW (containing 2 transformers)
Sulfur hexafluoride SF6 (switchgear insulation)	100 - 200 kg per 1 switchboard. Each AC substation will have 2 switchboards (MV and HV)
Diesel (emergency diesel generator)	30^{m3} tank at each station (enough fuel for 5 days of emergency operation)
Refrigerants (AC system cooling)	not specified

source: provided by the Contracting Authority

5.4. Service cables

The purpose of the inspection will be to check the buried condition of the cables and identify any damage to them. Ongoing repairs and maintenance will be performed during the inspection. Based on the results of the inspection, further maintenance work will also be planned. Small research vessels will be used to service the cables, as well as ROVs and divers. If a cable is found to be damaged or uncovered, it may be necessary to use specialized equipment, such as a ship-cable carrier.

6. Zones security

Safety zones are likely to be set up around power plants and substations, with limited access by vessels not owned by the farm operator. The establishment of such a zone is aimed at reducing the risk of their collision with the farm's facilities and, consequently, the risk of danger to human health and life, environmental pollution (including hazardous substances) and serious property damage. The extent of any safety zones and the rules of movement in these zones will be determined at a later stage of the project. So far, the position of the Maritime Office in Slupsk, the authority competent to determine safety zones for the BIII offshore wind farm project, expressed during the consultations conducted for the BSIII and BSII offshore wind farm projects, indicated the legitimacy of creating safety zones with a width of 100 m around the turbines and other elements of the structure at the stage of operation. During construction, the bodies of water where work will be carried out will be gradually, temporarily closed to navigation and fishing. Sailing between power plants may be allowed for vessels up to 45 m in overall length, with a visibility of at least 3 nautical miles[3]. The Maritime Spatial Plan recommends for the 45E basin, where the BIII OWF will be located, the establishment of safety zones with a width of 100 meters around each operating turbine. [4]

7. Obstacle markings and systems warning

The wind turbines, substation and possibly other farm facilities will be properly painted, illuminated and equipped with warning systems as required by Polish aviation and maritime regulations.

In accordance with Article 871 (1) (2) of the Law of July 3, 2002. Aviation Law (i.e: OJ. U. of 2020, item 1970, as amended) construction objects that pose a threat to the safety of aircraft traffic ("aviation obstructions"), should be immediately notified pursuant to Article 871, paragraph 6. To the President of the Civil Aviation Authority (ULC). The form of notification and the method of obstruction marking are specified in the Law of December 14, 2018, Dz. U. 2019 item 235 on Amendments to the Law - Aviation Law and Certain Other Laws, the definition of the procedure for notification and marking of aviation obstacles has been transferred from the regulation to the text of the law. According to the Aviation Law, obstruction markings are understood to be luminous (day or night) and graphic and color markings. The markings should be visible from all sides and should indicate the location, general shape and size of the aerial obstacle. The method of marking the elements of the farm will be determined at the stage of development of the construction project, taking into account the requirements of the applicable regulations.

8. Emissions at the stage of operation

The operation of the BIII offshore wind farm is expected to last about 25 to 30 years. The emissions described in this chapter will therefore occur continuously or periodically during this time. The data

[3] Position of the Maritime Office in Slupsk dated 08.02.2017. (NP.-obm-60/6/17) in response to an inquiry from SMDI Doradztwo Inwestycyjne Sp. z o.o.

[4] Ordinance of the Council of Ministers of April 14, 2021 on the adoption of a spatial development plan for internal marine waters, territorial sea and exclusive economic zone at a scale of 1:200,000. OJ. U. of 2021, item 935.

presented in this chapter are based on analyses conducted in the 2015 Report for the most far-reaching scenario, which assumes the construction of 200 power plants, with the variant finally approved in the Environmental Decision reducing this number to 120. In the variant that is the subject of this Report, a maximum of 60 wind turbines will be built, which is about 70% less than envisaged in the case of the Project's statement of parameters representing the most far-reaching scenario - NIS 2015, and twice less than specified in the Environmental Decision, and the use of gravity foundations under the turbines has been excluded, which is associated with correspondingly lower emissions during the operation stage. Thus, it is considered that the project will cause lesser impacts from both the most far-reaching scenario - NIS 2015 and the variant approved in the Environmental Decision.

8.1. The work of the farm management center on land

It is envisioned that the farm management center will be located in the service port area and will use its infrastructure, including buildings, parking lots, etc.

Table 7. Emissions related to operation of onshore farm management center

Emissions related to operation of onshore farm management center	
Potential emissions and environmental disturbances	• atmospheric emissions • water intake • wastewater generation • waste generation
Sources of emissions	Operation of the land-based management center
Scale of emissions	Local
Frequency of emissions	Constant (over the lifetime)
Issue duration	During the life of the farm
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

source: provided by the Contracting Authority

8.2. Movement of service units from the port to the site investment

Table 8. Emissions associated with the movement of service units from the port to the project site

Emissions associated with the movement of service units from the port to the project site	
Potential emissions and environmental disturbances	• noise emissions • atmospheric emissions

	• wastewater generation • waste generation
Sources of emissions	Ships and helicopters in service
Scale of emissions	Local (industrial port area, transport route, project site)
Frequency of emissions	Constant (over the lifetime)
Issue duration	During the life of the farm
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

source: provided by the Contracting Authority

8.3. Operation of service units on farm

Table 9. Emissions associated with the operation of service units on the farm

Emissions associated with the operation of service units on the farm	
Potential emissions and environmental disturbances	• noise emissions • atmospheric emissions • wastewater generation • waste generation
Sources of emissions	Ships and helicopters in service
Scale of emissions	Local
Frequency of emissions	Repeatable (over the lifetime)
Issue duration	During the life of the farm
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

source: provided by the Contracting Authority

8.4. Operation of the farm wind farm

Table 10. Emissions associated with wind farm operation

Emissions associated with wind farm operation	
Potential emissions and environmental disturbances	• noise emissions (by wind turbines and service vessels) • emission of electromagnetic fields and radiation • heat emissions from submarine cables • atmospheric emissions (by service vessels) • wastewater generation • waste generation
Sources of emissions	Farm facilities
Scale of emissions	Local
Frequency of emissions	Repeatable (during the construction period)
Issue duration	During the life of the farm
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

source: provided by the Contracting Authority

9. Literature and other sources

9.1. Acts legislation

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457)
2. Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz. U. of 2021, item 2373, as amended).
3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws of 2019, item 1839)
4. Act of July 3, 2002 Aviation Law (consolidated text Dz. U. of 2020, item 1970, as amended).

5. Ordinance of the Council of Ministers of April 14, 2021 on the adoption of a spatial development plan for internal marine waters, territorial sea and exclusive economic zone at a scale of 1:200,000. (Journal of Laws 2021, item 935)

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 6

Wind farm decommissioning stage

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
PSZW	Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection of July 7, 2016, ref. No.: RDOS-Gd-WOO.4211.12.2015.KP.22 (zpo)
RDEP	Regional Director of Environmental Protection in Gdansk

1. Introduction

The section presents the decommissioning stage of the project, which consists in the construction of an offshore wind farm designated as OWF Baltic Central III in parameters modified from the variant for which the Environmental Decision was issued[1]. Since this report is prepared for the purposes of the proceedings to amend the Environmental Decision, thus the Environmental Impact Report[2] - Report 2015, which was the basis for the issuance of the Environmental Decision, is the reference point both for comparing alternatives and for the basis for conducting the environmental impact assessment. The changes in the project description are primarily related to the refinement of the approved variant, resulting from the progress of design work, including the development of a preliminary farm layout plan and the selection of foundation technology. The presented changes - modifications to the parameters of the BIII OWF approved by the Environmental Decision are the subject of both the description of the project and the basis for conducting an impact assessment.

The description of the decommissioning process was prepared on the basis of the Environmental Impact Assessment Report Volume II, Section 6 Decommissioning Phase, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015. The option planned for implementation did not affect the decommissioning process of the OWF or its selected elements. The changes made to the project description are primarily related to the refinement of the variant selected for implementation, resulting from the progress of design work, including the development of a preliminary plan for the farm and the selection of foundation technology.

2. Description of the liquidation process IMF

The expected life of the investment is about 25 to 30 years. After that time, it may be liquidated (e.g., as a result of technological advances that will make other energy sources applicable). More likely, however, is a scenario in which the decommissioned turbines will be replaced by newer-generation equipment, allowing for greater energy production.

Possible scenarios include dismantling still-operational wind power plants and reselling them for further use, while new plants, with greater capacity, will be installed in their place. This is now a fairly common practice in the onshore wind industry. Used wind turbines from countries where the industry developed earlier than in Poland are now often imported and used in our country. Due to the very rapid development of wind technology, it is expected that this practice will continue.

2.1. Ports possible to use at the stage of decommissioning

Depending on the dimensions of the decommissioned elements, construction and installation or service ports, as described in Sections 4 and 5 of Volume III, may be used to handle the decommissioning of individual farm facilities.

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22z dated July 72016.

[2] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

2.2. Reasons decommissioning

Decommissioning of the BIII offshore wind farm (or its individual components, e.g., individual turbines) may occur for the following reasons:

- scheduled decommissioning, due to the depletion of equipment and the end of the farm's operation,
- decommissioning for technical reasons, such as mistakes made during construction, as a result of which the relevant authority will issue an order to demolish the farm equipment,
- liquidation for formal and legal reasons (e.g., due to the expiration of the location decision - PSZW).

Today, the expected life cycle of a wind power plant is a minimum of 20 years, but technological progress in the field of offshore wind energy is very fast, and it is very likely that this time will extend in the case of the BIII OWF to 25-30 years. It is also possible that the farm's equipment will be replaced with new, higher-capacity equipment after a certain period of operation (known as repowering). It should be noted that such an operation will require a new environmental decision and this report does not cover it.

2.3. The basic principles of the process decommissioning

The various components of the wind farm will be decommissioned as follows:

- power plants - removed in their entirety,
- foundations - removed to a depth of 3 m below the level of the seabed or in their entirety, or left,
- internal cables - removed or left in the seabed, covered by sediment,
- protection against leaching - left,
- power substations - removed or left for future use.

It is also possible to decide to leave the foundations intact, so that the artificial reef that will emerge once these structures are populated by benthic organisms will not be destroyed. Such a decision should be one taken immediately before the possible decommissioning of the investment, in consultation with the Regional Director of Environmental Protection in Gdansk and after the completion of a nature inventory.

2.3.1. Decommissioning power plants

Decommissioning a power plant is roughly the reverse process of installing it. The sequence of work is as follows:

1) mobilization of the ship - crane, pontoon / barge with tugboat, service vessels,
2) attaching the crane hooks to the EW, using the same hooks as for installation,
3) cutting the connections between the EW and the connector or foundation,

4) cutting the cables between the EW and the foundation,
5) eW lift from the foundation,
6) placing EW on the pontoon and attaching,
7) land transportation,
8) disposal or sale.

2.3.2. Decommissioning of substations power stations

Offshore substations can continue to be used after the farm is decommissioned. It is possible to connect other IMFs to them. In the case of decommissioning a substation, the sequence of work will be as follows:

1) mobilization of the ship - crane, pontoon / barge with tugboat, service vessels,
2) disconnecting all electrical systems, cutting cables, fixing or removing any station components that are not permanently fixed,
3) possible construction of temporary supports around the legs of the station,
4) attaching the crane hooks to the EW, using the same hooks as for installation,
5) cutting off the legs of the substation just above the foundation and possibly setting the substation on temporary supports,
6) raising the station from its foundation,
7) placing the station on the pontoon / barge and attaching,
8) land transportation,
9) disposal or sale.

2.3.3. Liquidation foundations

The method of eliminating foundations depends on their type.

Monopiles

In the case of monopile decommissioning, the sequence of work will be as follows:

1) mobilization of the ship - crane, pontoon / barge with tugboat, service vessels,
2) attaching the crane hook to the monopile foundation connector,
3) cutting the cables just before they enter the J-tubes,
4) removal of bottom sediments to the depth of the cut (probably about 3 m),
5) cutting the monopile at a depth of about 3 meters below the surface of the seafloor,

6) raising the monopal,
7) laying the monopile on the pontoon and attaching,
8) land transportation,
9) disposal or sale.

It may be necessary to cut the monopal into two or more pieces before transporting it to land.

Tripod or jacket

In the case of the elimination of tripod or jacket foundations, the sequence of work will be as follows:

1) mobilization of the ship - crane, pontoon / barge with tugboat, service vessels,
2) attaching the crane hook to the foundation,
3) cutting the cables just before they enter the J-tubes,
4) partial removal of bottom sediments around the foundation to allow access to the piles,
5) pile cutting,
6) raising the foundation,
7) laying the foundation on the pontoon and attaching,
8) land transportation,
9) disposal or sale.

Foundations gravity

The decommissioning of gravity foundations is a complicated procedure. Two methods are used - partial decommissioning on site or transport ashore in its entirety. Depending on the type of foundation, it can be placed on a barge or floated. In the case of transporting foundations to land, the sequence of work will be as follows:

1) mobilization of the ship - crane, pontoon / barge with tugboat, service vessels,
2) attaching the crane hooks to the foundation,
3) removal of ballast from the foundation,
4) cutting the cables just before they enter the J-tubes,
5) raise the foundation (it may be necessary to partially dig up the foundation),
6) removing the rest of the ballast and water, so as to restore the buoyancy of the foundation,
7) laying the foundation on the pontoon and fastening (in the case of non-floating structures),

8) land transportation,

9) disposal or sale.

2.3.4. Decommissioning cables

The method of cable decommissioning depends on how the cables are laid. In the event that they have been shallowly buried in the sand, then they can be pulled out after digging them up. This may cause uplift of bottom sediments, but this impact is not expected to be significant. If the cables have been laid deeper, then they will most likely be left in place, as decommissioning them would be economically unjustifiable, in addition to having a greater environmental impact.

In the case of cable decommissioning, the sequence of work is as follows:

1) mobilization of a vessel-cable carrier equipped with an ROV,

2) disconnecting the electrical voltage and disconnecting the cables from the foundations,

3) pulling cables to the surface of the seabed using an ROV,

4) pulling the cables through the cable carrier, pulling them aboard and winding them onto a drum,

5) land transportation,

6) disposal or sale.

2.3.5. Survey of the seabed after decommissioning farm

Once decommissioning work is completed, a seabed inspection is required to ensure that all farm components have been removed as required.

2.4. Anticipated types and traffic vessels

During the decommissioning stage of the farm, similar vessels will be used as during the construction stage, as described in Section 4 of this Volume.

Only approximations are given, based on past experience, to illustrate the possible scale of the project. Final assumptions on vessel traffic for the BIII OWF will be made at a later stage, when the construction project is developed and the final concept of organization at the decommissioning stage is worked out. At the same time, it should be emphasized that reducing the number of construction and maintenance units and minimizing their time at sea is one of the main courses of action to reduce costs in offshore wind energy. Today, the market for decommissioning services for offshore wind farms does not exist, so it is difficult to determine the principles, number and efficiency of using vessels in this process. It is to be expected that vessels specializing in OWF construction will be used for this purpose, which in 30-40 years' time, when the BIII OWF is decommissioned, will allow for a reduction in the volumes listed below, rather than an increase.

2.5. Emissions at liquidation stage IMF

The data presented in this chapter are based on analyses conducted in the 2015 Report for the most far-reaching scenario, which assumes the construction of 200 power plants, with the option finally approved in the environmental decision reducing this number to 120. The variant that is the subject of this Report will build about 70% fewer wind turbines than envisioned in the 2015 NIS, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the turbines has been ruled out. It is therefore considered that the project will result in lower impacts and emissions from both the 2015 NIS and the variant approved by the Environmental Decision.

2.5.1. Movement of service and transport units from the port to the site investment

Table 1. Emissions associated with the movement of service and transport units from the port to the project site

Emissions associated with the movement of service and transport units from the port to the project site	
Potential emissions and environmental disturbances	• noise emissions • atmospheric emissions • wastewater generation • waste generation
Sources of emissions	Ships and helicopters in use during decommissioning
Scale of emissions	Local (industrial port area, transport route, project decommissioning site)
Frequency of emissions	Repeatable (during the period of liquidation)
Issue duration	During the liquidation period
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

Source: provided by the Contracting Authority

2.5.2. Operation of vessels at the site of decommissioning project

Table 2. Emissions associated with the operation of vessels at the project decommissioning site

Emissions associated with the operation of vessels at the project decommissioning site	
Potential emissions and environmental disturbances	• noise emissions • atmospheric emissions

Emissions associated with the operation of vessels at the project decommissioning site	
	• wastewater generation • waste generation
Sources of emissions	Ships and helicopters in use during decommissioning
Scale of emissions	Local (place of liquidation of the project)
Frequency of emissions	Repeatable (during the period of liquidation)
Issue duration	During the liquidation period
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

Source: provided by the Contracting Authority

2.5.3. Liquidation foundations

Table 3. Emissions related to the decommissioning of foundations

Emissions related to the decommissioning of foundations	
Potential emissions and environmental disturbances	• noise emissions • atmospheric emissions • wastewater generation • waste generation • increase in water turbidity due to disturbance of the bottom sediment layer
Sources of emissions	Ships and helicopters in use during decommissioning
Scale of emissions	Local (place of liquidation of the project)
Frequency of emissions	Repeatable (during the period of liquidation)
Issue duration	During the liquidation period
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment

Emissions related to the decommissioning of foundations	
Additional comments	Emissions will depend on the type of foundations to be decommissioned.

Source: provided by the Contracting Authority

2.5.4. Decommissioning of wind power plant components and substations power stations

Table 4. Emissions related to de-installation of wind power plant components, substations

Emissions related to decommissioning of wind power plant components, substations	
Potential emissions and environmental disturbances	• surface noise emissions • atmospheric emissions • wastewater generation • waste generation
Sources of emissions	Ships and helicopters in use during decommissioning
Scale of emissions	Local (place of liquidation of the project)
Frequency of emissions	Repeatable (during the period of liquidation)
Issue duration	During the liquidation period
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

Source: provided by the Contracting Authority

2.5.5. Decommissioning of cables undersea

Table 5. Emissions associated with submarine cable decommissioning

Emissions associated with submarine cable decommissioning	
Potential emissions and environmental disturbances	• noise emissions • atmospheric emissions • wastewater generation • waste generation • water pollution during normal ship operations

Emissions associated with submarine cable decommissioning	
	• increase in water turbidity due to disturbance of the bottom sediment layer
Sources of emissions	Ships in use during decommissioning, underwater vehicles (ROVs)
Scale of emissions	Local (liquidation site)
Frequency of emissions	Repeatable (during the period of liquidation)
Issue duration	During the liquidation period
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

Source: provided by the Contracting Authority

2.5.6. Transport of dismantled farm components and subassemblies to the land

Table 6. Emissions associated with the transportation of dismantled farm components and subassemblies to land

Emissions associated with the transportation of dismantled farm components and subassemblies to land	
Potential emissions and environmental disturbances	• noise emissions • atmospheric emissions • wastewater generation • waste generation
Sources of emissions	Ships and helicopters in use during decommissioning
Scale of emissions	Local (industrial port area, transport route, project decommissioning site)
Frequency of emissions	Repeatable (during the period of liquidation)
Issue duration	During the liquidation period
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment

Emissions associated with the transportation of dismantled farm components and subassemblies to land	
Additional comments	No

Source: provided by the Contracting Authority

2.5.7. Transport, recovery or disposal of waste from decommissioning of the farm and waste and wastewater from vessels

Table 7. Emissions related to transportation, recovery or disposal of waste from the decommissioning of the farm and waste and wastewater from vessels

Emissions related to transportation, recovery or disposal of waste from the decommissioning of the farm and waste and wastewater from vessels	
Potential emissions and environmental disturbances	Potential irregularities related to transport, recovery or disposal of waste and wastewater
Sources of emissions	Vessels used during construction, vehicles used to transport waste, recovery or disposal sites
Scale of emissions	Local
Frequency of emissions	Repeatable (during the period of liquidation)
Issue duration	During the liquidation period
Reversibility of emissions	Reversible
Probability of occurrence	Very large
Preventive, minimizing or mitigating actions	They are described in the following section of the report, which includes an environmental impact assessment
Additional comments	No

Source: provided by the Contracting Authority

2.5.8. Unplanned emissions related to accidents and accidents

Unplanned emissions related to accidents and accidents during the decommissioning phase are expected to be similar in nature to similar events during the construction phase, as described in Section 4 of Volume II. Therefore, there is no need to describe them again here.

2.5.9. Projected air emissions air

Vessel traffic (at each stage of the project) will involve emissions of pollutants into the air, with average levels:

- NOx: 20-50 kg /$^{m3\ of}$ fuel,
- PM10: 1-2.6 kg /$^{m3\ of}$ fuel,
- $_{SO2}$: 1.7-17 kg /$^{m3\ of}$ fuel.

3. Literature and other sources

3.1. Acts legislation

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457)
2. Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Journal of Laws of 2021, item 2373, as amended.)
3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)

3.2. Literature, expert studies and administrative decisions administrative

1. Environmental Impact Assessment Report Volume II, Section 4 Construction Process, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015
2. Decision on environmental conditions issued by the Regional Director of Environmental Protection in Gdańsk on July 7, 2016, under the sign RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project titled. "Construction of offshore wind farm Baltic Central III"
3. Decision on environmental conditions dated March 12, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director of Environmental Protection in Gdansk for the project involving "construction of offshore electricity transmission infrastructure.
4. Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas for the project OWF Bałtyk Środkowy III, decision of the Minister of Transport, Construction and Maritime Economy of March 30, 2012, ref. GT7/62/1170069/decyzja/2012
5. Decision of the Minister of Transport, Construction and Maritime Economy No. MFWK/1/13 dated July 19, 2013, authorizing the laying and maintenance of submarine cables within the Polish Exclusive Economic Zone, mark: GT7pb/62/14823/decyzja/2013.
6. Polenergia offshore wind developments for projects Middle Baltic II and Middle Baltic III. High level technical design options study. Version 1, with additions. Royal Haskoning DHV Nederland B.V., 2013
7. Stryjecki M., Mielniczuk K. Guidelines for forecasting environmental impacts of wind farms, General Directorate for Environmental Protection, 2011.
8. Polenergia offshore wind developments for projects Middle Baltic II and Middle Baltic III. High level technical design options study, with additions. Royal Haskoning DHV Nederland B.V., 2013.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 7

Linkage matrix

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named “Construction of the Bałtyk III Offshore Wind Farm”
EW	Wind power plants
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
MSE	Offshore substation
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection of July 7, 2016, ref. No.: RDOS-Gd-WOO.4211.12.2015.KP.22 (zpo)
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments(consolidated text, Journal of Laws of 2022, item 1029).
WA2015	Alternative option from the 2015 Report assuming 200 wind turbines
WR2015	The implementation variant from the 2015 Report assuming the implementation of 120 wind power plants, for which a decision on environmental conditions was issued by the Regional Director of Environmental Protection in Gdansk on July 7, 2016 (sign: RDOS-GdWOO.4211.12.2015.KP.22) for the project titled "Wind power plant. "Construction of the Polenergia Baltic Central III offshore wind farm"
WR60	Option selected for implementation

1. Introduction

Below is information summarizing the most important emissions that an offshore wind farm may cause at various stages of construction, operation and decommissioning. Each type of emission has been assigned a source, i.e. an IMF component or activity in the operation of the farm that causes the emission. Then, for each emission, the type of impacts it causes in the marine ecosystem is indicated, while indicating the receptor/recipient of the impact, both direct and indirect.

Then, the factors, on the side of the environment and the Project, which influence the occurrence and scale of the impact were determined for each impact, and the most far-reaching scenario for the BIII OWF presented in the 2015 Report was indicated, i.e. such a technical solution, which in all variants considered at that time (the implementation variant assuming the implementation of 120 wind power plants, for which the Environmental Decision was issued - WR2015, and the alternative variant assuming the implementation of 200 wind power plants - WA2015 would cause the impact of the greatest scale - NIS 2015. Finally, the 2015 NIS was compared to the current variant selected for implementation-WR60, in the parameters that could cause its most far-reaching impacts.

Since the environmental assessment conducted in the 2015 Report was based on the parameters set by the 2015 NIS, these parameters are therefore the appropriate benchmark for conducting analyses related to changes in the nature or magnitude of impacts associated with the proposed modifications to the Project. At the same time, it should be emphasized that due to the fact that for the most part the parameters of the Project proposed for modification have not been increased, and most of them are significantly reduced, the consequence will be a reduction in the magnitude of impacts for most types of emissions or disturbances. The exceptions are the parameters related to the maximum overall height of the power plant (which increased by 97.5 meters compared to WR2015) and the maximum rotor diameter (which increased by 57.5 meters compared to WR2015). The change in parameters in this regard is offset many times over by reducing the number of power plants by about 70% compared to WA2015 and 50% compared to WR2015, respectively. In addition to a 50% reduction in the number of power plants in the currently proposed implementation variant, it was decided to limit the types of foundations considered that will be used for wind power plants. The developer has decided to rezegn from the possibility of using gravity foundations for wind turbines. This will reduce the area of the bottom occupied by foundations in WA2015 compared to the currently preferred implementation option by 97.4%. The investor also decided to reduce the diameter of the monopile foundations from 12.5m to 10.0m in the current implementation variant.

Nevertheless, the types of emissions and disturbances themselves, their sources and receptors will remain unchanged, thus the matrix compiled for the 2015 Report remains valid. However, the juxtaposition of the 2015 NIS with the proposed post-modification parameters of the Project in the linkage matrix makes it possible, in one place, to briefly illustrate the nature and direction of the proposed modifications to the Project in the minor environmental decision amendment proceedings.

The matrix of linkages, between emissions, impacts and parameters of the project, constructed in this way, served at subsequent stages to assess the impact of individual solutions, processes and technologies on the marine ecosystem, which is presented in the following chapters of Volume IV.

2. A matrix of linkages between emissions and impacts IMF

Table 1. A matrix of interrelationships of potential emissions and disturbances caused by the OWF and their sources, direct and indirect impacts on the environment and the factors determining them.

Type of emission or disturbance	Source of emissions	Type of impacts	Which elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	The most far-reaching scenario of the 2015 NIS	Project - variant selected for implementation (Project after update)
Disruption of sediment structure (and any other physical disturbance of the seabed)	• Preparation of the bottom for the foundation • Geotechnical drilling • Installation of foundations • Laying a protective layer against leaching	• Habitat destruction and alteration • Reduction in population size • Reduction of the foraging base • Potential for damage to historic objects at the bottom • Ability to wash out or pick up raw materials while preparing the bottom for foundations • Possibility of backfilling mineral deposits with dredging spoils	• Sediments • Bentos • Fish	• Seabirds • Mammals • Cultural heritage	• Bottom type • Thickness of the sediment layer	• Number of foundations • Type of foundation • Foundation diameter • Width of the protective layer	Construction of 200 gravity foundations of the maximum diameter under consideration, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket type and implementation of one gravity foundation (with a maximum base diameter of 50 m) for the implementation of MSEs
Increase in the concentration of suspended solids in water	• Preparation of the bottom for the foundation • Installation of foundations • Cable laying	• Change in living conditions • Turbidity of water	• Bentos • Fish • Mammals • Seabirds • Hydrological conditions	• Seabirds • Mammals • Tangible assets	• Type of sediment • Directions of currents • Speed of currents • Sedimentation rate	• Number of foundations • Type of foundation • Foundation diameter • Cable lengths	Construction of 200 gravity foundations of the maximum diameter under consideration, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket type and implementation of

Type of emission or disturbance	Source of emissions	Type of impacts	Which elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	The most far-reaching scenario of the 2015 NIS	Project - variant selected for implementation (Project after update)
						• Width of the protective layer		one gravity foundation (with a maximum base diameter of 50 m) for the implementation of MSEs
Release of pollutants and nutrients from the sludge into the water body	• Preparation of the bottom for the foundation • Installation of foundations • Cable laying • Heat emission from cables	• Increase in the amount of pollutants and nutrients in water • Change in living conditions • Decline in population size • Increase in the concentration of contaminants in the bodies of fish from consuming species	• Bentos • Fish • Mammals • Hydrochemical conditions	• Seabirds • Health and life of people	• Type of sediment • Sludge contamination • Speed and direction of currents	• Number of foundations • Type of foundation • Foundation diameter • Cable lengths • Depth of cable burial	Construction of 200 gravity foundations of the maximum diameter under consideration, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket type and implementation of one gravity foundation (with a maximum base diameter of 50 m) for the implementation of MSEs
Deposition of agitated sediment	• Preparation of the bottom for the foundation • Installation of foundations • Cable laying	• Change in living conditions • Possibility of additional backfilling of mineral deposits	• Bentos • Fish	• Seabirds • Mammals • Cultural heritage • Tangible assets	• Type of sediment • Directions of currents • Speed of currents • Sedimentation rate	• Number of foundations • Type of foundation • Foundation diameter • Cable lengths	Construction of 200 gravity foundations of the maximum diameter under consideration, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket type and implementation of one gravity foundation (with a maximum base diameter of 50 m) for the implementation of MSEs

Type of emission or disturbance	Source of emissions	Type of impacts	Which elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	The most far-reaching scenario of the 2015 NIS	Project - variant selected for implementation (Project after update)
The "artificial reef" effect	• Foundations laid	• Creation of new habitats • Changing species compositions • Growth of the food base • Change in living conditions • Increase the quantity and quality of professional and tourist fishing • Increase in revenue from the fishing and tourism industries	• Bentos • Fish	• Seabirds • Fish • Mammals • Tourism and recreation • Fishing • Tangible assets	• Physical and chemical parameters of water	• Number of foundations • Type of foundation • Foundation diameter	Construction of 200 gravity foundations of the maximum diameter under consideration, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket type and implementation of one gravity foundation (with a maximum base diameter of 50 m) for the implementation of MSEs
Increased underwater noise and vibration	• Foundation placement • Cable laying • Ship traffic • Operation of the power plant • Decommissioning of farm facilities	• Displacement from habitats • Change in living conditions • Injury • Mortality • Reduction in catches	• Fish • Mammals • Seabirds	• Seabirds • Mammals • Fishing	• Background noise level • Depth • Formation of the bottom • Depth structure of the bottom • Wind speed	• Type of foundation • Number of foundations • Foundation diameter • Foundation time for 1 foundation • Effective driving time • Number of impacts when driving the foundation • Hydraulic hammer power • Depth and method of cable laying	Construction of 200 monopile foundations of the maximum diameter under consideration, i.e. 10 m (WA2015) or removal of gravity foundations (200 units, WA2015)	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket type and the implementation of one gravity foundation (with a maximum base diameter of 50 m) for the implementation of MSE or the decommissioning of monopile or jacket type foundations (60 pieces) and a gravity foundation

Type of emission or disturbance	Source of emissions	Type of impacts	Which elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	The most far-reaching scenario of the 2015 NIS	Project - variant selected for implementation (Project after update)
						• Number of construction vessels		
Heat emission from cables	• Cables	• Increase in water and sediment temperature • The appearance of alien species	• Water • Sediments	• Abiotic environment • Archaeology and cultural heritage • Bentos • Fish	• Type of sediment • Thermal conditions at the bottom	• Cable lengths • Type of cables • Burial depth	Construction in WA of 200 power plants with cable infrastructure (With the caveat that WR2015, ie. 120 power plants, will likely require the laying of cables of similar length, due to the greater distances between wind turbines	Construction of 60 power plants with cable infrastructure it is assumed that a similar number of cables may be laid as for NIS 2015 due to the distances between EWs)
Emergence of new structures under the sea surface	• Foundations • Cables	• Barrier effect • Change in living conditions • Changes in the regime of sea currents and waves • Difficulties for shipping and navigation • Orders for the maritime industry	• Fish • Mammals • Hydrological conditions • Shipping and navigation • Maritime industry • Tangible assets		• Water transparency • Wind speed	• Number of power plants • Type of foundation • EW density/km2 • Diameter of foundations • Constant noise and vibration • Cable length	Construction of 206 gravity foundations with the maximum diameter under consideration, i.e. 40 m (WA2015)	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket type and implementation of one gravity foundation (with a maximum base diameter of 50 m) for the implementation of MSEs
Emission of electromagnetic field and radiation	• Cables	• Orientation disorder • Changes in the use of space	• Fish • Mammals • Radar systems			• Cable type • Cable length • Buried depth • Number of MSEs	Construction in WA2015 of 200 power plants with cable infrastructure (with the caveat	Construction of 60 power plants with cable infrastructure it is assumed that a similar number of

Type of emission or disturbance	Source of emissions	Type of impacts	Which elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	The most far-reaching scenario of the 2015 NIS	Project - variant selected for implementation (Project after update)
		• Interference with radar systems • Disruption of navigation and navigation	• Shipping and navigation			• MSE foundation height	that WR2015, ie. 120 power plants, will likely require laying cables of similar length, due to the greater distances between EWs)	cables may be laid as for NIS 2015 due to the distances between EWs)
Appearance of new structures above sea level	• Rotor • Tower • Electricity substations	• Barrier effect • Displacement from habitats • Collision fatality rate • Landscape changes • Difficulties for shipping and navigation • Orders for the maritime industry • Increase innovation in industry • Growth in employment / wages	• Seabirds • Migratory birds • Landscape • Bats • Shipping and navigation • Maritime industry • Tangible assets			• EW height • Rotor diameter • Number of structures • EW density	Construction of 200 power plants with a minimum clearance of 20 m, a maximum rotor diameter of 200 m and a maximum height of the entire structure of 275 m and 6 MSEs (WA2015)	Construction of 60 power plants with a minimum clearance of 20 m, a maximum rotor diameter of 255 m and a maximum height of the entire structure of 300 m and (the parameter of diameter and total height are not changed from the condition set by the Environmental Decision) and 1 MSE
Increased traffic of vessels and helicopters	• Watercraft (ships, barges) • Helicopters	• Barrier effect • Hounding • Collisions with animals	• Seabirds • Migratory birds • Bats • Marine mammals • Fish • Bentos • Water			• Number of ships • Type of ships	Construction, operation and decommissioning of 200 farm facilities (WA2015)	Construction, operation and decommissioning of 60 farm facilities and 1 MSE

Type of emission or disturbance	Source of emissions	Type of impacts	Which elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	The most far-reaching scenario of the 2015 NIS	Project - variant selected for implementation (Project after update)
			• Sediments					
Surface noise emissions	• Rotor • Ship traffic	• Hounding • Displacement from habitats • Deterioration of living conditions for people in the area of the farm (e.g., on ships)	• Seabirds • Marine mammals • Fish • Tourism • Health and life of people		• Wind speed • Wind directions • Wave height	• Sound power of the turbine • Tower height • Number of EW • Number and type of ships	Construction / decommissioning in WA2015 of 200 power plants with infrastructure (resulting in the longest noise emissions due to the length of construction or decommissioning; noise levels will be the same regardless of the number of power plants built) Operation in WA2015 of 200 power plants (resulting in noise emissions of the highest level and extent)	Construction / decommissioning in the WR of 60 power plants and 1 MSE with infrastructure (resulting in the longest noise emissions due to the length of construction or decommissioning; noise levels will be the same regardless of the number of power plants built, but the length of emissions depends on the number of power plants) Operation of 60 power plants (resulting in noise emissions of the highest level and extent)
Air pollutant emissions	• Ships • Helicopters	• Deterioration of animal habitat • Deterioration of living conditions for people in the area of the farm (e.g., on ships)	• Air quality • Health and life of people	• Birds • Mammals	• Wind speed • Wind directions	• Number of ships • Engine power • Fuel consumption • Number of working days	Construction / operation / decommissioning in WA2015 of 200 power plants with infrastructure (causing the most air emissions from	Construction / operation / decommissioning of 60 power plants and 1 MSE with infrastructure (causing the most air emissions from ships and helicopters,

Type of emission or disturbance	Source of emissions	Type of impacts	Which elements of the ecosystem are directly affected	Linkages (indirect impacts)	Environmental factors affecting the scale of impact	Parameters of the project affecting the scale of impact	The most far-reaching scenario of the 2015 NIS	Project - variant selected for implementation (Project after update)
							ships and helicopters)	depending on the number of power plants)
Water pollution emissions	• Ships • Protection against corrosion • Grouting • Measures for protection against overgrowth of marine structures	• Deterioration of living conditions	• Hydrochemical conditions • Bentos • Fish • Marine mammals • Seabirds		• Physical and chemical properties of water	• Number of ships • Number of foundations • Type of foundation • Type of binder	Construction / operation / decommissioning in WA2015 of 200 power plants with infrastructure (causing the most air emissions from ships and helicopters)	Construction / operation / decommissioning of 60 power plants and 1 MSE with infrastructure (causing the most air emissions from ships and helicopters, depending on the number of power plants)
Waste generation	• Construction process • Construction and service vessels • Construction and service support					• Number of EW • Number of foundations • Number of ships • Timing of the construction process • Frequency of service	Construction / operation / decommissioning in WA2015 of 200 power plants with infrastructure (causing most waste generation)	Construction / operation / decommissioning in 60 power plants with infrastructure (causing the most waste generation, depending on the number of power plants)
Light phenomena	• Power plants in operation	• Strobe effect • Shadow flicker	• Marine mammals • Seabirds		• Height of the power plant • Current position of the sun relative to the position of the power plant	• Number of power plants • Height of the power plant • Rotor diameter • Number of sunny days	Operation of 200 power plants (WA2015)	Operation of 60 power plants and 1 MSE

3. Literature and other sources

3.1. Acts legislation

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457).
2. Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz. U. of 2021, item 2373, as amended).
3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)

3.2. Literature, expert studies and administrative decisions administrative

1. Environmental Impact Assessment Report Volume II, Section 7 Relationship Matrix, SMDI Advisory Group, April 2015
2. Decision on environmental conditions issued by the Regional Director of Environmental Protection in Gdańsk on July 7, 2016, under the sign RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project titled. "Construction of offshore wind farm Baltic Central III"
3. Decision on environmental conditions dated March 12, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director of Environmental Protection in Gdansk for the project involving "construction of offshore electricity transmission infrastructure.
4. Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas for the project OWF Bałtyk Środkowy III, decision of the Minister of Transport, Construction and Maritime Economy of March 30, 2012, ref. GT7/62/1170069/decyzja/2012
5. Decision No. IMFK/1/13 dated July 19, 2013 ref. GT7pb/62/14823/decyzja/2013
6. Polenergia offshore wind developments for projects Middle Baltic II and Middle Baltic III. High level technical design options study. Version 1, with additions. Royal Haskoning DHV Nederland B.V., 2013

4. Table of tables

Table 1. A matrix of interrelationships of potential emissions and disturbances caused by the OWF and their sources, direct and indirect impacts on the environment and the factors determining them. 6

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 7

Linkage matrix

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk III Offshore Wind Farm"
BIII OWF	Bałtyk Środkowy III Offshore Wind Farm
EIA	Environmental impact assessment
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF

1. Introduction

The section presents a report on the study of the acoustic environment in the area of OWF BIII near Slupsk Shoal, and which forms the basis for noise analyses. The results of the study were used as the basis for conducting an environmental impact assessment as part of the proceedings that resulted in the Environmental Decision[1].

Since the total area of the farm that is the subject of this report, where the construction of the power plant is possible, is slightly smaller and within the boundaries of the area described in the Environmental Impact Report for the Central Baltic III offshore wind farm, prepared in 2015, the sections of Volume IV of the EIA Report containing the assessment of the impact on individual receptors cite the results of the studies from the report that is Appendix A.

The report on acoustic background monitoring in the area of the offshore wind farm "Baltic Central III" in Polish and English language versions is attached as Appendix A.

2. Literature and other sources

2.1. Acts

1. Act of October 3, 2008 on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz. U. of 2021, item 2373, as amended).

2.2. Literature and expert studies

1. Monitoring of acoustic background in the area of the "Central Baltic III" offshore wind farm, Final report with results, DHI, 2015.
2. Environmental impact assessment report for the proceedings completed by the decision of RDOŚ dated July 7, 2016, mark: RDOŚ-Gd-WOO.4211.12.2015.KP.22 (zpo)

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Chapter 9

Environmental characteristics - noise propagation

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Abbreviations and definitions

Decibel (dB)	A logarithmic measure of sound/pressure intensity. The value for sound level is 20 log10 (P / P0) where P = current pressure and P0 = reference pressure
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
FEW Baltic II	Baltic II wind farm
IMF BII	Offshore wind farm OWF Bałtyk II (originally: Bałtyk Środkowy II and Polenergia Bałtyk II)
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Offshore Wind Farm Baltica
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
SELcum sound exposure level	Summary of exposure levels to the sound of multiple consecutive beats. Calculated as: SELcum = SEL single + 10 log (N); N = number of beats
Sound pressure level SPLpeak	Expression of the highest sound pressure in decibels (dB)
PTS	Permanent elevation of the hearing threshold as a result of physical damage to the sensory hair cells of the ear.
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Temporary shift of the TTS threshold	Temporary elevation of the hearing threshold due to fatigue of the sensory hair cells of the ear
Hertz (Hz)	A unit of frequency where 1 Hz = 1 cycle per second. One Kilkohertz is 1,000 cycles per second

1. Introduction

Sound can be generated during all stages associated with the construction, operation and decommissioning of an offshore wind farm. The biggest concern, however, is the underwater noise emitted during construction, due to the high sound levels generated when piles are driven into the seabed (piling). Marine life forms such as fish and marine mammals are sensitive to sound, hence noise associated with wind farm construction activities can affect them over long distances. Particularly sensitive are those marine organisms that have developed relatively good hearing , such as whales and seals. The hearing of both these groups of animals is several times more sensitive and covers a much wider range of frequencies than human hearing.

This section summarizes the results of numerical modeling of propagating sound due to generated noise caused by the installation of 10-meter diameter monopile foundations, which is the most far-reaching scenario for the variant selected for implementation, i.e. the proposed modified parameters of the Project approved by the Environmental Decision. The generated sound levels were compared with the recorded background sound spectrum to show changes in the sound field during the construction of the wind farm.

Wind farm construction methods vary for specific projects and thus generate sounds with different characteristics into the marine environment.

Several modeling studies of underwater noise propagation associated with the installation of offshore wind farm foundations have been carried out in the Project area in recent years. The results of these modeling studies were presented in the environmental impact reports for the BII OWF project (previously: WBII, SMDI 2015), the IMF BIII project (formerly: WBIII, SMDI 2015), the Baltic Power OWF project (MEWO S.A, IMUMG, 2020), the FEW Baltic II project (Baltic Trade and Invest Sp. Z o.o., 2019), and the Baltica OWF (IMG/MEWO S.A. 2017).

In all studies, the use of a monopile foundation, driven into the bottom, was assumed as the furthest-reaching scenario, generating the largest sound propagation ranges.

Originally, for the purpose of assessing the Project's environmental impact, both for the variant approved in the Environmental Decision and the farthest-reaching scenario evaluated in the 2015 Report (NIS 2015), it was assumed that the maximum diameter of monopile foundations would be up to 10m, with modeling done for a diameter of 7.5m. Based on the directions of noise propagation determined by modeling for the BSIII offshore wind farm, as well as the maximum ranges for a 7.5-meter diameter monopole, noise impact zones were estimated for marine mammals (seals and porpoises) and fish occurring in the area of the planned farm, where injury, temporary displacement of the hearing threshold and behavioral response of avoidance may occur. Since there is no knowledge of the increase in sound levels during piling for larger piles due to the increase in diameter, it was assumed that a 7.5-meter-diameter monopile (8MW) and a 10-meter-diameter pile (10 MW) emit the same sound levels.[1]

At present, based on the design work carried out so far to clarify the parameters of the Project, a diameter of 10 m monopile foundations has been assumed. Also currently under consideration is the

[1] Environmental Impact Assessment of the offshore wind farm Baltic Central III. Numerical modeling of noise propagation generated by piling. DHI February 2015 (Volume II, Chapter 9 of the 2015 Report)

use of jackhammers with a higher capacity than originally planned for the installation of foundations, which is related to the rapid development of technologies used for the construction of offshore wind farms. In order to verify the impact of the changes in question on the predicted ranges of underwater noise impacts on marine organisms, particularly in relation to the closest Natura 2000 area protecting marine mammals, i.e. the Ostoja Słowińska area (PLH220023), a simulation of underwater noise propagation from the piling of a 10 m diameter monopile foundation using a 4,500 kJ pneumatic hammer was carried out. The location of the foundation in the BIII OWF development area for modeling purposes was selected to be as close as possible to the boundary of the aforementioned Natura 2000 area. The modeling was performed for two scenarios - with and without the use of noise mitigation measures in the form of a single bubble curtain, which allows us to determine the predicted effectiveness of this solution in minimizing underwater noise propagation. It should be noted here that the application of a minimization measure in the form of a bubble curtain or other, with no lesser degree of reduction in the spread of underwater noise, as a mandatory recommendation was included in the conclusions of the 2015 Report, was also indicated as a condition of the Environmental Decision. The simulation was performed taking into account the current literature on the subject, including, among other things, the threshold values for potential hearing damage in marine mammals as defined in the article np. *"Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects"* by Southall et al. published in 2019. It should be mentioned that due to the development of knowledge on the sensitivity of marine organisms to underwater noise impacts that has occurred since 2015. (threshold values of impacts and weighting functions), the results of the modeling in question are not comparable to the results of the modeling performed for the 2015 Report. A summary of the results of the modeling conducted and the predicted ranges of underwater noise impacts in the form of temporal shift of hearing threshold (TTS) in harbor porpoise and sealfish occurring in the Project area without and with the application of a single bubble curtain are presented in Chapter 3 of this section.

2. Methodology

This chapter presents a description of the methods used and the input data used to model sound propagation during monopile driving, conducted in 2020.

The report[2] presenting the results of the modeling, which is the basis for the development of this section of the Report, estimates the intensity of noise generated by 10-meter diameter monopile piling at a hammer impact force of 4,500 kJ.

Sound propagation in the environment was modeled as a function of bathymetry, seafloor conditions, water temperature, salinity and sound speed profile, using the dBSea program.

The modeling used the basic assumptions and settings set forth in the 2015 DHI report[3], but also used information that was not known in 2015, so the results obtained in 2020 are more precise than those in the aforementioned report. In particular, the information includes the latest limits for possible effects on living organisms, as well as higher hammer energy and a different approach to propagation model configuration (Combination of parabolic wave equation and ray-tracer method).

[2] Sound Simulation Pile Driving for Baltic WF, Equinor 2020

[3] Environmental Impact Assessment of the offshore wind farm Baltic Central III. Numerical modeling of noise propagation generated by piling. DHI February 2015 (Volume II, Chapter 9 of the 2015 Report)

Noise from pile driving is transient and intermittent. Acoustic energy is generated when the hammer hits the pile and is transferred to the water. However, this complex process is simplified by describing sound as emitting from a point source.

The strength of sound at the source depends mainly on:

- Size (diameter), shape, length and diameter of the pile
- Hammer size and energy

How this sound propagates in the environment depends mainly on:

- Bathymetry
- Profile of the speed of sound in water (a function of salinity, temperature and depth)
- Type and thickness of sediment
- The type and depth of the rock substrate
- Volume damping (function of viscosity, pressure, salinity, acidity)

In general, higher-frequency sounds are more strongly attenuated than lower-frequency sounds, and in shallow water there is more interaction with the seafloor and water surfaces, which also leads to greater attenuation at a distance.

The dBSea tool (Irwin Carr Consulting) was used to model sound propagation. This tool allows modeling of sound propagation in its full range, taking into account all the parameters mentioned. It also offers several mathematical tools for modeling sound propagation. For frequencies below 400 Hz, a tool using the parabolic wave equation was used. For frequencies above 400 Hz, a ray-tracer tool was used.

The results were calculated along 36 radial slices (10 degrees per slice). Along each slice, sound properties were calculated at a distance of 60 m (2400 points of coverage). The depth resolution was 2 meters. For graphical display, the calculated results were projected / extrapolated onto a grid with a resolution of 60 m. When calculating and displaying the range, the highest values found are projected onto the surface.

The sound sources were entered into the propagation model as point sources at half water depth, i.e. 13m for OWF BIII.

The source strength and frequency content of the sound source were taken from the literature based on theoretical considerations and field measurements.

Sound propagation in the environment was modeled based on the characteristics of a 4500 kJ impact hammer. This is the strongest possible source, and the lower hammer energy will have less impact due to reduced energy and peak pressure at the source. The effect of using a single bubble curtain for a 4500 kJ hammer was also simulated. SELcum24h was calculated assuming 16800 strokes, which corresponds to 4-5h of pile driving per day.

3. Results modeling

The modeling for OWF BIII conducted in 2020 considered 2 variants of noise propagation: without mitigation measures and with the use of a bubble curtain to limit sound propagation in one, which

allows us to determine the predicted effectiveness of this solution in minimizing underwater noise propagation. A summary of the results of the modeling performed is shown in Table 2.

Table 1. The ranges of underwater noise impacts emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the BIII offshore wind farm development area - with and without the use of a single bubble curtain, reducing the sound pressure level (SPL) by 14 dB and the sound exposure level (SEL) by 11 dB.

Source	Taxonomy group.	Impact	Modeled sound type	Range of influence (m)			
				with minimization		without minimization (for comparison purposes)	
				average	max.	average	max.
Southall et al. 2019	Porpoises	PTS	Single hit	78	99	530	611
		PTS	Multiple strikes	2094	2196	9176	10396
		TTS	Single hit	138	154	908	1009
		TTS	Multiple strikes	4771	5365	28224	34439
	Seals in the water	PTS	Single hit	44	50	74	94
		PTS	Multiple strikes	1312	1416	4999	5491
		TTS	Single hit	57	68	123	142
		TTS	Multiple strikes	4872	5418	21979	30303
Popper et al. 2014	Fish*	PTS	Single hit	67	84	270	308
		PTS	Multiple strikes	1634	2170	3985	4513
		TTS	Multiple strikes	5441	6301	14394	20532

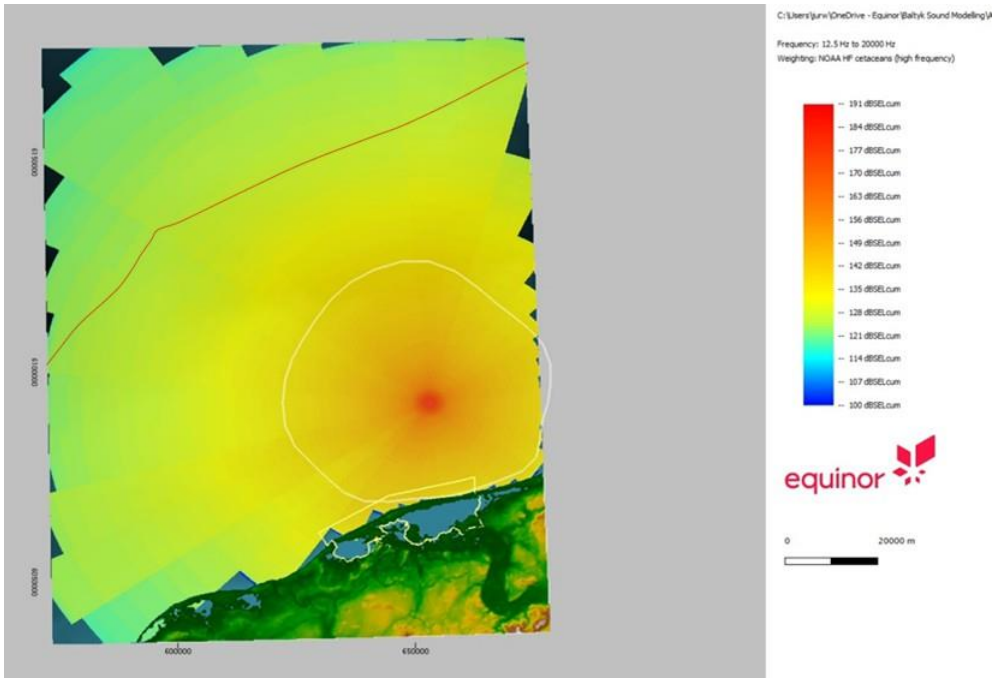
*Threshold values were adopted for the group of fish with the best-developed hearing (fish in which the swim bladder is connected to the hearing organs).

Source: own study based on the results of modeling performed for the BIII OWF project.

In the no-mitigation variant, threshold values for SPLpeak are exceeded less than 1,000 meters from the source. Thus, none of the threshold criteria at the boundary of the Natura 2000 area Ostoja Słowińska was exceeded.

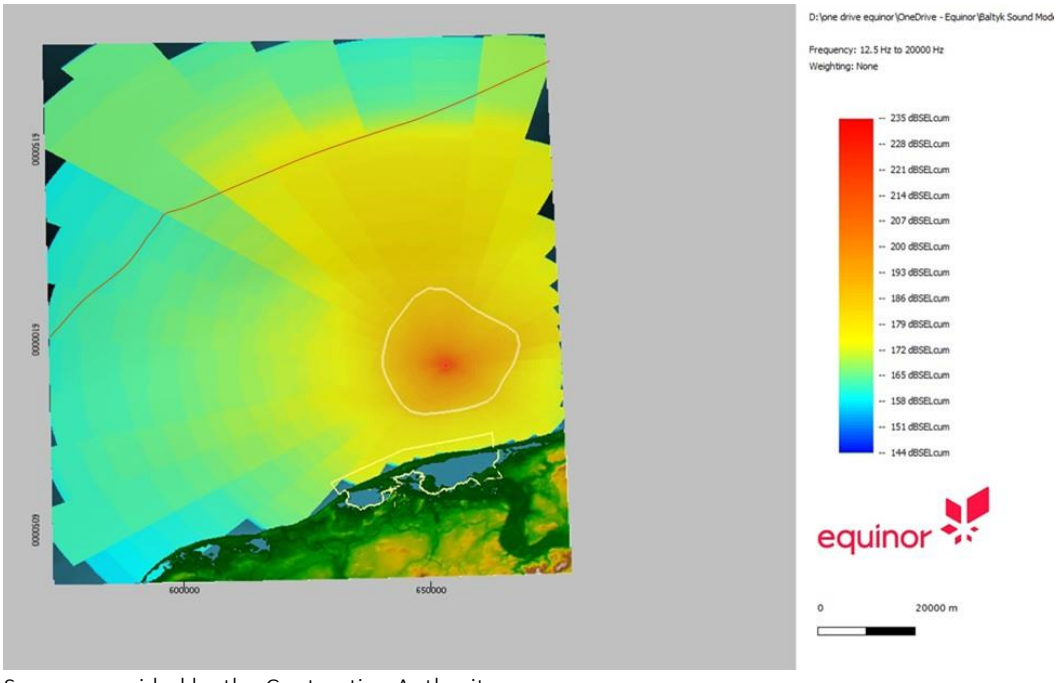
Threshold values for TTS for SELcum24 in very high-frequency cetaceans and pinnipeds were exceeded at the Natura 2000 site boundary, but the threshold level for TTS for fish was not exceeded, as shown in the figures below.

Figure 1 10m diameter monopile, 4500 kJ, SELcum 16800 strokes. The white line indicates a TTS level of 140dB for cetaceans with high sensitivity to very high frequency (VHF) sounds. The yellow line represents the border of the Natura 2000 area Ostoja Słowińska.



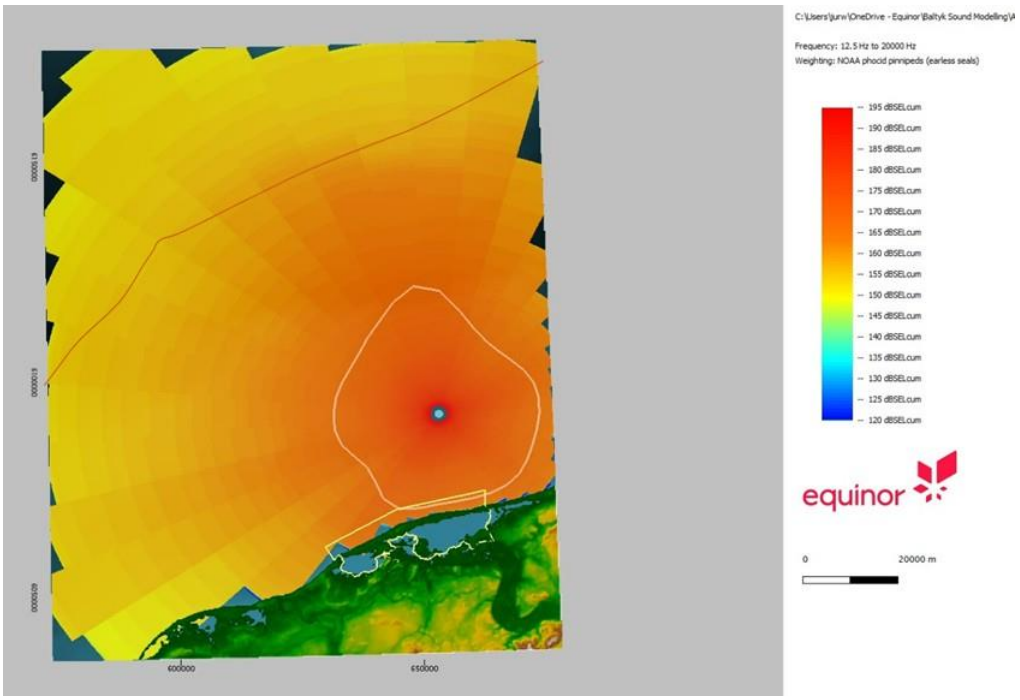
Source: provided by the Contracting Authority

Figure 2 Monopal with a diameter of 10m, 4500 kJ, SELcum 16800 strokes. The white line indicates a TTS level of 186dB for fish. The yellow line represents the border of the Natura 2000 area Ostoja Słowińska.



Source: provided by the Contracting Authority

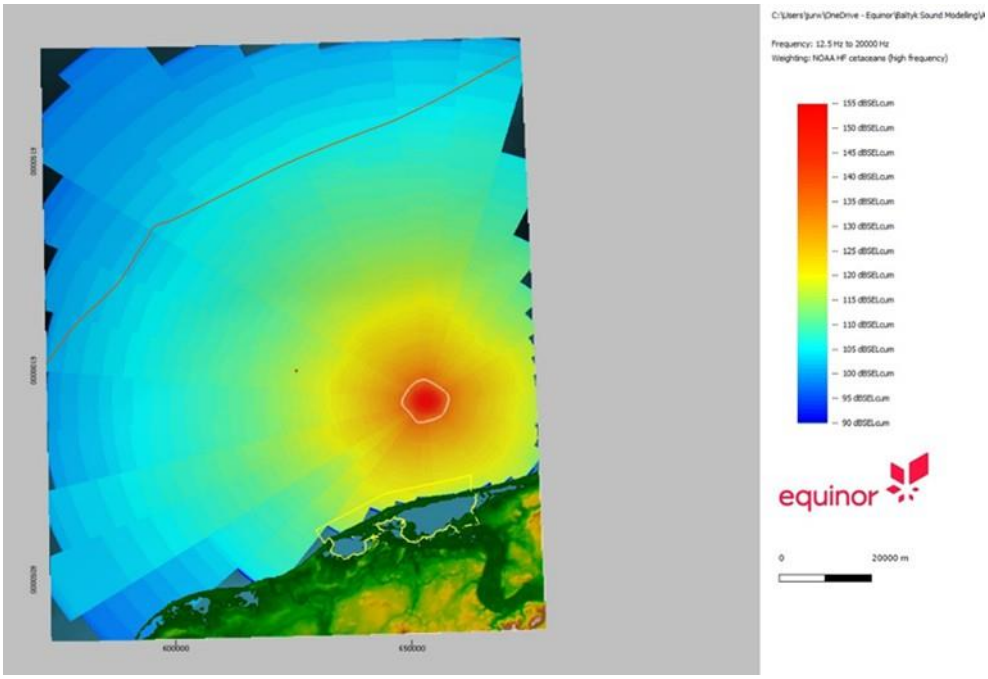
Figure 3 Monopal with 10m diameter, 4500 kJ, SELcum 16800 strokes. The white line indicates the TTS level of 170dB for sealife (PW). The yellow line represents the border of the Natura 2000 area Ostoja Słowińska.



Source: provided by the Contracting Authority

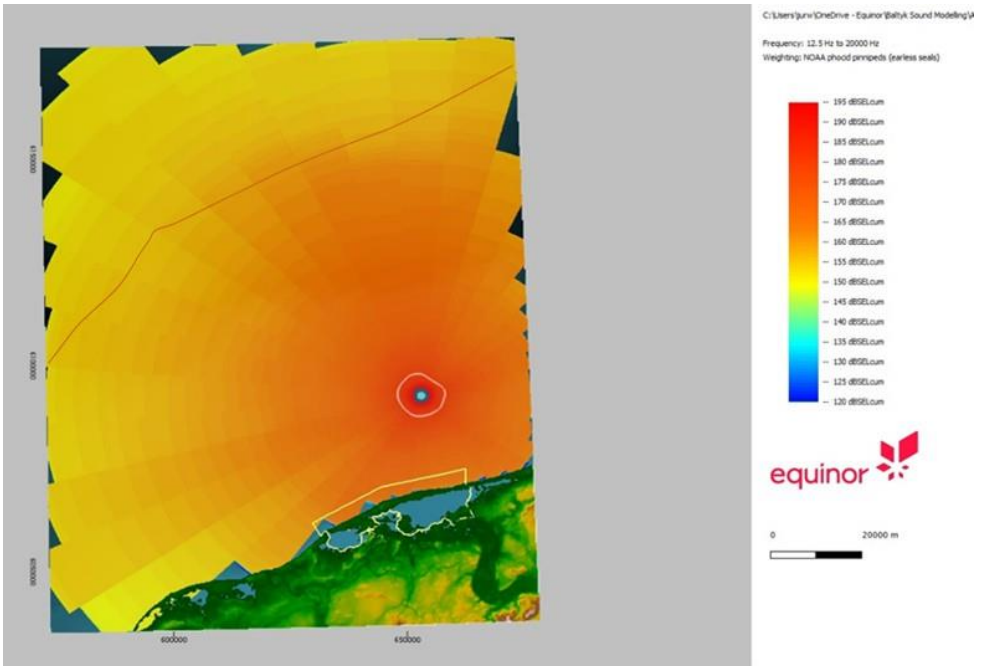
The introduction of a damping effect in the form of a single bubble curtain and a corresponding reduction in SEL and SPL values at the source led to a situation where none of the threshold values were exceeded at the boundary of the Natura 2000 area Słowińska Ostoja (Figure 5, Figure 6).

Figure 4 Monopal 10m diameter, 4500 kJ, mitigated by 11 dB by bubble curtain, SELcum 16800 strokes. The white line indicates a TTS level of 140dB for cetaceans with high sensitivity to very high frequency (VHF) sounds. The yellow line represents the border of the Natura 2000 area Ostoja Słowińska.



Source: provided by the Contracting Authority

Figure 5 Monopal 10m diameter, 4500 kJ, mitigated by 11 dB due to bubble curtain, SELcum 16800 beats. The white line indicates the TTS level of 170dB for sealife (PW). The yellow line represents the border of the Natura 2000 area Ostoja Słowińska.



Source: provided by the Contracting Authority

The modeling exercise also calculated the distances from the sound sources (pile driving) to the point where the acoustic energy (SEL) or sound pressure (SPL) fell below the respective thresholds. Threshold values of impact on porpoises and seals were used for the assessment, and these distances were related to the Natura 2000 area lying south of OWF BIII (where these mammals are protected).

The TTS impact zones with a maximum distance of 34 km from BIII for seals clearly exceeded the distances to the Natura 2000 area. The mitigation effect was modeled with one bubble curtain reducing SEL values by 11dB and SPLpeak values by 14dB. With this mitigation measure, none of the thresholds were exceeded at the boundary of the Natura2000 area Ostoja Słowińska.

It should be borne in mind, of course, that sound propagation modeling is subject to some uncertainty, and determining the extent of the impact to the nearest meter is not indicative of such accuracy and precision of the results. However, the results of the modeling study indicate that, with mitigation measures, none of the threshold values for potential impacts on cetaceans and seals (TTS, PTS) will be exceeded at the boundary of the Natura 2000 site Slovianska Ostoja Słowińska. Model calculations have shown that one bubble curtain is enough to achieve the desired results. A hammer energy of 4500 kJ can also be seen as a worst-case scenario, so additional mitigation can be achieved, using less hammer energy if possible.

However, the results of modeling underwater noise propagation from foundation piling in the BIII offshore wind farm development area with and without the bubble curtain, presented in Table 1 and in the figures, indicate that this solution is highly effective in reducing the extent of noise impacts on marine organisms. It should be noted here that the bubble curtain is one of the feasible methods to reduce underwater noise propagation during foundation piling. The selection of the final solution to minimize the impact of underwater noise on the marine environment during the construction of the BIII OWF should be made taking into account the type and parameters of the selected foundations and equipment for their installation and the logistics of the process, as well as the need to meet the threshold values of noise levels for marine mammals on the border of the Natura 2000 area Ostoja Słowińska.

In addition, given that the predicted ranges of underwater noise impacts in the form of TTS and PTS in marine mammals and fish from a single impact are up to two orders of magnitude smaller than the ranges of the same impacts from multiple (cumulative) impacts (see Table 1), it can be inferred that the use of a gradual piling procedure (soft start) is effective in protecting these groups of organisms.

4. Literature and other sources

1. Sound Simulation Baltic II and III, Equinor 2020

5. Table of tables

Table 1. The ranges of underwater noise impacts emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the BIII offshore wind farm development area - with and without the use of a single bubble curtain, reducing the sound pressure level (SPL) by 14 dB and the sound exposure level (SEL) by 11 dB. 8

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the projet

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 10

Waste and sewage

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting the environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF

1. Introduction

The section describes the anticipated waste and wastewater emissions at the various stages of the project, which involves the construction of an offshore wind farm designated as Baltic Central III in parameters updated from the variant for which the Environmental Decision was issued. Since this Report is prepared for the purposes of the proceedings to amend the Environmental Decision, thus the Environmental Impact Report-Report 2015, which was the basis for the issuance of the Environmental Decision, is the reference point for both the comparison of alternatives and the basis for conducting the environmental impact assessment. The updated parameters of the BIII OWF are the subject of both the project description and the basis for conducting an environmental impact assessment.

At each stage of the Project, i.e. construction, operation and decommissioning of the BIII OWF, wastewater and waste will be generated. They will be managed in accordance with the applicable law, in particular with the provisions of the Law of March 16, 1995 on the Prevention of Marine Pollution from Ships (unified text, Dz. U. of 2020, item 1955).

According to Article 1. of this law, the provisions of the following international agreements, with amendments in force as of the date of their entry into force with respect to the Republic of Poland, made public in an appropriate manner, shall apply to the prevention of marine pollution by ships:

- International Convention for the Prevention of Pollution from Ships, 1973, done at London on November 2, 1973, as amended by the Supplementary Protocol done at London on February 17, 1978. (Journal of Laws of 1987, No. 17, item 101) and the Supplementary Protocol drawn up in London on September 26, 1997. (Journal of Laws of 2005 No. 202, item 1679), hereinafter referred to as "MARPOL Convention",
- Convention on the Protection of the Marine Environment of the Baltic Sea Area, done at Helsinki on April 9, 1992. (Journal of Laws of 2000, No. 28, item 346), hereinafter referred to as the "1992 Helsinki Convention."
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Substances, done at Moscow, Washington, London and Mexico City on December 29, 1972. (Journal of Laws of 1984, No. 11, item 46), hereinafter referred to as the "Sinking Convention."
- the provisions of the Act of May 15, 2015 on substances that deplete the ozone layer and on certain fluorinated greenhouse gases (unified text: Dz. U. of 2020, item 2065) with respect to the operation on ships of equipment and installations containing controlled substances, where this Law does not provide otherwise.

In addition, the provisions of the Law of December 14, 2012 on waste (consolidated text of the Official Gazette of (t.e.. OJ. U. of 2022, item 699). along with implementing regulations.

The chapter is divided into three parts, corresponding to the stages of construction, operation and decommissioning. Each section describes the activities of the investment, leading to wastewater and waste.

These chapters classify waste in accordance with the provisions of the Regulation of the Minister of Climate of January 2, 2020 on the waste catalog (Journal of Laws of 2020, item 10). Their estimated quantities and expected types of wastewater are also given, along with how they will be handled.

The quantities of waste and wastewater generated from the 2015 Report (Volume II, Section 10: Emissions Waste and Wastewater, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015), which is the basis for the Environmental Decision.

It should be noted here that in the variant selected for implementation, which is the subject of this Report, about 70% fewer power plants will be built than envisaged in the 2015 NIS, and twice as many as specified in the Environmental Decision. The use of gravity foundations under power plants has also been ruled out. Thus, it is considered that the Project will not generate emissions and impacts greater than in the 2015 NIS, as well as the variant approved in the Environmental Decision.

2. Waste and wastewater during the construction

Preparatory work for the foundations involves carrying out geotechnical surveys of the seabed to gain a thorough understanding of its geological structure in the areas selected for the foundations. Geotechnical testing typically involves deep drilling and/or CPT (Cone Penetration Test) probing, which involves vertically pressing a probe tipped with a conical tip into the ground at a constant speed and measuring the resistance values on the cone. Specialized drillships or jack-up vessels are typically used for exploration, as well as additional equipment such as ROVs that can be transported on a support vessel. Thus, waste and domestic sewage associated with their work will be generated. No substances will be introduced into the environment during CPT soundings. Drilling may produce small amounts of borings, which will be left on the seabed. As shown by seabed surveys, the seabed is not contaminated (cf. Seabed Survey Report, Section 3 of Volume III), so there is no need to remove them. The ships will generate sanitary sewage, waste (primarily municipal), used work clothes, packaging, cleaners, used lubricants and used oils.

Waste and wastewater will also be generated during the loading, unloading and storage of materials at the construction and assembly port, as well as during the construction process of the power plant and substation itself and the laying of cables, particularly during such operations as:

- the use of ships, helicopters and the work of the farm management center,
- preparation of the bottom by dredgers,
- pile driving or drilling (borings may result),
- injection of cement mortar under the base of the gravity foundation - if such a type of foundation is used for supporting infrastructure,
- connecting individual power plant and station components by means of welding, bolts or adhesives (mainly cement),
- installation of additional elements on the foundations (such as cables and their covers, ladders, etc.),
- placing a layer around the foundation to prevent leaching,
- laying cables in the seabed,
- installation of zinc or aluminum anodic plates to protect them from corrosion,
- storage of excavated material from the installation of foundations and cables.

The expected types and quantities of waste during the construction phase are shown in Table 1 below.

Table 1. Anticipated types and quantities of waste during the construction phase

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
08	**Waste from the manufacture, preparation, marketing and use of protective coatings (paints, varnishes, ceramic enamels), putty, adhesives, sealants and printing inks**	
08 01	**Waste from the manufacture, preparation, marketing and use and disposal of paints and varnishes**	
08 01 11*	Waste paint and varnish containing organic solvents or other hazardous substances	0.05
08 01 12	Waste paint and varnish other than those mentioned in 08 01 11	0.05
12	**Waste from shaping and physical and mechanical surface treatment of metals and plastics**	
12 01	**Waste from shaping and physical and mechanical surface treatment of metals and plastics**	
12 01 13	Welding waste	0.1
13	**Waste oils and liquid fuel wastes (excluding edible oils and groups 05, 12 and 19)**	
13 01	**Waste hydraulic oils**	
13 01 09*	Mineral hydraulic oils containing halogenated compounds	0.05
13 01 10*	Mineral hydraulic oils containing no halogenated compounds	0.05
13 01 11*	Synthetic hydraulic oils	0.05
13 01 12*	Readily biodegradable hydraulic oils	0.05
13 01 13*	Other hydraulic oils	0.05
13 02	**Waste engine, gear and lubricating oils**	
13 02 04*	Mineral engine, gear and lubricating oils containing halogenated compounds	0.05
13 02 05*	Mineral engine, gear and lubricating oils containing no halogenated compounds	0.05
13 02 06*	Synthetic engine, gear and lubricating oils	0.05
13 02 07*	Easily biodegradable engine, gear and lubricating oils	0.05
13 02 08*	Other engine, gear and lubricating oils	0.05
13 03	**Waste oils and liquids used as electrical insulators and heat carriers**	
13 03 01*	Oils and liquids used as electrical insulators and heat transfer media containing PCBs	0.2
13 04	**Bilge oils**	
13 04 03*	Bilge oils from marine vessels	0.1
13 05	**Waste from oil dewatering in separators**	
13 05 02*	Sludges from oil dewatering in separators	0.5
13 05 06*	Oil from oil dehydration in separators	0.5
13 05 07*	Oily water from oil dewatering in separators	0.5
13 07	**Liquid fuel waste**	

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
13 07 01*	Heating oil and diesel fuel	0.05
13 07 02*	Gasoline	0.05
13 08	**Oil waste not included in other subgroups**	
13 08 80	Oily solid waste from ships	0.1
14	**Wastes from organic solvents, coolants and propellants (excluding groups 07 and 08)**	
14 06	**Waste organic solvents, coolants and propellants in foams or aerosols**	
14 06 01*	Freons, HCFCs, HFCs	0.05
14 06 02*	Other halogenated solvents and solvent mixtures	0.05
14 06 03*	Other solvents and solvent mixtures	0.05
15	**Packaging waste; absorbents, wiping cloths, filter materials and protective clothing not included in other groups**	
15 01	**Packaging waste (including separately collected municipal packaging waste)**	
15 01 01	Paper and cardboard packaging	2
15 01 02	Plastic packaging	2
15 01 03	Wood packaging	2
15 01 04	Metal packaging	2
15 01 05	Multi-material packaging	2
15 01 06	Mixed packaging waste	2
15 01 07	Glass packaging	0.1
15 01 09	Textile packaging	0.1
15 02	**Sorbents, filter materials, wiping cloths and protective clothing**	
15 02 02*	Sorbents, filter materials (including oil filters not included in other groups), wiping cloths (e.g., rags, cloths) and protective clothing contaminated with hazardous substances (e.g., PCBs)	1
15 02 03	Sorbents, filter materials, wiping cloths (e.g. rags, cloths) and protective clothing other than those listed in 15 02 02	1
16	**Waste not included in other groups**	
16 06	**Batteries and accumulators**	
16 06 01*	Lead batteries and accumulators	0.1
16 06 02*	Nickel-cadmium batteries and accumulators	0.1
16 06 03*	Batteries containing mercury	0.01
16 06 04	Alkaline batteries (excluding 16 06 03)	0.01
16 06 05	Other batteries and accumulators	0.01
16 81	**Waste resulting from accidents and incidents**	
16 81 01*	Wastes exhibiting hazardous properties	1
16 81 02	Wastes other than those listed in 16 81 01	1
17	**Waste from construction, repair and dismantling of buildings and road infrastructure (including soil and earth from contaminated**	

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
	sites)	
17 01	**Waste materials and components of construction and road infrastructure (e.g., concrete, bricks, slabs, ceramics)**	
17 01 01	Concrete waste and concrete rubble from demolition and renovation work	50
17 01 03	Waste of other ceramic materials and fixtures	10
17 01 07	Mixed waste from concrete, brick rubble, waste ceramic materials and fittings other than those mentioned in 17 01 06	50
17 01 82	Other waste not mentioned	50
17 02	**Wood, glass and plastic waste**	
17 02 01	Wood	2
17 02 02	Glass	0.1
17 02 03	Plastics	5
17 04	**Metallic and metal alloy waste and scrap**	
17 04 01	Copper, bronze, brass	0.05
17 04 02	Aluminum	0.05
17 04 04	Zinc	0.05
17 04 05	Iron and steel	1
17 04 07	Metal mixtures	0.05
17 04 11	Cables other than those listed in 17 04 10	5
17 09	**Other waste from construction, renovation and dismantling**	
17 09 03*	Other waste from construction, renovation and dismantling (including mixed waste) containing hazardous substances	20
17 09 04	Mixed construction, renovation and dismantling waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	20
19	**Waste from waste management facilities and equipment, from sewage treatment plants, and from the treatment of drinking water and water for industrial purposes**	
19 08	**Waste from sewage treatment plants not included in other groups**	
19 08 05	Stabilized municipal sewage sludge	1
20	**Municipal waste including fractions collected selectively**	
20 01	**Segregated and separately collected municipal waste (excluding 15 01)**	
20 01 01	Paper and cardboard	1
20 01 02	Glass	1
20 01 08	Biodegradable kitchen waste	1
20 01 10	Clothing	1
20 01 21*	Fluorescent lamps and other waste containing mercury	0.05
20 01 23*	Equipment containing freons	0.05
20 01 29*	Detergents containing hazardous substances	0.05

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
20 01 30	Detergents other than those listed in 20 01 29	0.05
20 01 33*	Batteries and accumulators including batteries and accumulators listed in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing them	0.05
20 01 34	Batteries and accumulators other than those listed in 20 01 33	0.05
20 01 35*	Waste electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (1)	0.05
20 01 36	Waste electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	0.05
20 03	**Other municipal waste**	
20 03 01	Non-segregated (mixed) municipal waste	20

Source: provided by the Contracting Authority

It is assumed that the quantities of waste at the construction stage of the Project will not be greater than those contained in the provisions of the Environmental Decision.

3. Waste and wastewater at the operation

During the operation stage, waste and wastewater will be generated during the following activities:

- use of ships, helicopters, the farm management center, and social, sanitary and workshop facilities at substations,
- scheduled maintenance and service of farm equipment and facilities,
- unplanned repairs.

The expected types and quantities of waste during the operation stage are shown in Table 2 below.

Table 2. Expected types and quantities of waste during the operation stage

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
08	**Waste from the manufacture, preparation, marketing and use of protective coatings (paints, varnishes, ceramic enamels), putty, adhesives, sealants and printing inks**	
08 01	**Waste from the manufacture, preparation, marketing and use and disposal of paints and varnishes**	
08 01 11*	Waste paint and varnish containing organic solvents or other hazardous substances	0.5
08 01 12	Waste paint and varnish other than those mentioned in 08 01 11	0.5
12	**Waste from shaping and physical and mechanical surface treatment of metals and plastics**	

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
12 01	**Waste from shaping and physical and mechanical surface treatment of metals and plastics**	
12 01 13	Welding waste	0.1
13	**Waste oils and liquid fuel wastes (excluding edible oils and groups 05, 12 and 19)**	
13 01	**Waste hydraulic oils**	
13 01 09*	Mineral hydraulic oils containing halogenated compounds	0.03
13 01 10*	Mineral hydraulic oils containing no halogenated compounds	0.03
13 01 11*	Synthetic hydraulic oils	0.03
13 01 12*	Readily biodegradable hydraulic oils	0.03
13 01 13*	Other hydraulic oils	0.03
13 02	**Waste engine, gear and lubricating oils**	
13 02 04*	Mineral engine, gear and lubricating oils containing halogenated compounds	0.03
13 02 05*	Mineral engine, gear and lubricating oils containing no halogenated compounds	0.03
13 02 06*	Synthetic engine, gear and lubricating oils	0.03
13 02 07*	Easily biodegradable engine, gear and lubricating oils	0.03
13 02 08*	Other engine, gear and lubricating oils	0.03
13 03	**Waste oils and liquids used as electrical insulators and heat carriers**	
13 03 01*	Oils and liquids used as electrical insulators and heat transfer media containing PCBs	1
13 04	**Bilge oils**	
13 04 03*	Bilge oils from marine vessels	0.1
13 05	**Waste from oil dewatering in separators**	
13 05 02*	Sludges from oil dewatering in separators	0.5
13 05 06*	Oil from oil dehydration in separators	0.5
13 05 07*	Oily water from oil dewatering in separators	0.5
13 07	**Liquid fuel waste**	
13 07 01*	Heating oil and diesel fuel	0.1
13 07 02*	Gasoline	0.05
13 08	**Oil waste not included in other subgroups**	
13 08 80	Oily solid waste from ships	0.1
14	**Wastes from organic solvents, coolants and propellants (excluding groups 07 and 08)**	
14 06	**Waste organic solvents, coolants and propellants in foams or**	

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
	aerosols	
14 06 01*	Freons, HCFCs, HFCs	0.05
14 06 02*	Other halogenated solvents and solvent mixtures	0.05
14 06 03*	Other solvents and solvent mixtures	0.05
15	**Packaging waste; absorbents, wiping cloths, filter materials and protective clothing not included in other groups**	
15 01	**Packaging waste (including separately collected municipal packaging waste)**	
15 01 01	Paper and cardboard packaging	0.1
15 01 02	Plastic packaging	0.1
15 01 03	Wood packaging	0.1
15 01 04	Metal packaging	0.1
15 01 05	Multi-material packaging	0.1
15 01 06	Mixed packaging waste	0.1
15 01 07	Glass packaging	0.1
15 01 09	Textile packaging	0.1
15 02	**Sorbents, filter materials, wiping cloths and protective clothing**	
15 02 02*	Sorbents, filter materials (including oil filters not included in other groups), wiping cloths (e.g., rags, cloths) and protective clothing contaminated with hazardous substances (e.g., PCBs)	0.3
15 02 03	Sorbents, filter materials, wiping cloths (e.g. rags, cloths) and protective clothing other than those listed in 15 02 02	0.3
16	**Waste not included in other groups**	
16 06	**Batteries and accumulators**	
16 06 01*	Lead batteries and accumulators	0.1
16 06 02*	Nickel-cadmium batteries and accumulators	0.1
16 06 03*	Batteries containing mercury	0.01
16 06 04	Alkaline batteries (excluding 16 06 03)	0.01
16 06 05	Other batteries and accumulators	0.01
16 81	**Waste resulting from accidents and incidents**	
16 81 01*	Wastes exhibiting hazardous properties	0.3
16 81 02	Wastes other than those listed in 16 81 01	0.3
17	**Waste from construction, repair and dismantling of buildings and road infrastructure (including soil and earth from contaminated sites)**	
17 01	**Waste materials and components of construction and road**	

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
	infrastructure (e.g., concrete, bricks, slabs, ceramics)	
17 01 01	Concrete waste and concrete rubble from demolition and renovation work	5
17 01 03	Waste of other ceramic materials and fixtures	1
17 01 07	Mixed waste from concrete, brick rubble, waste ceramic materials and fittings other than those mentioned in 17 01 06	5
17 01 82	Other waste not mentioned	5
17 02	**Wood, glass and plastic waste**	
17 02 01	Wood	0.2
17 02 02	Glass	0.1
17 02 03	Plastics	0.5
17 04	**Metallic and metal alloy waste and scrap**	
17 04 01	Copper, bronze, brass	0.05
17 04 02	Aluminum	0.05
17 04 04	Zinc	0.05
17 04 05	Iron and steel	1
17 04 07	Metal mixtures	0.05
17 04 11	Cables other than those listed in 17 04 10	5
17 09	**Other waste from construction, renovation and dismantling**	
17 09 03*	Other waste from construction, renovation and dismantling (including mixed waste) containing hazardous substances	2
17 09 04	Mixed construction, renovation and dismantling waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	2
19	**Waste from waste management facilities and equipment, from sewage treatment plants, and from the treatment of drinking water and water for industrial purposes**	
19 08	**Waste from sewage treatment plants not included in other groups**	
19 08 05	Stabilized municipal sewage sludge	3
20	**Municipal waste including fractions collected selectively**	
20 01	**Segregated and separately collected municipal waste (excluding 15 01)**	
20 01 01	Paper and cardboard	2
20 01 02	Glass	2
20 01 08	Biodegradable kitchen waste	2
20 01 10	Clothing	2
20 01 21*	Fluorescent lamps and other waste containing mercury	0.1

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
20 01 23*	Equipment containing freons	0.1
20 01 29*	Detergents containing hazardous substances	0.1
20 01 30	Detergents other than those listed in 20 01 29	0.1
20 01 33*	Batteries and accumulators including batteries and accumulators listed in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing them	0.1
20 01 34	Batteries and accumulators other than those listed in 20 01 33	0.1
20 01 35*	Waste electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (1)	0.1
20 01 36	Waste electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	0.1
20 03	**Other municipal waste**	
20 03 01	Non-segregated (mixed) municipal waste	30

Source: provided by the Contracting Authority

It is assumed that the quantities of waste at the operation stage of the Project will not be greater than those contained in the provisions of the Environmental Decision.

4. Waste and wastewater at the decommissioning

During the decommissioning stage, large amounts of waste will be generated, associated with the physical removal of the farm's components. It is assumed that they will be liquidated as follows:

- power plants - removed in their entirety,
- foundations - removed to a depth of 3 m below the level of the seabed,
- internal cables - removed or left in the seabed, covered by sediment,
- protection against leaching - left,
- power substation - removed or left for future use.

Domestic wastewater will also be generated at this stage - on the decommissioning vessels and at the farm management center.

The expected types and quantities of waste during the decommissioning stage are shown in Table 3 below.

Table 3. Expected types and quantities of waste at the decommissioning stage for 1 power plant

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
13	**Waste oils and liquid fuel wastes (excluding edible oils and groups 05, 12 and 19)**	
13 01	**Waste hydraulic oils**	
13 01 09*	Mineral hydraulic oils containing halogenated compounds	0.05
13 01 10*	Mineral hydraulic oils containing no halogenated compounds	0.05
13 01 11*	Synthetic hydraulic oils	0.05
13 01 12*	Readily biodegradable hydraulic oils	0.05
13 01 13*	Other hydraulic oils	0.05
13 02	**Waste engine, gear and lubricating oils**	
13 02 04*	Mineral engine, gear and lubricating oils containing halogenated compounds	0.01
13 02 05*	Mineral engine, gear and lubricating oils containing no halogenated compounds	0.01
13 02 06*	Synthetic engine, gear and lubricating oils	0.01
13 02 07*	Easily biodegradable engine, gear and lubricating oils	0.01
13 02 08*	Other engine, gear and lubricating oils	0.01
13 03	**Waste oils and liquids used as electrical insulators and heat carriers**	
13 03 01*	Oils and liquids used as electrical insulators and heat transfer media containing PCBs	82.5
13 04	**Bilge oils**	
13 04 03*	Bilge oils from marine vessels	0.1
13 07	**Liquid fuel waste**	
13 07 01*	Heating oil and diesel fuel	0.05
13 07 02*	Gasoline	0.05
13 08	**Oil waste not included in other subgroups**	
13 08 80	Oily solid waste from ships	0.1
14	**Wastes from organic solvents, coolants and propellants (excluding groups 07 and 08)**	
14 06	**Waste organic solvents, coolants and propellants in foams or aerosols**	
14 06 01*	Freons, HCFCs, HFCs	0.1
14 06 02*	Other halogenated solvents and solvent mixtures	0.1
14 06 03*	Other solvents and solvent mixtures	0.1
15	**Packaging waste; absorbents, wiping cloths, filter materials and protective clothing not included in other groups**	
15 01	**Packaging waste (including separately collected municipal**	

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
	packaging waste)	
15 01 01	Paper and cardboard packaging	0.1
15 01 02	Plastic packaging	0.1
15 01 03	Wood packaging	0.1
15 01 04	Metal packaging	0.1
15 01 05	Multi-material packaging	0.1
15 01 06	Mixed packaging waste	0.1
15 01 07	Glass packaging	0.1
15 01 09	Textile packaging	0.1
15 02	**Sorbents, filter materials, wiping cloths and protective clothing**	
15 02 02*	Sorbents, filter materials (including oil filters not included in other groups), wiping cloths (e.g., rags, cloths) and protective clothing contaminated with hazardous substances (e.g., PCBs)	1
15 02 03	Sorbents, filter materials, wiping cloths (e.g. rags, cloths) and protective clothing other than those listed in 15 02 02	1
16	**Waste not included in other groups**	
16 06	**Batteries and accumulators**	
16 06 01*	Lead batteries and accumulators	0.1
16 06 02*	Nickel-cadmium batteries and accumulators	0.1
16 06 03*	Batteries containing mercury	0.01
16 06 04	Alkaline batteries (excluding 16 06 03)	0.01
16 06 05	Other batteries and accumulators	0.01
16 81	**Waste resulting from accidents and incidents**	
16 81 01*	Wastes exhibiting hazardous properties	1
16 81 02	Wastes other than those listed in 16 81 01	1
17	**Waste from construction, repair and dismantling of buildings and road infrastructure (including soil and earth from contaminated sites)**	
17 01	**Waste materials and components of construction and road infrastructure (e.g., concrete, bricks, slabs, ceramics)**	
17 01 01	Concrete waste and concrete rubble from demolition and renovation work	7000
17 01 03	Waste of other ceramic materials and fixtures	50
17 01 07	Mixed waste from concrete, brick rubble, waste ceramic materials and fittings other than those mentioned in 17 01 06	50
17 01 82	Other waste not mentioned	50

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
17 02	**Wood, glass and plastic waste**	
17 02 01	Wood	0.1
17 02 02	Glass	2
17 02 03	Plastics	1000
17 04	**Metallic and metal alloy waste and scrap**	
17 04 01	Copper, bronze, brass	1
17 04 02	Aluminum	1
17 04 04	Zinc	1
17 04 05	Iron and steel	4000
17 04 07	Metal mixtures	1
17 04 11	Cables other than those listed in 17 04 10	71
17 09	**Other waste from construction, renovation and dismantling**	
17 09 03*	Other waste from construction, renovation and dismantling (including mixed waste) containing hazardous substances	50
17 09 04	Mixed construction, renovation and dismantling waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	50
19	**Waste from waste management facilities and equipment, from sewage treatment plants, and from the treatment of drinking water and water for industrial purposes**	
19 08	**Waste from sewage treatment plants not included in other groups**	
19 08 05	Stabilized municipal sewage sludge	1
20	**Municipal waste including fractions collected selectively**	
20 01	**Segregated and separately collected municipal waste (excluding 15 01)**	
20 01 01	Paper and cardboard	1
20 01 02	Glass	1
20 01 08	Biodegradable kitchen waste	1
20 01 10	Clothing	1
20 01 21*	Fluorescent lamps and other waste containing mercury	0.05
20 01 23*	Equipment containing freons	0.05
20 01 29*	Detergents containing hazardous substances	0.05
20 01 30	Detergents other than those listed in 20 01 29	0.05
20 01 33*	Batteries and accumulators including batteries and accumulators listed in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing them	0.05
20 01 34	Batteries and accumulators other than those listed in 20 01 33	0.05

Code	Groups, subgroups and types of waste	Estimated quantity [Mg/year]
20 01 35*	Waste electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (1)	0.05
20 01 36	Waste electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	0.05
20 03	**Other municipal waste**	
20 03 01	Non-segregated (mixed) municipal waste	20

Source: provided by the Contracting Authority

At this stage, the model of the power plant, the type of foundation, or the length of the cable sections between each power plant are not known. Therefore, it is not even possible to give an approximate indication of what types and quantities of materials will constitute the main mass of waste during decommissioning. Accordingly, the above table shows estimates for the decommissioning of 1 wind power plant (mass 2500 Mg) sited on a reinforced concrete gravity foundation (mass 7000 Mg), 1 substation (mass 1500 Mg) on a jacket foundation (mass 1500 Mg) and 1 km of power cable section (mass 71 Mg), so that possible recalculations can be made, based on the information contained in the technical description of the farm (Section 3 of Volume II). It should also be remembered that there is a very low probability that the entire farm will be liquidated. Much more likely is the replacement of individual devices, to which the assumptions shown in the table correspond.

It is assumed that the quantities of waste at the decommissioning stage of the Project will not exceed those contained in the provisions of the Environmental Decision.

5. Handling of waste and wastewater wastewater

Contractors for construction, servicing and eventual demolition will be required to store the various types of waste selectively and to separate recyclable waste.

Municipal waste will be collected in plastic bags and then - in a specially marked container.

The operation of the power plant and substation will involve the use of hazardous substances, such as transformer oils (in transformers and reactors, among others), lubricating oils, hydraulic oils, propulsion oils (for emergency diesel generators) or cooling fluids, used in air conditioning systems, and oily water. Hazardous waste will also be generated as a result. Sorbents, filtration materials and spill elimination equipment will be stockpiled on ships and the substation in case of an oil spill. Hazardous waste will be collected separately in lockable, specially marked drums, and then - in transport containers.

Other types of waste will be collected in special containers, bags and containers, in specially designated areas on ships and at the substation.

Once the containers are filled, the waste will be transported to land and transferred to companies with the appropriate permits, for recovery or disposal. The investor will sign relevant contracts with them before the work begins. The farm will have a waste management plan.

The investor will obtain a waste generation permit before starting construction of the farm. Regardless of the amount of waste generated during the construction, operation and decommissioning phases of the project, it is not expected to cause a significant threat to the environment, provided that the provisions of the Law on Waste and related implementing acts are observed.

It should also be noted that according to Article 2(3) of the Law on Waste, the Law does not apply to sediments moved within surface waters for the purpose of managing waters or waterways, managing waters or water facilities, or protecting against flooding or reducing the effects of floods and droughts, reclamation, siltation, land acquisition or treatment, if the sediments are not hazardous. Therefore, sediments removed from the bottom during its preparation for foundation placement are not treated as waste. These sediments are not contaminated, as confirmed by the results of the performed seabed surveys, and it is planned to leave them on the bottom, within the limits of the planned OWF BIII.

During the construction, operation and decommissioning of the wind farm, social and domestic wastewater, oily bilge water, deck washing water and rainwater (including oily water) will be generated.

Social and domestic wastewater generated in the social premises on land will be discharged into the sanitary sewer system or into a tank without a drain, and then to a wastewater treatment plant.

Wastewater generated by the use of bathrooms and toilets located at substations will be treated in biological wastewater treatment plants and then discharged to the sea. Approximately 1 m3 of sanitary sewage is assumed to be generated per day.

Oily water (bilge oil, from deck cleaning, and rainwater) will be collected in the bilges and then treated with oil separators to a level below 15 p.p.m. (as recommended by IMOA 393) and discharged into the sea. Bilge oils (resulting from these processes), on the other hand, were classified as precipitation. They will therefore be collected in special tanks and then collected on land by authorized companies.

6. Literature and other sources

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2. Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Journal of Laws of 2021, item 2373, as amended)
3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)

6.2. Literature, expert studies and administrative decisions administrative

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3. Decision on environmental conditions dated March 2, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director of Environmental Protection in Gdańsk for the project involving the construction of offshore electricity transmission infrastructure
4. Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas for the project OWF Bałtyk Środkowy III, decision of the Minister of Transport, Construction and Maritime Economy of March 30, 2012, ref. GT7/62/1170069/decyzja/2012
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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 11

Emissions - Hydrographic modeling

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Abbreviations and definitions

OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
EIA	Environmental Impact Assessment
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF

1. Introduction

The section presents a report containing a description of hydrographic conditions and the results of hydrographic modeling of the environment in the area planned for OWF BIII near Slupsk Shoal. The report establishes baseline conditions in the planned Project area, assesses hydrographic impacts in relation to the construction of the BIII OWF, and provides important support in the process of identifying and analyzing the distribution of habitats suitable for marine mammals and waterbirds. The results of the studies and modeling were used as the basis for conducting an environmental impact assessment as part of the proceedings that resulted in the Environmental Decision[1].

Since the total area of the farm that is the subject of this Report, where construction of the power plant is possible, is slightly smaller and within the boundaries of the area described in the Environmental Impact Report for the Central Baltic III offshore wind farm, prepared in 2015, the sections of Volume IV of the EIA Report containing the assessment of the impact on individual receptors cite the results of the studies and analyses from the report that supplements this section - Appendices B.

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2017.

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2.1. Acts

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 12

Unplanned events - processes, emissions, risk of occurrence

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Abbreviations and definitions

AIS	The Automatic Identification System (AIS), which all vessels with a gross tonnage of more than 300t are equipped with. It provides automatic data exchange, useful for avoiding collisions between vessels and identifying the vessel for shore-based vessel traffic surveillance (VTS) systems
ALARP	Risk as low/low as reasonably practicable (As Low As Reasonably Practicable)
BRISK	Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea
CCTV	CCTV
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
FSA	Formal Safety Assessment
IMO	International Maritime Organization (IMO)
ITOPF	The International Tanker Owners Pollution Federation Limited
KKON	National Coordinator of Navigation Warnings
MARPOL	International Convention for the Prevention of Pollution from Ships
IMF	Offshore wind farm
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
MGO	Marine gas oil (marine gas oil)
MMO	Marine mammal observer
MSPiR	Maritime Search and Rescue Service (SAR)
NDS	Maximum Permissible Concentration
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
EIA	Environmental impact assessment
OZPRO	Shipboard oil spill prevention plan (Shipboard Oil Pollution Emergency Plan - SOPEP)
PAM	Passive acoustic monitoring
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
SAR	Maritime Search and Rescue Service
SDF	Standard Data Form of the Natura 2000 site
TBT	Tributyltin
TSS	Traffic Separation Scheme (Traffic Separation Scheme)

Law oos	Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz.U. of 2022, item 1029).
UXO	Explosive objects of military origin - (Unexploded ordnance)

1. Introduction

The section presents unplanned events that may occur at all stages of the project's "life" (from construction through operation until decommissioning) of the offshore wind farm designated as Baltic Central III in parameters updated in relation to the variant for which the Environmental Decision was issued[1]. Since this report is prepared for the purposes of the proceedings to amend the Environmental Decision, thus the environmental impact report[2], which was the basis for the issuance of the Environmental Decision, provides a reference point both for comparing alternatives and for the basis for conducting an environmental impact assessment. Changes in the description of the project are primarily related to the refinement of the variant approved for implementation, resulting from technological progress, the progress of design work, including the development of a preliminary plan for the farm and the selection of foundation technology and, consequently, the possibility of unplanned events. The updated parameters of the BIII OWF as the variant accepted for implementation result in a reduction of the environmental impact compared to the parameters approved by the Environmental Decision and are the subject of both the project description and the basis for conducting an impact assessment.

According to Article 66 (1) (6) of the EIA, the EIA report should include a determination of the anticipated environmental impact of the analyzed alternatives, including in the event of a major industrial accident and natural and construction disasters (unplanned events).

This chapter analyzes the possibility of unplanned events during the construction, operation and decommissioning of the BIII OWF.

The analysis was carried out in the 2015 Report and applies to both the variant approved by the Environmental Decision and the rational alternative variant, which is also the most far-reaching scenario - NIS 2015, and includes cumulative impacts with the neighboring wind farm - the nature of impacts that could potentially occur in emergency situations is similar, only the scale of risk may differ.

Assessments of the impact of the effects of unplanned events on individual environmental elements can be found in the assessment chapters of the report concerning them (Volume IV). In assessing the significance of unplanned impacts, additional factors were taken into account, i.e. the probability of an event that will be the source of the impact and its potential consequences.

The description is based on the Environmental Impact Assessment Report Volume II, Section 12 Unplanned Events, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015, which is the basis for the issuance of the Environmental Decision. The material has been revised and supplemented on the basis of new knowledge and analyses carried out.

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2017.
[2] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

2. Identification of hazards and sources of pollution

Unplanned impacts are the result of events or failures that are not related to activities included in the project schedule.

Causes of plant failures that may result in marine pollution may include shipwrecks, collisions of ships with each other and with farm facilities, operator errors, material fatigue, exceeding permissible pressures and stresses, etc.

Based on data from other OWF projects and similar projects, as well as on the knowledge and experience of the study's authors, the following potential unplanned events or failures of the OWF were selected:

- leakage of petroleum substances as a result of a collision, accident or construction disaster (during normal operation or in an emergency);
- accidental release of municipal waste or domestic sewage;
- accidental release of construction materials;
- contamination of the water tone and bottom sediments with antifouling agents;
- explosions of unexploded ordnance of military origin (UXO), either as part of deliberate bottom clearing in preparation for construction or as a result of accidental damage to undetected munitions during the work.

It should be noted that as a result of unplanned events, the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. Oil spill events can also affect living organisms that inhabit or otherwise use the seabed, the water table and the sea surface. Explosions of unexploded munitions can cause damage to living organisms in the zone of potential impact or their habitats, as a result of shock wave and noise emissions. Explosions can also cause damage to equipment, including construction or research vessels, and result in contamination of the marine environment with the spills mentioned above.

Each turbine contains a certain amount of mineral oil, the amount of which depends on the size and type of turbine. The following are estimated quantities for the different types of oil that are present in existing turbines installed in marine areas (Strategic Marine Services Ltd. 2011):

- gear oil - 750 - 1000 l/turbine;
- hydraulic oil - 250 l/turbine;
- transformer oil - 1500 -2500 l/turbine;
- lubricating oil - 20 l/turbine.

It can be assumed that an oil transformer in an offshore substation can contain a maximum of about 80$^{m3\ of}$ transformer oil - this is the amount of oil in the largest transformer currently installed at an offshore wind farm in Wlk. Britain[3].

The Baltic Sea is a historically and strategically important body of water for military shipping. Since World War I and World War II, there have been numerous unexploded bombs at its bottom, which pose a significant threat to any seabed intervention activity.

3. Spill of substances oil

During the normal operation of ships during the construction, operation and decommissioning of the farm, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) may occur.

They may contribute slightly to the deterioration of water quality. Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. There they can be bound by bottom sediments. However, due to the nature of the sediments in the BIII offshore wind farm area (small amount of organic matter and low content of fine fractions), they will not cause any noticeable deterioration in their quality. It should be assumed that these spills will be small (stage I), up to 20^{m3}. Visible traces of such contamination under favorable conditions can disappear spontaneously due to evaporation and dispersion in the water. The size of these spills will be practically limited to the OWF area.

Pollution of sediments with oil substances will be more noticeable in areas with fine-grained sediments, which have a greater capacity to absorb oil substances.

Oil spills can also occur as a result of a shipwreck or collision, a construction disaster at one of the farm's facilities, and during maintenance work. In the event of a collision or collision between ships, a Grade III spill, i.e. over 50^{m3}, can be expected.

The visible result of an oil spill is the formation of an oil stain, which, under the influence of gravity and surface tension, spreads at a speed that depends on the type of oil and external conditions. The influence of factors such as oil volume, density, viscosity, temperature, wind speed and time determine the size of the spill. The estimated speed of movement of the oil patch in large bodies of water is about 2-3% of the wind speed. It was found that a spill of 1.6 t (1.8^{m3}) of oil in one day of spreading over an area of 1 ^{km2} results in a film thickness of 2µm and a dark color. In contrast, 40 kg of oil results in a spill over an area of 1 ^{km2} with a film thickness of 0.05 µm.

The oil film formed on the surface of the water can cause:

- impeded gas exchange, especially oxygen, between water and the atmosphere,
- a 5-10% decrease in light intensity below the water surface (mainly due to the presence of heavy oil and sulfur fractions) limiting photosynthesis,
- increase in water temperature during the day due to absorption of light rays by the oil layer.

[3] Royal Haskoning DHV, "Polenergia Offshore Wind Developments for projects Middle Baltic II and Middle Baltic III," 2014

At the same time as the spread of the oil slick, other degradation processes run, aiming to reduce the concentration of hydrocarbons on the water surface (e.g., the release of low molecular weight hydrocarbons). Heavier oil fractions, on the other hand, can sorb on the surface of organic and mineral suspensions, which can cause their specific gravity to increase and gradually sink to the bottom. Thus, heavier oil fractions can be bound by bottom sediments, causing contamination. The susceptibility of bottom sediments to contamination depends on the grain size of the sediment and its packing. Loose sandy sediments and fine silty clay sediments are more susceptible to contaminant absorption. Compact clay sediments inhibit the penetration of contaminants deep into the sediment.

3.1. Characteristics pollution

The exposure limit for highly refined mineral oils, according to the Decree of the Minister of Family, Labor and Social Policy of June 12, 2018 on the maximum permissible concentrations and intensities of harmful factors for health in the work environment (Journal of Laws of 2018 No. 1286, as amended), is the Maximum Permissible Concentration (MPC) equal to 5 $^{mg/m3}$.

Typical hazard statements for a wide range of commercial products (diesel, hydraulic, lubricating oils, etc.), based on their data sheets, are presented below[4]:

- R18 - Flammable or explosive vapor-air mixtures may be formed during use,
- R20 - Harmful by inhalation,
- R38 - Irritates the skin,
- R40 - Limited evidence of carcinogenicity,
- N51/53 - Toxic to aquatic organisms; may cause long-term adverse changes in the aquatic environment,
- R65 - Harmful; may cause lung damage if swallowed.

Typical phrases specifying conditions for safe use are shown below:

- S2 - Keep out of the reach of children,
- S23 - Do not breathe vapor/spray,
- S24 - Avoid skin contamination,
- S36/37 - Wear appropriate protective clothing and suitable gloves,
- S51 - Use only in well-ventilated areas,
- S61 - Avoid discharges to the environment. Follow the instructions or safety data sheet,

[4] 4 Classification according to the Council Directive of June 27, 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labeling of dangerous substances 67/548/EEC) (http://www.lotos.pl/132/dla_biznesu/reach /characteristics_cards)

- S62 - If swallowed, do not induce vomiting: seek medical advice immediately and show the package or label.

Oils spread over the water surface at a rate that depends on the type of oil and external conditions (wind force, sea state, ambient temperature, etc.). Light oil fractions spread quickly, heavy oils (lubricating oils and greases) tend to clump together. The speed of oil spreading is highest in the initial phase and decreases significantly when the thickness of the layer reaches several millimeters.

The rate of evaporation and the change in composition and concentration of the hazardous substance on the water surface is determined by the substance's vapor pressure. Evaporation, which is a natural process, causes large amounts of light fractions to disappear from the surface of the water, while atmospheric pollution increases and thus fire and explosion hazards appear. In the case of heavy oils and lubricants, evaporation practically does not occur.

The speed of oil spreading is also affected by the formation of an oil-water emulsion with a viscosity greater than that of the oil itself. Spilled oil can quickly disperse in seawater, forming an emulsion that is difficult to break down and contains 40-80% water. The formation of this emulsion, known as "chocolate mousse," is accompanied by a significant increase in viscosity. Emulsification of oil is the result of sea waves, even very calm ones. The process occurs the faster the more agitated the sea is.

Hydrocarbons included in crude oil can be broken down by marine microorganisms. The bacteria that cause this decomposition are most abundant in shallow waters. The degree of biological decomposition of the oil depends on the complexity of its chemical structure, as well as on the presence of suitable media (e.g., nitrogen, phosphorus, oxygen) and the right temperature. Biodegradation occurs at the surface of the water-oil phase separation. Hence, it is advantageous to disperse the oil in as much water volume as possible.

The solubility of oil in water is very low, hence the amount of oil lost in this way is small. Some of the oil, however, may be dissolved by photo-oxidation. Factors that promote photo-oxidation are sunlight and the presence of oxygen. The end result is directly proportional to the surface area of the oil film, while the process itself is very slow and has little effect on oil decomposition. The oil is also partially dissolved through biodegradation. Intermediate products are namely more hydrophilic than oil and dissolve better in water.

The first visible effect of the oil compound spill is the formation of stains on the water body. In practice, oil spreading in offshore waters is formed into long strips separated by clear water, or water covered with a thin oil film. Based on optical observation of the spill, it is possible to determine the thickness of the coating and estimate the amount of the spill - the so-called color code being a fairly precise tool in this regard.

The following table gives the approximate thickness and volume of spills depending on the color of the oil stain, which depends on the thickness of the oil film and thus the refractive index and physical properties of the oil.

Table 1. Calculation of spill size depending on the color of the oil stain

Oil spill color (color code)	Spill thickness [µm]	Approximate spill volume [$^{m3/km2}$]
Silver	0,02 0,05	0.0

Gray	0.1	0.1
Rainbow	0.3	0.3
Blue	1	1
Blue-brown	5	5
Brown and black	15÷ 25	15÷ 25
Dark brown and black	above 100	above 100

Source: Kurc, 2005

The influence of the thickness of the layer after the spill is important in its collection. Thin film spills with low viscosity and low liquidity temperatures are more difficult to collect. The spills, which have a high liquid temperature in the range of 200C, form a thick ooze that is difficult to collect. The best effect is obtained with the additional use of dams that limit the spill area and increase its thickness. In the case of explosion or fire hazards, consideration should be given to whether erecting a dam will increase these risks.

3.2. Qualification of the magnitude of hazards and pollution

The magnitude of the contamination and the scale and scope of the operation can be classified as follows, according to the commonly accepted international system (among others, the ITOPF guidelines), which is shown in the table below.

Table 2. Qualification of the extent of hazards and pollution

Classification	Limit spill size	Description
I degree (small spills)	20^{m3}	Minor spills of petroleum substances that do not require intervention with additional forces and resources, possible to clean up by own means. These are the most common types of spills, caused by minor malfunctions or inadvertent spills, and will be virtually limited to the IMF area. These spills do not cause particular technical difficulties in their removal and do not pose a major threat to the marine environment. Visible traces of contamination under favorable conditions can disappear spontaneously in up to a week due to evaporation, dissipation in water, etc.
II grade (medium-sized spills)	20 - 50^{m3}	Spills of petroleum substances, the scale of which exceeds its own capabilities and requires counteraction at the regional level, which includes activities within the maritime area under the territorially competent director of the maritime office. Such spills are the result of failures of larger units or their collisions, as well as more serious plant failures at the OWF. They require the intervention of forces and resources covered by the National Plan for Combating Hazards and Pollution of the Marine Environment. The decision on the

		required scale of counteraction is made by the director of the maritime office.
III degree (catastrophic spills)	50^{m3}	Spills of petroleum substances having the character of an extraordinary threat to the environment, for which forces and resources under more than one director of the maritime office (including foreign ones) are engaged. The decision on the required scale of countermeasures, expansion or suspension of the rescue operation is made by the director of the maritime office, in accordance with the Law of March 16, 1995 on the Prevention of Pollution from Ships (consolidated text, Journal of Laws of 2012, item 1244).

Source: provided by the Contracting Authority

3.3. Scenarios and risks of possible most serious accidents

The estimated scale of the incident and the maximum quantities released were determined based on the technical concept prepared by Royal Haskoning DHV.

The probability was determined according to Strategic Marine Services Ltd, 2011:

- 10^{-5} - virtually impossible - 1 time in 100,000 years (1/2000 chance of an event occurring in 50 years),
- 10^{-4} - extremely rare - 1 time in 10,000 years (1/200 chance of occurrence in 50 years),
- 10^{-3} - very rare - 1 time in 1,000 years (1/20th chance of occurrence in 50 years),
- 10^{-2} - rare - 1 time in 100 years (50% chance of occurrence within 50 years),
- 10^{-1} - frequent - 1 time per year,
- very frequent - 11 once a year or more often.

3.3.1. Construction and decommissioning phase decommissioning

The predicted scenarios of potential events during the construction and decommissioning stages in the offshore wind farm area are shown in Table 3. The values specified in the estimated scale of the event are the upper limits of the most likely scenario.

Table 3. Events that may occur in the area of the OWF with the determination of the scale and probability of their occurrence - oil pollution (construction and decommissioning stage)

Potential pollution	Potential event	Estimated scale of the incident	Estimated probability of an event and possible countermeasures
Marine gas oil (MGO)	Collision between two	The worst-case scenario envisions the complete	The probability should be estimated as very low, on the order

Potential pollution	Potential event	Estimated scale of the incident	Estimated probability of an event and possible countermeasures
	vessels	destruction of the largest fuel tanks of both vessels and a fuel spill. Assuming that fuel is stored on board in several tanks (filled, as a rule, to no more than max. 3/4 of their capacity), it is reasonable to assume the release of diesel fuel into the environment in the order of 200^{m3} at most.	of 10-4. Any collision of units in the construction/ decommissioning area will occur at a very low speed and the probability that the tanks in both units will be destroyed is extremely low, on the order of 10-5. Use of oil pollution elimination measures available on ships and external forces and resources (SAR).
Marine gas oil (MGO)	Collision of a vessel with an object in the offshore wind farm area	The worst-case scenario is the complete destruction of the vessel's largest fuel tank and its leakage. Assuming that the fuel is stored in several tanks, it is reasonable to assume the release of diesel fuel into the environment in a maximum amount of the order of 100^{m3}.	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on board and external forces and resources (SAR).
Marine gas oil (MGO)	Stranding of a vessel / sinking	The worst-case scenario is the complete destruction of the vessel's largest fuel tank and its leakage. Assuming that the fuel is stored in several tanks, it is reasonable to assume the release of diesel fuel into the environment in a maximum amount of the order of 100^{m3}.	The probability should be estimated as very low, on the order of 10-5. Use of oil pollution elimination measures available on board and external forces and resources (SAR).
Machine (engine) oil	Collision between two vessels	The worst-case scenario is the complete simultaneous destruction of the largest vessels' oil tanks and an oil spill. Assuming that on large ships the total amount is about 15^{m3}, there will be a release of oil in the order of 30^{m3} at most.	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on ships and external forces and resources (SAR) .
Machine (engine) oil	Collision of a vessel with an object in the offshore wind farm area	The worst-case scenario envisions the complete destruction of the vessel's largest oil tank and an oil spill. Assuming that on large ships the total volume is about 15^{m3},	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on board and external forces and resources (SAR).

Potential pollution	Potential event	Estimated scale of the incident	Estimated probability of an event and possible countermeasures
		there will be a maximum release of oil in the order of 15^{m3}.	
Machine (engine) oil	Stranding of a vessel / sinking	The worst-case scenario envisions the complete destruction of the vessel's largest oil tank and an oil spill. Assuming that on large ships the total volume is about 15^{m3}, there will be a maximum release of oil in the order of 15^{m3}.	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on board and external forces and resources (SAR).
Hydraulic oil	Failure of construction equipment (such as a hose or fitting)	The worst-case scenario envisions the release of oil in the order of 10^{m3} (the maximum amount of hydraulic oil in vessels designed for construction work in offshore areas).	The probability should be estimated as low, on the order of 10-3. Use of oil pollution elimination measures available on board and external forces and resources (SAR).
Hydraulic oil	Operational leaks and spills	Minor oil spills during routine operations, such as when connecting or disconnecting hoses and fittings.	The probability should be estimated as low, on the order of 10-2. Since a hydraulic oil spill will generally occur on deck, the likelihood of the contamination spreading outside the vessel is less - on the order of 10-3. Use of oil pollution elimination agents available on board.
Hydraulic oil	Stranding of a vessel / sinking	The worst-case scenario envisions the release of oil in the order of 10^{m3} (the maximum amount of hydraulic oil in vessels designed for construction work in offshore areas).	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on board and external forces and resources (SAR).

Source: provided by the Contracting Authority

3.3.2. Stage operation

The predicted scenarios for potential events at the operation stage in the OWF basin area are shown in Table 4. The values specified in the estimated scale of the event are the upper limits of the most likely scenario.

Table 4. Events that may occur in the area of the OWF with the determination of the scale and probability of their occurrence - oil pollution (operation stage)

Potential pollution	Potential event	Estimated scale of the incident	Estimated probability of an event and possible countermeasures
Marine gas oil (MGO)	Collision of a vessel with an object in the offshore wind farm area	The worst-case scenario is the complete destruction of the vessel's largest fuel tank and its leakage. Assuming that the fuel is stored in several tanks, it is reasonable to assume the release of diesel fuel into the environment in the order of 100^{m3} at most.	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on board and at the OWF site, as well as external (SAR) forces and resources.
Machine (engine) oil	Collision of a vessel with an object in the offshore wind farm area	The worst-case scenario envisions the complete destruction of the vessel's largest oil tank and an oil spill. Assuming that on large ships the total volume is about 15^{m3}, there will be a maximum release of oil in the order of 15^{m3}.	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on board and at the OWF site, as well as external (SAR) forces and resources.
Gear oil Hydraulic oil Machine oil Lubricating oil	Leak from wind turbine oil system	The worst-case scenario envisions the release of transformer oil in an amount of 2.5^{m3} at most.	The probability should be estimated as low, on the order of 10-3. Since the oil spill will occur inside the turbine, the contamination is not expected to spread outside the facility and contaminate the marine environment.
Transformer oil	Collision of a vessel with an object	The worst-case scenario envisions the release of oil in the order of 80^{m3} at most.	The probability should be estimated as very low, on the order of 10-4. Use of oil pollution elimination measures available on board and at the OWF site, as well as external (SAR) forces and resources.
Transformer oil	Transformer leak at offshore substation	The worst-case scenario envisages the release of oil in the order of 80^{m3} at most (the amount of oil in the largest transformer installed from an offshore wind farm in WK. Britain).	The probability should be estimated as low, on the order of 10-3, directly proportional to the number of transformer stations. Since the spill will occur inside the facility, equipped with a tray with a capacity of 110% of the

Potential pollution	Potential event	Estimated scale of the incident	Estimated probability of an event and possible countermeasures
			transformer oil volume, the contamination is not expected to spread outside the facility and contaminate the marine environment.
Oil (in general)	Incidental oil spill associated with ongoing maintenance and repair work	The worst-case scenario predicts an oil release of $0.2^{m3\ at}$ most.	Probability of 10-2. Use of oil pollution elimination agents available at the OWF site.

Source: provided by the Contracting Authority

As part of the BRISK project (www.brisk.helcom.fi) estimated the risk of a collision in the Baltic Sea area in which more than 5,000 tons of oil pollution would be released into the marine environment (e.g., a tanker cargo unsealing). In the Baltic Sea as a whole, the risk was estimated at 1 case in 26 years, with the most at-risk areas being the Danish Straits (1 case in 65 years) and the Southwest Baltic (1 case in 97 years). For the area of the Southeast Baltic, which may include the BIII offshore wind farm area, the risk of such a collision was estimated at 1 case per 1,060 years, with the most at risk being areas in the area of the Wolin and Rugia islands and the Hel Peninsula. As a result of the BRISK project's risk analyses, ship-to-ship collisions are the biggest threat likely to cause the release of oil pollution, and pose about 100 times the risk of a ship sinking. Fires, explosions on ships and their collisions with installations located offshore (offshore wind farms, platforms, etc.) and oil releases from these installations were considered in the aforementioned risk analyses, but were determined to be much less likely.

Therefore, for the OWF area, the probability of such a collision during construction/ decommissioning, can be estimated as extremely rare and practically impossible, on the order of 10-5.

For comparison, the following analysis is cited, carried out as part of the implementation of the Hornsea 3 offshore wind farm, in the report on the Environmental Assessment of Navigational Risk Assessment in the area of the farm (Environmental Statement, Volume 5, Annex 7.1. - Navigational Risk Assessment, May 2018[5]) it was indicated that between 2005 and 2016 there were 13 accidents involving wind farm components. Of which 1 accident involved a collision during a ship maneuver, and the other between ships operating a farm. The remaining collisions were those of service units related to the operation of individual elements of the farm.

Analyses were also carried out on how the aforementioned farm would affect ship traffic, especially in terms of the gas platforms that exist in its vicinity. It turned out that the implementation of the wind farm as a navigational obstacle would reduce the risk of ship collisions with neighboring platforms, due to the "relegation" of ship traffic to existing shipping lanes that are better regulated.

[5] Available online https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-000582-HOW03_6.5.7.1_Volume%205%20-%207.1%20-%20Navigational%20Risk%20Assessment.pdf access: 03.2022

In contrast, the risk analysis performed on the development of the Teesside Offshore Wind Farm (EDF 2004), located in the North Sea off the central east coast of the UK. Britain (in the Tees estuary with vessel traffic - about 13,000 per year) has shown that the basic measures to be taken to reduce the risk of collision between a large vessel (tanker, ro-ro, container ship) and elements of the farm to ALARP (i.e., acceptable) levels are:

- proper planning of the route in the vicinity of the farm and proper navigation service on the ship,
- control of ship traffic by navigation services (VTS),
- navigation restriction within 500 m of the farm,
- moving the anchorage for small vessels.

3.3.3. The level of collision risk presented in the analysis navigational

In connection with the formal requirements of the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas (PSZW), the Investor commissioned the monitoring of ship traffic in the area of the Baltic Central III offshore wind farm and the so-called navigation expertise. The study was carried out by the Maritime Institute in Gdansk in 2015. The PSZW requires that such an assessment be provided to the permit-issuing authority (the minister in charge of maritime affairs) prior to submission of the ROIA.

It should be emphasized that it is too early in the project preparation process for such a document to meet the formal requirements of a Formal Safety Assessment (FSA), as defined by the International Maritime Organization (IMO). A full and final assessment can be made only at the stage of the construction project, when the parameters of the project, including the actual locations and number of power plants, are known in more detail. Since the technical data of the BIII offshore wind farm available to the investor at this stage was insufficient, the analysis relied, among other things, on the example of the Triton Knoll offshore wind farm from the UK, a project with comparable parameters to the BIII offshore wind farm. Among other things, data were used on the number and traffic of vessels planned to serve this farm, as determined by an analogous navigational expertise.

The analysis for the BIII offshore wind farm in the currently available version was done for the 200 wind turbine variant (which is the furthest-reaching scenario), while the variant selected for implementation will have no more than 60 wind turbines. Several likely scenarios have been analyzed.

Since the baseline data is only an estimate and unverifiable at this stage, this analysis should be considered only as a preliminary document, as the authors emphasize, pointing out that only two of the five steps of the IMO-required FSA have been fully completed. Stage three has been partially implemented. The evaluation contractor was not aware of the relevant parameters determining the construction and operation of the BIII offshore wind farm. Knowledge of these parameters is required in order to determine scenarios and estimate actual navigation safety risks. As a result, it was not possible to identify either specific risk control measures or to group them into risk control options. The analysis contractor was only able to identify hypothetical risk areas.

The preliminary navigation analysis presents higher levels of collision risk than those presented in sections 3.3.1. and 3.3.2. above. The differences in the reported figures are due to their reliance on other source examples. Its summary indicates the following potential impacts of major significance:

1) In the category of incidents referred to as ship collisions:

   a) for fishing vessels, in all scenarios considered, the risks associated with the safety of navigation are in the acceptable area, provided that specific risk reduction measures are introduced for OWF-OSV vessels;

   b) for tankers in one of the scenarios considered (scenario D - construction traffic and operational traffic to 206 farm facilities), the risk level for reasonably likely and rare events is in the ALARP*(As Low As Reasonably Practicable*) area. General risk reduction measures are required[6];

   c) for commercial vessels, in all scenarios considered, the risk level for reasonably likely events is in the ALARP area for consequences described as severe. Risk reduction measures of a general nature are required. For events whose consequences are described as severe, the risk level is in the unacceptable area. Special risk reduction measures are required;

   d) for passenger ships, in all scenarios considered, the risks associated with shipping safety are in the acceptable area;

   e) for service vessels, in all scenarios considered, the risk level for sensibly probable and rare events is in the ALARP area. The probability of a collision is relatively high, but the consequences are of minimal (small ships) or significant (large ships) importance. Due to the high probability, special risk reduction measures are required[7].

2) In the category of incidents defined as contact between a ship and a wind turbine,

   a) for commercial vessels for NIS, the risk level for rare events is in the ALARP area for consequences described as severe. General risk reduction measures are required;

   b) for service vessels for the operational traffic scenario, the risk level for reasonably likely events is in the ALARP area. The probability of contact is relatively high, but the consequences are of minimal (small ships) or significant (large ships) importance. Due to the high probability, special risk reduction measures are required;

   c) for the remaining categories of ships, the risk level is in the acceptable area.

Taking into account the cumulative impact, the collision risk assessment is as follows:

1) in the category of events referred to as ship collision:

   a) for the farm demolition variant (reverse construction traffic scenario), the vast majority of events are in the area of frequencies described as extremely rare. The category of rare

[6] The risk reduction measures mentioned above will be specified in the final version of the navigation expertise, at the stage of obtaining a construction permit.

[7] Source: Monitoring of ship traffic in the area of the OWF Central Baltic II. Final report with impact assessment (navigational expertise), Maritime Institute in Gdansk, 2015, Table 7.1. (Chapter 7.2.)

events includes the probability of head-on and cross collisions for service vessels. Risk reduction measures will be required for large service vessels;

b) for the average operational traffic scenario, the vast majority of events are in the area of frequencies described as extremely rare. The rare event category includes the probability of head-on and cross collisions for commercial vessels and, in one case, tankers. Area collisions for service vessels fall into the category of frequent events, also almost "frequent" may be head-on collision events. Risk reduction measures will be required for all large service vessels. Too many large service vessels will require special security measures. The threat of collision is in an unacceptable area, requiring the search for other solutions;

c) for the high operational traffic scenario, the vast majority of events are in the area of frequencies described as extremely rare. The rare event category includes the probability of head-on and cross collisions for commercial vessels and, in one case, tankers. Area collisions and head-on collisions for service vessels fall into the category of frequent events. Special risk reduction measures will be required for all large service vessels. The threat of collision is in an unacceptable area, requiring the search for other solutions.

2) in the category of events defined as contact between a ship and a wind turbine:

a) the minimum payback period for an event defined as contact between a ship and a wind turbine is 85 years and falls into the category of events defined as rare (this means that this type of event will occur once every 85 years). Thus, for events of this type, there is no cumulative impact effect.

4. Places with the highest risk and particularly vulnerable sensitive

The places with the highest risk, due to the distance from the OWF area and the direction of the spread of pollution, are the Slupsk Shoal and the coastal area oriented between the villages of Rowy and Białogóra, which are tourist destinations, and a small tourist-fishing port in Leba.

Areas particularly sensitive to potential pollution are protected natural areas, including those belonging to the Natura 2000 network, established on the basis of the Law of April 16, 2004 on Nature Protection (consolidated text: (i.e. OJ. U. of 2021, item 1098, as amended).

The BIII OWF will not be located in protected areas, however, it will be located at a distance of about 5.5 km from the Natura 2000 area Slupsk Shoal PLC990001, at a distance of about 8 km from the border of the Natura 2000 areas Przybrzeżne Wody Bałtyku PLB990002 and at a distance of about 19 km from the Natura 2000 area Ostoja Słowińska PLH220023 together with the Słowiński National Park (the Park also includes a sea strip along the shore with a width of 2 nautical miles - the protection perimeter of the Baltic Sea with an area of 11,171 ha).

A sensitive area is also the Baltic Sea coast as a place of rest and recreation, with numerous tourist resorts and beaches between Rowy and Bialogóra.

The locations of the BIII OWF in relation to the nearest sensitive areas are shown in the figure below.

Figure 1. Location of OWF BIII in relation to sensitive areas

Ławica Słupska	Slupsk Shoal
5.5 km	5.5 km
35.5 km	35.5 km

30.4 km	30.4 km
23.4 km	23.4 km
8.3 km	8.3 km
5.6 km	5.6 km
18.9 km	18.9 km
Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Rez. Mierzeja Sarbska	Rez. Sarbska Spit
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Łeba	Leba
Słowiński Park Narodowy	Slowinski National Park
Ostoja Słowińska	Ostoja Słowińska
Jez. Gardno	Jez. Gardno
Klify Poddębskie	Poddębski Cliffs
Ustka	Ustka
Białogon	Bialogon
Paśnickie Łąki	Pashnic Meadows
Lębork	Lębork
Słupsk	Slupsk
Podkład – Landsat 13.06.2000 RGB – kan 3.2.1	Primer - Landsat 13.06.2000 RGB - kan 3.2.1
Legenda:	Legend:
Obszary chronione	Protected areas
PLC – Ostoja Ławica Słupska	PLC - Slupsk Shoal Ostoja
PLB – Ostoja ptaków	PLB - Bird Refuge
PLH – Ostoja – siedliskowa	PLH - Ostoja - habitat
Słowiński Park Narodowy	Slowinski National Park
Rezerwaty	Reserves

Source: provided by the Contracting Authority

The areas listed above overlap with the sensitive areas identified in the BRISK project (www.brisk.helcom.fi).

The following briefly discusses the closest protected areas established under the Law on Nature Protection of April 16, 2004 (based on Standard Data Forms - SDF).

Slupsk shoal PLC990001

An area of 80,050.3 hectares.

Slupsk Shoal is a body of water in the southern Baltic Sea, encompassing an area with a highly shallow seabed, the boundaries of which are conventionally defined according to the course of the 20-m isobath. It is an area with a highly varied bottom, with numerous hills and depressions. The dominant plants are macroalgae, with many species already disappearing in the Gulf of Gdansk.

Bird refuge of European rank E 79.

No bird species from Annex I of Council Directive 79/409/EEC. During winter there is at least 1% of the long-tailed duck's migratory path population (C3) of the following species: long-tailed duck, guillemot. Wetland birds occur in concentrations of more than 20000 individuals (C4).

Isolated site of habitat 1170 (marine bivalve shoals) in Polish marine waters. The shallows are inhabited by numerous invertebrates, providing a rich food base for the flocks of wetland birds that stop in autumn and winter here.

The dominant plants are macroalgae, with many species found to be disappearing in the Gulf of Gdansk. The site of the crayfish Delesseria sanguinea, which is considered lost in the Baltic Proper.

Coastal Baltic Waters PLB990002

An area of 194,626.7 hectares.

It covers the coastal waters of the Baltic Sea with a depth of 0 to 20 meters. Its borders stretch for 200 kilometers, starting from the base of the Hel Peninsula and ending at the Pomeranian Bay. The seabed is uneven, with denivelations reaching 3 meters.

A bird sanctuary of European rank E 80.

The area is wintered in significant numbers by 2 species of birds from Annex I of Council Directive 79/409/EEC: black-throated diver and red-throated diver (C7). During the winter there is more than 1% of the long-tailed duck's migratory path (C3) population, at least 1% of the guillemot and uhla.

The benthic fauna is dominated by small crustaceans. Rarely observed are large marine mammals - ringed seals Phoca hispida and gray seals Halichoerus grypus, and porpoises Phocaena phocaena.

Ostoja Słowińska PLH220023 and Słowiński Park Narodowy

An area of 32,955.3 hectares.

The area protects the landscape and the diversity of morphological forms observed on the Gardner Spit

- Leba, including unique coastal barchans (up to 40 m above sea level, migrating at a rate of 3 - 10 m per year), the two largest brackish coastal lakes: Lebsko (7140 hectares, max. gl. 6.3 m) and Gardno (2468 ha, max. depth. 2.6 m) along with adjacent meadows, bogs, forests and swamp forests. In total, the area includes: the main complex of the Slovinski National Park (including the marine waters incorporated into the park in 2004), the Rowokół complex and the bed of the Lupawa River connecting Rowokół to the main complex.

In the interduction depressions, known as deflation fields, primary plant succession is observed, running from initial psammophilous communities to crowberry boron.

The area is occupied by well-preserved habitats characteristic of coastal areas, developed typically and over large areas, including 26 habitat types on Annex I of Council Directive 92/43/EEC. In the area, stands of many rare and endangered species have been found, including 23 from Annex II of Council Directive 92/43/EEC, including 8 species of fish, as well as one of the most abundant populations in Poland of the fragrant flax (also a species from Annex II of this Directive) and many vascular plants under legal protection. There are also interesting species of invertebrates in the area, including leeches *Hirudinae*:

Haementria costata, Haemopsis sanguisuga, Piscicola geometra and the arachnids Arachnidae: Arctosa sp., Dolomedes fimbriatus.

A unique landscape of moving dunes is protected here. The marine part of the area is the habitat of the harbor porpoise.

It is an important bird sanctuary of European rank E09 (Slowinski PN). The area is listed as a Ramsar Convention site, and is also within the Slovenian Biosphere Reserve.

There are at least 28 species of birds from Annex I of the Birds Directive, 11 species from the Polish Red Book (PCK). During the breeding season, the area is inhabited by at least 1% of the national population (C3 and C6) of the following bird species: white-tailed eagle (PCK), golden eagle (PCK), osprey (PCK), eagle owl (PCK), dunlin (PCK), variable darter (PCK), ringed plover (PCK); meadow harrier, black cormorant occur in relatively high density (C7).

At least 1% of the migratory route populations (C2 and C3) of the following bird species are present during the migration period: white-tailed godwit (c. 2%), crane (>3%), bean goose (>4%) and barnacle; white-fronted goose and marmot occur in relatively high densities (C7).

Protected status

Slowinski National Park (18,618 hectares, 1967, 29,283.4 hectares as of 2004).

The area includes the Slowinski National Park Biosphere Reserve (18,618 ha; 1967); a Ramsar Refuge: Slowinski National Park.

4.1. Determination of the potential area of the basin covered by the threatened

The extent of oil pollution depends primarily on the amount and type of oil spilled, hydrometeorological conditions such as wind strength and direction, sea state and its surge, water and air temperature.

The degree of dispersion of oil droplets in seawater is also not insignificant. In calm seas, about 40% of the oil remaining on the surface can penetrate deep into the water mass during the first few days, while up to 95% during storms. Dispersion, however, results in contamination of the food chain in the failure area (Malaczynski 2010).

Oil pollution travels on the sea surface with the resultant velocity for the speed of the water surface layer, forced by wind action, and the speed of sea currents. Any change in these parameters causes changes in the shape of the spill. Most often, it is a set of separated patches on the sea surface with an irregular shape, moving in the direction of the wind at 3-4% of its speed, having a thickness of <1 mm, width of up to 1 km and length of up to a dozen km. When the hydrometeorological situation is unfavorable, the speed of movement ranges from 0.5 to 2.0 km/h (Malaczynski, 2010). If strong currents are present along the shore, pollution can occur.

Appendix 1 of this section presents the estimated potential extent of oil pollution for selected input parameters, based on the UMPL mesoscale atmospheric model (Pietrek, 2006) and the two-dimensional stochastic model of oil pollution spread (Mazurek 2013).

The maps show the potential extent of the oil spill for the most unfavorable scenario, i.e. the release of about 200$^{m3\ of}$ oil pollution after 1-24 hours (the volume of the spill mainly affects the thickness of the oil layer on the water surface, but to a lesser extent its extent, which depends mainly on sea currents and wind direction), for the following options:

A. Release in the geometric center of the IMF

   1) any wind direction of up to 2°B and the speed of surface currents up to 15 cm/s, and moving the spot for the most likely wind direction;

   2) any wind direction of up to 3°B and the speed of surface currents up to 30 cm/s, and moving the spot for the most likely wind direction;

   3) taking into account the wind distribution for the Southern Baltic for winds up to 2°B and surface current speeds up to 15 cm/s;

   4) taking into account the wind distribution for the Southern Baltic for winds up to 3°B and surface current speeds up to 30 cm/s.

B. Release on IMF border

   1) taking into account the wind distribution for the Southern Baltic for winds up to 3°B and surface current speeds up to 30 cm/s.

Modeling of the extent of the oil spill patch was based on a factor of 0.030 - 0.035 of the patch's velocity relative to the wind measured at 10 meters above sea level.

The center circles represent the likely extent of the spill at any wind direction, while the outline of the spill shows an example of the likely extent of the spill at a particular wind direction - the effect of the Coriolis force deflecting the direction of the spill to the right has been taken into account.

In the case of maps showing the velocity of the spot moving at 30 cm/s, it should emulsify and disappear after 12-18 hours of drifting on the surface - its significant environmental impact should not exceed the ranges of the maps calculated for a velocity of 15 cm/s (for light fuels, which evaporate faster and emulsify heavy fractions).

The map, which takes into account the wind rose for winds of 3□B, determines the modified probability of an oil patch in specific directions in the case of a point spill, as well as the danger resulting from its occurrence at the border of the OWF area (e.g., a collision on the outer strip of a body of water) - it shows the most likely maximum area of spill danger.

The presented oil pollution extents have been determined on the basis of wind statistics, as determined by UMPL model predictions and maximum current velocities in the area (about 30 cm/s, Krzyminski 1996), but other scenarios, corresponding to other meteorological conditions prevailing at the time, but statistically less likely, are not excluded. It will only be possible to determine the actual extent practically during the event, based on current meteorological data and the type and potential amount of pollution.

4.2. Description of the methods used to remove pollution

The primary methods of eliminating oil spills are:

- eliminating the source of the spill,
- mechanical collection from the surface of the water, after limiting the spread of the spill,
- sorption,
- dispersion,
- combustion.

The most environmentally beneficial method, with virtually no side effects, is mechanical oil collection.

Dispersing involves the use of chemicals (dispersants) that help disperse the oil and accelerate its biological decomposition. However, in accordance with §6 of the Decree of the Council of Ministers of August 30, 2017 on the organization and manner of combating hazards and pollution at sea (unified text Dz. U. of 2022, item 216), the use of methods other than mechanical is restricted in Polish maritime areas and requires the consent of the competent director of the maritime office.

The other methods (sorption and incineration), due to their low efficiency and environmental nuisance, are not practically applicable in the area under study.

Typical equipment used for mechanical collection in marine conditions are:

- plastic flexible dams, shape-shifting in all planes and along their length and height under the influence of waves, tows and currents;
- rigid dams as structures with floats, with limited shape variation under external influences - more effective than flexible dams, but can be used when the sea state does not exceed 1B and the speed of the surface current is less than approx. 1.5 m/s;
- sorption dams - sorbent sleeves made of mesh filled with natural or artificial sorbent;
- adhesive collectors, which take advantage of the better adhesion of oil to certain materials, but do not soak with it (e.g. metal or plastic discs, ropes, belts, etc.);
- overflow-pump collectors, which mechanically separate oil from water using a threshold placed at the level of the oil-water separation surface;
- vortex collectors, which use the phenomenon of a vortex produced by a horizontal disc placed under water and causing oil to flow into the suction pump.

Specially designed sweep nets can be used to collect heavy lubricating oils and greases that tend to clump together in conglomerates.

The spill control action can be divided into the following stages:

1) Location and fencing of the spill. The dam should be set up so as not to create problems with pumping out the water-oil mixture and allow the oil to flow down to the collection area. Take into account the direction and speed of winds and currents. If there is a large spill, additional safety dams should be set up especially on the leeward side (several dam lines). The dam should be towed at the right speed, i.e., at a speed that will not cause it to break or waterlog. In the case of spills from ships, the dam should be set up so that the distance between the dam and

the ship is such that the oil does not flow outside the dam. A dam length of at least 3 ship lengths is recommended.

2) If possible, remove from the spill site all vessels that may impede the spill control operation. However, the vessels at the center of the spill are not being removed - it is advisable to remove the crew of these vessels and stop all work in the danger zone. In the event of a fire hazard, it is necessary to evacuate all workers in the vicinity of the contamination zone.

3) Removal of stains with the highest density of oil fraction (thickest oil layer).

4) Cleaning of hard-to-reach areas containing a significant amount of oil.

5) Removal of the remaining oil stains, cleaning the water surface by collecting the remaining trace amounts of oil that were not removed by collectors through, for example, the use of sorbents, cleaning of IMF equipment and facilities and ships.

6) Disposal of waste generated from the liquidation of the spill (oil/water mixture/emulsion, contaminated sorbents).

7) Cleaning of the equipment used during the action, completion of the action.

8) The use of methods other than mechanical methods (i.e., mechanical collection) for combating pollution in Polish maritime areas may take place only with the consent of the competent director of the maritime office (§6 of the Decree of the Council of Ministers of August 30, 2017 on the organization and manner of combating hazards and pollution at sea).

4.2.1. Liquidation of spills under conditions winter

Low temperatures reduce fire and explosion hazards. As oils increase their viscosity, they become less mobile. Less volatile substances evaporate into the atmosphere. Where the surface of a body of water is covered by a solid layer of ice, pollutants have no way of getting under the ice when spilled from above, while they cannot escape to the surface when they get onto the unfrozen surface of the sea.

Snow acts as a sorbent. The oil that has made its way into the waters between the ice and snow crystals is partly retained there and partly spreads on the surface of the water. The ability to spread is limited by increasing viscosity.

To capture the tethered contaminant, the entire contaminated mass must be collected and transported ashore to a designated location for oil extraction. This can be done by melting the mass in properly prepared and heated tanks. Capturing such a mass of ice, snow and dirt requires clearing a sizable body of water of ice and setting up conventional floating dams, taking into account the phenomenon of free movement of contaminated ice in the depths. As a rule, this requires duplicating and even triplicating the contamination capture system.

4.2.2. Elimination of spills during storm

In rough seas and stormy conditions (sea state above 6°B), mechanical collection is impossible - there will be a strong dispersion of oil contaminants in the ocean depths, promoting biodegradation and

limiting the possibility of oil splashing. There will also be an increase in oil viscosity as a result of emulsification and evaporation of lighter fractions.

The dissipation of the oil will occur naturally, within a few to several days.

Technical activities can be conducted in the full range up to and including 3°B, at 4-6°B they can be conducted to a limited extent, while above 6°B they will not be possible.

5. Accidental release of municipal waste or wastewater domestic

During the construction of the wind farm, waste, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage, will be generated on vessels as well as at the construction facilities located on land (at the port serving the project). Their expected types of quantities, as well as how they will be handled, are presented in Section 10 of Volume II of the EIA. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident, causing a local increase in nutrient concentrations and deterioration of water and sediment quality. However, the pollutants should quickly disperse, so they will not contribute to permanent deterioration of the environment in the project area.

As a minimizing measure, it is recommended to create procedures related to waste and wastewater handling.

6. Accidental release of chemicals and waste from construction, operation or decommissioning of the farm

During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released accidentally into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that single incidents involving the sinking of about $5^{m3\ of}$ product could occur during handling.

Grouts, mortars and other binders often contain hazardous substances. They are characterized by different chemical compositions, depending on the manufacturer. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 g-cm-1, they sink and are deposited on the bottom. The above substances do not pose a major threat to human health and life, but they are considered a serious threat because they cannot be easily removed from the bottom and are toxic to marine organisms. The scale and estimated probability of their release (determined in accordance with Strategic Marine Services Ltd, 2011, see Section 3.3.) are estimated in the table below.

Table 5. Events that may occur in the offshore wind farm area with an indication of the scale and probability of their occurrence - construction materials

Potential pollution	Potential event	Estimated scale of the incident	Estimated probability of an event and possible countermeasures
Grout, mortar, cement, grout, etc. containing substances toxic to the marine environment	Reloading in powder form	The powdered products will be transshipped by crane from the supply vessel to the platform in unit packs of about 1^{m3}. It is expected that about $5^{m3\ of}$ product may sink during handling.	The probability should be estimated as low, on the order of 10-2. Use of external companies specializing in underwater work.

Source: provided by the Contracting Authority

During the operation of the farm, maintenance of its facilities will be carried out (cf. description of the construction phase, Volume II Section 5 of the EIA). Accidental release of small amounts of waste or operating fluids into the sea cannot be ruled out.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out these works (cf. description of the decommissioning stage, Volume II Section 6 of the EIA), and the greatest pollution may occur if the gravity foundations have to be crushed.

The anticipated types and quantities of waste are presented in Section 10 of Volume II of the EIA.

For this type of investment like an OWF, a detailed plan is generally developed to address risks and pollution arising during construction, operation and decommissioning of the OWF, which specifies minimization measures and how to deal with such events. **It is recommended that such procedures be created as a minimization measure.**

If the contaminating substance sinks quickly (e.g., grout, mortar, grout joints, etc.), there will be no need for mechanical dams. In this case, it is necessary to determine the area (taking into account the direction and speed of the sea current), on the bottom of which contaminants have settled, in order to remove them later. In shallow waters it is possible to use mechanical and pneumatic mining equipment, as well as manual, using diving teams. In any case, these operations are tedious and costly.

7. Contamination of water depths and bottom sediments with agents antifouling

To protect the hulls of ships from overgrowth, biocides are used, which may include, for example, copper compounds, mercury compounds, organotin compounds (such as tributyltin - TBT). These substances can pass into the water's depths and eventually be retained in the sediment. It should be assumed that the emission of these compounds will be limited by dilution in the water depths. Of the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. TBT (the most harmful substance) is currently banned in antifouling paints, but the presence of these compounds in older units cannot be ruled out. The sensitivity of seawater and bottom sediments to biocides released from hulls was determined to be medium.

As a minimizing measure, it is recommended that vessels whose hulls have not been coated with TBT-containing antifouling paint be used at any stage of the project. This will eliminate this most harmful impact on aquatic organisms.

8. Management of unexploded ordnance of military origin military.

Due to the potential risk of negative impacts on people and the marine environment due to damage and explosions of remnants of combat equipment and munitions on the seabed, the Investor is taking measures to minimize these risks. As part of the UXO management strategy, the Investor has planned a series of activities, some of which have already been implemented in the preparation of the BIII OWF project to date.

Table 6. Key steps in the risk management strategy for unplanned UXO explosions

Stage	Description	Status / dates
1	UXO documentation study for preliminary assessment of the threat in question	Completed
2	Preliminary inventory to clarify the recognized conditions in the Project area and preliminary selection of potentially hazardous objects for detailed recognition	Completed
3	Detailed assessment of the risk posed by UXO to determine the threat from UXO and chemical weapons and the level of tolerance against them in the implementation area	Completed
4	Specialized inventory of UXO, which will result in geophysical maps of the seabed in the vicinity of the pipeline route and final identification of potential UXO in the construction area	Scheduled, will take place before construction work
5	Safeguarding UXO identified within the boundaries of the construction area	Scheduled, will occur before construction work

The first analysis of the potential threat of UXO in the Project area (documentation study) and preliminary inventory was carried out as part of the research campaign in 2012-2013, when a literature and museum data search) and seabed surveys (see Volume III Section 3) were conducted.

As part of the survey, the image of the bottom of the BIII offshore wind farm was constructed line by line from 217 profile lines representing 220% of the coverage of the farm area, for the most accurate inventory of objects on the bottom. In the course of the task, the analysis of sonar images taken on profiles with a total length of 2,500 km was carried out. The recorded sonar data was geometrically corrected and rectified, then arranged into a sonar mosaic that creates a clear picture of the bottom. Based on it, 218 points were pre-determined, from which, after reducing the buffer zone, 54 points were selected for verification with the ROV, which were small objects visible on the bottom (potential UXO). After ROV analysis, no objects of a military nature were found with particular reference to torpedo and mine weapons. This does not mean that there are no remnants of these weapons, unexploded ordnance and chemical weapons in the area.

Tests of sediment chemistry and water showed no elevated indicators that could indicate the presence of chemical weapons residues in the sediment. However, it must be remembered that these studies were conducted point-wise and their coverage is local, giving an idea of the overall picture of sediment and water chemistry in the BIII offshore wind farm area.

In 2018, the Investor commissioned Ordtek Limited to perform a UXO risk analysis of the farm area along with a mitigation strategy[8]. The analysis performed confirmed the highly unlikely occurrence of most types of mines used in the Baltic during WWI and WWII, as well as land munitions in the farm area. The possibility of World War I Axis mines (4 German minefields have been recorded within 7 km south of the farm area), as well as the presence of torpedoes, rockets and naval munitions, both from the war and post-war periods, were considered unlikely. The presence of chemical weapons was identified as a possibility - possible drop and dump sites for chemical weapons were located 18 km south of the Project boundary and 19 km to the north. As part of the risk mitigation strategy, it has been recommended to conduct geophysical surveys using a side scanner and Multibeam echo sounder, and to obtain ALARP certification before conducting geotechnical surveys for the preparation of the BIII OWF project.

These recommendations were implemented in 2018 prior to the initial geotechnical campaign at the indicated geotechnical drilling sites. After a survey campaign to look for UXO, ALARP certificates were issued based on the data collected, thus finding no UXO in these locations.

The above measures will be repeated before the next stage of geotechnical studies, and before construction work begins. The purpose of the inventory will be to develop a comprehensive, detailed and definitive proof of the absence of UXO within the boundaries of the farm and in the zone of ongoing works. Inventory tasks include:

- geophysical surveys (with a magnetometer or gradiometer) of the entire pipeline installation corridor (and other areas relevant to the project) with a grid density that gives sufficiently detailed data;
- surveys by unmanned underwater vehicle of objects selected as "potential UXO" (pUXO), including possibly pUXO possibly buried in the seabed, with visual confirmation of whether the objects so surveyed are in fact UXO.

The result of the study will be the identification of actual UXOs that need to be secured.

If at the stage of specialized UXO inventory is confirmed the presence of UXO within the boundaries of the area of investment works, it is envisaged to implement special protection of UXO before the commencement of works:

- an exclusion zone will be delineated around each UXO mapped but not visually inspected by an unmanned underwater vehicle - with boundaries and size depending on parameters specific to local risk and surrounding seabed conditions. The exclusion zone is intended to protect the facility from shrugging;

- a safety zone will be delineated around each UXO identified as such - with boundaries and size depending on parameters specific to local risk and surrounding seabed conditions. The safety

[8] Unexploded Ordnance (UXO) Hazard and Risk Assessment with Risk Mitigation Strategy, Baltic II & III Offshore Wind Farms, Ordtek Limited, 2018

zone is intended to protect the investment and third parties, ships and equipment in case the facility explodes.

The risk of having to remove unexploded ordnance can be mitigated, as far as practical, by relocating the various components of the OWF so as to avoid unexploded ordnance and unexploded ordnance visible on the seabed. If this approach is not feasible, UXOs will require decommissioning by removal from the seabed or detonation. It is assumed that the unexploded ordnance can be removed from the bottom, transported to land and disposed of in a controlled manner there. According to the OWF design strategy, it is assumed that the decommissioning of UXO will be an unplanned task.

It is deliberately planned to conduct the last parts of the detailed UXO inventory at a fairly late stage of the process preceding the geotechnical investigation and then the construction process. This is because there is a risk of objects on the seabed being dragged into the farm construction area by, for example, trawling with fishing nets, as well as the risk of changes in the seabed surface due to seasonal phenomena and storms. ALARP certificates for UXO are valid for only six months due to the possibility of changes in the image of the seafloor and the appearance of new objects there in the meantime.

Unplanned event (liquidation of UXO) - security measure

If UXO removal proves necessary, such activities could affect fish and marine mammals at the individual level. This is because the detonation of conventional weapons residues will be a source of underwater noise and vibration emissions.

Underwater explosions are among the strongest sources of sound in the sea. The characteristics of sound propagation underwater depend on the time of year, bathymetry and the size of the charge that is exploded. According to noise propagation modeling from potential explosions associated with UXO bottom cleaning, performed for the Baltic Pipe pipeline impact assessment within Polish marine areas (SMDI/Ramboll 2019), the ranges of impacts on fish and marine mammals (mortality, permanent hearing loss ("PTS"), temporary hearing threshold reduction ("TTS")), with detonation of the largest cargoes of 950 kg TNT, can reach no further than 20 km from the explosion source. Sample data is presented in the table below.

Table 7. Limiting distances from the source of the UXO explosion relative to the thresholds of sensitivity of fish and marine mammals to underwater noise impacts

Detonation of unexploded ordnance		Threshold value	150 kg TNT		950 kg TNT	
			Summer	Winter	Summer	Winter
Receptors	Impact	SEL (Cum*) [dB re 1µPa2s]	[km]	[km]	[km]	[km]
Seals and porpoises	PTS	179 dB	4.0	3.4	6.5	5.6
	TTS	164 dB	13.9	12.8	18.7	17.4
Fish	Mortality (fatal injuries)	207 dB (229-234 dB peak.)	0.6	0.6	0.7	0.7
	Physical injuries	203 dB	0.7	0.7	0.7	0.7

Source: SMDI/Ramboll 2019

9. Ways to prevent pollution

9.1. Construction and decommissioning phase decommissioning

The following are the most relevant technical and organizational safeguards for pollution prevention during construction and decommissioning of the OWF:

- closure of the body of water covered by construction/liquidation works for vessels not related to the construction/liquidation of the OWF;
- the use of vessel warning systems not related to the construction/ decommissioning of the OWF;
- definition of safety zones in the mode of navigational warnings of the national coordinator (KKON), which is currently the Hydrographic Office of the Navy in Gdynia (KKON operates within the framework of the World Navigation Warning System); these zones and their range are defined by an order of the Director of the Maritime Office on the basis of the Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457); e.g., for oil rigs, the safety zone includes the area of a circle with a radius of 500 m around the point of its foundation - in the case of wind power plants, these will be the distances from the corners of the body of water designated for the OWF;
- designation of waterways for vessels associated with the construction/ decommissioning of the OWF in order to minimize potential interactions between the movement of vessels serving the farm and external vessels, as well as to control access (e.g., by designating the entrance to the area) and vessel traffic in the area of the OWF;
- determining the maximum permissible speed of vessels in the OWF area and their mutual minimum distances from each other (depending on the type and size of vessels, meteorological conditions, etc.);
- introduce a requirement for a minimum of 2 people to be present on the bridge of the vessel associated with the construction/ decommissioning of the OWF, in order to reduce the risk of navigational error;
- audited service time control systems;
- systematic update of the development of the OWF area (the degree of erection/ decommissioning of facilities, routing of cable lines, etc.);
- equipping a minimum of one vessel in the offshore wind farm construction/ decommissioning area with flexible dams and packaged sorbents to limit the spread of oil spills and for the elimination of small spills, as well as a device for collecting mechanical contamination from the water surface (e.g., a skimmer) with a tank(s) for the collected oil;
- developing procedures for the movement and storage of substances that may contaminate the marine environment;
- establish a system of effective communications in the system: IMF - Contract Engineer - Services responsible for the safety of navigation and counteracting marine hazards and pollution, in

order to quickly respond to emergency situations (defined in the plan and accepted by all participants, i.e., the maritime administration, the Maritime Search and Rescue Service (MSPiR), the Contract Engineer, the investor and others). It should be noted that in the current state of law, the Ordinance of the Council of Ministers of August 8, 2017 on the organization and manner of combating hazards and pollution at sea (unified text Dz. U. of 2022, item 216).

- does not oblige offshore wind farm operators to develop plans to combat hazards and pollution;
- regular training and coaching of employees and subcontractors, including in the prevention and elimination of oil spills;
- informing the crews of small vessels about the dangers of wave action caused by large vessels and the associated uncontrolled behavior that can result in a collision with an OWF facility.

Most of the proven standards that will be used for the proposed development have been developed by the oil industry for offshore oil platforms. Thus, they will be taken into account when analyzing the risks and management methods for the construction of the Central Baltic III offshore wind farm. The best benchmark that is widely recognized in the market and hence its solutions can be implemented is the American Petroleum Institute (API) guidelines "Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms- Working Stress Design" (API 2007) and "Operation and Maintenance of Offshore Cranes" (API 2003). If it is necessary to detonate unexploded conventional weapons, it may be necessary to apply safety measures, which are summarized in the table below (Table 8).

Table 8. Suggested safeguards in case of UXO liquidation

Receptor	Safeguard measure (unplanned event)
Fish	**Sonar survey** It is necessary to identify by sonar survey from the deck of a technical vessel whether fish form shoals in the area to be secured and, based on their presence or absence, determine whether to proceed with the elimination of UXO or wait with detonation for a more appropriate moment. The assessment is expected to secure groupings of fish populations that may occur in the vicinity of UXO.
Marine mammals	**Securing marine mammals** The overall plan for securing marine mammals from UXO includes measures to protect these animals, such as the work of marine mammal observers ("MMO"), passive acoustic monitoring ("PAM"), and sound deterrents. **Visual observation and PAM** Visual observation by the MMO will be carried out from the deck of the surface vessel (using a suitable type of observation platform). Visual surveillance will be limited to daylight hours and only in conditions of good visibility, as visibility decreases as the weather deteriorates and with the twilight season. If marine mammals appear in the vicinity of UXO before its scheduled decommissioning, the detonation will have to be rescheduled.

	Visual observation prior to the disposal of unexploded munitions/ERW does not guarantee the complete safety of marine mammals at the time of detonation - these animals may be underwater, out of sight of observers, and for a long time. However, a visual inspection of the area just before the intended removal of UXO can save those animals that manage to be spotted from harm and death. PAMs are hydrophones placed in the water column. The underwater sounds they detect are processed by specialized sound processing software. PAM is a means of supplementing visual observations by MMO. Seal repellent Seal repellents are sound deterrent devices. The plan is to use them to scare away seals and porpoises, chasing them far enough away from the sites of necessary UXO removal. The range of operation, i.e. the effectiveness of these devices depends on their type and operating configuration. It is known that porpoises are easier to chase away with deterrents than seals (Hermannsen et al. 2015).

The types of other safeguards and issues that will need to be addressed in the implementation of the investment will depend on the results of a detailed risk assessment.

In the event that it is necessary to remove UXO, during the construction process, which were not identified during the pre-completion surveys (unplanned event), the farm contractor will use implementable measures to minimize the risk of impacts on fish and marine mammals (e.g., observation, deterrence).

9.2. Stage operation

The following are the most relevant technical and organizational safeguards for pollution prevention during the operation of the OWF:

- sealed turbine housing to prevent any oil spills from reaching outside the facility;
- offshore transformer stations will be equipped with oil pans with a capacity of about 110% of the amount of oil in the transformers, capable of accepting a complete spill in the event of a leak;
- the use of a system that controls the operation of the plant and the condition of the facilities, reacting in advance to possible damage to the plant and allowing, for example, to change the operating parameters or shut down the equipment before a more serious failure occurs resulting in, among other things, the release of oil;
- definition of safety zones in the mode of navigational warnings of the national coordinator (KKON), which is currently the Hydrographic Office of the Navy in Gdynia (KKON operates within the framework of the World Navigation Warning System); these zones and their range are defined by an order of the Director of the Maritime Office on the basis of the Act of March 21, 1991 on the maritime areas of the Republic of Poland and maritime administration

(consolidated text Dz. U. of 2022, item 457); e.g., for oil rigs, the safety zone includes the area of a circle with a radius of 500 m around the point of its foundation - in the case of wind power plants, these will be the distances from the corners of the body of water designated for the OWF;

- determination of the maximum permissible speed of vessels in the area of the OWF;
- within the offshore wind farm to require a minimum of 2 people on the bridge of the vessel, in order to reduce the risk of navigational error;
- audited service time control systems;
- equipping the OWF with flexible dams and packaged sorbents and a small/medium sized mechanical collector (e.g., skimmer) along with a tank(s) for collected oil, in order to limit the spread of oil spills and for the elimination of small spills (located in one of the offshore transformer stations);
- 24-hour supervision of the operation and monitoring of the IMF by the IMF Operations Center;
- developing procedures for the movement and storage of substances that may contaminate the marine environment;
- establish a system of effective communications in the system: OWF Operations Center - Services responsible for the safety of navigation and countering marine hazards and pollution, in order to quickly respond to emergency situations. It should be noted that in the current state of the law, the current Decree of the Council of Ministers of December 3, 2002 on the organization and manner of combating hazards and pollution at sea does not obligate offshore wind farm managers to develop plans for combating hazards and pollution;
- regular training and coaching of employees and subcontractors. among other things, on the proper handling of OWFs and the prevention and elimination of oil spills;
- optionally, implementation of ISO 9001:2000 quality management system certification (or equivalent) by the MFW operator.

The most important guidelines for the efficient and safe operation of an offshore wind farm are set forth by the Danish Energy Agency in its Guidelines for the Design, Production, Installation, Operation and Maintenance of Wind Turbines (DEA, 2008). The model for managing and monitoring the operation of the Central Baltic III offshore wind farm may be based on these guidelines or others more current at the time of commissioning the farm.

9.3. Measures to minimize negative impacts on shipping maritime

The following are measures to minimize negative impacts on marine navigation, as recommended by the navigational analysis[9] (see Section 3.3.3), performed as a result of the implementation of the PSZW

[9] Monitoring of ship traffic in the area of the OWF Central Baltic II. Final report with impact assessment (navigation expertise), Maritime Institute in Gdansk, 2015, Chapter 9.

recommendations for the BII OWF. The document states that the OWF will affect existing and planned shipping routes and maritime traffic regulation systems to the following extent:

- an increase in vessel traffic in the vicinity of the project site and adjacent areas;
- increase ship traffic on the shipping route of the TSS Slupsk Shoal in traffic transverse to natural navigation;
- restrictions on shipping and fishing activities
- increasing the intensity of maritime radio communications;
- potential disruption of maritime events, recreational shipping near the ports of Leba and Ustka, or non-commercial fishing activities.

Potential negative effects caused by the aforementioned factors include increased likelihood of a maritime accident, impact on port operations, possible pollution, injury or death of personnel personnel. In addition, increased intensity in maritime radio communications can affect the coordination of missions, pilot activities directed by the Coast Guard, emergency services, etc.

The main measures to minimize the negative impact of the BIII OWF at all stages of the project are proper navigational signage. In addition, it is recommended:

- establishment and maintenance during the stages of operation and especially decommissioning of properly marked safety zones;
- closure of navigation in the construction area during the construction and decommissioning phases, and establishment of the BIII OWF area with the adjacent safety zone as a hazardous area for navigation to be avoided (area to be avoided) during the operation phase;
- establish an absolute ban on sailing in the 50-meter zones around each structure of the BII OWF;
- introduce direct navigational surveillance during the construction and decommissioning phases, and monitoring of the BIII OWF area during the operation phase using navigational surveillance vessels, closed circuit television (CCTV), the Automatic Reporting System (AIS) and radar;
- providing navigational support in the form of AIS transponders, RACON radar transponders, navigation lights and foghorns on key turbines;
- launch of a navigation service covering ships in the vicinity of the BIII OWF (notifications of entry, approach to the closed area).
- development of rescue plans and training of ship crews participating in the construction of the BIII OWF and its operation;
- regularly updating and checking through exercises the rescue plans;
- provide permanent lines of communication between the BIII offshore wind farm and the onshore operation supervision center, as well as communication with the navigation supervision service (Slupsk Traffic Control) and the Maritime Search and Rescue Service (MSPiR, SAR);

- development and agreement (including public) of plans for safe construction, operation and decommissioning of the BIII OWF.

A potential minimization measure that will reduce the potentially negative impact of the OWF at all stages of the project is to continuously inform stakeholders and the public through the publication and broadcast of local announcements (NTMS) in cooperation with the captains of nearby ports and the maritime border service, as well as the introduction of navigation charts with the project area marked. In situations involving the work of SAR or maritime border services, communication and the possible introduction of routine exercises should be developed. An additional potential minimization measure is the designation of a temporary safety zone around the construction site, which would reduce the risk of ship collisions by temporarily ordering vessels to avoid the construction area. In addition, minimizing potential impacts can be achieved by constantly monitoring weather conditions. Weather observations will enable rapid and safe mobilization and demobilization of vessels working in the project area, which will ultimately reduce the risk of possible accidents related to the construction, operation and decommissioning process.

10. Information on the organization of response to accidents of hazards and pollution of the environment marine

The International Convention MARPOL 73/78 requires all ships, ports and harbors to inform the relevant services of all incidents of marine pollution.

It is important to determine the size of the spill and its classification (in grades I-III). Weather and sea state are important factors in determining decommissioning strategies. In the event that unidentified pollution is found flowing into the area of the OWF basin, classification and information procedures will be applied, but the cost of its elimination will be covered by the polluter or, if it cannot be identified, by the State Treasury (in accordance with the National Plan for Combating Hazards and Pollution of the Marine Environment).

11. Organizational structure and list of positions and persons responsible for conducting actions to combat hazards and pollution

11.1. Construction and decommissioning phase decommissioning

Control over the proper conduct of construction/ decommissioning of the OWF is exercised by the Contract Engineer, to whom all information in this regard flows.

Depending on the incoming information, the Contract Engineer will decide on ways to proceed, consisting of, among other things:

- to report a collision or potential collision between two vessels or a vessel and an OWF facility;
- to inform about marine pollution and determine its type and magnitude;
- to take measures to eliminate pollution of the marine environment.

The Contract Engineer supervises subcontractors and has information about the vessels involved and the type and amount of substances on board that may cause pollution of the marine environment.

The Contract Engineer, in consultation with the Investor's representative for environmental protection, is responsible for implementing measures appropriate to the situation and the extent of pollution, and informing the relevant services.

In the event of first-degree pollution, the Contract Engineer, in consultation with the Investor's representative for environmental protection, shall inform the Director of the Maritime Office in Gdynia of the incident and carry out an action to eliminate the pollution with his own resources.

In the event of 2nd and 3rd degree pollution, the Contract Engineer, in consultation with the Investor's environmental representative, shall inform the Director of the Maritime Office in Gdynia of the incident, who shall take control of the conduct of the action.

The director of the Maritime Office in Gdynia supervises the pollution elimination action and, if necessary, orders the SAR service or another specialized organizational unit to carry out the action to combat hazards and pollution.

The SAR service takes charge of the pollution elimination action and undertakes rescue operations with its own resources and, if necessary, cooperates in this regard with the relevant services (State Fire Service, Police, Border Guard, port fire departments) and/or specialized companies.

Third parties

When drifting oil reaches the area of neighboring installations (e.g., other offshore wind farms), third-party hazard and pollution prevention plans may be activated.

On each vessel, in accordance with Regulation 26 of Annex 1 of MARPOL 73/78, there should be, depending on the type of vessel, a Shipboard Oil Pollution Emergency Plan - OPZRO (SOPEP) or Simplified Oil Spill Prevention Plan - UPZRO, approved by the administration of the flag state or other authorized institution and written in the language used by the master and officers of the vessel.

A vessel involved in the construction/ decommissioning of an OWF, if found to be contaminated, should report the information about the contamination to the Director of the Maritime Office in Gdynia and the Contract Engineer and implement its own ship plan. The ship's captain shall take measures to stop or reduce the impact of the harmful substance and prevent the spread of the pollution.

In the case of 2nd and 3rd degree pollution, the Director of the Maritime Office in Gdynia decides to implement the National Plan for Combating Hazards and Pollution of the Marine Environment.

In actions involving international forces, the Helsinki Commission's guidelines for cooperation in combating marine pollution are applied.

The costs associated with the action to remove hazards and pollution are borne by the polluter, in accordance with the "polluter pays" principle. The investigation of marine pollution is carried out by the Director of the Maritime Office in Gdynia, in accordance with the Law of March 16, 1995 on the Prevention of Marine Pollution from Ships (i.e: OJ 2020, item 1955).

11.2. Stage operation

Control over the proper operation of equipment and installations is exercised by the OWF Operations Center located on land (the preliminary locations of the operating ports are: Kolobrzeg, Darlowo, Ustka, Wladyslawowo, Gdynia and Gdansk), to which all information from the technological monitoring of the farm flows.

Depending on the incoming information, the IMF Operations Center Manager will decide on ways to proceed, consisting of, among other things:

- on shutting down or changing the operating parameters of a turbine or other device,
- informed of the need for inspection or repair,
- informing of a collision or potential collision of a vessel with an OWF facility,
- to inform about marine pollution and determine its type and magnitude,
- to take measures to eliminate pollution of the marine environment.

The head of the OWF Operations Center also supervises contractors for periodic inspections and repairs of OWF facilities and has information about the vessels involved and the type and amount of substances on board that could cause pollution of the marine environment.

The head of the IMF Operations Center, in consultation with the Investor's representative for environmental protection, is responsible for implementing actions appropriate to the situation and the extent of pollution and informing the relevant services.

In the event of first-degree pollution, the Manager of the OWF Operations Center, in consultation with the Investor's representative for environmental protection, shall inform the Director of the Maritime Office in Gdynia of the incident and carry out an action to eliminate the pollution with his own resources.

In the case of the occurrence of pollution of the second and third degree, the Manager of the OWF Operations Center, in consultation with the Investor's representative for environmental protection, informs the Director of the Maritime Office in Gdynia about the incident, who takes control of the conduct of the action.

The director of the Maritime Office in Gdynia supervises the pollution elimination action and, if necessary, orders the SAR service or another specialized organizational unit to carry out the action to combat hazards and pollution.

The SAR service takes charge of the pollution elimination action and undertakes rescue operations with its own resources and, if necessary, cooperates in this regard with the relevant services (State Fire Service, Police, Border Guard, port fire departments) and/or specialized companies.

Third parties

When drifting oil reaches the area of neighboring installations (e.g., other offshore wind farms), third-party hazard and pollution prevention plans may be activated.

On each vessel, in accordance with Regulation 26 of Annex 1 of MARPOL 73/78, there should be, depending on the type of vessel, a Shipboard Oil Pollution Emergency Plan - OPZRO (SOPEP) or Simplified Oil Spill Prevention Plan - UPZRO, approved by the administration of the flag state or other authorized institution and written in the language used by the master and officers of the vessel.

The vessel providing services to the Investor in the event of pollution should report the pollution information to the Director of the Maritime Office in Gdynia and the Manager of the OWF Operations Center and implement its own ship plan. The ship's captain shall take measures to stop or reduce the impact of the harmful substance and prevent the spread of the pollution.

In the case of 2nd and 3rd degree pollution, the Director of the Maritime Office in Gdynia decides to implement the National Plan for Combating Hazards and Pollution of the Marine Environment.

In actions involving international forces, the Helsinki Commission's guidelines for cooperation in combating marine pollution are applied.

The costs associated with the action to remove hazards and pollution are borne by the polluter, in accordance with the "polluter pays" principle. The investigation of marine pollution is carried out by the Director of the Maritime Office in Gdynia, in accordance with the Law on Prevention of Pollution from Ships of October 16, 2019.

12. List and deployment of forces and resources to be used in the action to combat threats and pollution

The following is a list of the forces and resources of the various entities and services that may be involved in the rescue operation. The proposed status for the OWF and the current status (as of the date of the study) for the other services are given. During the implementation/liquidation of the IMF, it may change to more modern units.

12.1. Engineer Contract

Equipment of the surveillance ship of the construction/ decommissioning area:

- lightweight flexible (segmented) dam with a total length of min. 200 m,
- absorbent barrier of sorption sleeves (segmented) with a total length of min. 200 m,
- a small device for collecting dirt from the water surface (such as a skimmer or other mechanical collector),
- floating flexible dirt tank(s) with a total capacity of about 20 m3 (only if the ship does not have its own dirt tanks),
- bags for used desiccant sleeves.

12.2. Maritime Search and Rescue Service Rescue

According to the state of affairs as of the date of the study's execution, oil spill fighting vessels at sea equipped by the MSPiR include the M/S Kapitan Poinc and the M/S Czeslaw II. The purpose of the **M/S Captain Poinc** Maritime Multipurpose Rescue Ship is:

- oil pollution control,
- saving lives at sea,
- rescue towing,
- fighting fires on ships,
- contamination recognition,
- underwater work.

The basic technical parameters of the M/S Captain Poinc are shown in the table below:

Table 9. Basic technical parameters of the M/S Kapitan Poinc Marine Multipurpose Rescue Ship

Parameter	Size
Length	49,8 m
Width	13,6 m
Immersion	4,6 m
Power	2 x 1,920 kW
Maximum speed	13 knots
Crew	11 people
Ability to pick up survivors	272 people
Icebreaking Class:	L1

Source: www.shipspotting.com

The equipment of the M/S Captain Poinc consists of the following:

1) Combating oil pollution:
    a) lAMOR active brush system for removing oil contaminants from the water surface (collection width 45 m, max capacity: 2 x 140$^{m3/h}$, storage capacity of collected oil: 512^{m3}),
    b) rO-BOOM 1500 oil dams: 900 m and EXPANDI 4300: 90 m),
    c) oil collectors (TERMINATOR, capacity max: 100$^{m3/h}$, SCANTRAWL A heavy oil collection trawl: 20 m),
    d) a portable tank with a capacity of 5^{m3},

e) workboat;

2) Saving lives at sea:

a) rIB rescue boat (R-11);

3) Fighting fires on ships:

a) pumps: 2 x 1,500 m3/h,

b) water monitors: 2 x 1,200$^{m3/h}$,

c) water and foam monitor: 1 x 250$^{m3/h}$,

d) self-spray system: 2 x 300$^{m3/h}$;

4) Stationary explosive gas detection system (H_2S, NH_3, CO, O_2);

5) Remotely Operated Underwater Vehicle (ROV):

a) search for sunken objects (to a depth of 300 m),

b) condition surveys of underwater objects,

c) wreck research,

d) bottom tests for laying cables and pipelines,

e) lifting objects weighing up to 5 kg from the bottom,

f) registration of underwater images;

6) Other equipment:

a) equipment for emergency unloading of tankers (oils, chemicals),

b) hydraulic crane - max lifting capacity 160 kN, max height 13 m,

c) diving equipment for one team,

d) pSP R-1 emergency medical kit.

The M/S Czeslaw II Marine Oil Pollution Rescue Ship is used to combat oil pollution in port and coastal waters (up to 20 Mm).

Table 10. Basic technical parameters of the M/S Czeslaw II Marine Multipurpose Rescue Ship

Parameter	Size
Length	21,9 m
Width	6,0 m
Immersion	2,36 m
Power	2 x 120 kW

Maximum speed	9 knots
Crew	5 people

Source: www.shipspotting.com

The M/S Czeslaw II's oil pollution control equipment consists of:

a) lAMOR active brush system for removing oil contaminants from the water surface (collection width: 18 m, max capacity: 2 x 20$^{m3/h}$, storage capacity of collected oil: 20^{m3}),

b) oil dams (EXPANDI 4300: 340 m),

c) oil collectors (KOMARA 12k - oil filter, max capacity: 12$^{m3/h}$),

d) dispersant system (VICOSPRAY 1000, capacity: 4.2$^{m3/h}$),

e) a portable tank with a capacity of 5^{m3},

f) pSP R-1 emergency medical kit.

12.3. Maritime Office in Gdynia

According to the status as of the date of the study, the oil spill fighting units at sea, which are equipped by the Maritime Office in Gdynia, include the**oil pollution ship S/v Zodiak**.

The basic technical parameters of S/v Zodiak are shown in the table below.

Table 11. Basic technical parameters of the oil pollution ship S/v Zodiak.

Parameter	Size
Length	61,3 m
Width	10,8 m
Immersion	3,5 m
Power	2 x 960 kW
Maximum speed	13 knots
Crew	12 people

Source: www.umgdy.gov.pl

S/v Zodiac is equipped with an active LAMOR brush system for removing oil contaminants from the water surface (max capacity: 2 x 80$^{m3/h}$, storage capacity of collected oil: 72^{m3}).

13. Procedures for reporting incidents causing danger or pollution to the pollution of the marine environment

All marine pollution must be reported, such as:

- oil spills, including unidentified ones - flowing into the area of the OWF basin,
- visible oil sheen on the sea surface,
- chemical spills, including: de-icers, corrosion inhibitors, mortars, plasticizers, etc.

Notification should be made immediately to the Contract Engineer. It should include basic information on:

- location of the incident,
- the nature of the incident (type and source of pollution and its estimated size),
- time of the event,
- polluters,
- personal and contact information of the reporting person.

Notification must be made without fail even if all the necessary information is not available. They will be supplemented gradually at a later stage.

The degree of pollution (I-III) is determined by the Contract Engineer, in consultation with the Investor's environmental representative, on the basis of the pollution report and, depending on this, triggers information procedures. If there is any doubt about the classification of the contamination, it is better to classify it as a higher degree and possibly downgrade it at a later stage after obtaining the necessary information.

14. Description of how to deal with pollutants collected in the cleanup action waters

Substance-soaked sorbents, packed in polypropylene bags or metal containers, will be transported ashore and taken away - by prior arrangement - to a disposal facility with the appropriate permits (e.g. Port Service S.A. in Gdansk, which has an incinerator for this type of waste).

The collected water-oil mixture will be handed over to a specialized company for the recovery of this type of waste. There are a number of waste disposal companies of this type in the Tri-City area, the most important of which include CTL Północ Sp. z o.o. (Gdynia), Port Service S.A. (Gdansk), Comal sp. z o.o. (Gdansk), Oiler S.A. (Tczew).

All waste generated from marine debris removal will be properly collected and transferred only to companies with legally required permits.

15. Training and exercise plans exercises

The developer should provide for conducting training and exercises related to issues of responding to unplanned events. It should be both theoretical, verifying communication procedures, and practical, using personnel and equipment.
Training should specifically address:

1) the effectiveness of procedures for responding to hazards and identified contaminants,

2) how to alert the various services and cells responsible for combating pollution,

3) the functioning of communications between the various services and cells,

4) notification and elimination of the 1st degree oil spill in the area of the OWF basin.

16. Literature and other sources

16.1. Acts legislation

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz. U. of 2022, item 457).
2. Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Journal of Laws of 2021, item 2373, as amended)
3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)
4. Ordinance of the Council of Ministers of August 8, 2017 on the manner of organization of combating hazards and pollution at sea (unified text OJ 2022, item 216)
5. Ordinance of the Minister of Family, Labor and Social Policy dated June 12, 2018 on the maximum permissible concentrations and intensities of factors harmful to health in the work environment (Journal of Laws of 2018, item 1286, as amended)
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3) Decision on environmental conditions dated March 2, 2019, mark: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director of Environmental Protection in Gdańsk for the project involving the construction of offshore electricity transmission infrastructure
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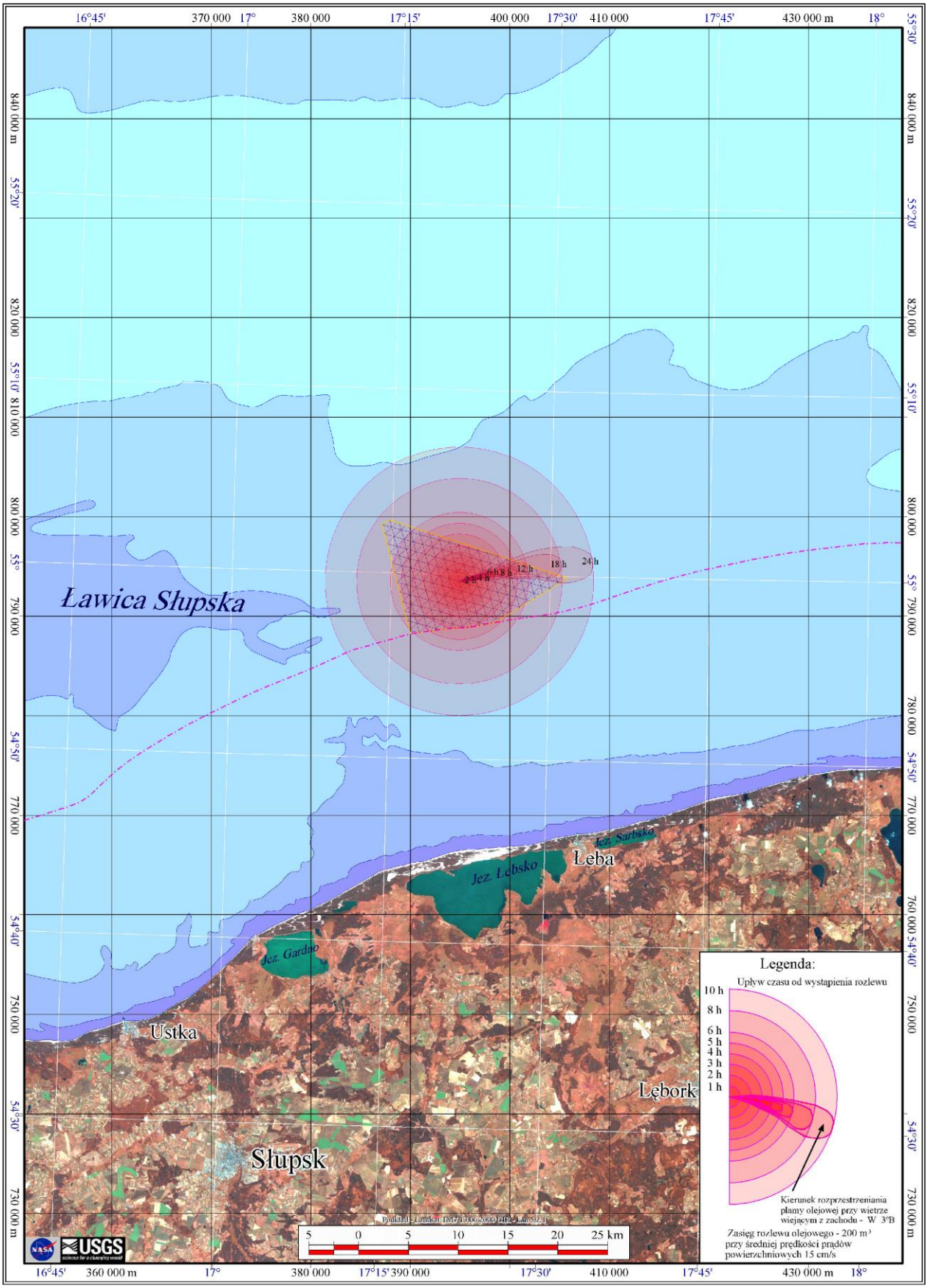
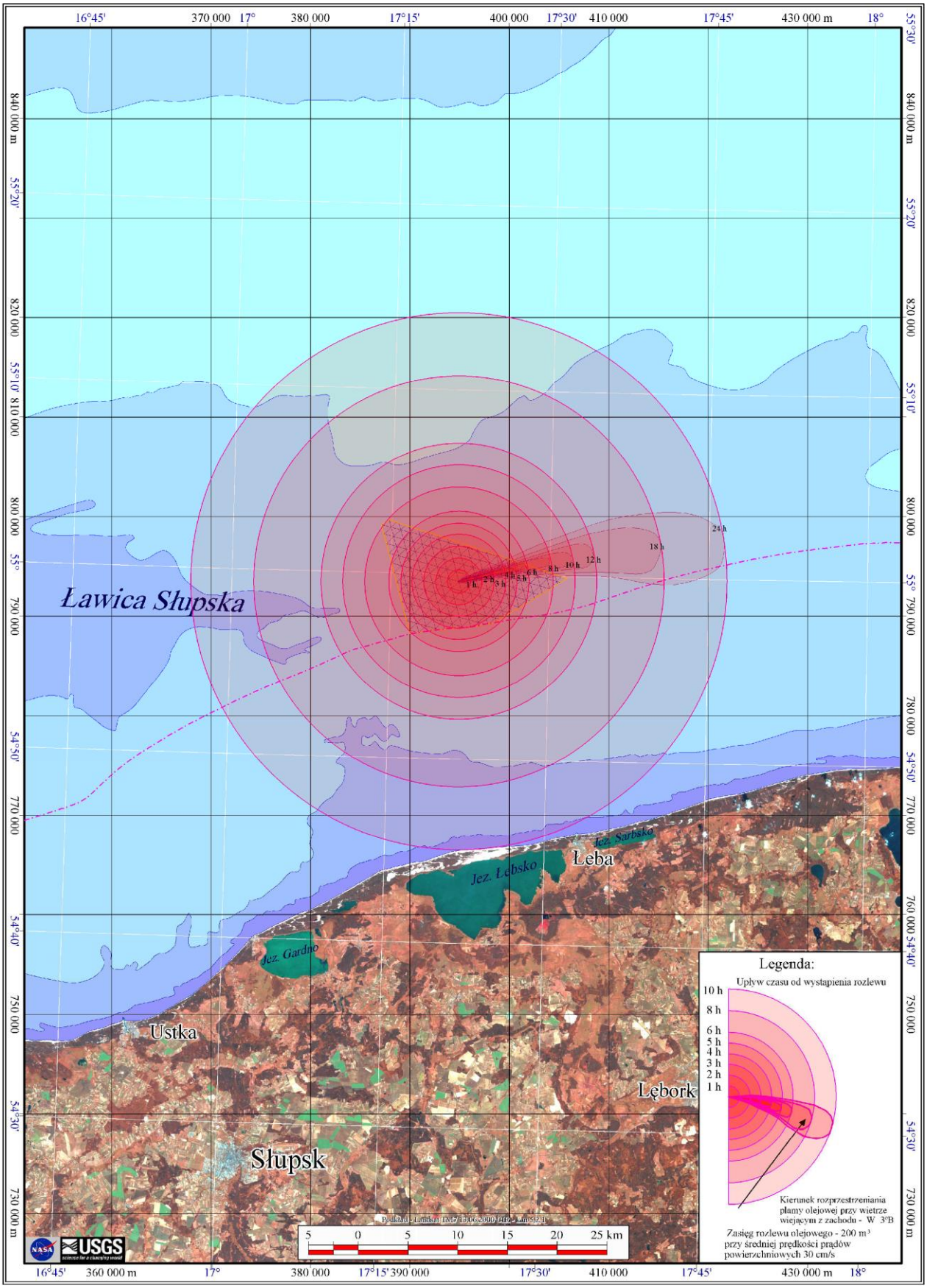

16°45'
370 000
17°
380 000
17°15'
400 000
17°30'
410 000
17°45'
430 000 m
18°
55°30'
840 000 m
55°20'
820 000
55°10'
810 000
800 000
55°
790 000
780 000
54°50'
770 000
760 000
54°40'
750 000
740 000
54°30'
730 000 m
Ławica Słupska
1 h
2 h
4 h
6 h
8 h
12 h
18 h
24 h
Jez. Sarbsko
Jez. Łebsko
Łeba
Jez. Gardno
Ustka
Lębork
Słupsk
5 0 5 10 15 20 25 km
Legenda:
Upływ czasu od wystąpienia rozlewu
10 h
8 h
6 h
5 h
4 h
3 h
2 h
1 h
Kierunek rozprzestrzeniania plamy olejowej przy wietrze wiejącym z zachodu - W 3°B
Zasięg rozlewu olejowego - 200 m³ przy średniej prędkości prądów powierzchniowych 15 cm/s
USGS
NASA

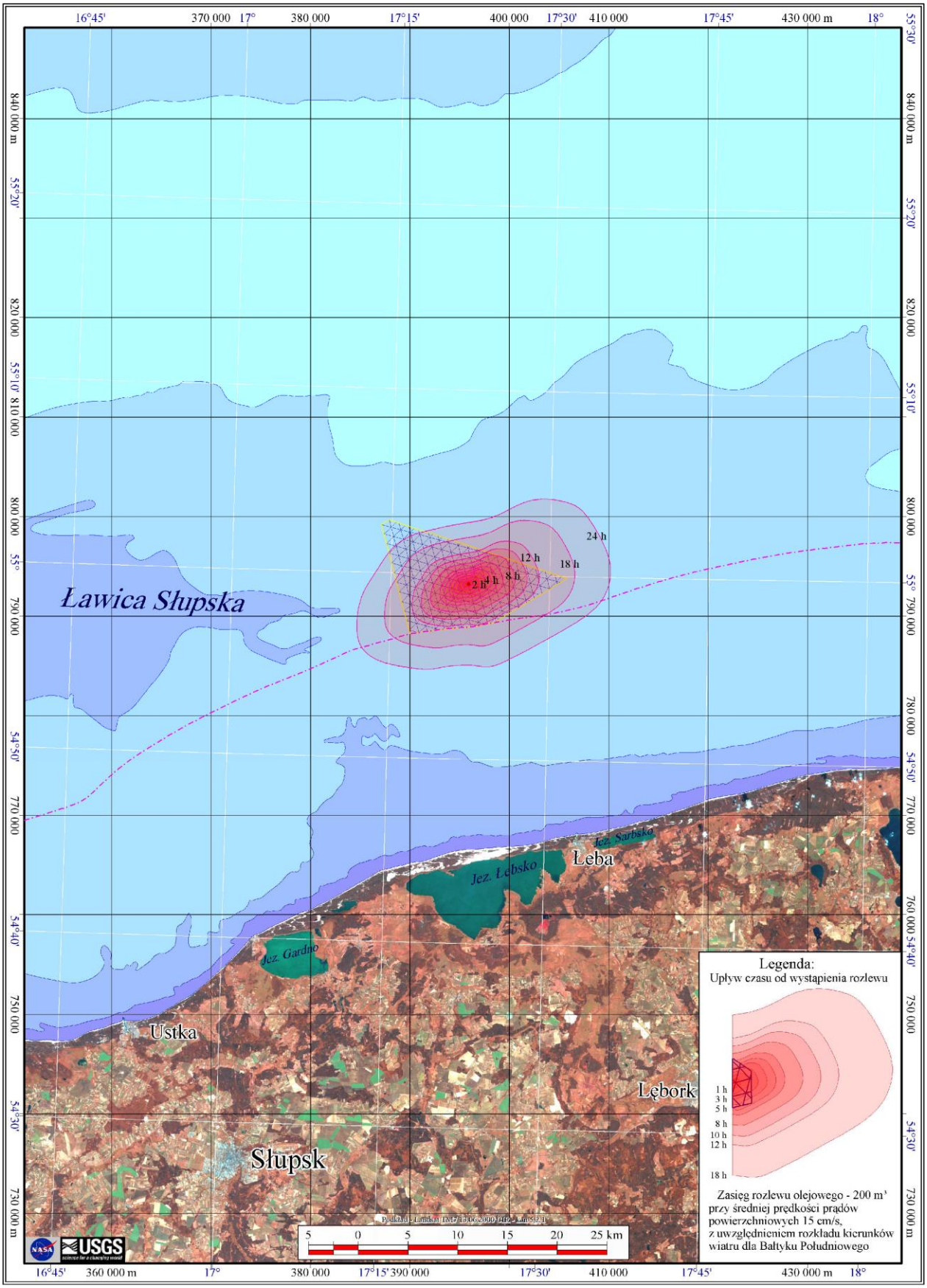
Ławica Słupska	Slupsk Shoal
Jez. Gardno	Jez. Gardno
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Ustka	Ustka
Łeba	Leba
Lębork	Lębork
Słupsk	Slupsk
Podkłat – Landsat TM7 13.06.2000 CIR – 5.2.1	Podklat - Landsat TM7 13.06.2000 CIR - 5.2.1
Legenda	Legend
Upływ czasu od wystąpienia rozlewu	The passage of time since the spill occurred
Kierunek rozprzestrzeniania plamy olejowej przy wietrze wiejącym z zachodu – W 3°B	The direction of spread of the oil stain with the wind blowing from the west - W 3°B
Zasięg rozlewu olejowego – 200 m^3 przy średniej prędkości prądów powierzchniowych – 15 cm/s	Range of oil spill - 200^{m3} at average speed of surface currents - 15 cm/sec

The map shows the extent of the point oil spill after 1; 2; 3; 4; 5; 6; 8; 10; 12; 18; 24 hours. The circles indicate the maximum extent of oil patch occurrence with any wind direction of up to 2°B and surface currents of up to 15 cm/s. The outline of the stain depicts its displacement in a 2°B wind blowing from a direction of 250º, in case the spill lasts for several hours (it comes out of the damaged tanks of the sunken vessel).
Surface currents generated by the wind are deflected to the right by the Coriolis force.


Ławica Słupska
Jez. Sarbsko
Jez. Łebsko
Łeba
Jez. Gardno
Ustka
Lębork
Słupsk
Legenda:
Upływ czasu od wystąpienia rozlewu
10 h
8 h
6 h
5 h
4 h
3 h
2 h
1 h
Kierunek rozprzestrzeniania plamy olejowej przy wietrze wiejącym z zachodu - W 3°B
Zasięg rozlewu olejowego - 200 m³ przy średniej prędkości prądów powierzchniowych 30 cm/s
5 0 5 10 15 20 25 km
16°45' 370 000 17° 380 000 17°15' 400 000 17°30' 410 000 17°45' 430 000 m 18°
55°30' 840 000 m 55°20' 820 000 55°10' 810 000 800 000 55° 790 000 780 000 54°50' 770 000 760 000 54°40' 750 000 54°30' 730 000 m

Ławica Słupska	Slupsk Shoal
Jez. Gardno	Jez. Gardno
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Ustka	Ustka
Łeba	Leba
Lębork	Lębork
Słupsk	Slupsk
Podkłat – Landsat TM7 13.06.2000 CIR – 5.2.1	Podklat - Landsat TM7 13.06.2000 CIR - 5.2.1
Legenda	Legend
Upływ czasu od wystąpienia rozlewu	The passage of time since the spill occurred
Kierunek rozprzestrzeniania plamy olejowej przy wietrze wiejącym z zachodu – W 3°B	The direction of spread of the oil stain with the wind blowing from the west - W 3°B
Zasięg rozlewu olejowego – 200 m^3 przy średniej prędkości prądów powierzchniowych – 30 cm/s	Range of oil spill - 200^{m3} at average speed of surface currents - 30 cm/sec

The map shows the extent of the point oil spill after 1; 2; 3; 4; 5; 6; 8; 10; 12; 18; 24 hours. The circles indicate the maximum extent of oil patch occurrence with any wind direction of up to 3°B and surface currents of up to 30 cm/s. The outline of the stain depicts its displacement in a 3°B wind blowing from a direction of 250°, in case the spill lasts for several hours (it comes out of the damaged tanks of the sunken vessel).
Surface currents generated by the wind are deflected to the right by the Coriolis force. The area covered by the oil patch can exceed 100 square ^{kilometers}.


16°45'
370 000
17°
380 000
17°15'
400 000
17°30'
410 000
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430 000 m
18°
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55°10'
810 000
800 000
55°
790 000
780 000
54°50'
770 000
760 000
54°40'
750 000
54°30'
730 000 m
360 000 m
390 000
Ławica Słupska
2 h
4 h
8 h
12 h
18 h
24 h
Jez. Sarbsko
Jez. Łebsko
Łeba
Jez. Gardno
Ustka
Lębork
Słupsk
5
0
5
10
15
20
25 km
Legenda:
Upływ czasu od wystąpienia rozlewu
1 h
3 h
5 h
8 h
10 h
12 h
18 h
Zasięg rozlewu olejowego - 200 m³
przy średniej prędkości prądów
powierzchniowych 15 cm/s,
z uwzględnieniem rozkładu kierunków
wiatru dla Bałtyku Południowego
NASA
USGS

Ławica Słupska	Slupsk Shoal
Jez. Gardno	Jez. Gardno
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Ustka	Ustka
Łeba	Leba
Lębork	Lębork
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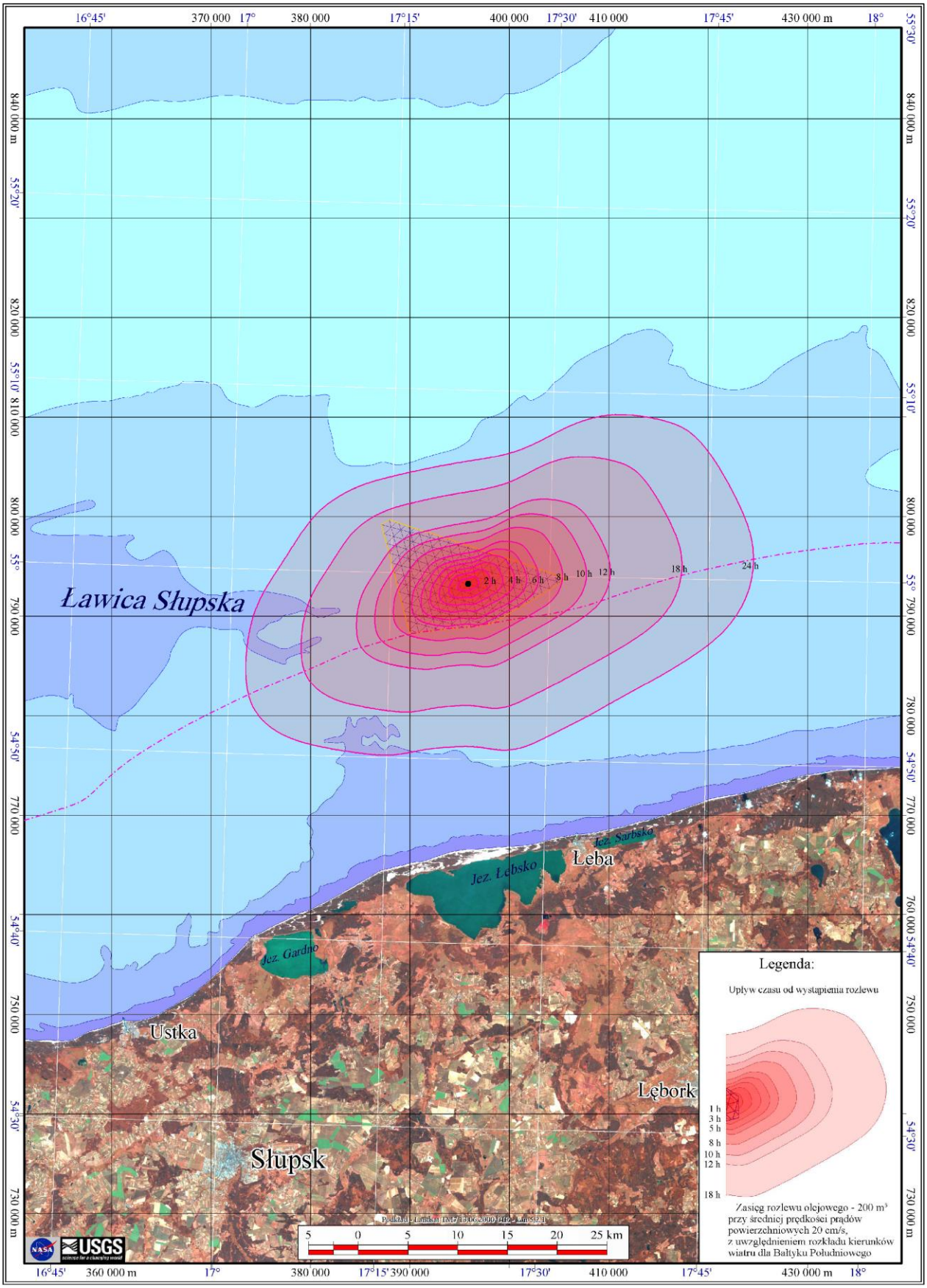
Podkłat – Landsat TM7 13.06.2000 CIR – 5.2.1	Podklat - Landsat TM7 13.06.2000 CIR - 5.2.1
Legenda	Legend
Upływ czasu od wystąpienia rozlewu	The passage of time since the spill occurred
Zasięg rozlewu olejowego – 200 m^3 przy średniej prędkości prądów powierzchniowych – 15 cm/s, z uwzględnieniem rozkładu kierunków wiatru dla Bałtyku Południowego	Range of oil spill - 200^{m3} at an average speed of surface currents - 15 cm/s, taking into account the distribution of wind directions for the South Baltic Sea

The map shows the most likely extent of a point oil spill after 1; 2; 3; 4; 5; 6; 8; 10; 12; 18; 24 hours, taking into account the wind distribution for the Southern Baltic.
The areas indicate the maximum extent of the oil patch occurrence, with a probable distribution of wind direction of up to 2ºB and surface current speeds of up to 15 cm/s.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55°30'
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820 000
55°10'
810 000
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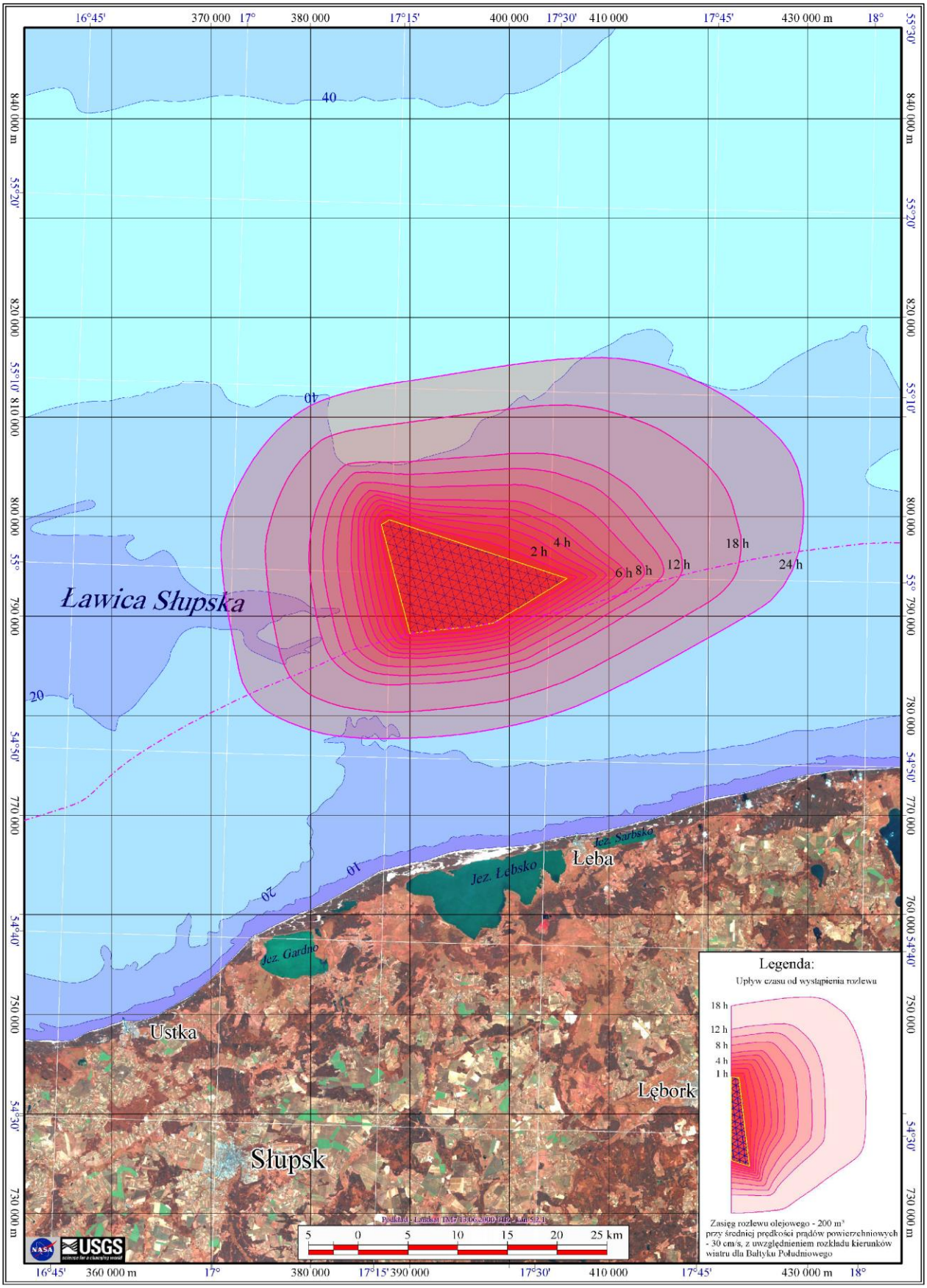
790 000
780 000
54°50'
770 000
760 000
54°40'
750 000
54°30'
730 000 m
Ławica Słupska
2 h
4 h
6 h
8 h
10 h
12 h
18 h
24 h
Jez. Sarbsko
Łeba
Jez. Łebsko
Jez. Gardno
Ustka
Lębork
Słupsk
5 0 5 10 15 20 25 km
Legenda:
Upływ czasu od wystąpienia rozlewu
1 h
3 h
5 h
8 h
10 h
12 h
18 h
Zasięg rozlewu olejowego - 200 m³
przy średniej prędkości prądów
powierzchniowych 20 cm/s,
z uwzględnieniem rozkładu kierunków
wiatru dla Bałtyku Południowego
360 000 m
390 000

Ławica Słupska	Slupsk Shoal
Jez. Gardno	Jez. Gardno
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Ustka	Ustka
Łeba	Leba
Lębork	Lębork
Słupsk	Slupsk
Podkłat – Landsat TM7 13.06.2000 CIR – 5.2.1	Podklat - Landsat TM7 13.06.2000 CIR - 5.2.1
Legenda	Legend
Upływ czasu od wystąpienia rozlewu	The passage of time since the spill occurred
Zasięg rozlewu olejowego – 200 m^3 przy średniej prędkości prądów powierzchniowych – 20 cm/s, z uwzględnieniem rozkładu kierunków wiatru dla Bałtyku Południowego	Range of oil spill - 200^{m3} at an average speed of surface currents - 20 cm/s, taking into account the distribution of wind directions for the South Baltic Sea

The map shows the most likely extent of a point oil spill after 1; 2; 3; 4; 5; 6; 8; 10; 12; 18; 24 hours, taking into account the wind distribution for the Southern Baltic.
The areas indicate the maximum extent of the oil patch occurrence, with a probable distribution of wind direction of up to 3°B and surface current speeds of up to 30 cm/s.


16°45'
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770 000
760 000
54°40'
750 000
54°30'
730 000 m
360 000 m
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Ławica Słupska
2 h
4 h
6 h
8 h
12 h
18 h
24 h
Jez. Sarbsko
Łeba
Jez. Łebsko
Jez. Gardno
Ustka
Lębork
Słupsk
Legenda:
Upływ czasu od wystąpienia rozlewu
18 h
12 h
8 h
4 h
1 h
Zasięg rozlewu olejowego - 200 m³
przy średniej prędkości prądów powierzchniowych
- 30 cm/s, z uwzględnieniem rozkładu kierunków
wiatru dla Bałtyku Południowego
5 0 5 10 15 20 25 km
USGS

Ławica Słupska	Slupsk Shoal
Jez. Gardno	Jez. Gardno
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Ustka	Ustka
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Lębork	Lębork
Słupsk	Slupsk
Podkłat – Landsat TM7 13.06.2000 CIR – 5.2.1	Podklat - Landsat TM7 13.06.2000 CIR - 5.2.1
Legenda	Legend
Upływ czasu od wystąpienia rozlewu	The passage of time since the spill occurred
Zasięg rozlewu olejowego – 200 m^3 przy średniej prędkości prądów powierzchniowych – 30 cm/s, z uwzględnieniem rozkładu kierunków wiatru dla Bałtyku Południowego	Range of oil spill - 200^{m3} at an average speed of surface currents - 30 cm/s, taking into account the distribution of wind directions for the South Baltic Sea

The map shows the probable extent of the oil spill occurring at the border of the OWF (probable collisions of ships after loss of maneuverability with wind turbine columns in the outer zone) after 1; 2; 3; 4; 5; 6; 8; 10; 12; 18; 24 hours, taking into account the wind distribution for the South Baltic.
The areas indicate the maximum extent of the oil patch occurrence, with a probable distribution of wind direction of up to 3°B and surface current speeds of up to 30 cm/s.

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02-087 Warsaw
@: kancelaria@kancelariaodj.pl

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions

for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 13

Cumulative impacts

Employer:

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Krucza 24/26, 00-526
Warsaw

Warsaw, June 2022

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named “Construction of the Bałtyk Środkowy III Offshore Wind Farm”
EEZ	Exclusive Economic Zone
NPS	National Power System
kV	Kilovolt
BIII OWF / Project	Bałtyk Środkowy III Offshore Wind Farm
OTI	Offshore Transmission Infrastructure
OMS	Offshore Monitoring Station
MW	Megawatt
WCS 2015	The worst case scenario from the Report 2015, which is a set of project parameters causing the worst case impacts, and which was the basis for conducting the environmental impact assessment during the procedure concluded with the issuance of the Environmental Decision.
Oil&gas	Oil and gas extraction sector
EIA	Environmental Impact Assessment
PSZW	Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
RDEP	Regional Director for Environmental Protection in Gdańsk

RP	Republic of Poland
EIA Act	Act of October 3, 2008 *on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments* (consolidated text, Journal of Laws of 2022, item 1029)

1. Introduction

This section presents emissions and disturbances that may provide cumulative impacts in the marine environment as well as existing and designed projects that may be a source of such emissions, thus strengthening the impacts of the BIII OWF. The subject of the environmental impact assessment conducted is the proposed modification of the Project in the parameters approved by the Environmental Decision; however, taking into account the nature of cumulative impacts, the mere change of the Project parameters, if it does not lead to a change in the nature of impacts, will also not result in a change in the scope of projects which should be the subject of the assessment of cumulative impacts. However, since the development of the Report 2015 and the issuance of the Environmental Decision, knowledge on the marine environment of the Baltic Sea has increased, and there have been changes in the investment environment of the Project caused, among others, by the administrative decision, including those related to the issued decisions on environmental conditions, which have been made in the meantime. Therefore, Section 12 Cumulative Impacts from the Environmental Impact Assessment Report Volume II, SMDI Doradztwo Inwestycyjne Sp. z o.o., April 2015, was the starting point for the preparation of this chapter; however, it takes into account the changes in the actual and legal status that occurred in the investment environment of the Project.

At this point, it is also necessary to emphasize the specificity of cumulative impact analyses and the impact of the sequence of events on the effects of the analyses conducted. Taking into account both the methodology of conducting the environmental impact assessment and the applicable regulations, the environmental impact report must include the assessment of cumulative impacts of the project for which the decision on environmental conditions was issued. Thus, each subsequent project during the process of issuing the decision on environmental conditions must take into account the existing projects and the projects for which the decision on environmental conditions was issued. As a consequence, if the already issued decision on environmental conditions are amended (unless it leads to changes resulting in an increase in the scope of impacts) or another environmental impact assessment is performed, in principle, the accumulation should be limited to projects that existed or for which a decision on environmental conditions had been issued prior to issuing a decision for the project for which the procedure of amending the decision on environmental conditions or another environmental impact assessment is performed. Otherwise, the projects for which the decision on environmental conditions was issued after the decision on environmental conditions was issued for the project for which the procedure related to another assessment or amendment to the decision on environmental conditions is conducted could lead to changes in the conditions of the project implementation, and thus to a limitation of the rights acquired.

Regardless of the above-mentioned reservations, this Report, when analyzing cumulative impacts, also took into account those projects for which the decision on environmental conditions was issued after issuing the Environmental Decision and those for which the procedures on the decision on environmental conditions are in progress.

At the same time, it should be noted that in the case of proposed modifications of the parameters of the Project implementation and operation, a significant part of its parameters is reduced, a part remains unchanged in relation to the parameters approved by the Environmental Decision, and the only parameters concerning the total height of the wind turbines and the rotor diameter are increased, which, however; is repeatedly compensated by a radical reduction in the number of wind turbines, and thus the Project, after the modification, does not become a source of impacts or disturbances that could be greater than in the case of the impacts of the Project with the parameters approved by the Environmental Decision. In particular, it should be noted that in the case of updating the parameters of the Project being the subject of this Report, the number of foundations to be constructed will be approx. 70% less than foreseen in the WCS 2015 and twice less than specified in the Environmental Decision, the use of gravity-base foundations under wind turbines was also ruled out, which involves a correspondingly smaller scope and range of impacts related to interference with the seabed and dispersion of sediments at the construction stage and occupation of the seabed at the operation stage, and thus a lower ability to accumulate with impacts of other facilities.

This chapter contains basic assumptions for the analysis of cumulative impacts, which was carried out separately for each element of the environment, in individual Sections of Volume IV of the Report.

2. Emission types and their sources that may cause cumulative impacts

Emissions and disturbances that may cause the impact of the BIII OWF on the environment and their sources are presented in Section 7 of Volume II “Matrix of the project emission-impact interconnections” in Table 1 and described in Sections 4–6 of Volume II of the Report.

The table below presents emissions and disturbances and their sources that may be subject to reinforcement in the case of parallel implementation of other projects typical for the maritime space and specifies the zones in which interaction of impacts may occur.

Table 1. Emissions, their sources and impact accumulation zones

Type of emission or disturbance	Emission source	Type of impacts	Type of project	Accumulation zone
Extraction/change of sediment structure	• Preparation of the seabed for installation of the foundation, cables, pipelines	• Destruction and change of living conditions of benthic habitats • Reduction in population size	• OWF • Cables • Oil&gas	Project area and direct vicinity

Type of emission or disturbance	Emission source	Type of impacts	Type of project	Accumulation zone
	• Geotechnical drilling	• Reduction in feeding grounds		
Increased concentration of suspended matter in water	• Preparation of the seabed for installation of the foundation, cables, pipelines • Installation of the foundations • Laying of cables/pipelines	• Change in living conditions	• OWF • Oil&gas • Transmission infrastructure	Several kilometers around the project area
Redistribution of pollutants deposited in sediments	• Preparation of the seabed for installation of the foundation, cables, pipelines • Installation of the foundations • Laying of cables/pipelines • Heat emission from cables/pipelines	• Change in living conditions • Decrease in population size • Increase in concentration of pollutants in fish of commercial species	• OWF • Oil&gas • Transmission infrastructure	Project area and direct vicinity
Sedimentation of disturbed sediment	• Preparation of the seabed for installation of the foundation, cables, pipelines • Installation of the foundations • Laying of cables	• Change of living conditions of benthic organisms • Change of sediment structure	• OWF • Oil&gas • Transmission infrastructure	Several kilometers around the project area
“Artificial reef” effect	• Foundations installed	• Creation of new habitats • Change in	• OWF • Oil&gas	Project area

Type of emission or disturbance	Emission source	Type of impacts	Type of project	Accumulation zone
		species composition • Increase in food base • Change in living conditions		
Emission of underwater noise (construction stage)	• Installation of foundations • Laying of cables • Vessel traffic	• Behavioral reaction • Temporary threshold shift (“TTS”) • Permanent threshold shift (“PTS”) • Bodily injury • Mortality • Reduction in catches	• OWF • Oil&gas • Transmission infrastructure	Behavioral reaction up to 130 kilometers around the project in the case of piling of 1 foundation without mitigation measures. Up to 60 km with the use of mitigation measures. Up to several dozen kilometers for other activities.
Changes in the regime of sea currents and waving	• Foundations	• Scouring	• OWF • Oil&gas • Transmission infrastructure	Project area
Heat emission from cables / temperature rise	• Cables/pipelines	• Changes in the oxidation and reduction potential • Changes in microbiological activity of sediments • Appearance of alien species	• OWF • Transmission infrastructure • Pipelines	At the project site
Emergence of new structures under the sea surface	• Foundations • Pipelines	• Barrier effect • Change in living conditions • Obstructions to	• OWF • Oil&gas • Transmission	At the project site and its direct vicinity

Type of emission or disturbance	Emission source	Type of impacts	Type of project	Accumulation zone
		shipping and navigation	infrastructure	
Emission of electromagnetic field and radiation	• Cables	• Disturbed orientation • Changes in the use of space • Interference with radar systems • Disturbance to shipping and navigation	• OWF • Transmission infrastructure	At the project site
Emergence of new structures above sea level	• Rotor • Tower • Transformer stations	• Barrier effect • Displacement from habitats • Mortality • due to collisions • Landscape changes • Obstructions to shipping and navigation	• OWF • Oil&gas	Within the project area and within a radius of up to several dozen kilometers around the project area
Emission of surface noise	• Rotor • Vessel traffic • Transformer stations	• Scaring • Displacement from habitats	• OWF • Oil&gas • Substations	Within the project area
Emission of air pollutants	• Vessels • Helicopters	• Deterioration of living conditions for animals	• OWF • Oil/gas • Transmission infrastructure • Navigation	Within the project area
Emission of water pollutants	• Vessels • Leakages from vessels and pipelines • Corrosion protection	• Deterioration of living conditions • Water quality change	• OWF • Oil&gas • Transmission infrastructure • Navigation	In the project area and up to several dozen kilometers around the project area

Type of emission or disturbance	Emission source	Type of impacts	Type of project	Accumulation zone
	• Pointing • Agents to prevent fouling of offshore structures			
Accidental release of waste into water	• Construction process • Construction and service vessels • Construction and service support	• Deterioration of living conditions	• OWF • Oil&gas • Transmission infrastructure • Navigation	Within the project area

Source: provided by the Employer

As can be seen from the list presented in Table 1, the largest zone of potential accumulation of impacts is the underwater noise emitted during foundation works for the structure, consisting in driving the foundation (monopile) or foundation stabilizing piles (tripod, jacket) into the seabed. Such impacts are typical for the stage of construction of foundations used for the foundation of offshore wind turbines, offshore substations and production platforms. As it results from underwater noise modeling, the results of which are presented in Section 9 of Volume II, the zone of significant noise increase during piling of one foundation (multiple impact of one pile) in the worst case scenario (monopile with a diameter of 10 m) may reach for modeled conditions up to more than 120 kilometers from the noise source. If simultaneous piling in two locations is assumed, the accumulation of noise may take place within a radius of approx. 150 kilometers (without mitigation measures). At the same time, it should be emphasized that the recommendations to the Report 2015 indicate the necessity to apply measures limiting noise emission during piling of foundations with the effectiveness not lower than the air curtain technology, significantly limiting the range of noise impacts – up to 30 km with one foundation and up to 50 km with 2 foundations. Therefore, the accumulation zone between the projects will not exceed 100 km. This means that simultaneous piling of two foundations in two OWF projects, not less than 100 km apart, may result in accumulation of impacts in the scope of increasing the level of underwater noise.

It should be emphasized that a new modeling of noise propagation related to installation of monopile foundations with a diameter of 10 m was performed for the EIA Report in question. With the application/introduction of a damping effect of one bubble curtain and appropriate reduction of SEL and SPL at source, it resulted in a situation where none of the threshold values was exceeded at the boundary of the Słowińska Refuge Natura 2000 site. Based on the directions of noise propagation specified in the modeling for the BIII OWF, as well as the maximum ranges for the monopile with the diameter of 12.5 m (BII OWF), the

noise impact zones on marine mammals (seals and porpoises) and fish occurring in the BIII area, in which bodily injury, temporary threshold shift and behavioral reaction consisting in avoidance may occur, were estimated. Directions and ranges of impacts so determined were subject to comparative verification on the basis of results obtained for the project directly adjacent to BIII – Baltica OWF. The assessment also used the results of modeling of cumulative impacts for the case of parallel piling on BIII OWF and Baltica OWF farms (SMDI 2015a, MIG/MEWO 2017). It should be emphasized that the said modeling was performed assuming similar geological conditions prevailing in the aforementioned areas of individual projects (boulder clays with sand and gravel cover). Model calculations showed that one bubble curtain would be sufficient to achieve the desired results. The hammer energy used of 4,500 kJ can also be seen as the worst case scenario, therefore additional mitigation measures can be achieved by using less hammer energy if possible.

The second type of impacts, which may generate accumulation in a significant zone around the emission source, is the impact of large structures raised above the sea level, especially wind turbines, which may reach the height up to 330 m and rotor diameter up to 260 m in the case of the Baltic Power Offshore Wind Farm. The equipment sizes adopted in the current implementation option for BIII are of the following parameters: height up to 310 m and rotor diameter up to 250 m.

The BIII OWF is closest to the coast, just on the BIII OWF to the north there are two wind farms owned by PGE Baltica and Orsted. For the Baltica 2 and Baltica 3 OWFs, the investor assumed the following maximum parameters: height up to 250 m and rotor diameter up to 220 m.

To the east of the BIII OWF, there will be the Baltic Power OWF whose maximum parameters have already been specified above. Behind the BP OWF to the east, a small farm is planned to be constructed, as it consists only of 41 wind turbines of the C WIND OWF with the following parameters: height up to 330 m and rotor diameter up to 280 m.

Structures of offshore wind turbines, spaced in large spaces, may cause accumulation of impacts on the landscape within a radius of several dozen kilometers (visibility of the OWF in the marine landscape may reach up to 50 km, so the maximum accumulation zone may reach approx. 100 km).

Another type of impacts that may accumulate significantly as a result of implementation of separate projects outside the place of their implementation is sedimentation of sediments disturbed during the construction process. In the conditions of low sea currents of the southern Baltic Sea, as it results from the conducted modeling of dispersion of disturbed sediments (BIII OWF, BII OWF, Baltica OWF, Baltic Power), the zone of propagation of disturbed sediments with a concentration of 4 mg/m^3 does not exceed 5 kilometers, and their re-depositing with the thickness of 1.5 mm reaches 2 km. Therefore, the zone of mutual accumulation from two different projects will not exceed 10 km.

In addition, OWFs may accumulate impacts on birds and bats in the form of a barrier effect and scaring away from habitats. According to the assessment of the impact on birds carried out in Section 5 of Volume IV, the zone of bypassing the OWF by flying birds, depending on the bird species, may reach up to approx. 4 km from the furthest wind turbine. Therefore, the accumulation zone between individual farms may cover up to 8 km. Another impact on birds, which may be reinforced in case of accumulation, is the scaring effect related to

another emission, namely surface noise and movement of rotor blades. It refers to buffer of approx. 2 km around the farm. Therefore, the accumulation zone will be to up to 4 km.

To sum up, it should be stated that the cumulative impact assessment should cover the existing or planned projects located not further than within the radius of approx. 100 km (without mitigation measures) around the borders of the BIII OWF, whereas in subsequent zones the following should be assessed:

- Zone 1 – within a radius of up to 100 km from the borders of the BIII OWF – projects that may cause the accumulation of impacts related to noise emission during piling at the construction phase of the BIII OWF or directly after completion of the foundation phase for the BIII OWF, and thus cause the scaring effect for fish and marine mammals or the barrier effect for these organisms (other offshore wind farms and/or production platforms and/or transformer stations and research stations installed on foundations driven into the seabed);
- Zone 2 – within a radius of up to 100 km from the boundaries of the BIII OWF in a line parallel to the coastline – projects that may cause accumulation of landscape impacts during the entire period of operation of the BIII OWF (other offshore wind farms, drilling rigs, research platforms);
- Zone 3 – within a radius of up to approx. 10 km from the BIII OWF boundaries – projects that may cause accumulation of impacts related to the disturbance of bottom sediments at the stage of construction and decommissioning of the BIII OWF (other wind farms, cables and pipelines laid on the seabed, drilling rigs and production platforms, transformer stations);
- Zone 4 – within a radius of 8 km from the borders of the BIII OWF – projects that may cause a barrier effect for birds and bats and a habitat displacement effect, but also located outside this zone, which may create a continuous spatial obstacle without maintaining migration corridors along the main directions of migration routes with a width of not less than 8 km from the nearest obstacles (other offshore wind farms);
- Zone 5 – within a radius of 4 km around the borders of the BIII OWF – projects that may cause the scaring effect for seabirds during the construction and operation of the OWF;
- Zone 6 – within the boundaries of the BIII OWF and in its immediate vicinity – projects that may cause other local impacts indicated in Table 1 (cables, vessels, drilling rigs).

It should also be emphasized that the accumulation of impacts may cover the impacts caused by various activities carried out as part of the construction, operation or decommissioning of the project itself (the so-called internal accumulation). These may be accumulations related to parallel performance of various activities – e.g. disturbance of sediment resulting from preparatory works for installation of foundations and disturbance of sediments caused by anchoring of vessels performing works in the farm area and/or works related to laying offshore cables in the farm area at the same time. These may also be cumulative impacts related to consecutive activities – e.g. piling of subsequent foundations one after the other or agitation of sediments as a result of preparing the seabed for laying power cables in the area of the offshore wind farm. Due to the crucial importance of internal

accumulation for the final results of the assessment of the impact of the entire farm, it will be considered each time when discussing individual impacts of the BIII OWF.

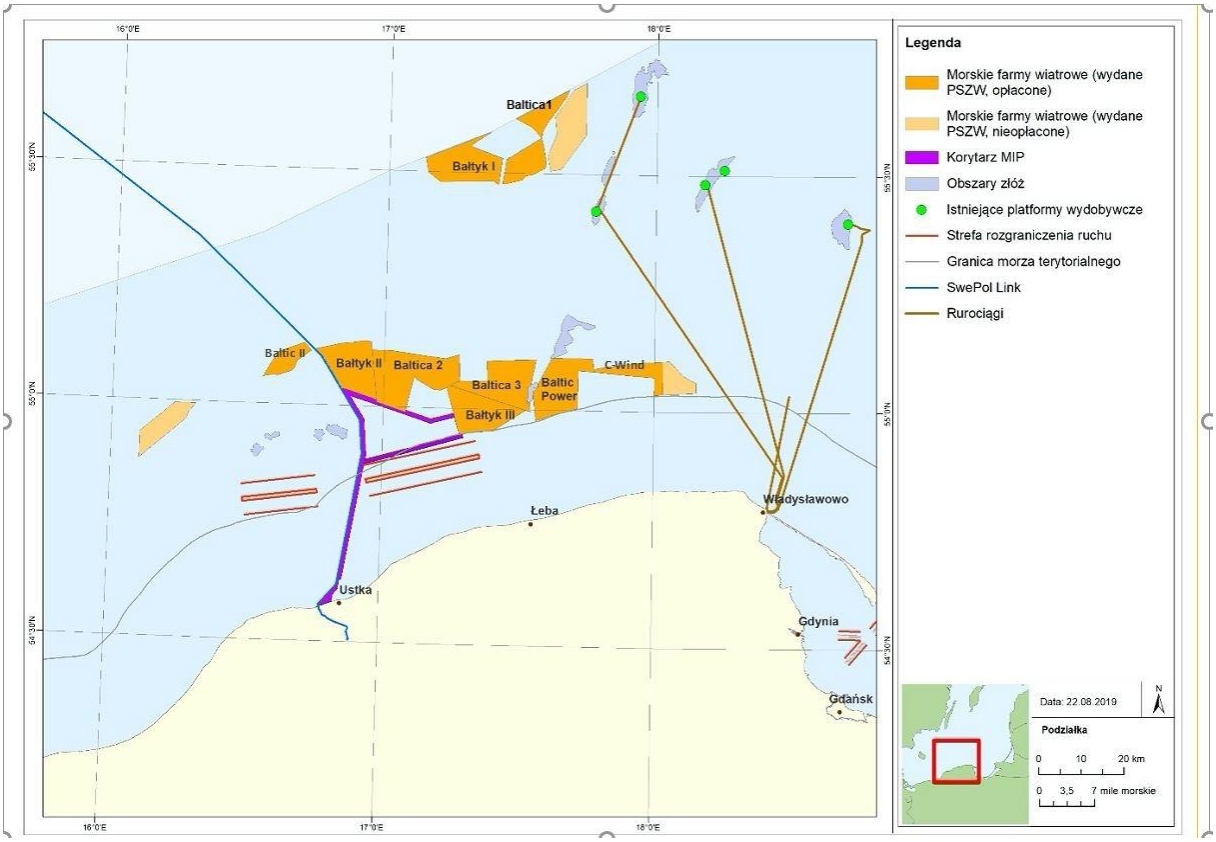
3. Projects in the zone of accumulation of impacts of the BIII OWF

In accordance with the applicable law, the cumulative impact assessment should be carried out taking into account the projects for which the decisions on environmental conditions were issued (Article 66 section 1 point 3b of the EIA Act). However, according to Article 62 section 2 of the EIA Act, there is an obligation to assess the cumulative impact on Natura 2000 sites of all implemented, completed or planned projects regardless of the decisions held by these projects, including those on environmental conditions. Applying the precautionary principle, it is necessary to assess the impact on Natura 2000 sites of all OWF projects known at this stage, which are likely to be implemented, i.e. in relation to the OWFs with at least location decisions and connection conditions.

The designed BIII OWF will be located in the southern part of the Baltic Sea, in the Polish Exclusive Economic Zone, approximately 23 km north of the coastline, at the level of the municipality of Smołdzino and the urban municipality of Łeba (Pomeranian Voivodship).

In the Polish maritime areas, there is a small number of functioning projects that may cause accumulation of impacts with the BIII OWF. However, in recent years, several new projects planned for implementation have been revealed, many of which are located in zones of potential accumulation of impacts of the BIII OWF. Locations of such projects, existing or for which at least some location decisions have been issued or procedures for issuing the decision on environmental conditions have been initiated, are presented in the map below.

Figure 1. Existing and planned projects in Polish maritime areas



PL	EN
Legenda	Legend
Morskie farmy wiatrowe (wydane PSZW, opłacone)	Offshore wind farms (permit for erection and use of artificial islands, structures and devices issued, paid for)
Morskie farby wiatrowe (wydane PSZW, nieopłacone)	Offshore wind farms (permit for erection and use of artificial islands, structures and devices issued, unpaid)
Korytarz MIP	OTI corridor
Obszary złóż	Deposit areas
Istniejące platformy wydobywcze	Existing production platforms
Strefa rozgraniczenia ruchu	Traffic separation zone
Granica morza terytorialnego	Boundary of the territorial sea
SwePol Link	SwePol Link
Rurociągi	Pipelines
Data: 22.08.2019	Date: August 22, 2019
Podziałka	Scale
mile morskie	nautical miles

source: own study

The following projects were considered as projects that could cause cumulative impact with the BIII OWF:

- existing or planned projects (holding decisions on environmental conditions), located in individual accumulation zones and which may cause impacts for which a given accumulation zone was determined, in the same or directly following period

as the BIII OWF;

- existing or planned projects for which basic technical parameters have been determined and are publicly available, located in individual accumulation zones and which may cause significant impacts on the integrity, coherence, subject of protection of Natura 2000 sites, in the same or directly following period as the BIII OWF.

The assessment did not take into account unplanned events, as the probability of their occurrence at the same time in two different projects is negligible. The table below presents projects and types of accumulation.

Taking into account the above conditions of the accumulation of impacts, the following were considered as projects that could cause the cumulative impact:

Table 2. Projects that could cause cumulative impact with the BIII OWF

Zone	Projects	Types of accumulation	Notes
Zone 1 – 100 km	Baltica 2 OWF and Baltica 3 OWF, Baltyk II OWF, Baltic Power OWF, FEW Baltic II OWF, BC-Wind OWF, BIII OTI.	Underwater noise during foundation piling (scaring, damage to fish organism and marine mammals). Construction stage. Possible impact on Natura 2000 sites for porpoise and gray seal	The foundation piling on the BIII OWF may be carried out in 2024–2027. During this period, Baltica 2 OWF, Baltica 3 OWF and BP OWF may also be constructed, which have a signed connection agreement with a completion date similar to the BIII OWF. The Investor is not planning to construct the BIII OWF and the Bałtyk II OWF at the same time. Baltica wind farms will be constructed gradually, first Baltica 2 will be constructed and then Baltica 3.
Zone 2 – 100 km	Baltica 2 OWF and Baltica 3 OWF, Baltic Power OWF, Bałtyk II OWF, FEW Baltic II OWF, BC-Wind OWF, BIII OTI	Impact on landscape. Operation stage. No impact on Natura 2000 sites	Currently, the decision on environmental conditions is held by the Baltica OWF projects (Baltica 2 and Baltica 3) and the BIII OWF, Bałtyk II OWF, Baltic Power OWF, FEW Baltic II. C-Wind holds an application for the EIA decision. The accumulation of landscape impacts from the land may be caused by those projects which are located at a distance of up to 50 km from the shore.
Zone 3 – 40 km	Baltica 2 OWF and Baltica 3 OWF, BIII OTI, FEW Baltic II OWF, Baltic Power OWF	Disturbance of bottom sediments at the construction/decommissioning stage “artificial reef” effect at the operation stage	The first stage of construction of the BIII OWF may be carried out in 2024–2027. At these dates, Baltica 2 OWF, Baltica 3 OWF and BIII OTI may be constructed.

Zone	Projects	Types of accumulation	Notes
Zone 4 – 30 km	Baltica 2 OWF and Baltica 3 OWF, BIII OTI, FEW Baltic II OWF, Baltic Power OWF, maritime navigation routes, including: planned deep-water route D, Słupsk Bank TSS and customary navigation route between Lubeck and Venspils	Leakages of oil derivative products	The risk of accumulation of impacts potentially applies to each construction stage of the indicated projects and results mainly from the risk of collision (vessel-to-vessel or vessel-to-structure at sea). In all these projects, service and maintenance activities will be carried out that require vessel traffic.
Zone 5 – 8 km	Baltica OWF (Baltica 2 and Baltica 3), BIII OTI, Baltic Power OWF	Barrier for migratory birds. Scaring away birds from habitats. All stages. Possible impact on Natura 2000 sites.	The main migration routes of birds run in SW-NE directions. Across these directions, during the operation period of the BIII OWF, there may also be a Baltic Power OWF located directly in the vicinity of the Baltica 3 and 2 OWFs; however, the planned area for the development of these OWFs leaves over 23 km of undeveloped maritime area along the coast from the south, where the main migration corridor runs, and over 30 km of the corridor from the north, between subsequent OWF projects prepared on the southern slope of the South Middle Bank. This causes that the cumulative effect of the barrier for birds migrating from Eurasian areas to areas from western and western-southern Europe will not be significant. Moreover, between Baltica 2 OWF (from the west) and the Baltica 3 OWF and BIII OWF there will be an approx. 5 km spacing (corridor) from north to south, which may act as a bird migration corridor. In relation to birds wintering in the areas of the southern Baltic Sea, such as the Słupsk Bank, the Oder Bank or the coastal strip of the Polish maritime areas, an uninterrupted

Zone	Projects	Types of accumulation	Notes
			sequence of 4–6 projects on the north-eastern slope of the Słupsk Bank may constitute a barrier for populations migrating to and from these overwintering areas.
Zone 6 – 4 km	Baltica OWF (Baltica 2 and Baltica 3), Bałtyk II OWF, BIII OTI, Baltic Power	Scaring away from habitats	The cumulative scaring effect for seabirds may theoretically concern OWF projects located directly in the vicinity of the BIII OWF – Baltica OWF (Baltica 2) and FEW Baltic II. This effect will mainly concern displacement of wintering bird populations occurring in the Słupsk Bank area and its direct vicinity. Theoretically, FEW Baltic II project is within such a designated range, however, due to its distance from the Słupsk Bank, its significance will be negligible. Scaring at the construction stage may accumulate with the Baltica OWF (Baltica 2 and 3), as these projects may be constructed in parallel or immediately one after the other with the BIII OWF.
Zone 7 – farm area	BIII OWF,	• Increased concentration of suspended matter in water, • Redistribution of pollutants deposited in sediments, • Increase in sediment and water temperature, • Emission of electromagnetic field and radiation.	Laying export cables in the BIII OWF area may result in accumulation of impacts with those caused by installation works at the farm. At the operation stage, impacts caused by internal cables of the farm and connection infrastructure may accumulate.

Unlike in the Report 2015 and due to the expiry of licenses for exploration and prospecting in the Baltic Sea and licenses for oil and gas extraction from the B3, B4, B6 and B8 fields (and non-issuance of new licenses in the areas in question or in other areas relevant for the cumulative impacts of the BIII OWF), no cumulative impacts with this projects have been accounted for.

Based on the above analysis, it should be stated that the projects that may actually cause the accumulation of impacts with the BIII OWF at the construction/decommissioning and operation stages, respectively, may be the projects indicated in the table below.

Table 3. Projects that may actually cause accumulation of impacts with the BIII OWF at the construction or operation stage

Project	Types of cumulative impacts at the construction/decommissioning stage	Type of cumulative impacts at the operation stage
Baltica OWF (Baltica 3)	• Underwater noise • Bird scaring • Disturbance of bottom sediments at the construction/decommissioning stage • Leakages of oil derivative products	• Disruption of the landscape, • Leakages of oil derivative products • Barrier for migratory birds • “Artificial reef” effect • Scaring effect
Baltica OWF (Baltica 2)	• Underwater noise • Bird scaring • Disturbance of bottom sediments at the construction/decommissioning stage • Leakages of oil derivative products	• Disruption of the landscape • Leakages of oil derivative products • Barrier for migratory birds • Scaring effect • “Artificial reef” effect
Bałtyk II OWF	• It is assumed that the project will not be built in parallel with the BIII OWF, so accumulation will not occur at this stage	• Disruption of the landscape • Barrier for migratory birds • Leakages of oil derivative products • Scaring effect
FEW Baltic II	• No impacts due to divergent	• Disruption of the landscape

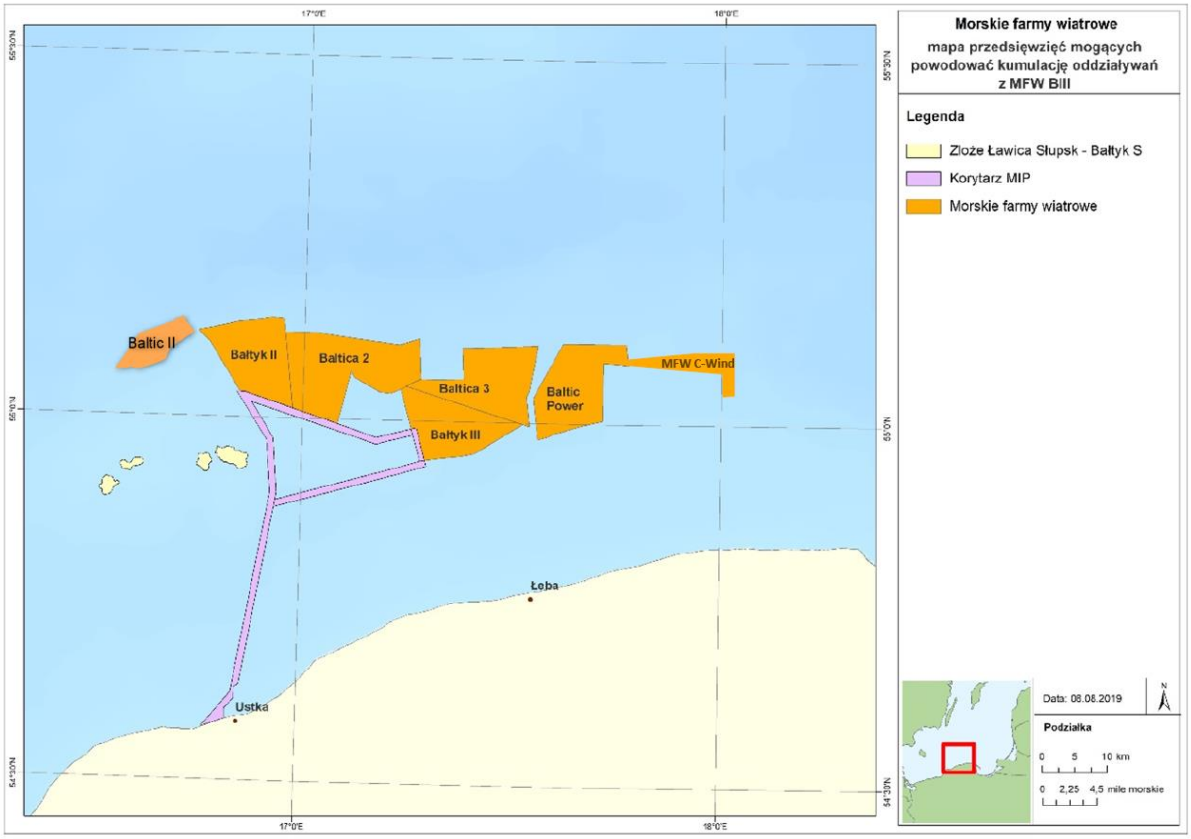
	construction dates	• Leakages of oil derivative products • Barrier for migratory birds • Scaring effect
Baltic Power OWF	• No impacts due to divergent construction dates	• Barrier for migratory birds • Disruption of the landscape
Maritime navigation routes, including: • planned deep water route D, • Słupsk Bank TSS, • customary navigation route between Lubeck and Venspils	• Leakages of oil derivative products	• Leakages of oil derivative products
BIII OTI	• Increased concentration of suspended matter in water, • Redistribution of pollutants deposited in sediments	• Increase in sediment and water temperature • Emission of electromagnetic field and radiation
C-Wind OWF	• The project will not be constructed in parallel or directly after the BIII OWF, so there will be no accumulation at this stage	• Disruption of the landscape

Source: own materials

4. Projects whose impact may accumulate with the impact of the BIII OWF

The following maps present projects with which the impacts of the BIII OWF may potentially accumulate.

Figure 2. Projects whose impacts may potentially accumulate with the impacts of the BIII OWF



own study

PL	EN
Morskie farmy wiatrowe	Offshore wind farms
mapa przedsięwzięć mogących powodować kumulację oddziaływań z MFW BIII	map of projects which may cause accumulation of impacts with the BIII OWF
Legenda	Legend
Złoże Ławica Słupsk – Bałtyk S	Słupsk Bank deposit – Bałtyk S
Korytarz MIP	OTI corridor
Morskie farmy wiatrowe	Offshore wind farms
Data: 08.08.2019	Date: August 08, 2019
Podziałka	Scale
mile morskie	nautical miles

4.1. Offshore wind farms

To assess the cumulative impact of the above-mentioned OWF projects, either available data on parameters were used, on the basis of environmental impact reports and issued environmental decisions – BII OWF, Baltica 2 and 3 OWF, Baltic Power OWF, C-Wind OWF, and FEW Baltic II OWF.

However, it should be emphasized that the decisions on environmental conditions do not directly determine the period of the project implementation, but they have a specific legal date when they may form the basis for applying for subsequent decisions permitting the project implementation. Knowledge of the date of issuing the decision on environmental

conditions and information disclosed by investors on the OWF projects being prepared form the basis for determining the date of implementation of individual projects.

Table 4. Parameters of offshore wind farms that may accumulate impacts with the BIII OWF

Parameters of OWF accumulation	Bałtyk II OWF	Baltica 3 OWF[1]	Baltica 2 OWF[2]	Baltic Power OWF	FEW Baltic II	C-Wind OWF
maximum capacity [MW]	1 200	1045,5	1500	1 200	350	500
number of WTs [pcs]	60	90	119	126	44	41
height [m]	300	250	250	330	300	330
rotor diameter [m]	250	220	220	260	250	280
completion date	2025-28	2025-27	2024-26	2024-26	2028-30	2026-2028

4.2. Offshore Transmission Infrastructure

The energy generated by the BIII OWF (and the BII OWF planned to be completed at another date) will be transferred to the shore using export cables. They will not be a part of the farm, but a separate project named Offshore Electricity Transmission Infrastructure ("OTI"), owned by MFW Bałtyk III Sp. z o.o. (formerly Polenergia Bałtyk III), with its registered office in Warsaw.

For the OTI, location permits were issued for laying submarine cables in EEZ and in territorial waters of the Republic of Poland. Moreover, in 2019, the Investor obtained a decision on environmental conditions for this project (RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29). This project is described in Chapter 7 of Section 3 of Volume II of the Report.

[1] The Baltica OWF area covered by the permit for erection and use of artificial islands, structures and devices issued for the Baltica 3 OWF, covered by the joint decision on environmental conditions together with the Baltica 2 area.

[2] The Baltica OWF area covered by the permit for erection and use of artificial islands, structures and devices issued for the Baltica 2 OWF, covered by the joint decision on environmental conditions together with the Baltica 3 area.

5. References and other sources

5.1. Legal acts

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text: Journal of Laws of 2022, item 457)
2. Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (consolidated text: Journal of Laws of 2021, item 2373, as amended)
3. Regulation of the Council of Ministers of September 10, 2019 on projects which may have significant environmental impact (Journal of Laws of 2019, item 1839)

5.2. Literature, expert studies and administrative decisions

1. Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on March 27, 2017, ref. No. RDOŚ-Gd-WOO.4211.26.2015.KSZ.20, for the project named “Construction of the Polenergia Bałtyk II offshore wind farm”
2. Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.26.2015.KP.22, for the project named “Construction of the Bałtyk Środkowy III offshore wind farm”
3. Decision on environmental conditions of March 2, 2019, ref. No.: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 issued by the Regional Director for Environmental Protection in Gdańsk for the project consisting in the construction of the offshore electricity transmission infrastructure
4. Decision on environmental conditions of January 24, 2020, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 issued by the Regional Director for Environmental Protection in Gdańsk for the project named “Baltica Offshore Wind Farm”.
5. Ekozapas. Environmental Impact Assessment Report for the FEW Baltic II Offshore Wind Farm. 2019
6. Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas for the project named “Bałtyk Środkowy II Offshore Wind Farm” (Decision No. MFW/2/2013 of January 15, 2013, amended by decision No. MFW/2a/13 of April 29, 2013).
7. Decision of the Minister of Transport, Construction and Maritime Economy No. MFWK/1/13 of July 19, 2013, allowing for laying and maintaining submarine cables within the Polish Exclusive Economic Zone, ref. No.: GT7pb/62/14823/decyzja/2013Polenergia offshore wind developments for projects Middle Baltic II and Middle Baltic III. High level technical design options study. Version 1, including supplements. Royal Haskoning DHV Nederland BV, 2013
8. Decision No. MFWK/1/13 of the Minister of Transport, Construction and Maritime Economy of July 19, 2013, ref. No. GT7pb/62/14823/decyzja/2013 approving the

location of laying and methods for maintaining submarine cables in the Exclusive Economic Zone for the project “External grid connection infrastructure of the Bałtyk Środkowy III Offshore Wind Farm.”

9. Decision No. MFWK/1/15 of the Minister of Infrastructure and Development of February 16, 2015, ref. No. DTM.VII.53.MFWK.2015.MT.1, approving the location of laying and methods for maintaining submarine cables in the Exclusive Economic Zone for cables exporting electricity generated in the Baltic II Wind Turbine Farm (FEW Baltic II)
10. Decision No. 4/14 of the Director of the Maritime Office in Słupsk of March 19, 2014, ref. No. NP.-obm- 60/2-7/14 on the permit to lay and maintain submarine cables within the territorial sea borders being a part of the offshore electricity transmission infrastructure from the Bałtyk Środkowy II OWF and Bałtyk Środkowy III OWF to the onshore substation of the Słupsk Wierzbięcin NPS
11. Polenergia offshore wind developments for projects Middle Baltic II and Middle Baltic III. High level technical design options study. Version 1, including supplements. Royal Haskoning DHV Nederland BV, 2013
12. Permit for erection and use of artificial islands, structures and devices in the maritime areas for the Bałtyk Środkowy III OWF project, decision of the Minister of Transport, Construction and Maritime Economy of March 30, 2012, ref. No. GT7/62/1170069/decyzja/2012
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15. Permit for erection and use of artificial islands, structures and devices in the maritime areas for the Offshore Monitoring Station OMS 1, decision of the Minister of Infrastructure and Development of December 30, 2014, ref. No. DTM7-PK/62/DEC/3/36451/2014
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17. Environmental Impact Assessment Report for the Baltica Offshore Wind Farm, Maritime Institute in Gdańsk in consortium with MEWO SA, 2017
18. Conditions for connection of the Bałtyk Środkowy III Offshore Wind Farm to the transmission grid, Polskie Sieci Elektroenergetyczne Operator S.A., Konstancin-Jeziorna, August 2012
19. Impact of SwePol link on fish and fishing. Surveys of fish carried out between 1999 and 2006. Westerberg H. et al., Swedish Fisheries Authority
20. Offshore Wind Farm Complex with a maximum total installed capacity of 1,200 MW together with technical, measurement, research and service infrastructure related to

the preparation, execution and operation stages. Project Information Sheet. Baltic Power Sp. z o.o., Warsaw

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME II Section 14

Description and analysis of climate change

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
RDEP	Regional Director of Environmental Protection in Gdansk

1. Introduction

This section of the Report contains the climate characteristics of the Project area along with climate change trends in the Project area. Offshore wind power is a zero-emission technology that generates electricity using a renewable energy source such as wind. The dynamic development of offshore wind energy is related to the climate policy based on renewable energy sources at the EU and national levels. The most important strategic documents whose environmental objectives (including climate) the BIII OWF may affect are presented in Chapter 2 of Volume I of the Report.

An assessment of the Project's climate impact and an assessment of climate impacts on the Project are presented in Volume IV, Chapter 13 of the report.

2. Characteristics

2.1. Conditions climatic

The Baltic Sea is located in a temperate climate zone with high seasonal variability. Air temperature ranges from about -30°C in winter, to 30°C in summer. The average air temperature in the South Baltic coastal zone ranges from 5.3°C in Maarianhamina to 7.9°C in Arkona and Kolobrzeg (Uścinowicz et al. 2011). The average annual wind speed in the Baltic Sea varies between 6-8 m/s, with values lower than 6 m/s measured in the coastal zone, while values higher than 7 m/s in the Baltic Proper. The highest wind speeds, over 8 m/s, were recorded in the Pomeranian Bay (Uścinowicz et al. 2011).

An important indicator is sunshine (the total number of hours during which sunlight falls directly on a specific location) - for the Baltic Sea it is: between 1,592 (Lund) and 1,881 (Visby station). The annual distribution indicates low sunshine in December and January (< 40 hours at all research stations, except Tallinn, where it is < 20 hours) and high sunshine from May to August (> 200 hours per month) (Ushinovich et al. 2011). Cloud cover in the Baltic area is quite high, with an annual average value ranging from 65% (Arkona, Maarianhamina) and 71% (Kolobrzeg). The most cloudy period is autumn and winter from November to February (cloud cover > 70%). Noticeably less cloud cover was observed in May and August, with most stations below 60% or slightly above this value. The number of days with precipitation on the Baltic coast varies from 158 to 182 days. The most frequent rains occur in Klaipeda, Kolobrzeg, Kaliningrad and Tallinn (≥ 180 days). The rainiest months are November, December and January (it rains about 20 days). The rains are rainiest from April to September (less than 15 days) (Uścinowicz et al. 2011).

Ice phenomena in the Baltic Sea occur during each winter, and are characterized by varying intensity in each of the years analyzed. Their duration also varies greatly geographically. In the Baltic Proper, ice phenomena last from 0 to 40 days (Uścinowicz et al. 2011).

In the area of the Polish exclusive economic zone, ice cover in the last 50 years has been rare and short, with an average thickness of less than 30 cm (Schmelzer, Holfort et al. 2012). Analysis of multi-year data shows a significant increase in surface air temperature over the past 140 years. Since 1871, the average annual temperature has shown an increase of 0.11°C per decade north of the 60°N parallel and 0.08°C south of the 60°N parallel, while the global trend was about 0.05°C per decade from 1861 to 2000 (HELCOM 2013). The daily temperature cycle is also changing and there has been an increase in temperature extremes. The above changes are causing changes in the seasons: the length of the

growing season has increased, while the length of the winter season has decreased. Climate change modeling indicates a further increase in temperature in the Baltic Sea area, and this increase will continue to be greater than the corresponding increase in average global temperature. The greatest warming is predicted in the north during the winter season. The increase in winter average daily temperatures will be most pronounced during the coldest periods, while extreme high temperatures will occur more frequently in summer than at present (HELCOM 2013).

The amount of precipitation in the Baltic Sea area has varied regionally and seasonally over the past century, this has included both increases and decreases in precipitation (HELCOM 2013). In the second half of the twentieth century, there was a trend of increasing precipitation in winter and spring. For individual seasons, however, the trends were different. Precipitation has a significant impact on the volume of river runoff, analyses of this runoff, based on data from the past century, have shown that there has been a decline in the annual volumes of water delivered from the southern part of the Baltic Sea basin, indicating that the southern regions of the Baltic Sea basin may become drier with rising air temperatures. In contrast, trends in the north and Gulf of Finland indicate an increase in annual flows at warmer temperatures. In a future warmer climate, extreme precipitation events are expected to be more frequent. Instead, the amount of snowfall in the region may decrease, even significantly for the southern part of the catchment area (HELCOM 2013).

The annual cycle of river runoff will fluctuate considerably. The maxima currently recorded during late spring can occur earlier, even in February or January. These changes will result from rising temperatures and earlier snowmelt, as well as changes in the annual precipitation cycle and increased evaporation (HELCOM 2013).

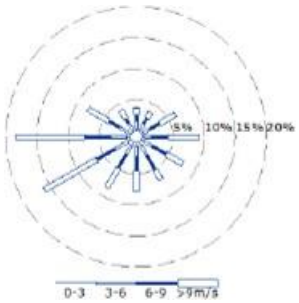
The above climate changes will translate into changes in sea surface temperature. The highest temperature rise may occur in the Gulf of Bothnia and South Bothnia during the summer and in the Gulf of Finland in the spring. The increase in summer sea surface temperature could be about 2°C in the southern parts of the Baltic Sea and about 4°C in the northern parts by the end of this century. The surface water layer is expected to warm more strongly than the bottom layers in all Baltic Sea sub-basins. The above projected changes will have a significant impact on the occurrence of ice events - simulations indicate that there will be a decrease in ice coverage in the future (HELCOM 2013).

As a result of the study of meteorological conditions at the stage of report preparation in 2015 and in 2019[1], it was found that in the area of the location of the planned project, the prevailing winds were from the southwestern and western sectors, with wind speeds above 9m/s.

Wind speeds range from 0-5 degrees on the Beaufort scale. The period when winds of greater strength blow is autumn and winter, which coincides with the period of storms at sea, where wind speeds exceeded 20-23 m/s.

[1] 1. DNV GL, Central Baltic III Wind Farm, Measurement campaign Data - Summary, 2019

Figure 1. Wind speeds and direction over the sea surface in the IMF B III field



Source: 1. DNV GL, Central Baltic III Wind Farm, Measurement campaign Data - Summary, 2019

Air temperature had an annual pattern consistent with the average temperature pattern in the Baltic area (Climate of Baltic Sea Basin, 1998). The minimum value did not exceed -10 o, while the maximum temperature was less than 25o C. The area of open sea blurs the influence of the continent on thermal conditions. Winters are milder and summers are cooler. The possibility of ice phenomena in the area of OWF BIII is described as negligible.

2.2. Greenhouse gas emissions greenhouse gases

Based on the results of the 2019 national greenhouse gas inventory (see Table 1; NOBiZE 2021), which includes carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), the HFC (hydrofluorocarbon) gas group, the PFC (perfluorocarbon) gas group, sulfur hexafluoride (SF6), and nitrogen trifluoride (NF3), total greenhouse gas emissions at the national level amounted to 412856.37 kt ekw. CO2 (excluding greenhouse gas emissions and removals from category 4. Land Use, Land Use Change and Forestry).

Table 1. National greenhouse gas emissions in the base year and in 2019. (KOBiZE 2021)

Greenhouse gas	Emissions in eq. CO_2 [kt]		(2019-baseline)/baseline [%]
	Base year	2019	
CO_2 - with category 4	450855.61	302484.60	-32.91
CO_2 - without category 4	472043.58	319520.97	-32.31
CH_4- with category 4	73564.91	45301.19	-38.42
$CH_{4\text{-no}}$ category 4	73515.72	45276.30	-38.41
N_2O- with category 4	35512.74	24069.86	-32.22
N_2O- without category 4	33512.00	22101.21	-34.05
HFC	171.97	3744.68	2077.53
PFC	171.97	10.76	-93.74
A mix of HFCs and PFCs	NA,NO	NA,NO	NA,NO
SF_6	29.12	90.75	211.64
NF_3	NA,NO	NA,NO	NA,NO
Total - with category 4	560306.32	375701.84	-32.95
Total - without category 4	579444.36	390744.67	-32.57

[a)] base year is understood in Table 1 and throughout the report as: 1988 for CO_2, CH_4 and N_2O, 1995 for HFCs, PFCs and SF_6, and 2000 for NF_3.

NA - not applicable, NO - not present

Compared to the base year, the volume of emissions for 2019 decreased by 32.6% (KOBiZE 2021). The dominant role in national emissions is played by CO2 (81.8%), the share of methane and nitrous oxide is much smaller, respectively: 11,6% i 5,7%. Fluorinated industrial gases (so-called F-gases) account for a small share of national greenhouse gas emissions (about 1.0% in total), and NF3 emissions have not been recorded in Poland.

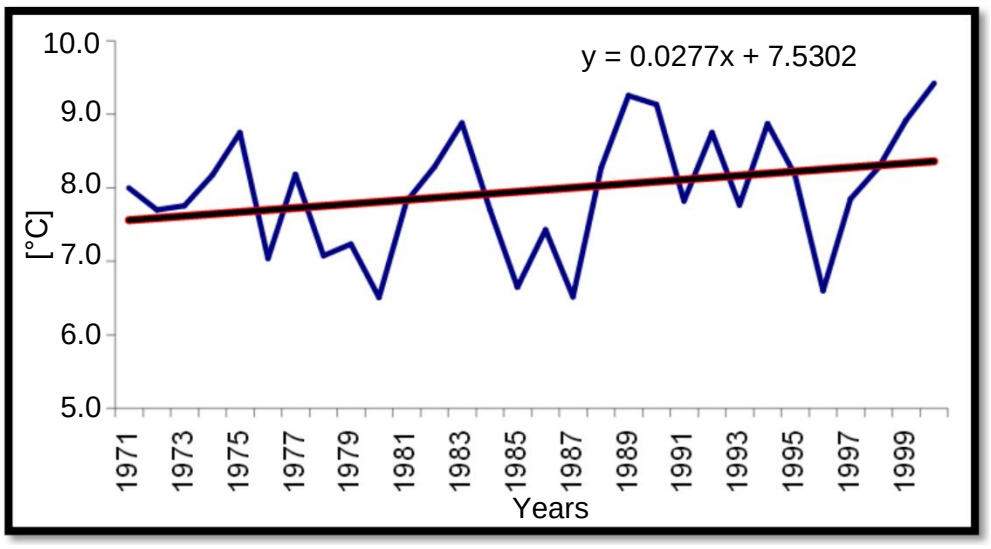
Based on multi-year observations, the course of change in aggregate greenhouse gas emissions replicates the trend in CO2 emissions: there is a noticeable decline in greenhouse gas emissions between 1988 and 1990. This is a result of changes in the domestic economy. The decline in emissions continued until 1994, after which emissions began to rise, reaching a peak in 1996 (economic growth). GHG emissions stabilized between 2008 and 2011 (except for a marked decline in 2009 as a result of the global economic slowdown). The significant increase in greenhouse gas emissions between 2016 and 2018 was influenced by the economic recovery and the increase in fuel consumption in the road transport sector. In 2018-2019, there was a decrease in greenhouse gas emissions, mainly the result of lower consumption of fuels burned in stationary sources, primarily coal and lignite. Emissions also decreased in the agricultural sector due to, among other things, lower (by nearly 16%) use of mineral fertilizers, as well as in the waste sector, where the amount of municipal waste disposed of through landfilling and industrial waste and sewage sludge disposed of thermally decreased. In contrast, 2019 was another year of increased emissions in the road transport sector due to higher fuel consumption than in 2018 (KOBiZE 2021).

2.3. Climate change trends - scenarios

Air temperature and precipitation in climatology are basic elements in describing the characteristics of climate from the global to the local scale. Based on the multi-year course of air temperature, oscillations and trends of temperature over shorter or longer periods are determined, identifying them as "quasi-cycles" of warming or cooling. In rainfall series - dry, wet or normal periods are distinguished.

Based on homogeneous observational material, a 30-year series of air temperature over Poland (1971-2000) was adopted, as shown below.

Figure 2. The course of the average values of air temperature in the territory of Poland in 1971-2000



Source: Zawora T., Ziernicka - Wojtaszek A. 2005. Influence of weather and climate on agrotechnical activities and planning of crops in the area of Poland. Problems of Ecology 5 (53),pp. 269-271

As shown in the figure above it is noticeable:

- high variability in air temperature from year to year;
- steadily increasing temperature trend (y = 0.0277x + 7.5302): the series is brought to the year 2000, the temperature trend obtains a temperature increment value of 0.58°C/100 years;
- significant variability in area average air temperatures over the analyzed period with the highest temperature over the half-century period of 9.4°C falling in the year 2000.

Analysis of the value of the average annual air temperature in the area of Poland in the second half of the 20th century on the basis of the collected data allows us to conclude that there has been a clear warming of the climate.

There has been a change in the structure of precipitation over most of Poland, involving a sharp increase in the number of days with heavy daily precipitation: daily precipitation of ≥10 mm and ≥20 mm increased to 10 days per decade and 4 days per decade , respectively, almost all over Poland; precipitation of ≥30 mm - more than 3 days per decade, except on the coast and in northeastern Poland, precipitation of 50 mm by 2 days per decade - clearly in southern and central Poland and in places in the north.

There was an upward trend in the sum of maximum 5-day precipitation (up to 15 mm/5 days per decade) on the coast (from Szczecin and Swinoujscie to Hel) and in the southern part of Poland, and a decrease in the height of maximum 5-day precipitation running along the belt from Slubice and Gorzow Wlkp, through Suwalszczyzna to the southern part of Podlasie.

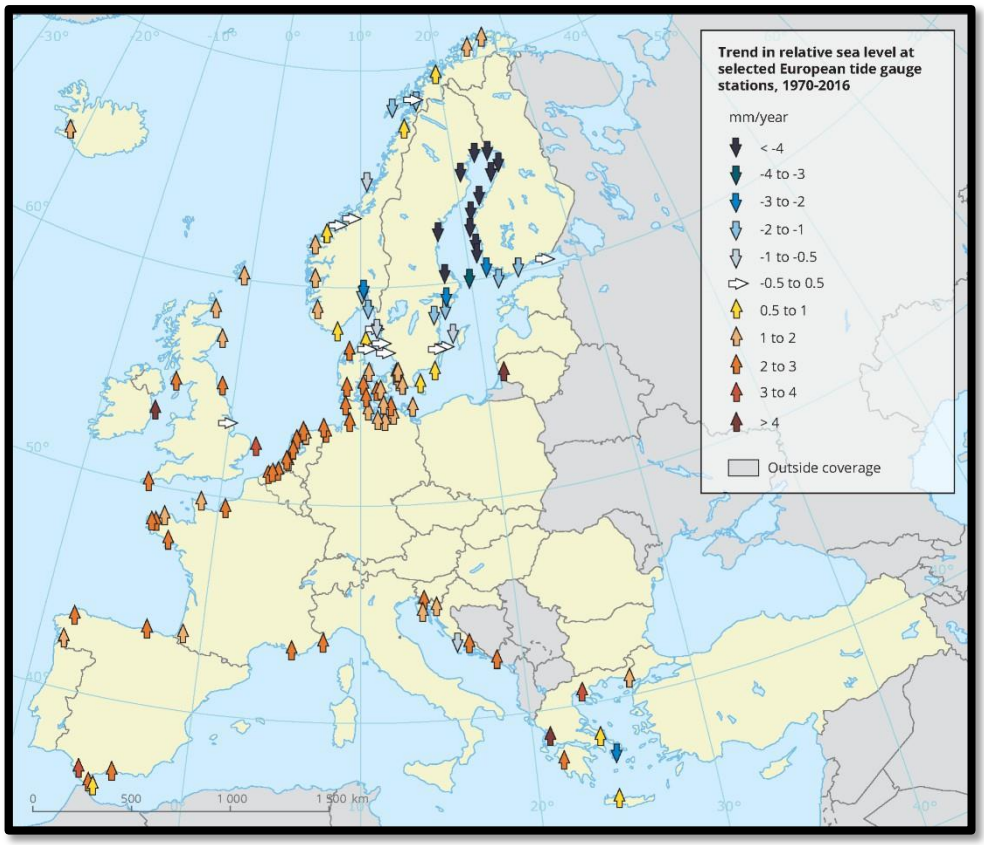
The precipitation data for July 2011, in which monthly precipitation totals across the country exceeded precipitation norms by as much as 400%, may serve as a rarity and an event demonstrating the strong dynamics of changes in precipitation patterns. Such a rainy July has not been observed since 1997. At the same time, studies show that the so-called continuous and small precipitation (< 1.0 mm) is disappearing, that the rainless periods (droughts) have lengthened - up to 5 days/decade, while the number of days with precipitation > 10 mm/day has increased.

The greatest impact on climatic conditions is exerted by extreme phenomena, the current increase in the number of occurrences of which is noticeably changing the dynamics of climate features in Poland. Thermal phenomena unfavorable and troublesome for the environment and society include heat waves (sequences of days with maximum daily air temperature ≥30°C lasting for at least 3 days), most often occurring in the southwestern part of Poland and least often in the region of the coast and mountains, with the longest sequences of hot days lasting ≥17 days (Nowy Sącz, Opole, Racibórz).

In most of Poland, there are decreasing trends in the number of frosty and very frosty days (days with daily maximum temperature ≤0°C and days with maximum temperature ≤-10°C, respectively). Slight increases in the number of frosty days were marked only in mountainous areas and the southwestern part of Poland. Over most of the country, the length of frost periods showed a slight upward trend, with the longest lasting more than 20 days and, except in the mountains, occurring only in the northeastern part of the country, while decreases were marked only in coastal areas and in the mountains. The longest periods of very cold weather occurred in the northeastern and eastern parts of the country (10-

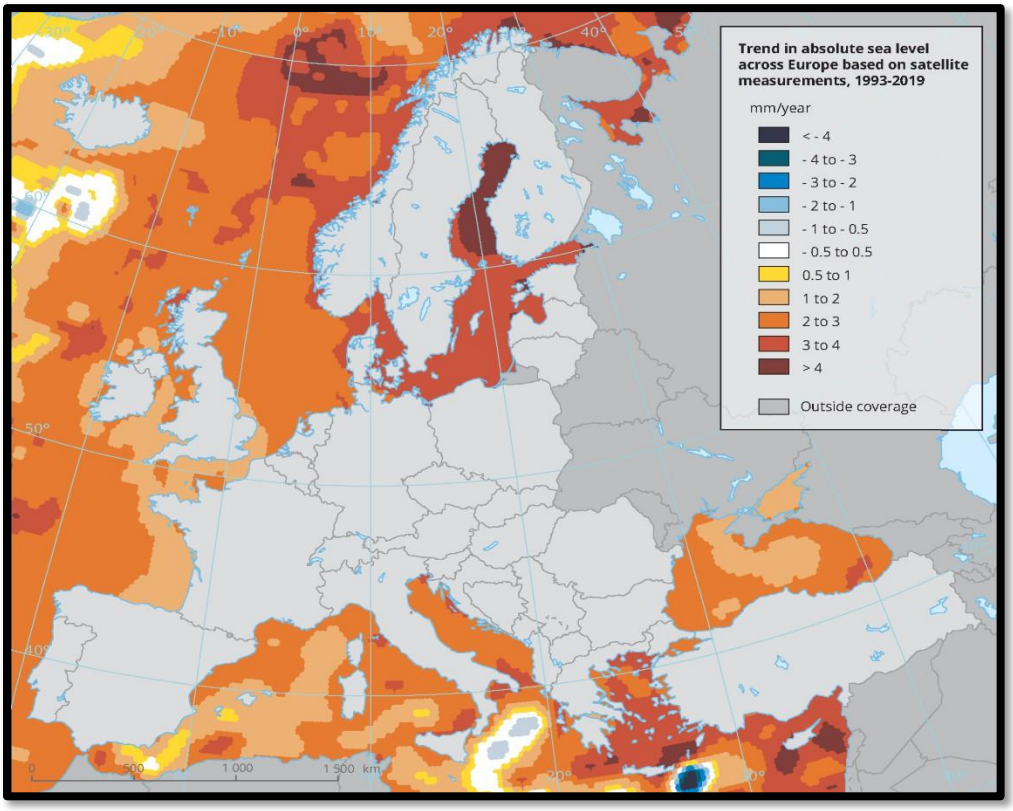
20 such episodes in 40 years), while the rest of the country recorded one to several periods of very cold weather - with the exception of coastal areas, where no such temperatures were recorded. In addition, as shown in the figures above, sea level rise is observed for the analyzed location due to tectonic reasons - the phenomenon of post-glacial rebound (post-glacial rebound) and changes in currents will cause a sea level rise of 0.2 to 0.4 meters.

Figure 3. Trends in relative sea level measured for tidal stations from 1970 to 2016



Source: https://www.eea.europa.eu/data-and-maps/indicators/sea-level-rise-6/assessment (Access date: 24.03.2022)

Figure 4. Trend of sea level changes in Europe



Source: https://www.eea.europa.eu/data-and-maps/indicators/sea-level-rise-6/assessment (Access date: 24.03.2022)

Scenarios of climate change in Poland were developed using the best tools of modern climatology - hydrodynamic models of the climate system. These models, constructed according to the degree of knowledge and understanding of the laws of physics, provide a three-dimensional description over time of climate variables. Unfortunately, they are also fraught with many uncertainties due to shortcomings in techniques (knowledge). And therefore, in any consideration of potential scenarios, it is necessary to take into account possible changes in certain ranges. Hence, a bundle of projections, obtained from different regional models, controlled by different boundary conditions generated by general circulation models, is analyzed.

The climate change scenarios for Poland are based on simulations conducted in the EU ENSEMBLES project (http://ensemblesrt3.dmi.dk), which produced the largest set of climate projections currently available for Europe for the 21st century. The results of the ENSEMBLES project make it possible to take into account various possibilities for the development of the climate system, are widely used and form the basis of many studies on climate change in other European countries. To assess climate change in Poland, the results of 8 regional models were used, i.e. RM5.1, DMI-HIRHAM5, MPI-M-REMO, KNMI-RACMO2, SMHIRCS, DMI-HIRHAM5, METO-HC_HadRM3Q0, ETHZ-CLM

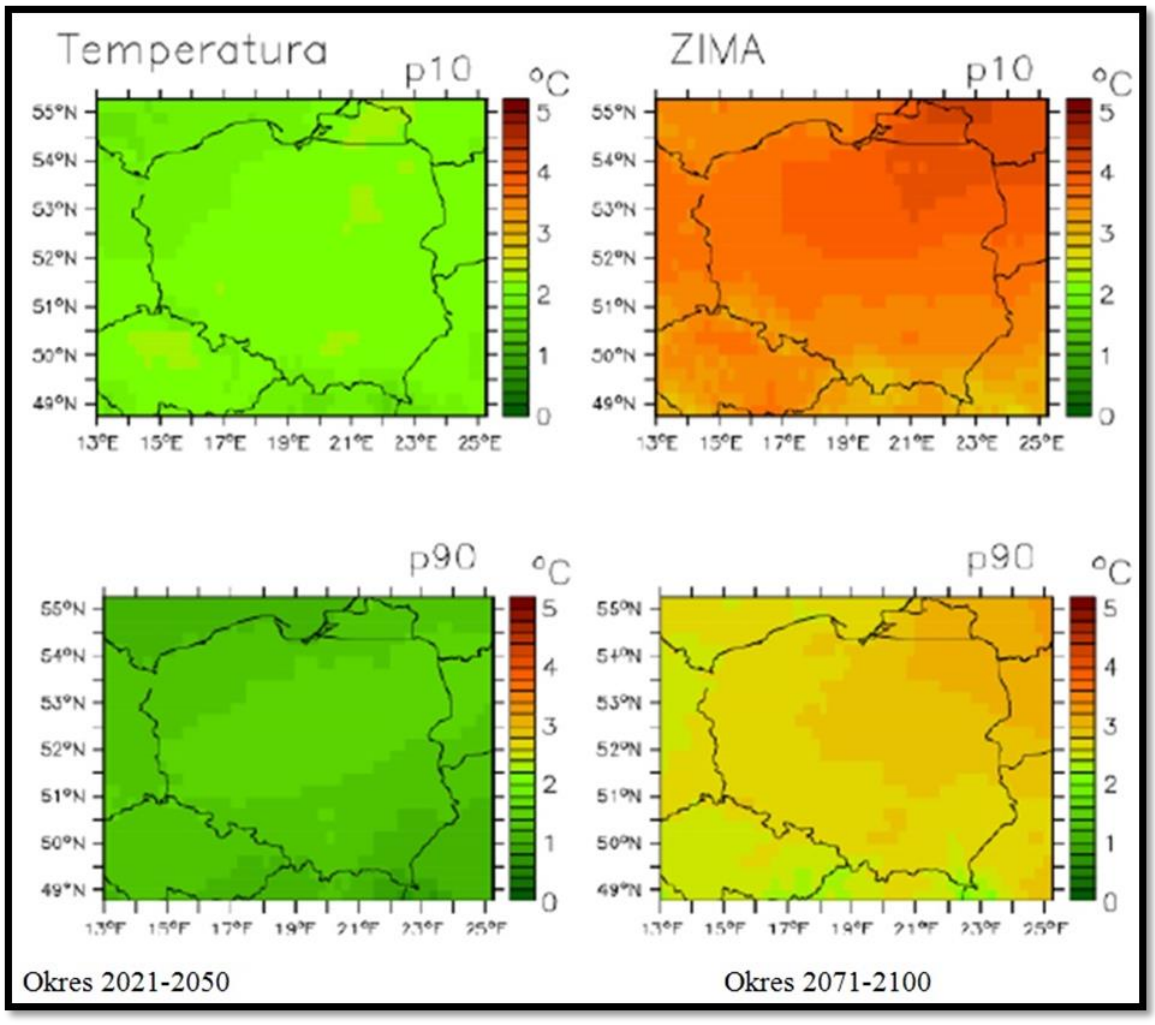
with boundary conditions from 4 global models (ARPEGE, ECHAM5, BCM, HadCM3Q0). Projections were made assuming the SRES A1B emissions scenario (Nakicenovic, Swart, 2000). Simulations conducted using this scenario reflect a picture of average changes relative to the extreme scenarios (A2 and B1).

On the other hand, the differences resulting from the use of a bunch of models are very important and it is essential to take them into account.

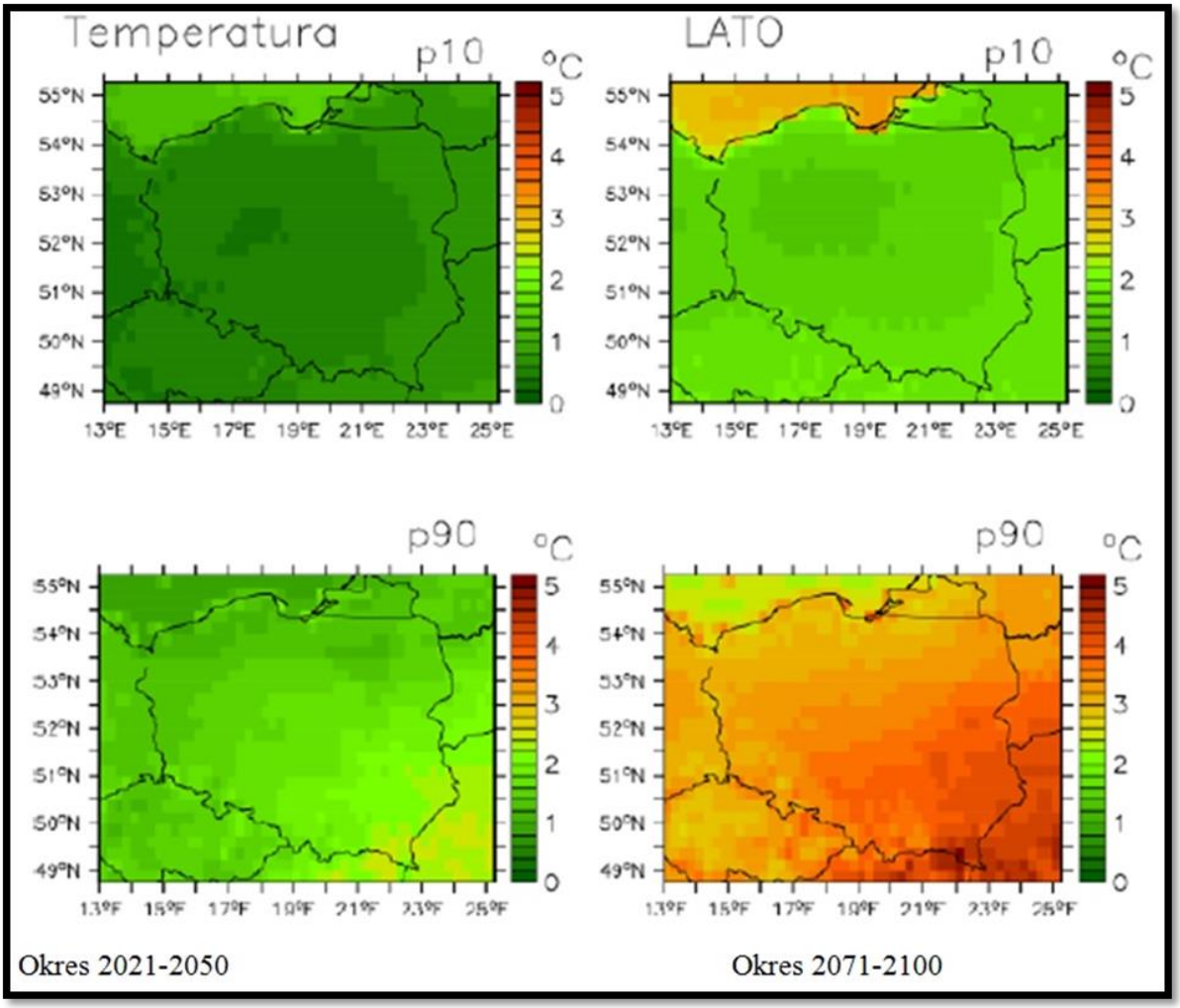
The 10th and 90th percentiles method was used to analyze temperature changes. A percentile of 10 indicates temperature values below which 10% of all temperature values occur in a given period, while a percentile of 90 cuts off the top 10% of temperature values. As shown in the figure below, the climate model indicates expected warming for both periods and for both seasons, with a clear advantage for the last thirty years given the analysis, which is important for infrastructure investments such as an offshore wind farm, due to its assumed long-term operation.

As can be seen from the figures below, for winter, by far the larger increases should be expected in the low temperature range (percentile 10), strongest in northeastern Poland, up to 2, 5°C in the first period and above 4, 5°C in the second. Increases in high winter temperature values are more homogeneous for the whole country and slightly smaller, about 1.5°C in 2021-2050 and about 3, 5°C in 2071-2100 for the 90th percentile. In summer (b), the increase in low temperatures represented by the percentile 10 reaches about 1°C in 2021-2050 and about 3°C in 2071-2100. There is a greater increase in high temperatures, especially in southeastern Poland, from 2.5°C in the first period studied to more than 4.5°C by the end of the century.

Figure 5. Differences in air temperature percentiles, between the periods 2021-2050 and 2071-2100 and the reference period 1971-2000 (a. winter, b. summer)



Temperatura	Temperature
p10	p10
ZIMA	WINTER
p90	p90
Okres 2021-2050	Period 2021-2050
Okres 2071-2100	Period 2071-2100



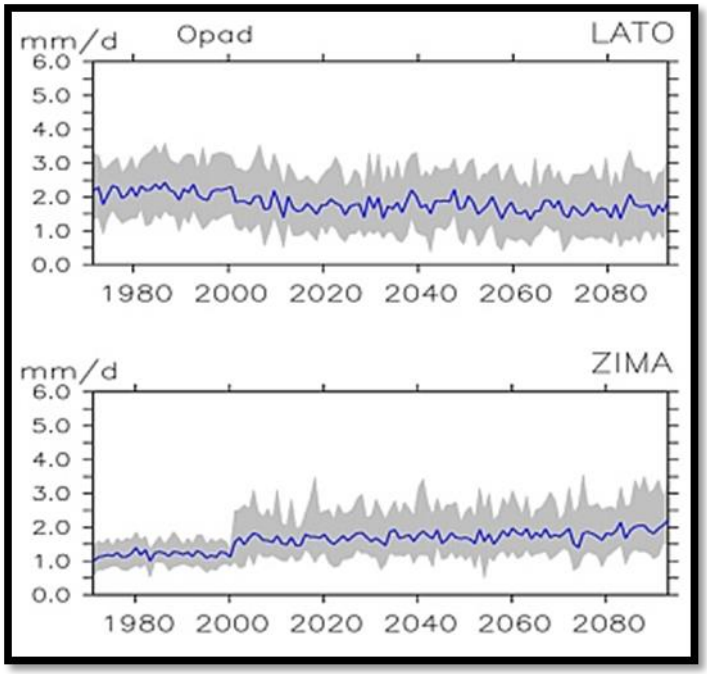
Temperatura	Temperature
p10	p10
LATO	SUMMER
p90	p90
Okres 2021-2050	Period 2021-2050

Okres 2071-2100	Period 2071-2100

Source: http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/tendencje-zmian-klimatu/ (Access date: September 2020)

The spatial distribution of relative changes in precipitation, as shown in the figure below, indicates an increase in winter precipitation reaching about 15% in the northern part of the country in 2021-2050 and up to more than 20% in the eastern part in 2071-2100. Summer precipitation is expected to decrease by the end of the century, the greatest in the southeast. Spring precipitation in the first period decreases slightly in the western part of the country, while in the second period it is noticeable that it increases by about 10% across the country. For autumn, trends are weakest, only a slight decline can be expected in the northern regions of the country.

Figure 6. Precipitation averaged for Poland



Opad	Precipitation
Lato	Summer
Zima	Winter
6.0	6.0
5.0	5.0
4.0	4.0
3.0	3.0
2.0	2.0
1.0	1.0
0.0	0.0

Source: http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/tendencje-zmian-klimatu/ (Access date: September 2020)

The results of the climate scenario analysis show that:

- temperature shows a clear upward trend throughout the country, more warming is expected towards the end of the century, temperature increases are regionally and seasonally differentiated, the largest temperature increase above 4.5°C in the last three decades of the 21st century in the ranges of low temperature values is seen in winter in the northeastern region of the country, and for high temperature values in summer in southeastern Poland;
- the increase in temperature is correctly reflected in the course of all climate indices based on this variable, for example, there is a clear tendency to lengthen the thermal growing season, its earlier onset is noted, the number of days with a minimum temperature less than 0°C is decreasing and the number of days with a maximum temperature higher than 25°C is increasing, of course, the course of the indices is regionally determined, which is very well reflected in the models;
- for precipitation, the trends are less clear, with simulations indicating some increase in winter precipitation and a decrease in summer precipitation by the end of the century;
- temperature characteristics such as the number of days reflect upward trends in temperature change;
- precipitation characteristics show an increase in rain-free periods, an increase in maximum precipitation totals and a reduction in the duration of snow cover (see table below).

Table 2. Scenario of changes of selected climatic characteristics for the area of Poland

	1971-1980	1981-1990	1991-2000	2001-2010	2011-2020	2021-2030	2041-2050	2061-2070	2071-2090
Average annual temperature [°C]	7.4	7.8	8.0	8.2	8.6	8.7	9.3	10.1	10.6
Number of days with T_{min} < 0°C	114	107	101	102	97	97	82	72	65
Number of days with T_{max} > 25°C	27	27	30	29	36	35	37	46	52
Number of degree days, T < 17°C	3616	3488	3384	3374	3237	3236	3005	2803	2664
Length of growing season T > 5°C (in days)	199	205	210	217	223	224	237	247	253
Maximum daily precipitation [mm]	25.4	25.6	25.6	31.5	30.3	31.9	32.2	32.9	33.7
Longest dry period (rainfall < 1mm)(in days)	20	21	21	20	22	22	22	24	24
Longest wet period (precipitation >1mm) (in days)	9	9	9	9	9	9	9	9	9
Number of days with snow cover	100	87	84	82	71	71	58	49	42

Source: http://klimada.mos.gov.pl/zmiany-klimatu-w-polsce/tendencje-zmian-klimatu/ (Access date: September 2020)

3. Literature and other sources

3.1. Acts legislation

1. Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz.U.2022 item 457)

2. Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz.U. of 2021, item 2373)

3. Ordinance of the Council of Ministers of September 10, 2019 on projects that may significantly affect the environment (Journal of Laws 2019, item 1839)

3.2. Literature, expert studies and administrative decisions administrative

1. DNV GL, Central Baltic III Wind Farm, Measurement campaign Data - Summary, 2019

2. Environmental Impact Assessment Report Volume II, Section 4 Construction Process, SMDI Doradztwo Inwestycyjne Sp. z o.o., November 2015

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 1

Introduction

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Abbreviations and definitions

OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
Baltic Power OWF	Baltic Power Offshore Wind Farm
Report	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (consolidated text, Journal of Laws of 2022, item 1029)

1. Introduction

This Volume III of the Report contains a description of the environment in which the Project involving the construction of the offshore wind farm OWF Central Baltic III will be implemented, as well as the environment within the range of its impact. This volume fulfills the requirements of Article 66 (1) (2) and (3) of the EIA, and provides the basis for the environmental impact analyses performed in the next, Volume IV of the Report.

This volume supplements and updates Volume III of the Environmental Impact Report[1], which was the basis for the issuance of the current Environmental Decision[2].

The various sections of this volume are based on the environmental studies carried out in 2012-2014 by the Maritime Institute in Gdansk for the environmental impact assessment for the Central Baltic offshore wind farm III project, and supplemented with more recent data where necessary.

Since the total area of the farm that is the subject of this report, where the construction of the power plant is possible, is slightly smaller and within the boundaries of the area described in the Environmental Impact Report for the Central Baltic III offshore wind farm, prepared in 2015, this report refers to the methodology, scope and results of the previously conducted studies.

In addition, during the work on environmental characterization, the available results of the Baltic Sea environment research conducted within the framework of the State Environmental Monitoring (PMŚ) were used, as well as the results of research conducted for the project of the neighboring BIII offshore wind farm - the 2016- 2017 Baltica offshore wind farm and the 2018-2020 Baltic Power offshore wind farm. The studies for the environmental impact assessment of the aforementioned farms were carried out by an executive team with a similar composition as the studies for OWF BIII, using similar, comparable methods. Parts of the study area overlapped, as there was some overlap between the buffer zones.

In accordance with Article 66 (1) (2) of the EIA Act, the report contains a description of the natural elements of the environment covered by the scope of the anticipated impact of the planned project on the environment, including the elements of the environment protected under the Act of April 16, 2004 on nature protection. In addition, in accordance with Article 66 (1) (3) of the UoA, the report (in the section on archaeological research) shall include a description of existing monuments protected under the regulations on the protection and care of historical monuments in the vicinity or in the immediate range of the impact of the planned project.

The report also included monitoring reports on vessel and fishery traffic in the area of the proposed farm, necessary for a socioeconomic assessment.

[1] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

[2] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016.

2. Literature and other sources

2.1. Acts legislation

1. Act of October 3, 2008 on providing information on the environment and its protection, public participation in environmental protection and environmental impact assessments (consolidated text Dz.U. of 2022, item 1029).

2.2. Literature and studies expertise

1. Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 2

Environmental characteristics - hydrology and hydrochemistry

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Abbreviations and definitions

OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
Report	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
RDSM	Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Official Journal. EU L164, 25.06.2008, pp. 19-40; "Marine Strategy Framework Directive.")

1. Introduction

The section presents a characterization of the hydrological and hydrochemical conditions present in the area of OWF BIII and in the zone of its potential impacts based on the results of hydrological and hydrochemical studies of marine waters. The results of the study, along with a description of the methodology used, are attached as Appendix C to the Report.

Other available materials and information on marine waters were also used for the development of this section.

For the preparation of the Report, including the determination of hydrological and hydrochemical conditions and their sensitivity to impacts from the Project, the results of the following studies were used:

- marine water quality (physical and chemical properties) including: turbidity, salinity, water temperature at the bottom and at depths of 4, 8, 16 m from the surface, oxygen conditions (dissolved oxygen, five-day oxygen demand (BOD5), total organic carbon (TOC), acidity (pH) and alkalinity, nutrients (ammonium nitrogen, nitrate nitrogen, total nitrogen, mineral nitrogen, phosphates, total phosphorus), suspended solids, and the content of substances particularly harmful to the environment, such as: mercury, nickel, lead, cadmium, arsenic, total chromium, chromium (VI), phenols, cyanides, mineral oils, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), measurements of the activity of radioactive isotopes of cesium (137 Cs) and strontium (90 Sr);
- meteorological indicators including: wind speed and direction, air temperature, atmospheric pressure;
- hydrodynamic processes taking into account: waves on the sea surface (wave heights, periods and propagation directions), water flows throughout the depth profile (flow directions and velocities).

2. Characteristics of hydrological and hydrochemical conditions hydrochemical

Based on the results obtained, the following are the key conclusions of the studies and analyses performed, which may affect the course of the impact assessment. The studies performed are considered sufficient to obtain reliable and representative data for assessing the environmental impact of OWF BIII.

The research methodology and detailed summaries of the various results of the studies performed, along with their analysis, are presented in Appendix C of the Report.

2.1. Water quality marine

Physical and chemical parameters

The physical and chemical parameters of the water in the area of the planned project did not differ significantly from typical values accepted for the waters of the southern Baltic Sea.

These waters are characterized by an alkaline reaction, with a pH in the range of 7.0 - 8.8 (with an average value of 8.12), alkalinity averaging 1.75 $^{mval\text{-}dm\text{-}3}$ (showing no seasonal or depth-related changes), and relatively good oxygenation (concentrations in all measurement periods were in the range >= 6 $^{mg\text{-}dm\text{-}3}$) characterized by seasonal variation, typical of southern Baltic waters. The assessment of water

quality in the BIII OWF area, taking into account the oxygen content of the bottom layer during the summer (VII, IX) indicates a good condition (no oxygen deficit).

Good water quality is also indicated by the results of the BOD5 and OWO tests, which were within the limits for water quality class I throughout the measurement period.

The lowest average concentrations of suspended solids in the study area occurred in autumn and winter, while the highest concentrations occurred in April, which could be due to the start of increased primary production.

Samples taken in October 2012 and February 2013 showed very low concentrations of suspended solids. The average suspended solids content in October was less than 0.5 $^{mg\text{-}dm\text{-}3}$, while seawater samples taken in February showed suspended solids concentrations ranging from less than 0.5 $^{mg\text{-}dm\text{-}3}$ to 0.96 $^{mg\text{-}dm\text{-}3}$. During the spring period, an increase in suspended solids in the water tone was observed. In seawater samples taken in April, the average suspended solids concentration in the study area was 4.48 $^{mg\text{-}dm\text{-}3}$. In the seawater samples taken from July to November 2013, the average suspended solids content remained between 1.83 and 2.53 $^{mg\text{-}dm\text{-}3}$.

The concentrations obtained are typical of Baltic Sea waters during the respective measurement periods.

The content of biogenic substances (total nitrogen, mineral nitrogen (nitrates, nitrites and ammonia), phosphates and total phosphorus) in the studied waters showed seasonal variability characteristic of southern Baltic waters. The lowest concentrations of the substances tested were found in May and July. In contrast, during the winter months (December, February) an increase in content was observed in accordance with the seasonal trend of nutrient recovery.

In the samples from the BIII OWF area, nitrites were found in a small number of water samples taken in February, April and September. In October 2012 and July and November 2013, nitrite concentrations in the study area were below the limit of quantification of 0.2 $^{pmol\text{-}dm\text{-}3}$. The highest levels of nitrite were found in samples taken in September 2013. This is likely the result of an increase in nutrients after a summer phytoplankton bloom. The presence of nitrite was found mainly in the northeastern part of the study area.

Higher nitrate concentrations were found in water samples taken in the fall and winter, which is consistent with the cycle of seasonal nitrate changes in marine waters. During spring and summer, a decrease in nitrate content was observed in the water samples, which is related to the period of increased phytoplankton vegetation and primary production.

Ammonia in waters taken from the BIII offshore wind farm area in October 2012 and February and November 2013 was found in few samples. Higher concentrations of ammonia were found in July, September and November. The concentrations found in the analyzed surface and bottom water samples do not deviate from the concentration values characteristic of Baltic waters. In the bottom layer, the highest concentration of ammonia became apparent during the autumn period (October 2012 and November 2013), when there is a subsidence of organic matter after an intense phytoplankton bloom.

Changes in mineral nitrogen content are consistent with seasonal changes in nutrients observed in Baltic Sea waters. The obtained average concentrations from the months of January through March do not exceed the limits for Class I water quality.

Comparing the seasonal changes in the average concentrations of total nitrogen in each measurement period, it is noted that the content decreases in July and the total nitrogen pool is rebuilt in autumn and winter. Analysis of the spatial distribution of total nitrogen concentrations in the surface and bottom layers shows a fairly even distribution of concentrations in the study area of OWF BIII.

Phosphate content in samples from the IMF BIII field ranged from below the limit of quantification (0.132 $^{pmol\text{-}dm\text{-}3}$) to 1.633 $^{pmol\text{-}dm\text{-}3}$. Analysis of the spatial distribution of phosphate concentrations in water samples from the WBW III study area shows a similar distribution in the surface and bottom layers. The highest concentrations were found in October 2012 and February 2013. In the following months, phosphate content decreased in accordance with the seasonal cycle of nutrient variability. A period of intense phytoplankton blooms is followed by a gradual recovery of phosphate content during the autumn and winter.

The range of total phosphorus concentrations found in the analyzed water samples from the BIII offshore wind farm area ranged from values below the limit of quantification of 0.3 ^mol-dm-3 to 2,341 ^mol-dm-3. Analysis of spatial distributions of total phosphorus concentrations in the surface layer of water from the BIII OWF area showed the highest concentration in October 2012 in the southern part of the area, while in February and September 2013 in the northwestern part of the BIII OWF area. The observed differences in the spatial distribution of phosphorus are small, and on the basis of the scope of the study, it is not possible to say conclusively which factors had the greatest influence on the situation found. During the other periods as well as in the bottom layer, phosphorus concentrations were fairly evenly distributed. Analyzing the seasonal variability of phosphorus compounds in the waters of the study area, it was found that the highest phosphate concentrations in most of the analyzed water samples were found in February, a period when the biogenic pool in the Baltic Sea waters is restored.

The waters of the study area were characterized by low levels of particularly harmful substances. Concentrations of polychlorinated biphenyls, free and bound cyanides, metals (Pb, Cd, Cr, Cr(VI), As, Ni, Hg) and phenols were present at very low levels. The waters studied are also characterized by low values of ^{137Cs}and ^{90Sr}activity,-typical of southern Baltic waters and confirming the slow downward trend of ^{90Sr}and ^{137Cs}concentrations in the Baltic Sea area (Zalewska, 2012).

The mineral oil index value was also traceable.

In the BIII offshore wind farm area, concentrations of PAHs were observed that were slightly higher than the literature.

Comparing the obtained results of water testing with the limit values specified in the Regulation of the Minister of Environment of November 09, 2011 on the *method of classification of the state of surface water bodies and environmental quality standards for priority substances* (Journal of Laws 2011, No. 257, item.1545)[1], it is possible to classify the studied area of OWF BIII as water quality class I (very good condition) due to the content of dissolved oxygen at the bottom, BOD5, inorganic nitrogen compounds (in winter), total phosphorus and OWO (in summer), free and bound cyanides, mineral oil index, phenols and metals (As, Cr (VI), Cu). The waters of the study area also showed no exceedances of marine water quality indicator limits for PAHs (naphthalene, benzo(a)pyrene fluoranthene, the sum of benzo(b)fluoranthene and benzo(k)fluoranthene, and the sum of benzo(g,h,i)perylene and indeno(1,2,3,c,g)pyrene) as well as cadmium, lead, mercury and nickel.

Due to the slightly elevated average annual pH values of the tested waters, total nitrogen concentrations in the summer months and phosphate concentrations in the winter, the waters of the BIII OWF area were classified as Class II water quality, which means waters in good condition (based on the results of tests of physical and chemical indicators).

Also, according to the current regulation of the Minister of Infrastructure of June 25, 2021 on the classification of ecological status, ecological potential and chemical status, and the method of classifying the status of surface water bodies, as well as environmental quality standards for priority substances

[1] Despite the repeal of the aforementioned regulation, it was deemed reasonable to refer to the limits specified therein due to the fact that the cited studies were conducted during the period of its validity. At the time of the survey, there was no regulatory act relating to marine waters, so the results were referred to the limits for coastal waters.

(Journal of Laws of 2021, item 1475), the water quality of the basin is within the values specified for good water status.

The waters of the study area also did not exceed water quality indicator limits for average PAHs (naphthalene, benzo(a)pyrene fluoranthene, the sum of benzo(b)fluoranthene and benzo(k)fluoranthene, and the sum of benzo(g,h,i)perylene and indeno(1,2,3,c,g)pyrene) as well as cadmium, lead, mercury and nickel.

However, due to a slight increase in the average annual pH of the tested waters and the concentration of phosphates during the winter, the waters from the BIII OWF area were classified as water quality class II, that is, waters of good condition (based on the results of physicochemical tests).

Based on the results of the studies and analyses obtained, the BIII offshore wind farm area was also evaluated in accordance with the IODR, i.e., assessments of descriptive indicators of pressure W5 - eutrophication and W8 - pollutants. The evaluation of W5 indicators was based on the analysis of nutrients (DIP - phosphate phosphorus, TP - total phosphorus, DIN - soluble inorganic nitrogen, TN - total nitrogen and dissolved oxygen at the bottom). Based on the analysis, it is considered that the marine waters of the analyzed area are classified as below good status (sub-GES) - according to the classification in accordance with the IODR.

Sea currents

Seasonal variations in the values of current velocities are evident. The greatest variability was recorded in the layer at a depth of 0-4 meters below sea level. Such values of water flow were recorded during a strong storm in the Baltic Sea on 31.01 - 02.02.2013. The velocities of water flow in the deeper layers, oscillate between 0 and 50 cm/s and are characterized by much smaller amplitudes.

Waving

The most intense ripples occurred in autumn and winter, while the calmest were in spring and summer. The highest wave recorded was 6.14 meters high and the highest significant wave was 3.89 meters. The average wave height (calculated as the average of all recorded average waves) for point 001 was 0.57 m and for point 002 - 0.54 m. The wave motion was mainly from the west (W) and northeast (NE) directions.

Water temperature

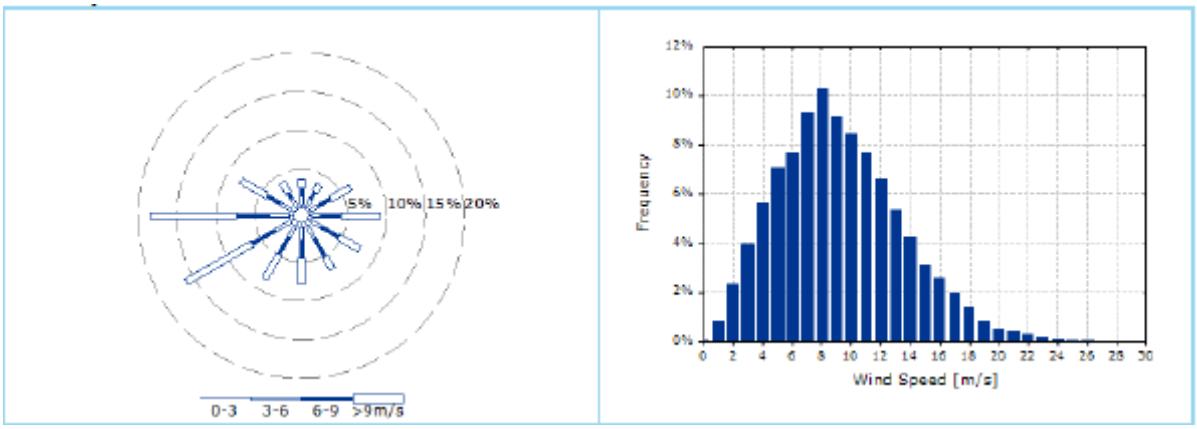
The temperature values do not deviate from the standard values for the entire measurement period. There were no extreme phenomena, deviating from the standard values for the South Baltic area (The Climate of Baltic Sea Basin, 1998). An increase in the average temperature of the Baltic Sea was observed (from 6.3°C to 7.8°C).

2.2. Indicators meteorological

Wind

Based on monitoring studies conducted for the project(Appendix C to the Report), the area of the planned BIII OWF is dominated by winds from the western and southwestern sectors with wind speeds above 9m/s, as shown below (Figure 1).

Figure 1. Wind rose and wind speed frequency distribution [m/s]



Source: (DNV GL 2019)

Wind speeds range from 0-5 degrees on the Beaufort scale. The period when winds of greater strength blow is autumn and winter, which coincides with the period of storms at sea, where wind speeds exceeded 20-23 m/s.

Air temperature

Air temperature had an annual pattern consistent with the average temperature pattern in the Baltic area (Climate of Baltic Sea Basin, 1998). The minimum value did not exceed -10 o, while the maximum temperature was less than 25°C. The area of open sea blurs the influence of the continent on thermal conditions. Winters are milder and summers are cooler. The possibility of ice phenomena in the area of OWF BIII is described as negligible.

2.3. Sea currents and undulations

The study made it possible to observe seasonal variations in the values of current velocities. The greatest variability was recorded in the layer at a depth of 0-4 meters below sea level. Such values of water flow were recorded during a strong storm in the Baltic Sea on 31.01 - 02.02.2013. Water flow velocities in the deeper layers, oscillate between 0 and 50 cm/s and are characterized by much smaller amplitudes.

The most intense ripples occurred in autumn and winter, while the calmest were in spring and summer. The highest wave recorded was 6.14 meters high and the highest significant wave was 3.89 meters. The average wave height (calculated as the average of all recorded average waves) for point 001 was 0.57 m and for point 002 - 0.54 m. Wave movement was mainly from the west direction

(W) and northeast (NE). The maximum differences in the levels of the mean free sea surface for both measurement points during the period in question significantly exceeded 1 m.

3. Summary

The parameters studied did not differ significantly from those characteristic of the South Baltic area, demonstrated both within the framework of the PMŚ and within the framework of studies conducted in areas designated for the construction of other wind farms.

The BIII offshore wind farm area, according to the HELCOM division of marine waters into sub-areas used for the implementation of the RDSM, lies within the Bornholm Basin sub-area. The waters of this

sub-acreage have been evaluated under the PME for, among other things, criteria related to water pollution:

D5 - evaluation of eutrophication based on analysis of the content of biogenic substances (phosphate, inorganic nitrogen, phosphorus and total nitrogen), as well as chlorophyll "a", seawater transparency and dissolved oxygen at the bottom,

D8 - hazardous substances in the environment.

Based on the analysis, it is considered that the marine waters of the analyzed area were classified as below good (sub-GES) in 2017, 2018 and 2019 (GIOŚ 2018, GIOŚ 2019, GIOŚ 2020).

Studies conducted for the BIII offshore wind farm area show similar marine water quality values to the results obtained for the Baltica 2 offshore wind farm area (IMG Consortium and MEWO et al. 2017) and the Baltic Power offshore wind farm (IMG Consortium and MEWO et al., 2020), which are adjacent to the Project.

4. Literature and other sources

4.1. Literature, expert studies and administrative decisions administrative

1. DNV GL, Central Baltic III Wind Farm, Measurement campaign Data - Summary, 2019
2. Offshore wind farm Baltic Central II. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015
3. Consortium of the Maritime Institute in Gdansk (IMG) and MEWO S.A. together with Subcontractors, Environmental Impact Report of the Baltica Offshore Wind Farm, Gdansk, 2017
4. Consortium of the Maritime Institute of the Maritime University of Gdynia (IMG) and MEWO S.A. together with Subcontractors, Baltic Power Offshore Wind Farm Environmental Impact Report, 2020
5. Chief Inspectorate for Environmental Protection (GIOŚ), Assessment of the state of the environment of Polish marine areas of the Baltic Sea on the basis of monitoring data from the year 2018 against the background of the decade 2008- 2017, Warsaw, 2019
6. Regulation of the Minister of Infrastructure of April 13, 2021 *on the adoption of an update of the set of characteristics typical of good environmental status of marine waters* (Journal of Laws of 2021, item 568)
7. Regulation of the Minister of Environment of November 9, 2011 *on the method of classification of the state of surface water bodies and environmental quality standards for priority substances* (Journal of Laws 2011, No. 257, item.1545)
8. Regulation of the Minister of Infrastructure of June 25, 2021 on the classification of ecological status, ecological potential and chemical status and the method of classifying the status of surface water bodies, as well as environmental quality standards for priority substances (Journal of Laws of 2021, item 1475)
9. Ordinance of the Council of Ministers of December 11, 2017 on the adoption of the National Program for the Protection of Marine Waters (Journal of Laws, item 2469)
10. Consortium of the Maritime Institute in Gdańsk (IMG) and MEWO S.A. with Subcontractors (IMG and MEWO Consortium), Environmental Impact Report for the Baltica Offshore Wind Farm, Gdańsk, 2017
11. Resolution No. 170 of the Council of Ministers of November 15, 2018 on giving consent to the submission to the European Commission of a draft update of the set of environmental objectives for marine waters (M.P. item 173)
12. Resolution No. 8 of the Council of Ministers of January 18, 2019 *on granting consent to submit to the European Commission an update of the preliminary assessment of the state of the marine water environment with a draft update of the set of characteristics typical of good environmental status of marine waters* (M.P. item 230)

5. List of drawings

Figure 1. Wind rose and wind speed frequency distribution [m/s] *9*

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 3

Environmental characteristics - seabed

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Abbreviations and definitions

OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
Report	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22

1. Introduction

The section presents a characterization of the seabed of the area of the planned BIII OWF, made on the basis of the results of studies conducted to determine the type of substrate for the Project.

In the BIII offshore wind farm area, a survey was conducted to describe: the depth of the bottom within the boundaries of the designated firing range, the nature of the bottom, the sediments present on its surface, and to identify the geological structure. Shallow boreholes were also drilled, from which core samples were taken to determine the type of bottom-building sediments.

During the course of the survey, data were collected, which were then used to create the following maps: bathymetric, sonar image of the bottom, maps of the depths of the various sediments. The methodology of the study and the results of the tests performed, along with their analysis, are presented in Appendix D of the Report.

The surveys carried out made it possible to determine the geological structure of the seabed - the type, geological structures and age of the sediments building the base of the planned project, and provided an opportunity to characterize the surface sediments of the seabed. Side-scan sonar measurements provided data showing an image of the bottom surface. The individual profiles were assembled into a sonar mosaic of the bottom. This image was the basis for determining sedimentary structures (accumulations of sediments arranged in characteristic forms): ripplemarks, sand waves and pebbles. Reconnaissance of the seafloor also made it possible to identify the presence of underwater objects.

The key conclusions of the research and analysis performed are presented below. The studies performed are considered sufficient, both in scope and timeliness, to determine the sensitivity of the environment and assess the environmental impact of OWF BIII (see Volume IV).

2. Characteristics of the seabed sea

The sculpture of the IMF BIII bottom is varied. The depth of the study area ranges from about 23.5 meters in the southwestern part to about 43 meters in the northwestern part. The slope of the bottom is relatively gentle. In the northwestern part, the relief of the bottom is varied - there are forms of ridges and depressions formed on the surface of clays. Denivelations within these forms reach about 3 meters. A bathymetric map of the area is shown in Figure 1.

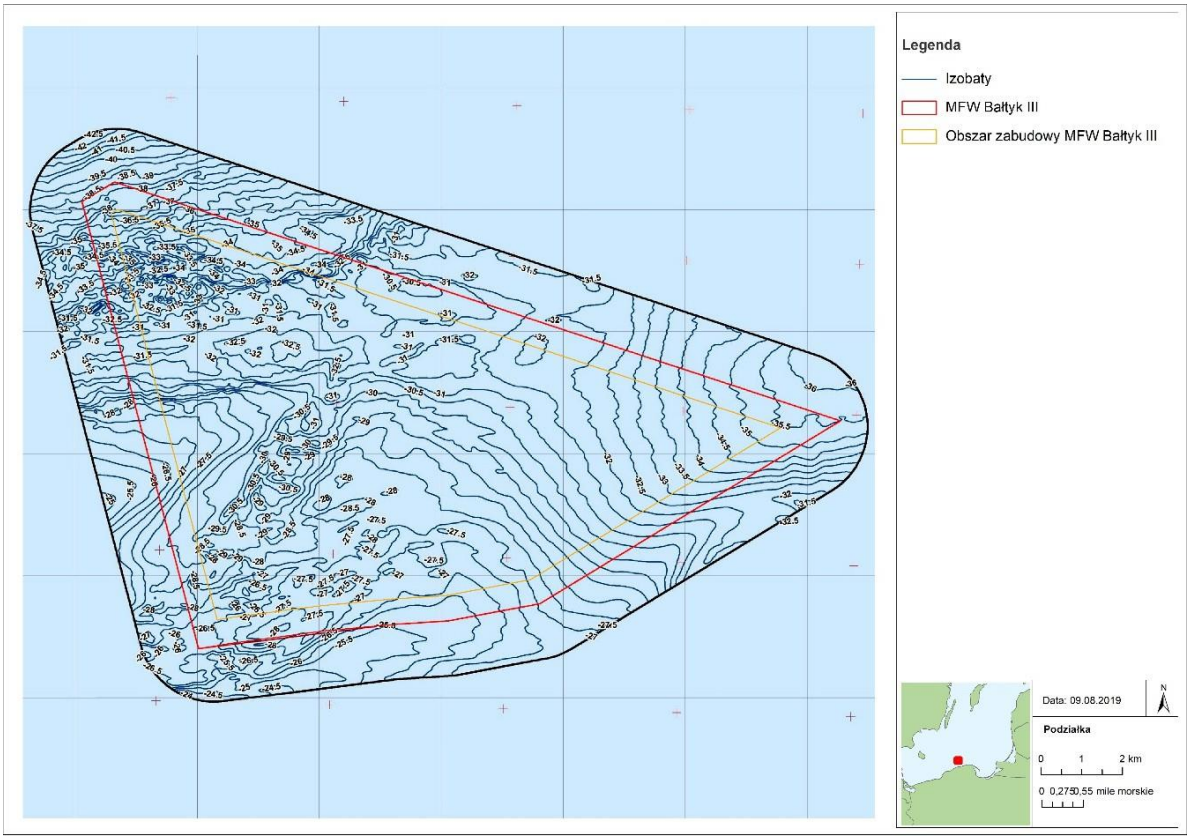
The relief and geological structure of the BIII OWF field is related to the presence of the Scandinavian ice sheet, the subsequent deglaciation (disappearance of the ice sheet) of the area and the activity of modern processes on the seabed. Five areas with different bottom relief and different genesis were separated (Figure 2):

P1 - outcrop of glacial till with a variable sand and gravel cover, formed as a result of erosion processes associated with the thawing of this part of the bed;

P2 and P3 - complexes of kem terraces, formed at the moraine elevation near the front of the ice sheet, formed by the action of surface runoff, outflows of evaporative waters;

P4 - sW-NE runoff valley with numerous sill formations; P5 - accumulation plain (area of accumulation of glacial and marine sediments)

Figure 1. Bathymetric map of the OWF BIII area



Legenda	Legend
Izobaty	Isobates
MFW Bałtyk III	OWF Baltic III
Obszar zabudowy MFW Bałtyk III	Baltic III offshore wind farm development area
Data: 09.08.2019	Date: 09.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

The bottom surface of OWF BIII is represented by 5 types of bottom sediments separated on the basis of sonar images of the bottom. Featured:

- outcrops of glacial till,
- heaping clays with a thin cover of sands,
- marine sands,
- miscellaneous sediments,
- iles and mules.

Boulders and anthropogenic underwater objects, i.e. cables, ropes, nets, logs, anchors, barrels, have been marked on the sonar map, along with assigned geographical coordinates.

The layer of surficial sediments was described on the basis of geological interpretation of seismoacoustic profiles in relation to data obtained from side-scan sonar recordings. On the surface of the bottom there are mainly fine and medium-grained modern marine sands, constituting the so-called dynamic layer, which is subject to displacement under the influence of wave action. The thickness of this layer is variable, averaging from about 0.2 to about 1.7 meters.

As a result of the analysis, four main types of sediments were distinguished in the deep structure of the analyzed area: sands, differentiated sediments, clay/silt and glacial till.

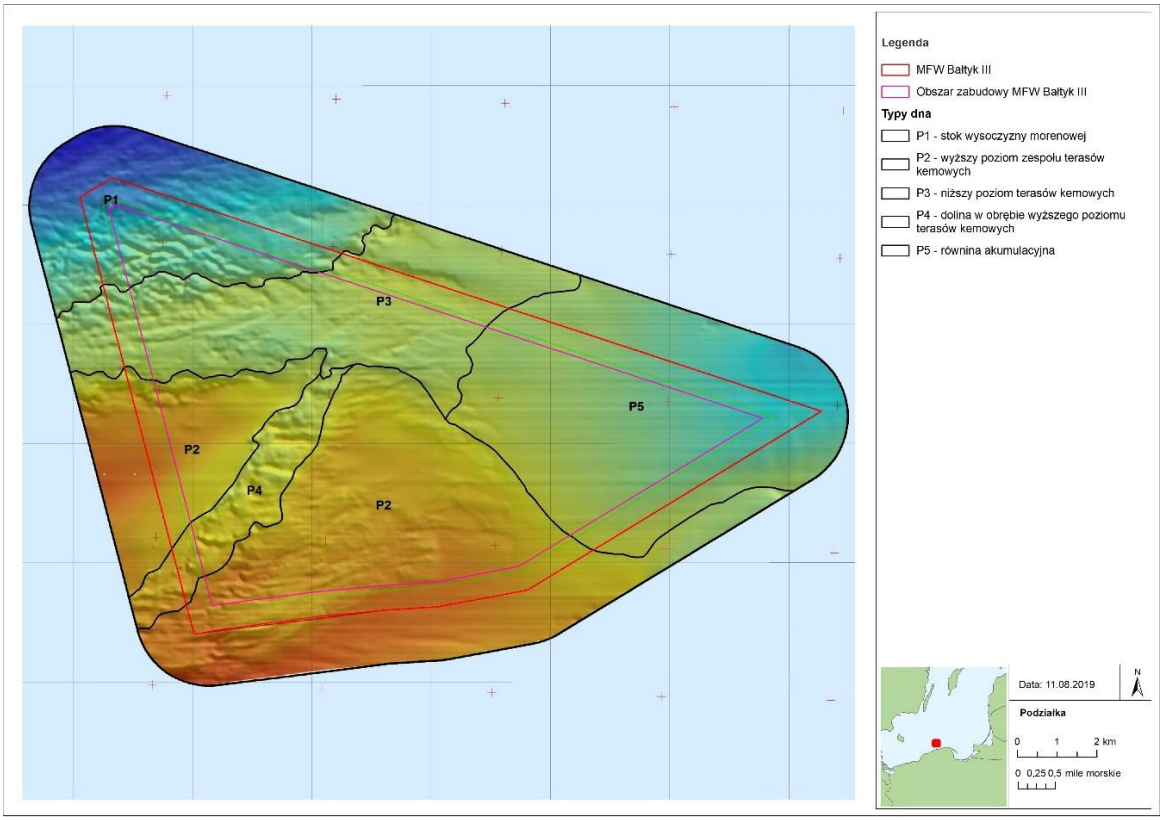
Till clays are found in the deep structure of the entire fama. In the northern and northwestern parts of the study area, they form extensive outcrops, locally covered by a thin layer of sands and gravels.

In the relief of the clay subsoil, in the central part, an elongated hill with a SW-NE course is marked. On both sides of the hill are depressions filled with silty-clay sediments.

An extensive cover of sands, ranging in thickness from a few tens of centimeters to several meters, lies on the surface over a significant area of the study field.

Geological and geomorphological conditions of the BIII OWF area are considered (based on the reconnaissance so far) favorable for the foundation of OWF elements.

Figure 2. Map of surface types in the area of OWF BIII



Legenda	Legend
MFW Bałtyk III	OWF Baltic III
Obszar zabudowy MFW Bałtyk III	Baltic III offshore wind farm development area
Typy dna	Bottom types
P1 – stok wysoczyzny morenowej	P1 - slope of the moraine upland
P2 – wyższy poziom zespołu terasów kemowych	P2 - higher level of kem terraces complex
P3 – niższy poziom terasów kemowych	P3 - lower level of kem terraces
P4 – dolina w obrębie wyższego poziomu terasów kemowych	P4 - valley within the higher level of kem terraces
P5 – równina akumulacyjna	P5 - accumulation plain
Data: 11.08.2019	Date: 11.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 5

Impact assessment on migratory birds

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Abbreviations and definitions

IMF	Offshore wind farm
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
PGG	Act of June 9, 2011. - Geological and Mining Law (consolidated text Dz. U. of 2021, item 1420, as amended).
Report	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22

1. Introduction

The section presents a characterization of the occurrence of mineral resources in the area of the planned OWF BIII, in terms of assessing the potential suitability for exploitation of sedimentary accumulations (gravel, gravel-sand, sand-gravel and sand). The results of the Maritime Institute's field and laboratory surveys of the seabed, the results of laboratory tests of sediment samples were used for the analysis.

A methodological description of the raw material analyses performed and detailed results with a preliminary assessment are presented in Appendix E of the Report.

2. Characteristics of the occurrence of mineral resources minerals

In order to assess the operational suitability of sediment accumulations in the area of the Baltic III offshore wind farm, literature data and the collected results of field surveys of the seabed and laboratory tests performed in the area by the Maritime Institute were used, as well as the results of laboratory tests of sediment samples.

Sonar surveys and surface samples taken by the Maritime Institute in the study area show that there are accumulations of boulders and stones on the bottom surface, often preventing sediment sampling. There are also outcrops of glacial till, gravels, coarse-grained, medium-grained and fine-grained sands (up to a few centimeters thick) lying on glacial till, and fine-grained and very fine-grained sands.

In the northern part of the study area, there are coarser sandy-gravel deposits of small thickness (up to 30 cm) lying on clays. In the northwestern part on the surface of the bottom, there are clays. It is also an area of boulders and stones. In the eastern part, the thickness of sandy sediments (various grains) is greater than 1 m.

The research conducted allowed:

- ocontouring of potential deposits of raw materials .Due to the small fields of these sediments (gravelly sands) and the significant overburden (2 m) of mainly fine-grained and very fine-grained sands make these deposits unusable from a technological and economic point of view as of today;
- charting areas of boulder fields and outcrops of glacial till over a significant area, which deposits preclude the existence of accumulations of raw materials of a depositional nature on these surfaces;
- confirmation of the presence of sands in the southeastern part of the area. These are fine-grained and very fine-grained sands, which are not suitable for shoreline recharge.

Macroscopic analysis of cores taken during field surveys by the Maritime Institute and literature data showed the absence of heavy minerals in the sediments of OWF BIII. No amber was found in sediments taken from the OWF BIII field. Literature data exclude the study area as prospective for the exploration of amber deposits.

The area of OWF BIII partially overlaps with areas of hydrocarbon deposits (without the conflict of coexistence of the OWF and potential exploitation).

In the area of the planned offshore wind farm BIII and in its vicinity, there are no valid licenses for exploration, prospecting and production of hydrocarbons from deposits issued under the provisions of

the PGG.[1]

[1] Based on information made public on the website of the Ministry of Environment's Public Information Bulletin - as of March2022 (https://bip.mos.gov.pl/pl/koncesje-geologiczne/mapy-koncesji-na-poszukiwanie-rozpoznawanie-i-wydobywanie-kopalin-ze-zloz-pliki-jpeg-i-shapefile/rok-2022/; access date: 22.03.2022 r.)

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 5

Environmental characteristics - bottom sediments

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Abbreviations and definitions

LOI	Method for determining dry matter loss during roasting
IMF	Offshore wind farm
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
PCB	Polychlorinated biphenyls
Report/EIA	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
TBT	Tributyltin
WWA	Polycyclic aromatic hydrocarbons

1. Introduction

The section presents the characteristics of bottom sediments as an important element of the Baltic Sea aquatic ecosystem. The results obtained from field and laboratory surveys of the seafloor (see Appendix D of the EIA) and the results of laboratory tests of surface sediment samples (see Appendix F of the EIA) were used for the analysis.

For the development of the Report, including the characterization of bottom sediments in terms of physical and chemical properties and sensitivity to potential impacts of the Project, the results of the following studies were used: moisture content, roasting losses, total content and labile form of metals (Pb, Cu, Zn, Ni, Cd, Cr, As, Hg), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), mineral oils, ^{137Cs}radioactivity, tributyltin (TBT), and nutrient content (total nitrogen and total phosphorus).

The detailed results of the study, along with a description of the methodology used, are attached as Appendix F to the Report.

Based on the results obtained, the following are the key conclusions of the research and analysis performed. The studies performed are considered sufficient to obtain reliable and representative data for assessing the environmental impact of OWF BIII.

In addition, the summary refers to the results of surveys covering the northern part of the Project area carried out for the Baltica offshore wind farm project, as well as surveys carried out for the Baltic Power offshore wind farm project about 2 km away from the Project area.

2. Characteristics of the sediments bottom sediments

The construction of wind turbines (and in particular the laying of foundations) involves a great deal of disturbance to the bottom sediments, so there is a potential danger of releasing contaminants from the sediments into the water table and thus deteriorating water quality and its condition. The studies conducted in the aforementioned area allow estimating the potential impact on water levels, especially during the construction phase (see Volume IV, Chapter 2 of the EIA). The concentrations of the studied parameters will also serve as a background (reference) in monitoring studies conducted in the study area during the operation stage of the farm.

None of the tested sediment samples from the BIII offshore wind farm area exceeded the permissible concentrations of metals, PAHs and PCBs, as specified in the now-defunct (due to the repealed legal basis) Regulation of the Minister of Environment of April 16, 2002 on the *type and concentrations of substances that cause the excavated material to be contaminated* (Journal of Laws of 2002. No. 55, item 498). The study showed that the bottom sediments taken from the BIII OWF area are not hazardous in terms of the tested substances, and according to the Law on Waste of December 14, 2012, Article 2, item 7 (Journal of Laws 2021, item 779), they can be moved within the waters.

2.1. Moisture content and roasting losses roasting

The analyzed surface bottom sediments from the BIII offshore wind farm area collected in both June/July and November belonged to inorganic sediments with organic matter content expressed by loss on ignition (LOI) <10%. The average value of LOIs taken in June/July was 0.33% and 0.31% in November, indicating that the BIII OWF study area is located in an erosion bottom zone, where continuous physical activity of the waters causes sediment resuspension, i.e. the movement of insoluble sediment particles into the water table due to water movement (see Appendix F of the EIA).

2.2. Phosphorus general

According to the literature (see Appendix F of the EIA), the phosphorus content of the surface layer of Baltic sediments in the region of continuous accumulation of fine and dispersed sediments is higher than in the region of their transport and erosion.

The average concentration of phosphorus in the area of OWF BIII, was 265 mg kg $^{-1}$ s.m. in June/July and 264mg kg $^{-1}$ s.m. in November (from 145 to 784 mg kg -1 s.m.), respectively Higher concentrations of phosphorus (450-784mg kg $^{-1}$ d.m.) were observed in the northwestern and southwestern parts of the study area, where clayey sediments and sands on clays were found (see Appendix D and Appendix F of the EIA). In this type of sediment there is an easier accumulation of nutrients. Also, slightly higher concentrations of total phosphorus were found in the vicinity of the wreck (measuring stations BS3_504-BS3_507) - however, these are not concentrations above the level typical of Baltic Sea sediments (see Appendix D to the EIA).

The content of total phosphorus found in the analyzed sediments from the BIII offshore wind farm area in both measurement periods did not exceed the values typical for Baltic Sea sediments, which means that the sediments from the studied area are not rich in total phosphorus.

2.3. Nitrogen total

The main source of nitrogen in sediments is organic matter. Nitrogen in organic combinations is usually the dominant form of this element in bottom sediments. Inorganic forms of nitrogen are known as exchangeable and bound nitrogen. Exchangeable nitrogen represents ammonia adsorbed on the surface of clay minerals and/or organic matter. This form is easily displaced by other cations. Bound nitrogen is ammonia adsorbed to the interior of the crystalline structure of clay minerals and only marginally subject to ion exchange.

The average concentration of total nitrogen in the area of the planned project was 792 mg N kg $^{-1}$ d.m. in June/July and 616 mg N $^{kg-1}$ d.m. in November, respectively. Higher concentrations of total nitrogen were observed in the northern and northwestern parts of the BIII OWF area, where clayey sediments and sands on clays were found (see Appendix D and Appendix F of the EIA). In this type of sediment there is an easier accumulation of nutrients.

The content of total nitrogen found in the analyzed sediments from the BIII offshore wind farm area during the study period is comparable to the concentrations determined for Baltic Sea sediments.

2.4. Metals - total content

Heavy metals, migrating from the environment in various ways to surface waters (from anthropogenic sources as well as due to natural geochemical processes), are mainly deposited in bottom sediments. Despite their temporary immobilization, they pose a potential threat to biological life in a given reservoir, since under favorable conditions metals can be released from the sediment into the water depths, enter the trophic chain of the ecosystem and, as a result, restart their circulation in the environment.

The content of metals in the bottom sediments of the study area occurred at relatively low levels.

The distribution of concentrations of the elements studied was more or less evenly distributed throughout the study area. Slightly elevated metal concentrations were observed in the northwestern and southwestern parts of the farm area, where clayey sediments and sands on clays were found. No elevated concentrations of metals were observed in the area of the wreck.

The tested sediments were characterized by low heavy metal contents. Concentrations of mercury and cadmium were present in most of the sediment samples collected, below the lower limit of quantification, which for mercury was 0.01 $^{mg\text{-}kg\text{-}1}$ d.m., while for cadmium was 0.05 $^{mg\text{-}kg\text{-}1}$ d.m. The concentration of lead ranged from 0.96 to 7.40 $^{mg\text{-}kg\text{-}1}$ d.m., copper from 0.25 to 45.0 $^{mg\text{-}kg\text{-}1}$ d.m., nickel from 0.38 to 11.82 $^{mg\text{-}kg\text{-}1}$ d.m., arsenic from less than 1.25 to 5.05 $^{mg\text{-}kg\text{-}1}$ d.m., while the concentration of zinc in the tested sludge did not exceed 60 $^{mg\text{-}kg\text{-}1}$ d.m.

In the studied area of OWF BIII, the concentrations of analyzed metals (lead, copper, zinc, nickel, cadmium, chromium, arsenic, mercury) did not exceed typical values for sandy sediments of the southern Baltic Sea shown in the literature.

2.5. Metals - form labile

In terms of persistence and physical-chemical linkages, the way metals are bound to the sediment can generally be divided into two main groups: the part permanently bound in the crystal lattice - mainly to aluminosilicates, and the mobile (labile) part of metals susceptible to transition under natural conditions to the water table.

In order to assess how much of the metals from the bottom sediments from the BIII offshore wind farm area may pass into the water depths, the percentage of the labile form of each metal relative to its total content was calculated. This analysis showed that in the BIII OWF area in question, more than 70% of the lead and 54% of the copper present in the studied sediment can pass from the sediment to the water depth under favorable conditions. Zinc, nickel and chromium present in the tested sludge are mostly bound to it in a permanent manner. Only 31% of Zn, 36% of Ni and 29% of Cr can pass from the sediment to the water table under favorable conditions.

None of the tested sediment samples from the area of OWF BIII exceeded the permissible values of metals specified in the repealed Regulation of the Minister of Environment dated 16.04.2002 on the *type and concentrations of substances that cause the spoil to be contaminated (Journal of Laws No. 55, item 498)*. The limits (specified in this regulation) for individual metals are respectively: Hg (1.0 $^{mg\text{-}kg\text{-}1s}$.m.), Pb (200 $^{mg\text{-}kg\text{-}1s}$.m.), Cu (150 $^{mg\text{-}kg\text{-}1s}$.m.), Zn (1000 mg-kg-1s.m.), Ni (75 $^{mg\text{-}kg\text{-}1s}$.m.), Cd (7.5 $^{mg\text{-}kg\text{-}1s}$.m.), Cr (200 $^{mg\text{-}kg\text{-}1s}$.m.), As (30 $^{mg\text{-}kg\text{-}1s}$.m.).

2.6. Polycyclic aromatic hydrocarbons (PAHS)

Polycyclic aromatic hydrocarbons are compounds containing only carbon and hydrogen arranged in 2 - 13 aromatic rings adjacent to each other in the form of a "honeycomb." They are mainly formed as by-products of many processes, both natural and anthropogenic. Natural processes include forest and grassland fires, volcanic activity, geochemical reactions (e.g., the transformation of organic matter leading to the formation of oil). Anthropogenic processes are: burning of pastures and ditches, industrial processes, mainly related to the burning of oil and coal (refineries, coking plants, power plants and combined heat and power plants), household furnaces, automobile exhaust, waste incinerators, the plastics and dye industry, abrasion of automobile tires, emergency spills of oil and liquid fuels, cigarette smoke or home barbecues.

PAHs are found in all elements of the environment, and can enter bottom sediments along with atmospheric pollutants (dust), sewage and runoff, sediment and sewage water from storm sewers, ballast water, oil pollutants from associated with normal ship operations, and substances introduced during oil spills. The accumulation of PAHs in sediments is favored by, among other things: a high proportion of the muddy and clay fraction of the sediment, characterized by a large specific surface area and a high ability to retain hydrophobic pollutants on its surface, as well as a high content of humic substances and organic phosphorus, sulfur, nitrogen compounds (see Appendix F of the EIA).

All samples collected in the BIII offshore wind farm area from the surface layer of bottom sediments are characterized by low concentrations of tested PAH analytes, ranging from 0.001 to 0.086 $^{mg\text{-}kg\text{-}1s}$.m.

The obtained results of the analyzed PAH ratios may indicate that the source of surface sediment pollution in the study area is atmospheric deposition of pollutants from combustion processes (dust). The exceptions are the three samples taken at BS3_119, BS3_134 and BS3_506, where the concentration ratios indicate a petroleum origin of the analytes. One of these samples (BS3_506) was taken at the site of the detected wreck, where residues of petroleum products may have been present (see Appendix F of the EIA).

The concentrations of PAHs from the study area were compared with the limits determining the degree of contamination of the excavated material, which are presented in the repealed Decree of the Minister of the Environment dated 16.04.2002 *on the type and concentrations of substances that cause the excavated material to be contaminated* (Journal of Laws No. 55, item 498).

The comparison shows that the concentration of none of the PAHs listed in the above regulation was exceeded for any of the sediment samples taken.

2.7. Polychlorinated biphenyls (PCBS)

PCBs do not occur in nature as natural chemical compounds, and their appearance in the environment is the result of unintentional or inappropriate human activity, as a result of which PCBs entered the environment after a period of widespread use and increased production. Currently, their production has been halted and measures have been taken to reduce the associated environmental risks.

Significant amounts of these compounds are transported by air currents, are leached by rains, transported by surface water, and leached from the soil into water. As a result of atmospheric transport and river runoff, PCBs have entered marine and oceanic ecosystems. They become trapped on the surface of organic particles suspended in the water and enter the bottom sediments as a result of falling. Their accumulation in sediments is favored by a high proportion of the silty and clay fraction (< 0.063 mm) and a high content of organic matter (> 10%) (see Appendix F to the ROOŚ, per: Bolalek (ed.), 2010).

The obtained results of PCBs in bottom sediments from the BIII offshore wind farm area do not deviate from the literature data on PCBs in surface bottom sediments of the southern Baltic Sea, while being in their lower range, indicating a recent decrease in the concentration of these compounds.

The concentrations of total PCBs from individual points were compared with the limits determining the degree of contamination of the excavated material, which are presented in the repealed Decree of the Minister of the Environment dated 16.04.2002 on the *type and concentrations of substances that cause the excavated material to be contaminated (Journal of Laws No. 55, item 498)*.

The comparison shows that the concentration of the sum of seven congeners (i.e., "substances of the same type" denoted by the letter abbreviation of their name and assigned consecutive number) of PCBs (Nos. 28, 52, 101, 118, 138, 153, 180) (0.3 mg-kg-1 s.m.) was not exceeded for any of the samples taken from the BIII OWF study area (see Appendix F to the EIA).

2.8. Oil mineral

The largest source of oil pollution is land-based runoff from contaminated process water from industrial plants, water after washing motor vehicles, and from the flushing of fuels and oils lost by cars on paved

parking lots and streets. The second major source of oil is the normal (and therefore trouble-free) operation of ships, including sports vessels. Only in third place (globally) are tanker disasters. They are not much inferior to oil pollutants introduced by the atmosphere, coming mainly from incomplete combustion of liquid fuels in engines and boiler or thermal power plants. Natural sources, i.e. seepage through cracks in the earth's crust and seepage of oil through permeable layers, come next. In last place is the extraction of oil from beneath the seabed, i.e. the activities of exploration and production platforms (see Appendix F of the EIA, after: Gierak, 1995; Fabisiak, 2008; Korzeniowski, 1998).

In the study area, the concentration of mineral oil was low, while no oil above the analytical method's limit of quantification was found in samples taken in the area of the detected wreck.

The low values of the determined concentrations correlate with the low content of organic matter in the studied sediments and are adequate to the geological structure of the studied sediments (sands and gravels), which do not have the capacity to retain the compounds in question (see Appendix F to the EIA).

2.9. Radionuclides

The level of radioactivity in the Baltic Sea is mainly shaped by the presence of isotopes of cesium (^{137}Cs) and strontium (^{90}Sr). Both isotopes were prevalent in the marine environment both before the Chernobyl nuclear power plant accident in 1986 and today. They are isotopes of entirely anthropogenic origin and are characterized by long half-life times.

Sediments in the study area were also characterized by low radioactive concentrations of ^{137}Cs typical of sandy sediments. These concentrations varied from 1.1 to 6.61 Bq $^{kg-1}$ and were typical of sandy sediments of the southern Baltic Sea (with low organic matter and fine (silty) fractions, conducive to radionuclide accumulation).

According to the literature (see Appendix F of the EIA), the radioactive concentrations of ^{90}Sr in muddy sediments remain far lower than those of ^{137}Cs. Therefore, it is expected that in the case of sediments with a dominant sand fraction (which is the case for the OWF BIII area), ^{90}Sr concentrations will remain below the quantification threshold. This was the basis for abandoning the analysis of ^{90}Sr in sediments from the area of the planned farm, deeming it unfounded.

2.10. Tributyltin (TBT)

Organotin compounds belong to the group of organometallic compounds. The main environmental contamination with organotin compounds comes from anthropogenic sources, where they are used in particular in the production of polymers (70%), as biocides (20%), for the production of organometallic derivatives (7%). In the environment, organotin compounds are formed only in negligible amounts by biomethylation.

TBT concentrations in the study area were at low levels (generally below 0.01 mg-kg$^{"1}$ d.m.), characteristic of sandy sediments in the southern Baltic region.

Elevated TBT concentrations are generally found in sediments located in ports, harbor channels, shipyards and near waterways.

3. Summary

As a result of the study, it was found that the surface bottom sediments from the Project area belong

to inorganic sediments with an organic matter content of less than 10%. Concentrations of total phosphorus and total nitrogen do not exceed values typical of biogenic substances in the sediments of the southern Baltic Sea. Tested sediments from the Project site were characterized by low levels of heavy metals. All samples were characterized by low concentrations of the tested PAH analytes, which did not exceed values typical for the sediments of the southern Baltic Sea.

The results of the concentrations of the sum of the seven PCB compounds were mostly below the method's limit of quantification. The results obtained do not differ from the literature data on PCBs in the surface bottom sediments of the southern Baltic Sea, and, being in their lower range, indicate a decrease in the concentration of these compounds over time. The concentration of mineral oil was low in the study area. The oil concentration results for most samples are also mostly below the lower limit of quantification of the method.

The sediments studied were also characterized by low radioactive concentrations of 137Cs typical of sandy sediments of the southern Baltic Sea. TBT concentrations in the study area were also at low levels, typical of sandy sediments in the southern Baltic region.

None of the sludge samples tested exceeded the permissible concentrations of metals, PAHs and PCBs, as specified in the Ordinance of the Minister of the Environment of May 11, 2015 on the recovery of waste outside installations and facilities (Journal of Laws, item 796).

The study showed that the bottom sediments taken from the BIII OWF area are not hazardous in terms of the tested substances, and according to the Law on Waste of December 14, 2012, Article 2, item 7 (unified text Dz. U. of 2022, item 699) may be moved within the waters.

In addition, during the surveys carried out in 2016-2017 for the Baltic offshore wind farm project, the northern section of the Project area was surveyed for bottom sediments. As a result of the study, it was found that the analyzed surface bottom sediments from the study area belong to inorganic sediments with an organic matter content [expressed by loss on ignition (LOI)] of less than 10%. The content of biogenic substances (total phosphorus and total nitrogen) in the study area did not exceed the values typical of southern Baltic sediments. Concentrations of persistent organic pollutants (i.e., PAHs, PCBs, TBT) and harmful substances, such as metals and mineral oils, in the study area were low and did not generally differ from literature data for sandy bottom sediments of the southern Baltic Sea. The sediments studied were also characterized by low radioactive concentrations of 137Cs typical of sandy sediments. Thus, the results of the surveys conducted for the Baltic offshore wind project were in line with those done for the Project. It is also worth mentioning that analogous results to those for the Project area were obtained during bottom sediment surveys carried out in 2018-2020 for the Baltic Power OWF project, which is about 2 km away from the Project area, indicating similar characteristics of the condition of bottom sediments in the Project area.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 6

Environmental characteristics - benthos and benthic habitats

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Abbreviations and definitions

IMF	Offshore wind farm
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
Baltic Power OWF	Baltic Power offshore wind farm
Phytobenthos	plants that are at least a few millimeters in size, and include vascular plants (Angiospermae) rooted in the bottom (e.g., seagrass) and macroalgae that attach themselves to hard surfaces (pebbles, wrecks, breakwaters), float freely on the bottom or float in the water's depths
Macrozoobenthos	synonym: benthic macrofauna, is the fraction of organisms that inhabit the surface of the bottom sediments (epifauna) or their interior (infauna), which, after washing, remains on a sieve with a mesh size of 1.0 mm (HELCOM 1988)

1. Introduction

The section presents a characterization of the benthos found in the area of the planned OWF BIII and in its vicinity. The characterization in question was developed primarily on the basis of the results of surveys conducted in the area of the planned farm and in the buffer zone by the Maritime Institute in 2013. The research was conducted by video inspection. The results of the study, along with a description of the study area, its scope and the methodology used, are attached as Appendix G to the Report.

The results of surveys carried out in areas adjacent to the BIII offshore wind farm area for the environmental impact assessment of the Baltica offshore wind farm, Baltic Power offshore wind farm and State Environmental Monitoring projects were also used to develop this section.

2. Characteristics of the benthos in the OWF area BIII

2.1. Phytobenthos

Phytobenthos surveys were conducted only on rocky bottoms for macroalgae.

The basis for determining the location of the phytobenthos-macroalgae video inspection was the analysis of bathymetric and sonar maps, as well as images from side-scan sonar bottom measurements taken during phytobenthos surveys. This made it possible to initially identify the characteristics of the sediments and the shape of the bottom. As the maximum range of macroalgae in the Baltic Sea is 22 m, the locations for the video survey were determined on hard bottom (boulders, pebbles) not exceeding 25 m depth.

Due to the depths found in the area of the planned OWF BIII and in its vicinity (about 20-40 m), which exclude the presence of rooted plants (recorded in the Baltic Sea to a depth of 10 m), phytobenthos research was conducted only for the presence of macroalgae on the rocky bottom. The designated sites of potential macroalgae occupied only 1% of the study area and were located in the southwestern part of the buffer zone. Video inspection was carried out at 20 video locations selected for this purpose using a remotely operated underwater vehicle ROV.

Surveys revealed the presence of filamentous brown algae (probably common in Polish marine areas *Pylaiella littoralis* and/or *Ectocarpus siliculosus*) and filamentous kelp (probably of the Rhodomelaceae family) in the buffer zone. During the analysis of the footage in 5 locations, the species of the pleuroid crayfish *Furcellaria lumbricalis* (formerly *F. fastigiata*), which is under strict protection in Polish marine areas in accordance with the Regulation of the Minister of Environment of October 9, 2014 on the protection of plant species (Journal of Laws of 2014, item 1409), was also identified. The characteristics of the aforementioned phytobenthic species are presented in Table 5.1 in Appendix G of the Report.

The macroalgae identified during the survey in most cases (82% of the locations where they occurred) were overgrowing unattached aggregations of mussels on the bottom, moving freely on the sand with the sea currents. Accordingly, the filamentous brown algae and kelp overgrowing the mussel beds on the sandy bottom (including the only protected species, *Furcellaria lumbricalis*), were considered temporary vegetation in the area of the planned farm.

Macroalgae attached to solid substrate (pebbles and boulders) were found in the buffer zone of the BIII offshore wind farm in only two locations, in the 23-25 m depth range. It was a filamentous kelp, most likely from the family Rhodomelaceae, which overgrew the bottom very sparsely, in the form of single specimens sparsely distributed on the bottom (bottom coverage <1%).

The results of the survey indicate that both the area where the BIII OWF is planned and the surrounding

buffer zone are not valuable in terms of phytobenthos. This is due to the unfavorable environmental conditions for phytobenthos development prevailing in the study area, i.e. great depths and limited availability of hard substrate, overgrown primarily with mussels.

In 2016, phytobenthos surveys were also conducted in the body of water located in the vicinity of the BIII offshore wind farm area designated for the Baltic offshore wind farm. The survey showed trace presence of phytobenthos, only in the southwestern part of the Baltica OWF area, so at a considerable distance from the area of the planned BIII OWF, outside the zone of its potential impact. Single specimens of macroalgae were represented by 6 taxa previously recorded in the South Baltic: the brown algae *Sphacelaria sp.* and *Pylaiella littoralis* , and the kelp *Rhodomela confervoides, Coccotylus truncatus, Aglaothamnion tenuissimum,* and *Furcellaria lumbricalis* (IMG Consortium and MEWO et al. 2017).

Surveys conducted in 2018-2020 in the adjacent area designated for construction of the Baltic Power offshore wind farm did not reveal the presence of phytobenthos.

In the area of the planned offshore wind farm BIII, in the northern part of Slupsk Shoal, a macrophytobenthos monitoring station is located within the framework of the State Environmental Monitoring (LS station). During the surveys conducted in 2020 on Slupsk Shoal, as in previous years, representatives of kelp*(Vertebrata fucoides, Coccotylus truncatus, Ceramium diaphanum, Ceramium sp., Furcellaria lumbricalis*) and brown algae*(Ectocarpus siliculosus, Desmarestia viridis*) were most common (GIOŚ 2021). Dwarf algae on the surveyed profile accounted for more than 90% of the total biomass in June and 100% in September.

2.2. Macrozoobenthos

Macrozoobenthos samples from the sandy bottom were taken with a van Veen-type scoop in a regular kilometer grid. Samples of epiphytic macrofauna from the rocky bottom were taken with a grabber equipped with a remotely operated underwater vehicle.

In the basin encompassing the area of the planned offshore wind farm BIII and its vicinity, 27 species and higher (not designated to species) taxonomic units of benthic macrofauna were found, of which crustaceans were the most abundant, with 12 taxa. However, no rare or protected macrozoobenthos species were found during the survey. Absolutely constant taxa included: *Hediste diversicolor, Pygospio elegans, Marenzelleria neglecta* , and *Limecola balthica* (in Appendix G of the Report under the name *Macoma balthica*). The characteristics of the macrozoobenthos species found in the study area are presented in Table 5.4 in Appendix G of the Report.

Based on the qualitative and quantitative composition of the benthic macrofauna as the basic features of the grouping structure, two macrozoobenthos communities were distinguished in the study area. Syndrome I mainly inhabited the northwestern, deepest part of the study area, where the bivalve Mytilus trossulus - a major component of the diet of benthic birds - dominated in terms of abundance. Syndrome II occurred in the shallower part of the area on sandy sections of the bottom. The dominant species in terms of abundance in this assemblage was the sandy polychaete Pygospio elegans, living in tubes made of agglomerated sand grains.

The taxonomic composition, abundance and biomass of macrozoobenthos in both assemblages were typical of the shallow to intermediate deep bottom of the open zone of the southern Baltic Sea. Both separated assemblages were characterized by a similar degree of natural valuation, expressed by the value of the macrozoobenthos B multimetric index (3.01 and 3.05, respectively).

These values, in accordance with the Regulation of the Minister of Environment of March 29, 2021 *on the adoption of a set of characteristics typical of good environmental status of marine waters* (Journal

of Laws, item 568), indicate good environmental status of waters with respect to characteristics: 1 (concerning the maintenance of biodiversity), 5 (concerning the minimization of eutrophication caused by human activities) and 6 (concerning the maintenance of the integrity of the seabed at a level that ensures the protection of the structure and function of benthic ecosystems and the absence of negative impacts on these ecosystems) (the limit value of the indicator set by the regulation for all these characteristics is ≥ 3.18).

According to the Decree of the Minister of Maritime Affairs and Inland Navigation of June 25, 2021 *on the classification of ecological status, ecological potential and chemical status, and the method of classifying the status of surface water bodies, as well as environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475), the values of the multimetric indicator of macrozoobenthos B determined for both complexes correspond to water quality class III (moderate ecological status). Based on the regulation on the environmental status of marine waters, only two environmental statuses of marine waters can be distinguished - good and below good. It should be mentioned here that good status in accordance with the Regulation on the Environmental Status of Marine Waters includes Class I and II of coastal water quality (very good and good ecological status, respectively) from the Regulation on the Status of Surface Water Bodies, while below good status includes the other classes.

The result of the valorization of the area based on the evaluation of macrozoobenthos assemblages is shown in Figure 5.22 in Appendix G of the Report. Although this valorization was made on the basis of the Regulation of the Minister of Environment of November 9, 2011 on the method of classifying the state of surface water bodies and environmental quality standards for priority substances (Journal of Laws No. 257, item 1545), which was in effect during the period of the study, it is up to date with respect to the currently effective Regulation of the Minister of Infrastructure of June 25, 2021. on the classification of ecological status, ecological potential and chemical status and the method of classifying the status of surface water bodies, as well as environmental quality standards for priority substances (Journal of Laws No. 1475), as the limit values for coastal waters used for valorization have not changed.

The regions with the highest natural values in terms of macrozoobenthos (very good and good status according to the regulation on the status of surface water bodies = good status according to the regulation on the environmental status of marine waters) were dominant in the southern, sandy part of the study area. They occupied nearly 20% of the BIII OWF area.

In 2016, zoobenthos surveys were conducted in the body of water located in the vicinity of the BIII offshore wind farm area designated for the Baltic offshore wind farm. As a result of the surveys, 33 zoobenthic taxa were found in the Baltic Sea Area. The predominant taxa were those typical of shallow and medium-depth bottoms (up to 50 meters above sea level) of the open waters of the South Baltic. Absolutely constant species included the polychaetes *Marenzelleria sp.* and *Pygospio elegans* , as well as the Baltic horned clam *Limecola balthica*, which has a wide range of tolerance to environmental factors, the antinella *Bylgides sarsi*, and the common midget *Diastylis rathkei* (IMG Consortium and MEWO et al. 2017). Three of them were also among the most common macrozoobenthos taxa identified during surveys of the area of the planned OWF BIII and its vicinity.

On the other hand, in 2019, surveys were conducted at the Baltic Power offshore wind farm site adjacent to the east. In the area, 25 taxa belonging to one type, six clusters and one subcluster were found on the soft bottom, among which the polychaetes *Marenzelleria sp.* and *Pygospio elegans* were among the absolutely constant species. Sixteen taxa belonging to six clusters and one subcluster were recorded on the hard bottom. The abundance and biomass structure there was dominated by the mussel Mytilus sp. ((IMUMG Consortium and MEWO et al. 2020).

The closest shallow-water location to the BIII OWF area for monitoring of benthic macrofauna within the framework of the National Environmental Monitoring is in the area of Slupsk Shoal (station P14B), while the closest deep-water location is in the area of Slupsk Trough (station P3). During the survey

conducted in 2020 at the site in the area of Slupsk Shoal, a good condition of macroozoobenthos was found. However, in the case of the site located in the Slupsk Trough area, 2020 was another year during which a decrease in the value of the B index was recorded, so that the status decreased from good to moderate, below the limit of good status as defined by the IODC (GIOŚ 2021).

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5. Ordinance of the Minister of Environment of October 9, 2014 on the protection of plant species (Journal of Laws of 2014, item 1409)
6. Regulation of the Minister of Environment of May 23, 2016 *on the adoption of a set of characteristics typical of good environmental status of marine waters* (Journal of Laws 2016, item 813)
7. Regulation of the Minister of Infrastructure of June 25, 2021 *on the classification of ecological status, ecological potential and chemical status, and the method of classifying the status of surface water bodies, as well as environmental quality standards for priority substances* (Journal of Laws item 1475)

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 7

Environmental characteristics - ichthyofauna

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Abbreviations and definitions

OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
Baltic Power OWF	Baltic Power offshore wind farm
Ichthyoplankton	Floating in the depths of water early stages of fish: eggs and larvae

1. Introduction

This section presents a characterization of the ichthyofauna found in the area of the planned offshore wind farm OWF Central Baltic III and in its vicinity. The characteristics in question were developed primarily on the basis of the results of surveys conducted in 2012-13. The results of the study, along with a description of its scope, study area and methodology used, are attached as Appendix H to this Report.

The results of surveys conducted in areas adjacent to the BIII offshore wind farm area, carried out for the environmental impact assessment of the Baltica offshore wind farm and the Baltic Power offshore wind farm, were also used to develop this section.

2. Characteristics of ichthyofauna in the OWF area BIII

Studies of ichthyofauna were conducted in the area of the planned construction and operation of OWF BIII and in the 1 Mm buffer zone, over a period of one year. From the fall of 2012 to the summer of 2013, 5 series of surveys were conducted, covering all seasons. To determine the temporal variability of pelagic and demersal fish assemblages in the OWF and buffer zone, 10 research cruises were carried out, including five targeting pelagic fish (mainly herring and sprat) and ichthyoplankton, and five targeting demersal fish (mainly cod and flatfish).

Fifteen species of fish were found in the study area. In ichthyoplankton samples collected with a Bongo net, 10 taxa of fish larvae and sprat eggs were recorded. Of all the fish species encountered, species (sprat, herring, cod, flounder, plaice, turbot) are commercially caught by Polish fishermen, but only 4 of them (sprat, herring, cod and flounder) were more abundant in the survey catch. The abundance of other fish species was low or incidental, ranging from one individual (coalfish, beluga) to 43 individuals (sandeel). A complete list of ichthyofauna species caught during surveys in the area of OWF BIII and its vicinity, subject to differentiation into eggs and larvae (ichthyoplankton) and adult fish, is presented in Table 5.1.1 in Appendix H of the Report.

In the survey catch, sprats (77.9%) were the most abundant species found in the BIII OWF and buffer zone, followed by cod (9.5%), herring (7.6%) and flounder (4.4%). The pelagic trawl fishery was dominated by sprats and herring, while the pound net fishery was dominated by cod and flounder. In terms of weight, cod clearly dominated the survey catch (56.3% of the total weight of fish caught), followed by flounder and sprat. No adult protected or endangered fish species were found throughout the study period.

A total of 9 fish species were recorded in pelagic fisheries during the study period. In addition to the dominant species (sprat and herring), cod, beluga, sandeel, tobaccos, haddock, mackerel and stickleback occurred in small numbers. The abundance of herring and sprat varied from one study period to another, with the highest biomass and abundance of pelagic fish (nearly 207 million individuals of sprat and 12 million of herring) estimated in the summer (July) of 2013, a period when herring and sprat moved through the study area to feeding grounds. With regard to herring, the study area at the end of summer contained only juveniles, mainly from the generation of recruits (age group 0), a relatively high proportion of which (about 37% of abundance) was also recorded the previous autumn. Despite the fact that shallow waters, primarily in the 30-60 m isobath interval, are a natural place for juvenile fish of herring species to grow up, the low density of their concentration in the study area, as well as their poor feeding intensity, testified to the low suitability of these waters as feeding grounds during the season in question. This was the only period in which the surface density of pelagic resources was higher than the multi-year average for the Polish Marine Areas. During the other study periods, the surface density of pelagic fish was many times lower than the multi-year average. Small numbers of herring and sprat occurred in the study area in autumn 2012 and late summer (September) 2013. Only single

individuals of herring and sprat were recorded during the winter (January) and early spring (March) of 2013. The spatial distribution of herring and sprat during their feeding and spawning migrations is much wider than the relatively small area the OWF is expected to occupy.

The bottom catches of the survey kits recorded the presence of 11 fish species, of which cod and flounder were the most abundant and in all survey periods. The abundance of these two species varied from one survey season to the next. Cod occurred most abundantly in the autumn (November) of 2012 and late summer (September) of 2013, where they accounted for 95% and 73% of the abundance, respectively, in catches conducted with bottom survey sets. Flounder was most abundant in winter (January - 68%). Due to the nature of the bottom and the favorable food base, the study area is a habitat and feeding ground for juvenile cod, while it is bypassed by adults during reproductive migrations to the spawning grounds in the Bornholm Deep. The offshore winter flounder area lies on the winter migration route of flounder from feeding grounds located in shallow coastal waters to spawning grounds in the Slupsk Trough, but is not a target spawning ground for the dominant deep-sea spawning flounder in the area, which is mainly due to salinity that is too low, not exceeding 7.7 PSU. During bottom set fishing, in addition to cod and stronia, plaice, herring and devil hen were recorded in smaller numbers, while the remaining species (turbot, sprat, tassel, eel, mackerel and saithe) occurred as single individuals.

Studies of ichthyoplankton (the floating early life stages of fish: eggs and larvae) revealed the presence of 10 taxa belonging to this group of organisms. The most abundant component of ichthyoplankton were the eggs and larvae of sprat, indicating the occurrence of a fairly intensive summer spawning of this species in the area of the planned project. The summer spawning phase usually takes place in a layer of water up to 50 m deep and with a salinity of 6-8 PSU throughout the southern Baltic Sea.

Of the remaining ichthyoplankton taxa, flounder larvae were the most abundant species, coming primarily from spawning that takes place in the Slupsk Trough. The role of the shallow bottom areas in the project area as spawning grounds for a small portion of the breeding population in the shoal area appears to be insignificant compared to the deep-water spawning areas.

A relatively important component of the autumn and summer ichthyoplankton in the study area were herring larvae, but their abundance in the area of the planned project during these periods was significantly lower than that usually observed on typical spawning grounds, testifying to the low intensity of reproduction. This is also confirmed by the lack of mature individuals and larvae in September, despite the fact that this is the autumn spawning period, and the temperatures recorded at that time were optimal for the reproductive process. These observations indicate that the study area is of little importance as a spawning ground.

An important result of the ichthyoplankton survey from the point of view of the natural values of the area of the planned project was the finding of larvae of two fish species under partial species protection listed in the Decree of the Minister of Environment of December 16, 2016 on the protection of animal species (Journal of Laws of 2016, item 2183, as amended): denfish and small goby. For some time after hatching, the larvae of both species have a pelagic lifestyle, so the presence of scattered larvae in the water depths may indicate the spawning of these species both in and near the OWF area. Dennik, which prefers a plant substrate for spawning, is most abundant in deeper waters in the eastern part of the Baltic, but is not found in the southwestern part. The larvae of this species spread very widely in the pelagial, and are sometimes encountered near the surface of the water. The little goby, on the other hand, prefers shallow waters with a sandy bottom covered with clam shells and rocks.

It should be noted that in the vicinity of the area of the planned project there is the Slupsk Shoal which provides more favorable conditions for spawning of bottomfish and goby: adequate depth and the presence of substrate that allows spawning, such as stones, macroalgae and empty shells.

In 2016/2017, ichthyofauna surveys were conducted in the body of water located in the vicinity of the BIII offshore wind farm area designated for the Baltic offshore wind farm. During the survey, a total of

19 taxa of ichthyofauna were caught in all survey gear, of which the permanent fish assemblages of the study area included cod, flatfish, herring, sprats, and sparse hen devils, skates, sandeels and eels. During pelagic control fishing, in addition to herring and sprat, few specimens of cod, sandeel, mackerel, anchovies, flounder, tasso and stickleback were caught. The bottom fishery was dominated by flounder and cod, while other species made up a small bycatch (plaice, devil hen, turbot, herring, haddock, sandeel, mackerel, foxtail, sprat). In the ichthyoplankton samples, 12 taxa were identified. During the survey, 27 gobies larvae were recorded, most likely belonging to the partially protected species of small gobies, as well as 16 larvae of the denworm, which is also partially protected in Poland (IMG Consortium and MEWO et al. 2017).

In contrast, 22 taxa of fish were caught in surveys conducted in the Baltic Power OWF area. Flounder and cod were the dominant species, with the remaining species constituting a small bycatch (sandeel, plaice, devil hens, foxes, moths, turbot, herring, skates, eels, whiting and dab) (IMUMG Consortium and MEWO et al. 2020).

Table 1 below shows a comparison of the species composition of the ichthyofauna found during surveys in water bodies covering the areas and neighborhoods of the BIII OWF, Baltica OWF and Baltic Power OWF, indicating the dominant species in pelagic and demersal fisheries.

Table 1. Comparison of the species composition of ichthyofauna found during surveys in water bodies covering the areas and vicinity of OWF BIII and OWF Baltica, indicating the dominant species in pelagic and demersal fisheries

Species	The area and vicinity of the OWF BIII		The area and vicinity of the Baltic offshore wind farm		Area and neighborhood of the Baltic Power offshore wind farm	
	Ichthyoplankton	Adult fish	Ichthyoplankton	Adult fish	Ichthyoplankton	Adult fish
Belona		x				X*
Stickleback		x		X		X*
Czarniak		x				
Dennik	x		X		X	
Dobijak		x	X	X	X	X
Cod		x**	X	x**		X**
Plaice	x	x	X	x	x	X**
Hound of the devil	x	x	X	x	x	X**
Houndhead					X	
Vixen				x		X**
Mackerel		x		x		
Motela	x		x		X	X**
Oystercatcher	x		x		X	
Anchovy				X		X*

Species	The area and vicinity of the OWF BIII		The area and vicinity of the Baltic offshore wind farm		Area and neighborhood of the Baltic Power offshore wind farm	
	Ichthyoplankton	Adult fish	Ichthyoplankton	Adult fish	Ichthyoplankton	Adult fish
Skarp		x	x	X		X**
Orchid	x	x**	x	x**	X	X
Sprat	x	x*		x*	X	X*
Herring	x	x*	x	x*	X	X
Tasha		x		X		X
Tobias		x	no [data3]		X	X*
Eelam		x		X		X**
Witlinek						X**
Zimnica						X**
Sandeel1	x					
Cupcake2	x		x		X	

* dominant species in pelagic fisheries during surveys of both areas of the OWF

** dominant species in bottom fishing during surveys of both OWF areas

[1] in the case of surveys conducted in the BIII OWF area, due to difficulties in determining sandeel larvae to the species level, they were determined to the family level. There are two species of this family in the South Baltic: the tobacconist and the sandeel (both of which were found in adult form during the survey in the study area).

[2] due to the difficulty of determining gobies fish larvae to the species level, they were determined to the family level. Taking into account the biology and environmental preferences of goby fish species found in the Baltic Sea, it can be assumed with high probability that the larvae caught belonged to the small goby species (Pomatoschistus minutus).

[3] according to the report on the environmental impact of the Baltic offshore wind farm (IMG Consortium and MEWO et al. 2017), tobias were found during ichthyofauna surveys carried out for its purposes, while based on the information contained in the documentation in question, it is not possible to determine whether this species was a component of the ichthyoplankton or whether its adults were found.

The species composition of the ichthyofauna found during the surveys in all three study areas was similar, with pelagic and demersal fisheries by far dominated by the same species, sprat and herring, and cod and flounder, respectively. The species in question also dominated commercial fishing in fishing squares N7, M7, N8 and M8 (according to data for 2013-2020), in the area where the BIII OWF is planned to be built. The characterization of the BIII OWF area in terms of fisheries, including the analysis of fishing data from the aforementioned squares, was presented in Chapter 13 of Volume III of the Report.

The assessment of ichthyofauna in open marine waters within the framework of the PMS is carried out on the basis of the LFI index relating to the community of fish in open waters observed in research fisheries carrying out demersal fish stock assessment tasks. This index reflects the overall size structure at the community level and is assessed based on the biomass of large fish. It is primarily a good indicator of human pressure on the marine ecosystem, but its value can also be affected by other environmental conditions, such as temperature or nutrient concentrations.

Data obtained in 2020 as part of the State Environmental Monitoring enabled an assessment of the LFI Large Fish Index. The LFI index refers to the community of open-water fish observed in survey fisheries performing demersal fish stock assessment tasks (Baltic International Trawl Surveys - BITS). For the

Baltic, the index covers only the community of groundfish excluding pelagic fish, considering 5 species: (cod, whiting, flounder, plaice, turbot). The fish size index reflects the overall size structure at the community level and is assessed based on the biomass of large fish[1]. It is expressed in CPUE (catch per unit of fishing effort). ICES Subarea 25, inside which the BIII OWF area is located, saw a significant increase in the LFI compared to last year (0.56 and 0.42, respectively). After a period of several years where the value of LFI remained low, a rather significant increase was found. The value of the LFI without cod has also increased and now stands at 0.19. Analysis of both indicators shows an increase in the biomass of large cod and large flounder in the population. Based on this, it can be concluded that there has been an improvement in the marine environment in terms of the proportion of large fish biomass in subarea 25. The LFI value obtained in 2020 is lower than the designated threshold value (0.56 and 0.80, respectively) (GIOŚ 2021).

[1] The term "large fish" means fish above the total length (longitudo totalis) defined specifically for each area. In the case of the Polish Marine Areas, "big fish" are individuals over 30 cm l.t

3. Literature and other sources

1. Consortium of the Maritime Institute in Gdansk (IMG) and MEWO S.A. together with Subcontractors, Environmental Impact Report of the Baltica Offshore Wind Farm, Gdansk, 2017

2. Consortium of the Maritime Institute of the Maritime University of Gdynia (IMG) and MEWO S.A. together with Subcontractors, Baltic Power Offshore Wind Farm Environmental Impact Report, 2020

3. Ordinance of the Minister of Environment of December 16, 2016 *on the protection of animal species* (Journal of Laws 2016 item 2183, as amended)

4. Assessment of the state of the environment of Polish marine areas of the Baltic Sea on the basis of monitoring data from the year 2020 against the background of the decade 2010-2019, GIOŚ 2021

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 8

Environmental characteristics - seabirds

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Abbreviations and definitions

Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Official Journal. EU L 20/7, 26.01.2010, p. 7-25, as amended)
IUCN	International Union for Conservation of Nature
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
Baltic Power OWF	Baltic Power offshore wind farm
PMŚ	State Environmental Monitoring
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
SDF	Standard Data Form of the Natura 2000 site (Standard Data Form)
VU	A category indicating the degree to which a species is at risk of extinction in the IUCN system; vulnerable - species that are likely to die relatively soon, though not as quickly as endangered species

1. Introduction

This section presents the characteristics of seabirds in the area of OWF BIII and in the zone of its potential impacts. The characterization was developed primarily based on the results of seabird surveys conducted in the area of the planned farm and its buffer zone. A report with the results of the seabird surveys along with a description of the methodology used is attached as Appendix I.1 to the Report.

The section also presents, developed for the purpose of assessing the impact of the planned farm on the integrity, coherence and object of protection of Natura 2000 areas, the characteristics of seabird occurrence in the area of Slupsk Shoal. Slupsk Shoal, located at a distance of about 5.5 km from the area of the planned farm, is an area belonging to the Natura 2000 network of areas with the code PLC990001, designated to protect wintering populations of black guillemot and long-tailed duck.

For this purpose, the existing documentation of the area, the results of studies conducted for the impact assessments of wind farms planned in the Slupsk Shoal area, and the Monitoring of Wintering Seabirds under the PMS were used. A report with the results of seabird surveys in the Slupsk Shoal area, conducted in parallel with the surveys in the area of the planned OWF BIII and its buffer zone, along with a description of the methodology used, is attached as Appendix I.2 to the Report.

The section also presents the results of studies carried out for the environmental impact assessment of the neighboring area of the planned OWF Baltica, covering both the area of the said farm and its vicinity, as well as the area of Slupsk Shoal.

2. Characteristics of the occurrence of seabirds in the area of OWF BIII (excluding excluding Slupsk shoal)

The seabird group includes species of waterbirds that mostly reside in marine waters during the non-breeding season. Most of them reach their highest numbers in the high seas zone, located more than 1 km from the shore. The exceptions are gulls, which accompany fishing boats on fishing grounds and their occurrence in the open sea is strongly influenced by human activity.

The primary objective of the study was to determine the species composition, abundance, density and flight height of seabirds occurring in the area of the proposed farm or flying over it. In addition, birds associated with terrestrial environments were recorded flying over the project area. Data from these observations will be used to assess the impact of birds migrating and flying over the farm area.

The research was conducted in the area of the planned offshore wind farm OWF Bałtyk Środkowy III (OWF BIII) and in a buffer zone of 2 nautical miles from the boundaries of the area designated in the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas (PSZW), during a 13-month campaign in 2012-2013. The period covered by the study was divided into 4 seasons covering consecutive annual periods of seabird life: summer, autumn migration, wintering and spring migration.

In the seabird group, the following species were identified (in order from highest to lowest abundance): long-tailed duck, silver-backed gull, scoter, alka, uhla, nucleus, yellow-legged gull, little gull, saddle-backed gull, black-throated diver, guillemot, three-tailed gull, red-throated diver, eider and sharp-tailed otter. The first five of the aforementioned species were found in numbers of more than 100 individuals throughout the year: long-tailed duck - 3,163 individuals, silver-backed gull - 2,294 individuals, scoter - 524 individuals, alka - 422 individuals, and scoter - 284 individuals.

All of the identified species of seabirds are, with the exception of the silvery gull, under strict protection in Poland in accordance with the provisions of the Decree of the Minister of Environment of December 16, 2016 on the protection of animal species (Journal of Laws item 2183, as amended). The silver-backed

gull enjoys partial protection under the aforementioned regulation. The black-throated and red-throated auror and the lesser black-backed gull are listed in Annex I of the EU Birds Directive, while two species - the long-tailed duck and the black-throated duck - are classified by the IUCN as endangered species in the vulnerable category - VU (vulnerable).

The two by far most abundant bird species found during the survey were the long-tailed duck and the silver-backed gull. The long-tailed duck was the most abundant species in the study area, and its share among all observed birds ranged from 16.5% in autumn, to 61.2% in spring. The silvery gull was the second most abundant species found during the survey. The proportion of silvery gulls among all observed birds ranged from 8.2% in spring to 73.8% in summer. The remaining species appeared infrequently and sparsely in the study area, and most of them were not associated with it and only flew over it.

In the study area, seabirds resided at low densities. The average densities of waterbirds in the area of the planned BIII OWF and in its vicinity were similar, and in none of the four phenological periods did they exceed the value of 15 os./ ^{km2}. In individual phenological periods, these densities were, respectively, for the farm and buffer area: in summer, 0.7 and 0.9 os./ ^{km2}; in autumn, 3.2 and 3.4 os./ km2; in winter, 13.1 and 10.6 os./ ^{km2}; and in spring, 8.5 and 9.2 os./ ^{km2}.

Since the distribution of birds in the study area in successive phenological periods was highly variable, it is difficult to isolate one part of the study area that is clearly preferred by seabirds. In summer and autumn, when avifauna abundance was low, densities of less than 5 os./ ^{km2} prevailed in the BIII OWF area, while slightly more birds were present north of the planned farm area in the buffer zone and beyond (see Figure 7 and Figure 1 below or Figure 2 and Figure 3 in Appendix I.1 of the Report). In winter, when seabird abundance was highest, the area of highest density of 50 to 87 os./ ^{km2} covered only a narrow strip in the western part of the buffer zone and overlapped only slightly with the area of the planned OWF BIII. During the winter, the distribution of avifauna in the study area was very uneven, with adjacent areas of different densities (see Figure 3 or Figure 4 in Appendix I.1 of the Report). In the spring, after a decline in the number of birds, their preference for the eastern part of the basin was marked (see: Figure 5 or Figure 5 in Appendix I.1 of the Report), with average densities at the sites of the highest concentrations of avifauna during this period already reaching only 35 os./ ^{km2}. The reason for the lack of preference to one part of the study basin is most likely due to the poor food base with low zoobenthic biomass.

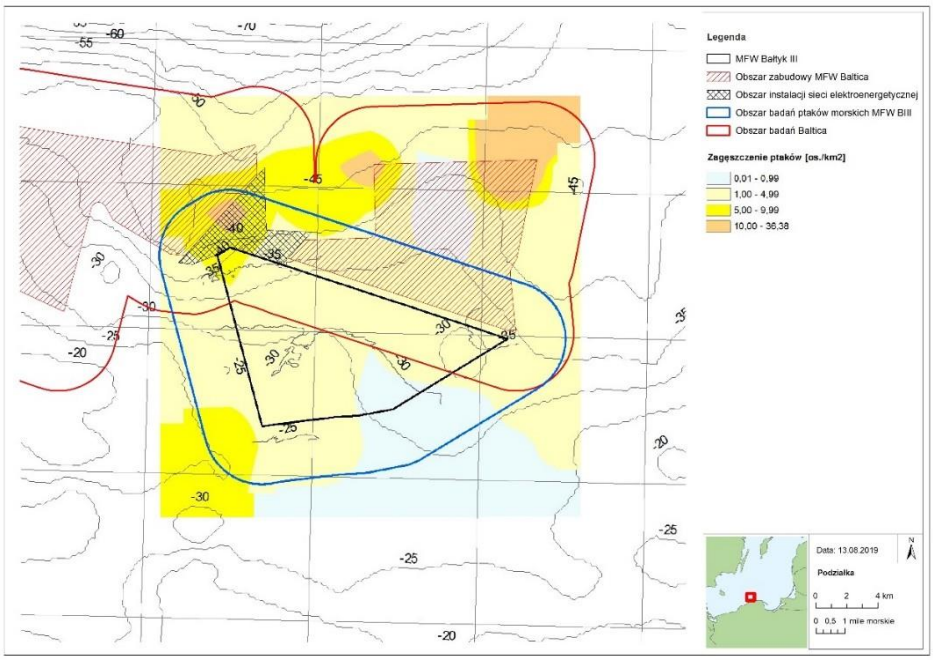
In 2016-2017, adequate methods were used to carry out monitoring in the body of water intended for the Baltica OWF, adjacent to the BIII OWF area to the north (Baltica Area 3) and northwest (Baltica Area 2), and in its buffer zone. The study area overlapped partially with the area of seabird surveys conducted in 2012-2013 covering the BIII OWF area and the zone of its potential impacts. During the surveys, a total of 14 species of birds residing on the water were found, including 12 species associated with the marine environment (in order from highest to lowest abundance: long-tailed duck, alcid, nuthatch, silvery gull, black-throated diver, yellow-legged gull, uhla, little gull, guillemot, saddle-backed gull, scoter and red-throated diver), as well as two species of waterbirds rarely found at sea away from the coast (laughing stock - 1 os. and gray gull - 19 individuals). The total abundance of all observed birds residing along the transects in the Baltica OWF Area was 5129 individuals. The long-tailed duck was the most numerous, accounting for 69% of all birds found. The second most abundant species was the alka, accounting for 12% of the total avifauna grouping. Of the remaining identified species, only the common boar and the silver-backed gull still exceeded the 5% threshold for participation in the grouping. The distribution of birds in the study area during the fall and spring migration periods was similar. In the spring, higher densities (up to 50 os./ ^{km2}) were found in Baltica Area 3, while in Baltica Area 2 they reached only 5 os./ ^{km2}. In autumn, such differences between the two parts of the IMF Baltic Area no longer marked themselves. In the winter, densities of up to 5 os./ ^{km2} prevailed in most areas of the Baltic Sea Area. In the central part of Baltica Area 3 and to the south and southwest of Baltica Area 2, they were higher, reaching up to 20 os./ ^{km2}. There was also a marked increase in the density of birds in

the direction to the Slupsk Shoal, from 5 os./ km2 to 500 os./ km2 at the very border with the Slupsk Shoal area. During the summer, densities were low with maximum values reaching 5 os./ km2 (IMG Consortium and MEWO et al. 2017).

Taking into account that the areas of the above-described surveys performed in 2012-2013 (hereinafter: first surveys) and 2016-2017 (hereinafter: second surveys) partially overlapped, a comparison of the size and distribution of bird densities in each period in the common part of the study area was made on the basis of the resulting maps. On the other hand, it should be remembered that the location of the survey transects during the two surveys in the common part of their areas was not the same. In addition, the different ranges of bird densities adopted for the presentation of the results of the two studies (much wider in the case of the second study) cause difficulties in their interpretation. It should be noted that the fact that, the density of birds in the common study area according to the map, for example, was in the range from 10.1 to 100 per km2, does not mean that the maximum density found in the area was 100 per km2. Instead, it can be concluded on this basis that the densities in the area exceeded 10 os./ km2. Therefore, the analysis of the resulting maps was supported by the relevant information contained in the descriptive part of the report on the environmental impact of the Baltic offshore wind farm. Accordingly, this comparison is for illustrative purposes only.

In the fall, bird densities found in most of the common area were slightly higher during the first surveys. They ranged from 1 to 4.99 per square kilometer, while during the second survey bird densities in most of the area did not exceed 1 per square kilometer. During the first survey, the highest densities were found in the northwestern part of the common area (falling within the range of 5 to 9.9 wasps/km2, and in a small section - from 10 to about 36 wasps/km2), while during the second survey - in its western and southwestern and southeastern parts (ranging from 1.1 to 10 wasps/km2) (see Figure 1 and Figure 2).

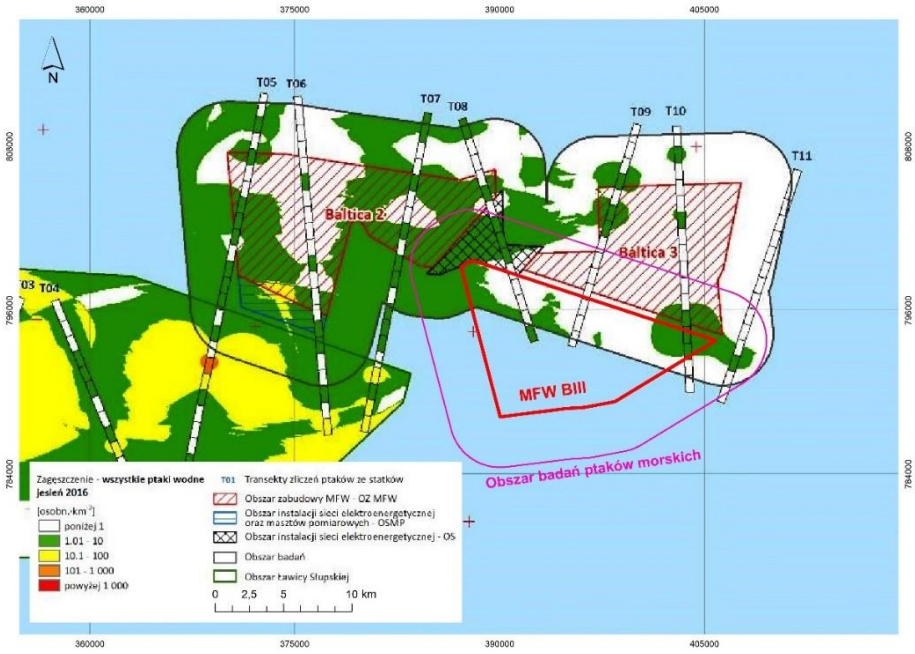
Figure 1 Distribution of all seabirds in the BIII offshore wind farm area during the autumn season, determined from surveys conducted in 2012-2013. The values of average density (individuals/km2) are presented. The figure shows the Baltic offshore wind farm development area and the area of seabird surveys conducted in 2016-2017



Legenda	Legend
MFW Bałtyk III	OWF Baltic III
Obszar zabudowy MFW Baltica	Baltic offshore wind farm development area
Obszar instalacji sieci elektroenergetycznej	Power grid installation area
Obszar badań ptaków morskich MFW BIII	OWF BIII seabird study area
Obszar badań Baltica	Baltica study area

Zagęszczenie ptaków [os./ km2]	Density of birds [os./ km2]
Data: 13.08.2019	Date: 13.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

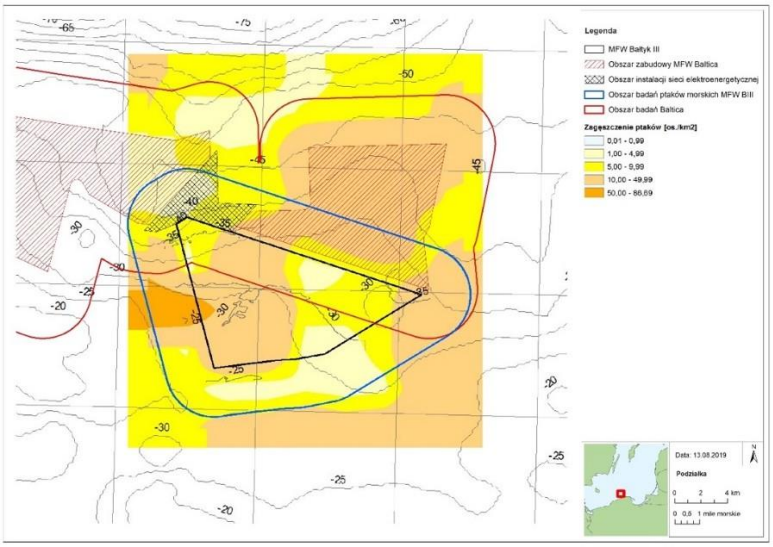
Figure 2 Density of all bird species in the Baltic offshore wind farm Area in the autumn season of 2016. The figure shows the area of OWF BIII (according to PSZW) and the area of seabird surveys conducted in 2012-2013 (own compilation based on IMG Consortium and MEWO et al. 2017)



Baltica 2	Baltica 2
Baltica 3	Baltica 3
MFW BIII	IMF BIII
Obszar badań ptaków morskich	Seabird study area
Zagęszczenie – wszystkie ptaki wodne jesień 2016	Density - all waterbirds fall 2016
[osobn. km2]	[pers. km2]
Poniżej 1	Below 1
Powyżej 1 000	Over 1,000
Transekty zliczeń ptaków ze statków	Transects of bird counts from ships
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych – OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej – OS	Power grid installation area - OS
Obszar badań	Research area
Obszar Ławicy Słupskiej	Slupsk Shoal area

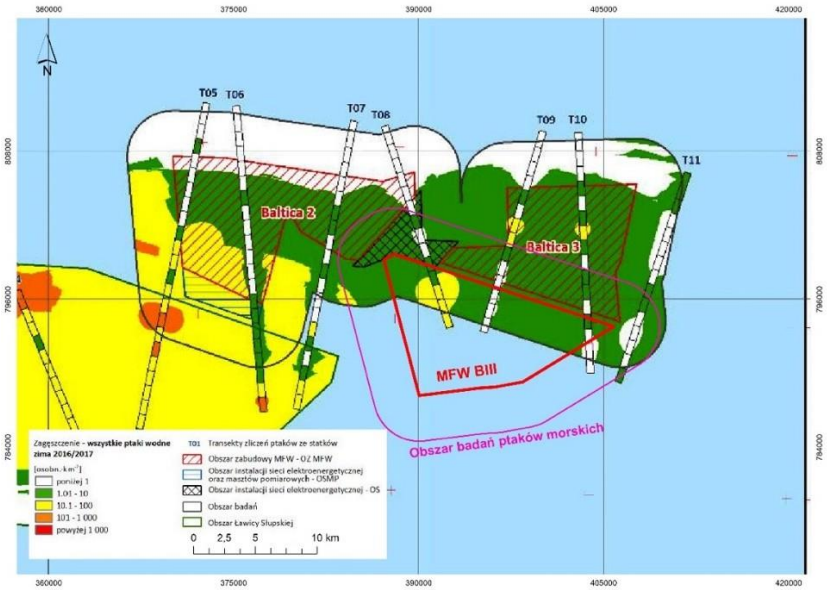
In the common area during the winter period during the first surveys, bird densities were found to be in the range of 1 to 49.99 per km2. Over the majority of the area, densities ranged from 4.99 per km2, while their highest values - in the range of 10 to 49.99 per km2 - were recorded in the central and eastern parts of the area. During the second survey, densities in almost all of the common area were in the range of up to 10 s./km2. They were higher only in a small part of the area, located in its southwestern part, and ranged from 10.1 to 100 settlements/km2. A few small fragments were also found in the area, where bird densities were less than 1 per square kilometer (see Figure 3 and Figure 4). Taking into account that, according to the report for Baltica OWF, in winter in the central part of Baltica Area 3, bird densities were higher compared to those found in most of the Baltica OWF area and reached up to 20 os./km2 (IMG Consortium and MEWO et al. 2017), it is assumed that also in the common study area they did not exceed the above-mentioned values.

Figure 3 Distribution of all seabirds in the BIII offshore wind farm area during the winter, determined from surveys conducted in 2012-2013. Average density values ([individuals/km2]) are presented. The figure shows the Baltic offshore wind farm development area and the area of seabird surveys conducted in 2016-2017



Legenda	Legend
MFW Bałtyk III	OWF Baltic III
Obszar zabudowy MFW Baltica	Baltic offshore wind farm development area
Obszar instalacji sieci elektroenergetycznej	Power grid installation area
Obszar badań ptaków morskich MFW BIII	OWF BIII seabird study area
Obszar badań Baltica	Baltica study area
Zagęszczenie ptaków [os./ km2]	Density of birds [os./ km2]
Data: 13.08.2019	Date: 13.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

Figure 4 Density of all bird species in the Baltic Offshore Wind Farm Area in the 2016/2017 winter season. The figure shows the area of OWF BIII (according to the PSZW) and the area of seabird surveys conducted in 2012-2013 (own compilation based on IMG Consortium and MEWO et al. 2017)

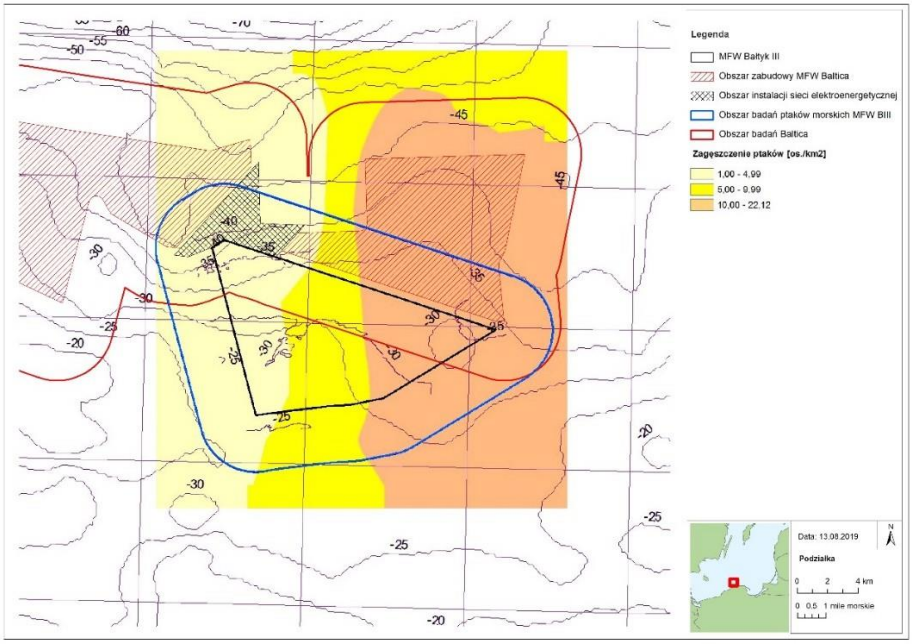


Baltica 2	Baltica 2
Baltica 3	Baltica 3

MFW BIII	IMF BIII
Obszar badań ptaków morskich	Seabird study area
Zagęszczenie – wszystkie ptaki wodne zima 2016/2017	Density - all waterbirds winter 2016/2017
[osobn. km2]	[pers. km2]
Poniżej 1	Below 1
Powyżej 1 000	Over 1,000
Transekty zliczeń ptaków ze statków	Transects of bird counts from ships
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych – OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej – OS	Power grid installation area - OS
Obszar badań	Research area
Obszar Ławicy Słupskiej	Slupsk Shoal area

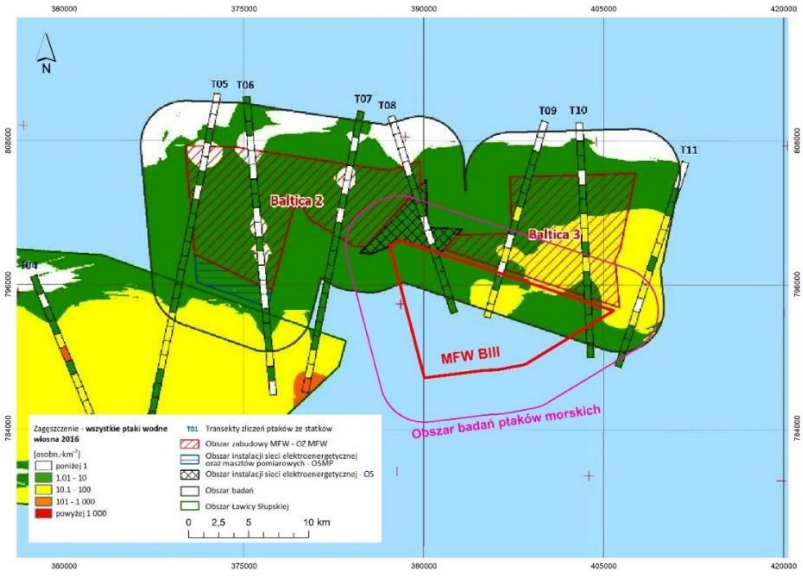
In the spring, during the first surveys in the common area, bird densities were found to be in the range of 1 to about 22 os./km2. The lowest bird densities were found in the western part of the area, slightly higher in the central part, while the highest densities (above 10 os./km2) were highest in the eastern part. In the case of the second surveys, the densities found ranged from 1.01 to 100 settlements/km2, and areas with densities exceeding 10 settlements/km2 were found in the central and northeastern parts of the area (see Figure 5 and Figure 6). It should be mentioned here that the content of the report for the Batica offshore wind farm indicates that in spring higher densities of up to 50 os./km2 were found in the Baltica 3 Area (IMG Consortium and MEWO et al. 2017). Therefore, it can be assumed that also in the common study area the densities did not exceed the above-mentioned values.

Figure 5 Distribution of all seabirds in the BIII offshore wind farm area during the spring, determined from surveys conducted in 2012-2013. Average density values (individuals/km2) are presented. The figure shows the Baltic offshore wind farm development area and the area of seabird surveys conducted in 2016-2017



Legenda	Legend
MFW Bałtyk III	OWF Baltic III
Obszar zabudowy MFW Baltica	Baltic offshore wind farm development area
Obszar instalacji sieci elektroenergetycznej	Power grid installation area
Obszar badań ptaków morskich MFW BIII	OWF BIII seabird study area
Obszar badań Baltica	Baltica study area
Zagęszczenie ptaków [os./ km2]	Density of birds [os./ km2]
Data: 13.08.2019	Date: 13.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

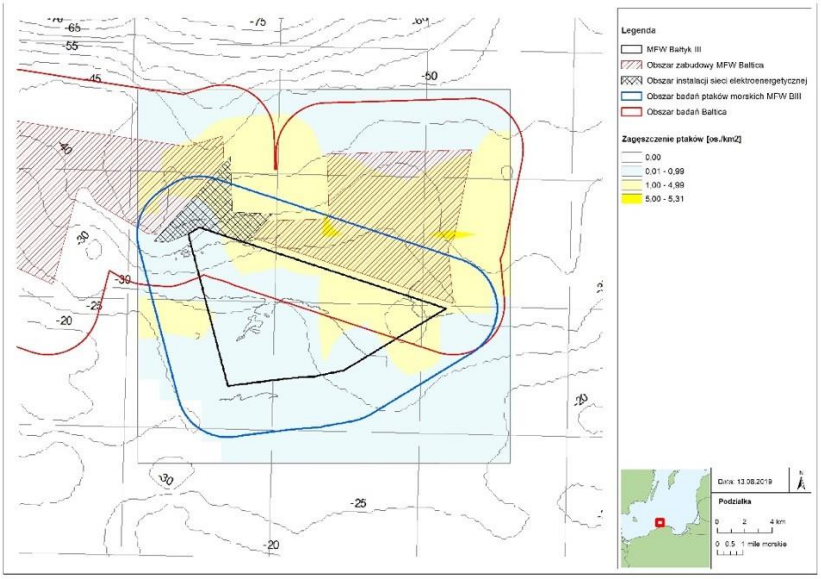
Figure 6 Density of all bird species in the Baltic OWF Area in the spring season of 2016. The figure shows the area of OWF BIII (according to PSZW) and the area of seabird surveys conducted in 2012-2013 (own compilation based on IMG Consortium and MEWO et al. 2017)



Baltica 2	Baltica 2
Baltica 3	Baltica 3
MFW BIII	IMF BIII
Obszar badań ptaków morskich	Seabird study area
Zagęszczenie – wszystkie ptaki wodne wiosna 2016	Density - all waterbirds spring 2016
[osobn. km2]	[pers. km2]
Poniżej 1	Below 1
Powyżej 1 000	Over 1,000
Transekty zliczeń ptaków ze statków	Transects of bird counts from ships
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych – OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej – OS	Power grid installation area - OS
Obszar badań	Research area
Obszar Ławicy Słupskiej	Slupsk Shoal area

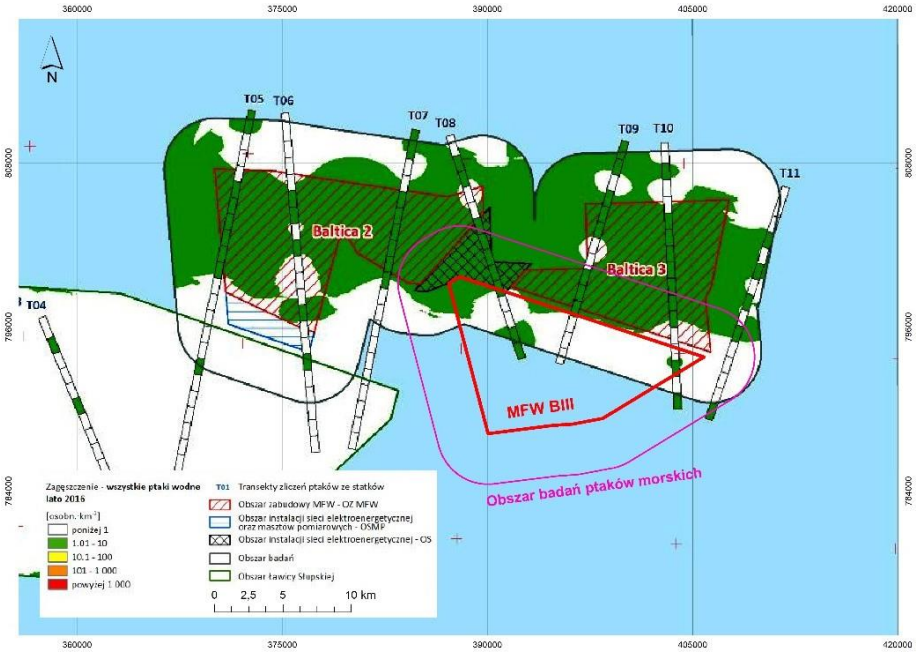
The densities of seabirds found during both surveys on the common portion of the basin during the summer were at similar, relatively low levels. The densities of birds in the area, according to the results of the first survey, were in the range of up to 5.31 per square kilometer, while the second survey was in the range of up to 10 per square kilometer. Nevertheless, since, as indicated in the report for the Baltic offshore wind farm, bird densities were low during the summer period with maximum values reaching 5 os./km2 (IMG Consortium and MEWO et al. 2017), it can be concluded that densities in the common area during the two surveys were within an analogous range. The density of birds during both surveys was higher in the northern part of the area (see Figure 7 and Figure 8).

Figure 7 Distribution of all seabirds in the BIII offshore wind farm area during the summer, determined from surveys conducted in 2012-2013. Average density values (individuals/km2) are presented. The figure shows the Baltic offshore wind farm development area and the area of seabird surveys conducted in 2016-2017



Legenda	Legend
MFW Bałtyk III	OWF Baltic III
Obszar zabudowy MFW Baltica	Baltic offshore wind farm development area
Obszar instalacji sieci elektroenergetycznej	Power grid installation area
Obszar badań ptaków morskich MFW BIII	OWF BIII seabird study area
Obszar badań Baltica	Baltica study area
Zagęszczenie ptaków [os./ km2]	Density of birds [os./ km2]
Data: 13.08.2019	Date: 13.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

Figure 8 Density of all bird species in the Baltic offshore wind farm Area in the summer season of 2016. The figure shows the area of OWF BIII (according to PSZW) and the area of seabird surveys conducted in 2012-2013 (own compilation based on IMG Consortium and MEWO et al. 2017)



Baltica 2	Baltica 2
Baltica 3	Baltica 3
MFW BIII	IMF BIII
Obszar badań ptaków morskich	Seabird study area
Zagęszczenie – wszystkie ptaki wodne lato 2016	Density - all waterbirds summer 2016
[osobn. km^2]	[pers. km^2]
Poniżej 1	Below 1
Powyżej 1 000	Over 1,000
Transekty zliczeń ptaków ze statków	Transects of bird counts from ships
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych – OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej – OS	Power grid installation area - OS
Obszar badań	Research area
Obszar Ławicy Słupskiej	Slupsk Shoal area

Comparing the above-described results of the two studies for their common area, there were no significant differences in the use of the water body in question by seabirds.

In 2018-2019, another avifauna survey was conducted in the area adjacent to OWF BIII to the east, intended for the construction of the Baltic Power OWF. The survey recorded a total of 19 species of water-dwelling birds, including 13 species associated with the marine environment and six species of waterbirds rarely seen at sea away from the coast. Species associated with the marine environment are: long-tailed duck, silver-backed gull, bulbul, alka, uhla, saddle-backed gull, scoter, little gull, black-throated diver, yellow-legged gull, red-throated diver, guillemot, eider. On the other hand, observed species rarely seen at sea far from the coast are: gray gull, laughing stock, cormorant, coot, arctic tern, white-fronted goose (IMUMG Consortium and MEWO et al. 2020).

3. Characteristics of the occurrence of seabirds in the Slupsk Shoal Natura 2000 area PLC990001

According to the SDF prepared for the Slupsk Shoal PLC990001 Natura 2000 site in October 2002, and subsequently updated in October 2021, the subject of protection in the area is the wintering and passage populations of three seabird species: long-tailed duck*(Clangula hyemalis*), guillemot (*Cepphus grylle*) and uhla*(Melanitta fusca*). These populations are estimated as follows:

- long-tailed duck: overwintering 101,148-231,180 individuals, long-tailed duck 76,440-214,374 individuals,
- plunger: wintering 98-556 individuals, transient 72-461 individuals,
- uhla: wintering 5,565-23,611 individuals, transient 910-1,789 individuals.

Ornithological monitoring in the area of Slupsk Shoal was carried out in parallel with seabird surveys conducted in the area of the planned OWF BIII and in its vicinity, described in Section 2. A total of 31 species of waterbirds, including 15 species of seabirds and 12 species associated with the terrestrial environment, were found during all survey cruises made in the shoal area. The total abundance of all birds observed was 102,134 individuals (the average abundance per research cruise was 5,674 individuals), including 72,225 individuals during the seven cruises made during the winter months (the average abundance of seabirds per cruise was 10313.6 individuals). Among all the birds observed, the proportion of seabirds was as high as 99.5%, due to the long-tailed duck's very abundant presence in the study area. The long-tailed duck accounted for a total of more than 94% of all birds observed, and 95.9% during the wintering period. These ducks in December and February formed very large concentrations of more than 10,000 individuals spotted from the ship, and during a cruise made in the

second half of February 2014, exceptionally large groupings of this species of more than 23,000 individuals were observed.

In the group of seabirds on Slupsk Shoal, the following species were recorded (in order from highest to lowest abundance): long-tailed duck, uhla, silver-backed gull, scoter, scoter, alka, dabbler, black-throated guillemot, yellow-legged gull, saddle-backed gull, lesser black-backed gull, red-throated gull, sharp-tailed otter, eider and three-toed gull. The first five of the aforementioned species were found in numbers of more than 100 individuals throughout the year: long-tailed duck - 97,398 individuals, uhla - 2,660 individuals, silver-backed gull - 1,380 individuals, scoter - 213 individuals, and alka - 159 individuals.

Seabirds in the Slupsk Shoal area periodically stayed at high and very high densities. The average density of the entire grouping of waterbirds in the different phenological periods was: for summer 1.1 per thousand square meters, autumn 164.2 per thousand square meters, winter 251.5 per thousand square meters and spring 67.9 per thousand square meters. In autumn, winter and spring, the long-tailed duck accounted for more than 90% of all birds observed, hence this species had a decisive influence on the picture of changes in the abundance, density and distribution of avifauna in the study area. The highest concentrations of seabirds were encountered in February, at the end of the wintering period, when during the research cruise on about 60% of the area of Slupsk Shoal the density of the most numerous species - the long-tailed duck - exceeded the value of 100 os./km2.

The distribution of birds during surveys on Slupsk Shoal in successive phenological periods was variable. In summer, when avifauna abundance was very low and densities of less than 3 os./km2 prevailed on Slupsk Shoal, slightly more birds stayed in its eastern part (see Figure 2 in Appendix I.2 of the Report). During the autumn migration period, average densities locally reached 230 s./km2. The highest concentrations of birds were then observed in the northern

-eastern part of the area (see Figure 3 in Appendix I.2 of the Report). In winter, when seabird abundance was highest, the area of highest density containing between 1000--1800 os./km2 covered the western and central parts of the study area (see Figure 4 in Appendix I.2 of the Report). In the spring, after a decline in bird numbers, their preference for two areas located in the eastern and northwestern parts of the basin became apparent (see Figure 5 in Appendix I.2 of the Report). However, the average density at the sites of the most abundant concentrations of avifauna slightly exceeded 100 os./km2.

In 2016/2017, for the environmental impact assessment of the Baltic offshore wind farm, seabird surveys were carried out on Slupsk Shoal in parallel with the studies in the farm area. During all the research cruises, the presence of 18 species of birds was found, including 12 species associated with the marine environment (in order from highest to lowest abundance: long-tailed duck, uhla, silvery gull, guillemot, alka, scoters, black-throated duck, lesser black-backed gull, yellow-legged gull, saddle-backed gull and red-throated duck) and 6 species of waterbirds rarely found at sea away from the coast (gray gull - 8 os, mute swan, cormorant and white-fronted goose - 4 individuals each, gannet - 2 individuals and marmot - 1 individual). The total abundance of all birds observed on the water along transects on Slupsk Shoal was 58,011 individuals. The long-tailed duck was by far the dominant species accounting for as much as 93% of all birds found. The threshold of 5% participation in the grouping was still reached by the uhla, and the remaining species appeared in low numbers. During the periods of spring and autumn migration, the maximum densities of avifauna in the area of Slupsk Shoal reached up to 500 os./km2. During the summer, bird abundance in the area in question was very low, and densities of 0.1 to 1 per square kilometer predominated. In contrast, in winter, densities of more than 10 wasps/km2 predominated, and in about 1/5 of its area they exceeded 100 wasps/km2, locally reaching values of more than 500 wasps/km2 (IMG Consortium and MEWO et al. 2017).

A seabird survey of Slupsk Shoal was also conducted in 2017-2018 for the FEW Baltic II environmental impact assessment. During the survey, 14 species of seabirds were found there (in order from highest to lowest abundance: : long-tailed duck, uhla, silvery gull, alka, scoter, black-throated diver, yellow-

legged gull, guillemot, little gull, red-throated diver, saddleback gull, eider, glacier gull), 24 species of waterbirds, rarely found from a great distance from the coast (gray gull, bean goose, mallard, marmot, mute swan, cormorant, barnacle, lapwing, laughing stock, goose, partridge, canadian barnacle, merganser, common tern, roseate, gray heron, black tern, white heron, dabbling heron, whooper swan, golden plover, great grebe, screech-owl) and 15 species of terrestrial birds (lark, gray wagtail, starling, siskin, swift, swallow, springtail, redshank, woodpigeon, woodpigeon, chaffinch, yellow wagtail, myotis, reed warbler, gray flycatcher, shorebird).

On Slupsk Shoal during the survey, the total number of stationary birds observed was 8555 (average 71.4 os/h). Here, the long-tailed duck was also the dominant species among all birds (Baltic Trade and Invest Ltd., 2019).

Slupsk Shoal, as one of three Natura 2000 areas located in Polish marine areas established for the protection of wintering birds, was included in the Monitoring of Wintering Seabirds started in 2010 under the PMŚ. During the 2020 count on Slupsk Shoal, the long-tailed duck was the most abundant species here, clearly more numerous than the uhla (Table 1). Slupsk Shoal was and still is one of the most important long-tailed duck wintering grounds in the Baltic. The number of uhla has gradually increased here in recent years. During the counts carried out as part of the Monitoring of Wintering Seabirds in 2011 and 2012, only 72 and 31 individuals of the species were observed there in the transect belt, while in the last three years there were already 1,317, 167 and 271 individuals.

Table 1. Abundance and density and frequency indices of individual species recorded within transects and snap-shot counts, as well as all individuals seen during the 2020 count on Slupsk Shoal. Core species for the monitoring program are shown in bold (GIOS 2021)

Species	Individuals in transect	Density [s./km2]	All observed individuals	Frequency rate [person/hour of cruise]
Long-tailed duck	1625	32.5	2741	502.9
Uhla	271	5.4	498	91.4
Silver gull	11	0.2	84	15.4
Alka	10	0.2	23	4.2
Diver	4	0.1	5	0.9
Black-throated diver	1	+	2	0.4
White-fronted goose			20	3.7
Whooper swan			9	1.7
Grey-headed Gull			7	1.3
Nurzyk			2	0.4
Goose			2	0.4
Red-throated diver			1	0.2
Saddleback gull			1	0.2
Individuals not marked as to species				

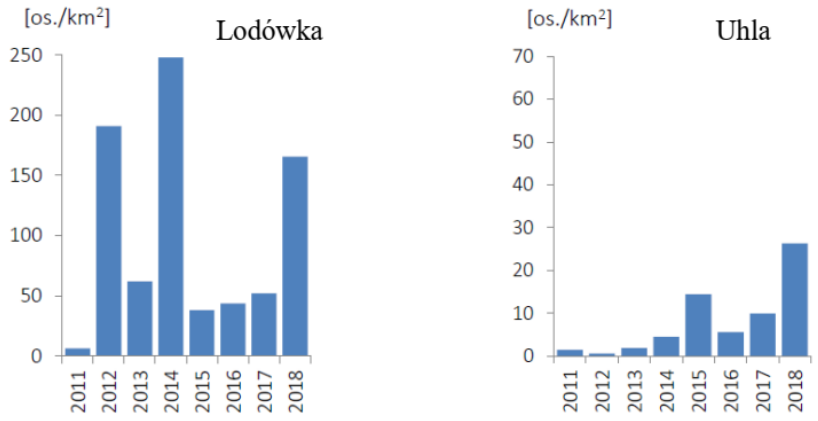
Species	Individuals in transect	Density [s./km²]	All observed individuals	Frequency rate [person/hour of cruise]
Alka unmarked	1	+	5	0.9
TOTAL	1923	38.4	3400	624.0

The long-tailed duck was by far the most abundant species recorded during monitoring on Slupsk Shoal in 2020, accounting for about 81% of all individuals observed. The second most abundant species was the uhla, with about 15% of the total grouping. The remaining species were far less abundant and the share of none of them exceeded 2.5%. During the entire cruise, only 5 individuals of the long-tailed duck (one of the three protected species in the area, along with the long-tailed duck and uhla) were observed.

In 2020, high densities of long-tailed duck were recorded on Slupsk Shoal, in excess of 50 os./km², but only in the eastern part of the basin. In the case of the uhla, the maximum density exceeded 10 os./km². Compared to the years 2011-2014, when the sea urchin was encountered sparsely on Slupsk Shoal, there is an increase in the number of birds of this species on this body of water (GIOŚ 2021).

Considering the changes in the density index of long-tailed duck and sculpin on Slupsk Shoal from 2011 to 2018 (see Figure 9), attention is drawn to the very large fluctuations in the abundance of long-tailed duck. This most likely indicates the birds' movements between Baltic wintering grounds. Significant fluctuations in abundance have also been observed for uhla. The results of the monitoring indicate that Slupsk Shoal is a body of water of increasing importance for wintering uhla, where an increase in the number of birds of this species is marked.

Figure 9. Indices of long-tailed duck and spotted eagle ray densities in 2011-2018 on Slupsk Shoal (GIOŚ 2018)



[os.km²]	[os./km²]
Lodówka	Long-tailed duck
Uhla	Uhla

4. Summary

Outside the coastal zone (up to 1 km from the shoreline), most birds congregate in bodies of water less than 30 m deep, while in the zone with a depth of more than 40 m, bird counts are very low, usually

well below 1 os./km^2. Only during the fishing season, large concentrations of gulls can be found in the fishing area (Meissner 2011).

Although long-tailed duck, scoters and scoters can dive to great depths (long-tailed duck up to 60 meters) in search of food, they prefer shallower waters where food acquisition is easier. Outside the coastal belt, these species in the Baltic are most abundant in the zone of waters up to 30 meters deep. Ichthyophages, which include divers, grebes and auks, can follow schools of fish, so the locations of their higher concentrations can change. Surveys conducted in the Baltic in winter have shown that both species of divers and guillemots reside most often in bodies of water that are no more than 30 meters deep, while the nuit and alka appear most abundantly

in a zone with depths of 30 to 50 m (Meissner 2011).

Taking into account the above and the results of the research described in points 2 and 3 of the section, it can be concluded that the area of the planned OWF BIII does not constitute a body of water particularly important for seabirds

in any of the analyzed periods. However, the significant densities of avifauna found during the survey in the Slupsk Shoal area during migration and wintering, as well as at the very boundary of the shoal in the area designated for the Baltic offshore wind farm during wintering, confirm the importance of the shoal area as a feeding and resting place for seabirds.

5. Literature and other sources

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ENVIRONMENTAL IMPACT ASSESSMNT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 9

Environmental characteristics - birds of passage

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Abbreviations and definitions

Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Official Journal. EU L 20/7, 26.01.2010, p. 7-25, as amended)
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
Baltic Power OWF	Baltic Power offshore wind farm

1. Introduction

This section presents the characteristics of seasonal bird migrations over the area of the planned OWF BIII, developed mainly on the basis of the results of surveys conducted in the area. A report with the results of the migratory bird surveys along with a description of the methodology used is attached as Appendix J to the Report.

In addition, the results of observations of migratory birds carried out in bodies of water adjacent to the BIII offshore wind farm area, carried out for the environmental impact assessment of the Baltica offshore wind farm and the Baltic Power offshore wind farm, were taken into account.

2. Characteristics of seasonal bird migrations over the OWF area BIII

Surveys of migratory birds were performed during the spring and fall migration periods.

Surveys were conducted from a boat anchored at a specific location located in the center of the study area.

The monitoring program included four types of surveys to obtain complementary information on various aspects of bird migration:

- daytime visual observations of birds,
- tracking migratory birds using horizontal radar during daylight hours,
- recording the flight altitude of migratory birds using vertical radar during nighttime hours,
- acoustic observations of migratory birds during nighttime hours.

The monitoring of migratory birds in the BIII offshore wind farm area made it possible to characterize seasonal bird migrations over the study area.

A high species diversity of migratory birds was noted.

During the spring migration period, 97 species were tagged, including 32 waterbirds and 65 landbirds, while 56 species were tagged during the fall migration period, including 25 waterbirds and 31 landbirds. The species composition found during the survey included almost all seabird species found in the Baltic Sea region and all major taxonomic groups of birds associated with the land environment. Summaries of bird species found during the spring and fall migration periods, respectively, with an indication of the number of individuals recorded for each of the survey methods used are presented in Table 5.32 and Table 5.33 in Appendix J of the Report.

The group of birds migrating over the area of the planned OWF BIII during the daytime was dominated by long-tailed ducks, particularly long-tailed ducks, scoters and scoters.

In terms of the biogeographic size of the seabird population, the largest percentage was recorded for the scoter (3.4%). Since scoters also migrate at night, the total percentage of this species is most likely higher, reaching 10%. Sea ducks migrating over the OWF BIII area do not fly over it in clusters but in a dispersed manner.

During the autumn period, among the species migrating over the area of the planned farm, geese were recorded in the greatest numbers. Their total estimated number was 100,000 individuals, accounting for 4% of the total goose species population.

Other duck species identified during the survey, ducks proper and ruddy ducks, did not occur in large

numbers over the BSIII offshore wind farm area, only occasional small flocks of them were recorded during both spring and autumn migrations.

The presence of two species of divers (black-throated diver and red-throated diver) was recorded during the survey, however, in relatively low numbers. It is estimated that about a few hundred birds of these species fly over the BSIII area during the migration season, which is only a small percentage of the biogeographic population of these bird species. Burrows migrate both along the coastline and over the open sea area in a highly dispersed manner.

The presence of all 3 species of the alk family (Alcidae) inhabiting the Baltic Sea region has been recorded: alka, nuisance, guillemot. Of these, alka was the most abundant species. Based on the results obtained, it is estimated that more than 6,000 auks may fly over the area of the planned OWF BIII, with the number of migrating birds most likely overestimated due to the local flights of birds living in the area, which is also indicated by data on the direction of bird flights.

Gulls did not occur in large numbers during migration periods in the BIII OWF area, with the Lesser Black-backed Gull (an EU Bird Directive Annex I species) being systematically observed during both spring and autumn migrations. Estimates indicate that up to about 1,500 birds of this species (or 2% of the biogeographic population) may fly over the BIII OWF area during the migration period.

Cormorants were regularly observed in the BIII OWF area during the survey, but not in large numbers. Calculations indicate that about 1,000 individuals of this species may fly over the BIII OWF area during the migration period. While some of the birds observed during the survey may have been migratory birds over the BIII OWF area, many of the cormorants observed did not show a consistent direction of flight, suggesting that they were resident birds that had ventured too far into the open sea.

During the survey, quite a number of cranes were found flying over the area of the planned farm during the autumn migration period - a total of 1,483 individuals of this species were recorded during visual observations during this period.

With regard to plovers, the largest percentage of biogeographic population size was recorded for the golden plover (3.7%). With the exception of the golden plover, they did not occur in large numbers during surveys in the BIII OWF area during migration periods. As for the golden plover - several large flocks were recorded in the spring.

During the survey of the area of the planned farm, only a few raptors were recorded: 8 birds of different species in spring and 1 unmarked falcon in autumn. Birds of prey, which use rising thermal air currents during flight, are reluctant to choose areas of open water for their flight route, where there are not sufficiently strong thermal currents used by them for rising flight. Therefore, only occasional overflight of raptors is expected over the BIII OWF area - their regular migration is not expected.

Although many of the passerine birds that migrate during the day avoid flying over the open sea, surveys of the area of the planned farm recorded the presence of some species belonging to this order in large numbers, albeit representing a small part of their very numerous populations. The most frequently observed species were chaffinch, starling, lark, gray wagtail and rich-eyed warbler. Most passerine birds migrate at night dispersing at high altitudes.

The information on flight directions collected during the survey clearly indicates that the overwhelming number of birds observed over the BIII offshore wind farm area are seasonally migratory species, maintaining a constant direction of flight to the northeast during spring and southwest during autumn. However, among some bird species, the dominant direction of flight was not clearly recorded at certain times, indicating that these were most likely resident individuals in the study area. The group included alcids and cormorants and, in early spring, long-tailed ducks.

Most of the waterbirds recorded during the survey were flying during the day low over the BIII OWF

area, below the potential height of the wind turbine rotor (<20m). Among marine species, only in the case of divers and cormorants did a relatively large proportion of recorded individuals (about 30%) fly at heights above 20 meters above sea level. A large proportion of birds associated with the terrestrial environment migrating over the BIII offshore wind farm area during the day flew at undersized heights, with a significant proportion of migrating geese, cranes and plovers flying at wind turbine rotor placement heights above 200 meters.

In the case of nocturnal migrants, the vast majority of birds flew over the BIII OWF area at heights above 200 meters above sea level. The highest number of nighttime birds was recorded at heights of 400-600 meters, indicating significantly higher flight altitudes compared to migrations taking place during daytime hours.

Based on the results of the survey, it was concluded that the area of the planned location of OWF BIII does not lie on the main migration route, through which birds fly in large concentrations during seasonal migrations. However, birds of various species fly over the area, migrating in a dispersed manner over marine areas.

Taking into account the abundance of bird species determined during surveys within the farm area, their conservation status, and their sensitivity to the impacts of offshore wind farms, the following species/species groups were included in the assessment of the impact of OWF BIII on migratory birds: auks, guillemots, long-tailed ducks, scoters, murres, marmots, geese, swans, cormorants, golden plovers, little gulls, blacksmiths, cranes, and woodpigeons.

In the spring and autumn of 2016 and March 2017, migratory bird surveys were conducted in the Baltica offshore wind farm area, adjacent to the north and northwest of the Project area. During the survey, data were collected at three survey stations using horizontal and vertical radar, visual observations and acoustic recordings (IMG Consortium and MEWO et al. 2017).

In all survey seasons, 57,112 birds belonging to 145 species were recorded (visual observations and acoustic recordings) in the Baltica OWF Area, of which 126 were recorded during visual observations (the urban pigeon was excluded from the analyses, as a domesticated species), and 48 were identified on acoustic recordings (ibid.).

The detailed analyses in the assessment of the impact of the Baltic offshore wind farm on migratory birds did not include species that were irregularly and infrequently recorded in its area, i.e., whose number of observations does not exceed 30 individuals (10 per research station), and species that were recorded in numbers between 30 and 50 individuals, but observed in several flocks (1-5). Of all the migratory bird species/groups identified during the survey, the detailed analyses in the report included: long-tailed duck, scoter, scoter, marmot, mallard, red-breasted goose, geese (white-fronted goose, goosander and bean goose), swans (black-tailed swan, whooper swan and mute swan), divers (black-throated diver and red-throated diver), alcids (alka and dipper), cormorant, lesser black-backed gull, laughing gull, yellow-legged gull, gray gull, terns (black tern, little tern, arctic tern, common tern and Caspian tern), sharp-tailed otter, great curlew, piping plovers (golden plover and gray plover) and crane (ibid).

Based on visual observations, it was found that more than 92% of all birds observed in the Baltic Sea Area in the spring of 2016 were flying at heights of 30 meters or less. At the time of the autumn survey, it was 86.1% of birds, while in March 2017. - 95,6%. Most of the sea ducks and alcids observed during the survey flew below 20 meters above sea level. Gulls and swans were observed at higher altitudes, but still dominated at elevations of up to 20 meters above sea level (ibid).

The predominant direction of flight of birds migrating through the Baltica IMF Area in the spring season was northeast-east, and in the autumn season was southwest-west. In March 2017, some of the birds headed in different directions than expected, which is related to the fact that the observations included

birds that had not yet started their spring migration and were still within the wintering grounds near the IMF Baltica Area, making short flights, moving in search of food, for example. They may also have been partly local birds that nest along the Polish Baltic coast (ibid).

The general flight directions of all birds found during surveys conducted during the spring and autumn migration periods in 2013 in the BIII offshore wind farm area and in 2016 in the body of water adjacent to the area of the planned farm designated for the Baltica offshore wind farm were consistent with each other. The aforementioned directions are shown in Figure 1.

Figure 1. General flight directions of all birds during spring and autumn migration periods recorded during surveys conducted in the BIII offshore wind farm area in spring (A) and autumn (B) 2013, and during surveys conducted in the Baltica offshore wind farm area in spring (C) and autumn (D) 2016. (Appendix H of the Report; IMG and MEWO Consortium et al. 2017; Baltic Trade and Invest Sp. z o.o., 2019)

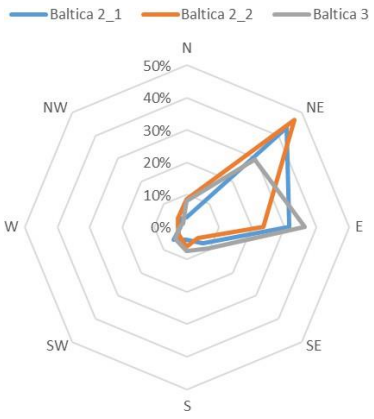
A

Wszystkie ptaki wiosną	All birds in spring
Pozycja kotwiczenia statku	Anchoring position of the vessel

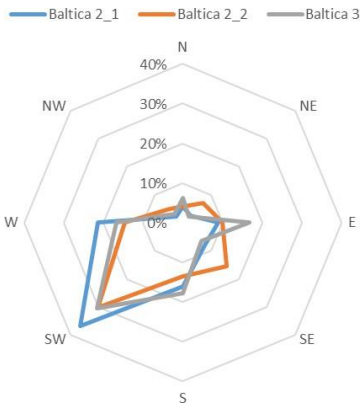
B

Wszystkie ptaki jesienią	All birds in autumn
Pozycja kotwiczenia statku	Anchoring position of the vessel

C



D



During visual observations conducted in the BIII OWF area in 2013, a greater number of bird species were determined than during analogous observations conducted at the Baltica_3 station located in the Baltica OWF area in 2016, in the general direction of bird migration over the areas in question. In the group of waterbirds during visual observations over the BIII OWF area, the most numerous (above 100 individuals) were recorded (in order from the largest to the smallest number of individuals observed): scoter, long-tailed duck, uhla, marmot, cormorant and alka, while at the Baltica_3 station: scoter, scoter,

uhla, marmot, alka, cormorant, yellow-legged gull, little gull and mallard. During the surveys conducted at the Baltica_3 station, there were no numerous flights of cranes during the fall migration period as were recorded over the BIII OWF area in 2013. Considering the flight directions of cranes during the fall migration period found during the surveys in the BIII OWF area (see Figure 5.100 in Appendix J to the Report), it can be suspected that a fairly numerous flight of this species also took place over the Baltica_3 OWF Baltica Area. On the other hand, the results from the Baltica_3 station do not indicate the occurrence of crane migration over the Baltica 3 Area in the fall of 2016. (not a single individual of this species was recorded during visual observations). This may indicate significant variability in the intensity of the crane migration phenomenon over the analyzed body of water, including the area of the planned OWF BIII.

Another survey of migratory birds was conducted in 2018-2019 in the area designated for the construction of the Baltic Power offshore wind farm. At the time, 95 species of birds were observed. Long-tailed duck and long-tailed duck (IMUMG Consortium and MEWO et al. 2020) were the most abundantly represented, as in the BIII and Baltic OWF areas.

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4. List of drawings

Figure 1. General flight directions of all birds during spring and autumn migration periods recorded during surveys conducted in the BIII offshore wind farm area in spring (A) and autumn (B) 2013, and during surveys conducted in the Baltica offshore wind farm area in spring (C) and autumn (D) 2016. (Appendix H of the Report; IMG and MEWO Consortium et al. 2017; Baltic Trade and Invest Sp. z o.o., 2019) 8

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 10

Environmental characteristics - marine mammals

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Abbreviations and definitions

C-POD	Acoustic porpoise detector
DPD	Detection-positive days
OWF Baltic II / OWF BII	Bałtyk II Offshore wind farm (originally: Bałtyk Środkowy II)
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
PMŚ	State Environmental Monitoring

1. Introduction

Marine mammals are among the species that may prove most sensitive to disturbance from offshore wind farm construction and operation. There are four species of marine mammals in the Polish Baltic Sea - the harbor porpoise (Phocoeana phocoena), the gray seal[1] (Halichoerus grypus), the common seal (Phoca vitulina) and the ringed seal (Pusa hispida). The construction as well as operation of an offshore wind farm may have a negative impact on them. Therefore, it was necessary to determine whether the planned location of the OWF is a region of high importance for these marine mammals.

This chapter presents a characterization of the occurrence of marine mammals in the area of OWF BIII. For the purpose of its development, the results of marine mammal monitoring conducted in the area of the planned farm and in its vicinity in 2012-2013 by DHI were used. A report with the results of this monitoring, along with a description of the methodology used, is attached as Appendix K to the Report.

The chapter also refers to the results of marine mammal monitoring carried out in waters adjacent to the BIII offshore wind farm area for the environmental impact assessment of the Baltic offshore wind farm, as well as the results of harbor porpoise monitoring carried out as part of the State Environmental Monitoring and the SAMBAH project.

2. Characteristics of the occurrence of marine mammals in the OWF area BIII

Monitoring of marine mammals was carried out using acoustic and visual means. Acoustic monitoring was dedicated to porpoises, and was performed using passive C-POD porpoise detectors. To verify the results obtained in acoustic monitoring, porpoise detections are confirmed visually by qualified personnel.

Visual monitoring, which is currently the only method of estimating the species' density and abundance on a large scale, was conducted from the air. Aerial observations were made in a much larger area, covering, apart from the BIII OWF area, the area of Slupsk Shoal (partially) and the neighboring areas intended for the construction of offshore wind farms, including the areas of the Baltic II and Baltica OWFs, as well as the area of the Polenergia Baltic I OWF located adjacent to the Central Shoal. The locations of C-POD detectors and aerial observation transects during marine mammal surveys are shown in Figure 16 and Figure 22 in Appendix L of the Report, respectively.

All large-scale studies of the presence of porpoises in the Baltic Sea carried out to date indicate a clear seasonality in their occurrence - the highest number of individuals was recorded in summer, with smaller numbers in winter and early spring. Accordingly, it was decided to conduct aerial monitoring mainly during spring and summer. Two follow-up surveys were also conducted in the fall, while no surveys were conducted in the winter.

Monitoring conducted in the area of OWF BIII showed the presence of three species of marine mammals in the area of the planned wind farm and adjacent waters: harbor porpoise (Phocoena phocoena), gray seal (Halichoerus grypus) and common seal (Phoca vitulina). The activity of all the above-mentioned animal species was very low. Passive acoustic monitoring showed only 5 days of porpoise presence per year. A total of nine individuals of marine mammals were observed during aerial visual monitoring, Of which five were porpoises and four were seals. One of the seals was a grey seal, two were common seals,

[1] According to the "Polish Nomenclature of Mammals of the World" of the Museum and Institute of the Polish Academy of Sciences, the current Polish species name is the sea grebe

and in the case of one individual, the species could not be determined. All the animals were adults, and no juveniles were observed.

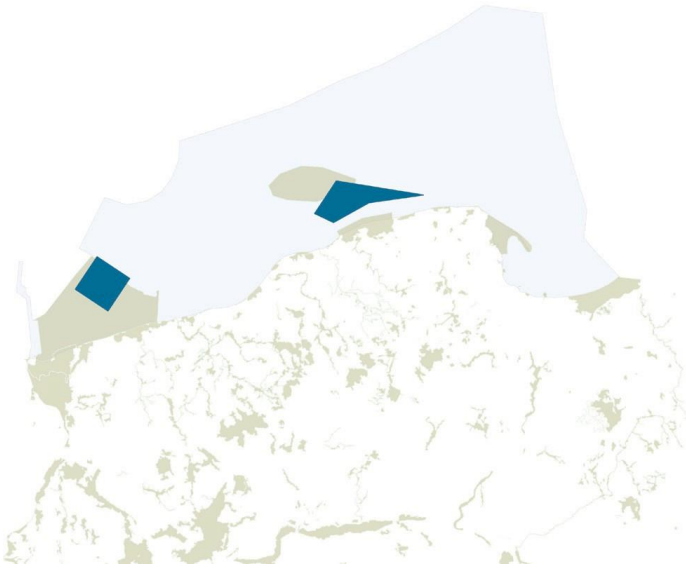
Based on the results, it was concluded that the BIII offshore wind farm area is characterized by very low activity of marine mammals. Due to the small number of days on which the animals were found, it was not possible to determine seasonal trends in their occurrence. The lack of juvenile porpoises means that the study area is not relevant to the reproduction of these animals. It was concluded that the BIII OWF area could be a region for porpoises to obtain food.

In the period from March 2016 to April 2017, marine mammal surveys were conducted in the body of water encompassing the Baltica offshore wind farm area, adjacent to the area of the planned BIII offshore wind farm to the north and northwest, by recording the presence of porpoises using C-POD acoustic equipment and aerial observations. Similarly to the marine mammal surveys performed in the BIII offshore wind farm area, C-POD recorders were deployed within or adjacent to the Baltica offshore wind farm area, while aerial observations covered a larger body of water, including the BIII offshore wind farm area (IMG Consortium and MEWO et al. 2017).

The results obtained from the aforementioned study show that porpoise detections in the area are relatively few. The clicks were recorded at three research stations between June and August 2016. (54 detections). The highest number of detections (98 detections) was recorded at one research station between August and November 2016. Porpoise detections also took place at several other stations between January and March 2017. (22 detections), 3 detections were also recorded at one research station between March and April 2017. However, it should be noted that more porpoise detections were recorded in summer than in other seasons. No porpoises were observed during aerial observations, despite good observation conditions. However, during the flights it was possible to observe closer unidentified seals: in May 2016. (1 individual), June 2016. (2 individuals) and in April 2017. (1 individual). The results collected indicate that the study area is an area with a low density of marine mammals (ibid).

In 2016-2018, in connection with the implementation of the PMŚ project entitled. "Pilot Implementation of Monitoring of Marine Species and Habitats in 2015-2018," surveys for porpoises were conducted in the Pomeranian Bay and Stilo Shoal (located southeast of the planned OWF BII). The location of the sites where porpoise monitoring was performed during the aforementioned period is shown in Figure 1. Seal surveys within the framework of the aforementioned project were conducted along the entire coast, so at a relatively considerable distance and under conditions significantly different from the BII OWF area.

Figure 1. Location of porpoise monitoring sites in 2016-2018 within the framework of PMŚ (Baranska et al. 2018)



Analysis of the collected data showed significant differences in porpoise occurrence between the areas - the Pomeranian Bay site had ten times as many days of positive detections (an average of 4.56 DPD) as the Stilo Shoal site, located in the area of OWF BIII (an average of 0.32 DPD). At the same time, it has been shown that the presence of porpoises in both areas is characterized by seasonality - in the Pomeranian Bay the maximum DPD values were recorded in the summer months, while on Stilo Shoal in the spring (Malinga M. et al 2019[2]). According to the released data of the Environmental Protection Inspectorate obtained within the framework of the State Environmental Monitoring, during the entire period of the aforementioned monitoring, i.e. from March 2016 to August 2017, 3 to 5 days of positive detections of harbor porpoise were found at each of the five CPOD stations located on Stilo Shoal (CPOD06-CPOD10) (GIOŚ 2019[3]).

Data on the occurrence and distribution of porpoises and their abundance in the Baltic Sea also come from the comprehensive acoustic monitoring of the species carried out in 2011- 2013 as part of the SAMBAH project. Monitoring results indicate that the porpoise population in the northeastern Baltic has an estimated 497 individuals (this value is believed to represent the population size of the Baltic proper), and in the southwestern part an estimated 21,390 individuals. During the summer season (May to October), detections were concentrated in two areas: one located in the southwestern part of the Baltic Sea and the other located on and around offshore shoals in the central part of the Baltic proper, while during the winter season (November to April) they were more dispersed. The identification of two areas with higher concentrations of summer porpoise detections based on the results of the SAMBAH project, combined with information from Danish satellite surveys of harbor porpoises from the Belts Sea population, led to the division of the study area into two areas of summer porpoise populations. The Belts Sea population is believed to dominate the southwestern part, while the Baltic proper population is mainly found in the northeastern part. During the winter season, the areas of occurrence of the two populations appeared to overlap (SAMBAH 2016).

Results from the SAMBAH project indicate that during the summer season there was a high probability of

[2] As the methodology does not specify the date of its development/publication, the date of access is given.

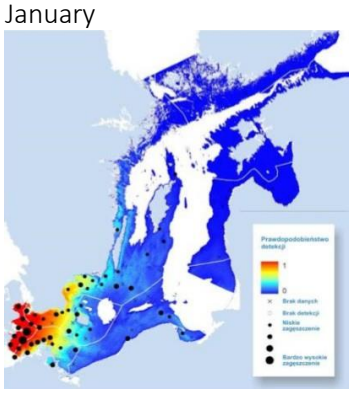
[3] Since the data made available is not dated, the date the data was made available is given.

porpoise detections on and around the submarine shoals south of Gotland and east of Öland. The aggregation of animals in the area was most evident in the period through May to August, the breeding season. This is also the period when their separation from the population concentrated in the southwest of the study area, between Denmark, Germany and Sweden, was most pronounced. During winter, especially in January-March, the animals were more dispersed, with intermediate detection probabilities occurring along the coasts of Poland and the Baltics, along the east coast of Sweden and in Finnish waters (SAMBAH 2016).

Determined from the results of the SAMBAH project, the spatial distribution of the probability of porpoise detection in the study area by month is shown in Figure 2.

Figure 2. SAMBAH project results - spatial distribution of probability of porpoise detection in the study area by month (red color indicates the highest probability of porpoise detection, while dark blue - the lowest) (GDOŚ 2015)

January



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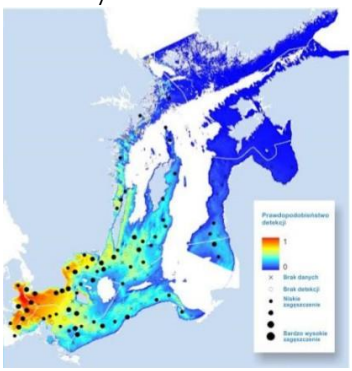
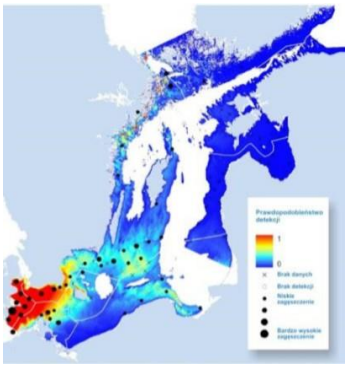
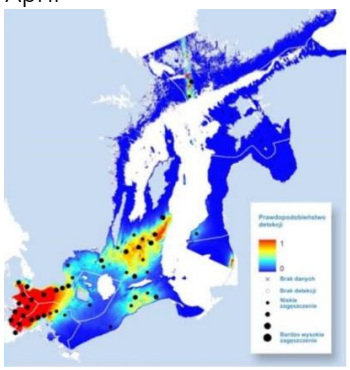


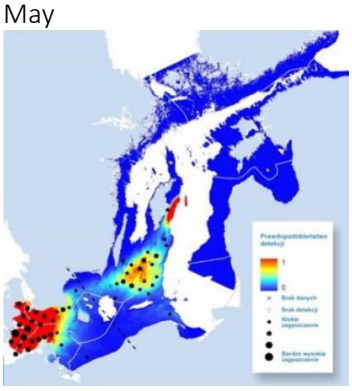
March



April



May



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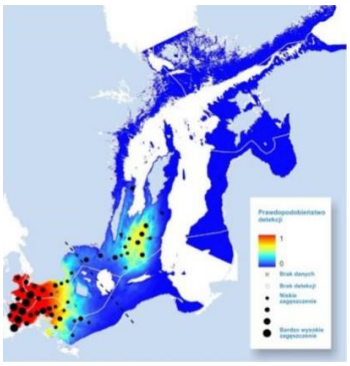

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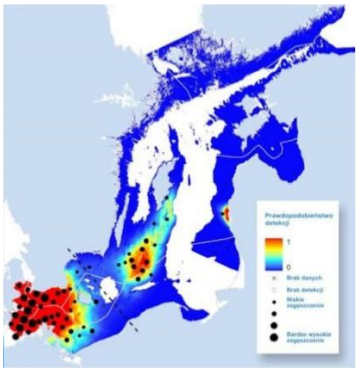
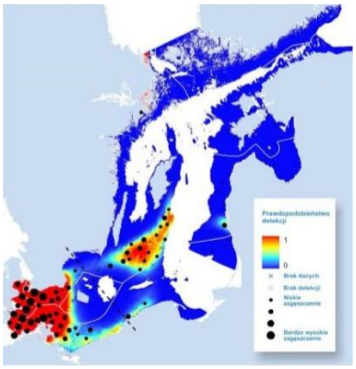


August



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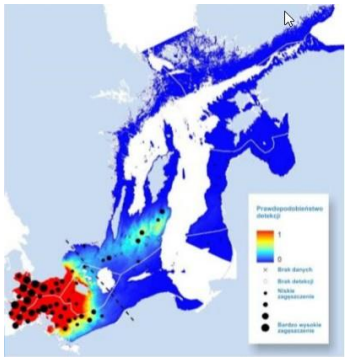
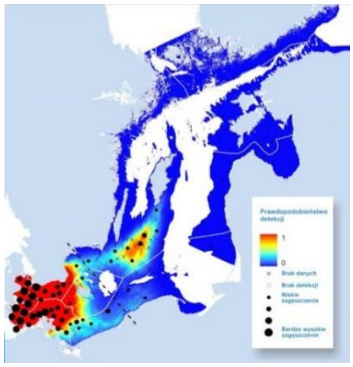
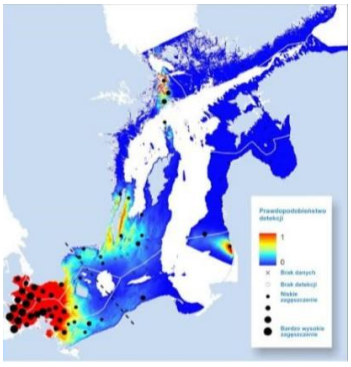


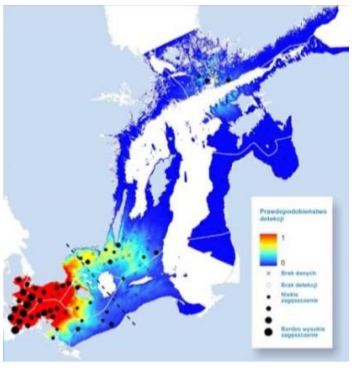
October



November



December

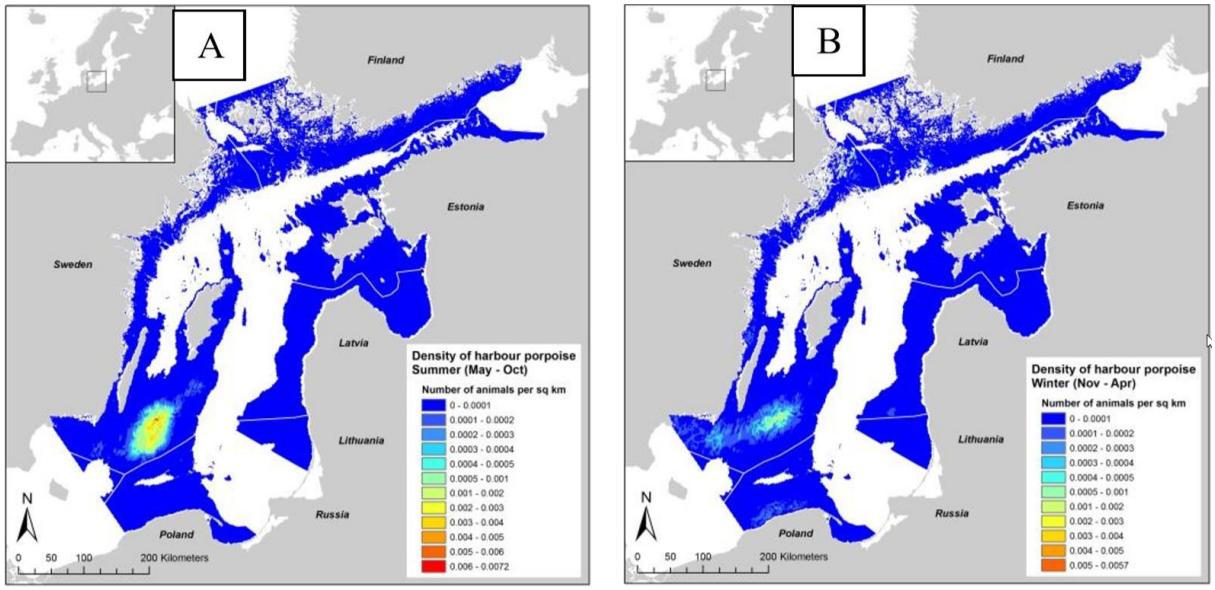


Prawdopodobieństwo detekcji	Probability of detection
Brak danych	No data available
Brak detekcji	No detection

Niskie zagęszczenie	Low density
Bardzo wysokie zagęszczenie	Very high density

According to the results of the SAMBAH project, the highest probability of porpoise detection in the BIII offshore wind farm area is in April. It is worth mentioning that the maximum values of DPD were recorded during porpoise monitoring conducted in 2016-2018 within the framework of the PMŚ at the Stilo Shoal site (see Figure 1), located south of the area of the planned farm, just in the spring period. As part of the SAMBAH project, maps of predicted summer and winter harbor porpoise densities were developed for the entire study area. Figure 3 shows maps of porpoise densities for the northwestern part of the study area, within which OWF BIII is planned.

Figure 3. Predicted densities of harbor porpoise (number of individuals per$_{km2}$) during the summer season - May to October (A) and winter season - November to April (B) in the northwestern part of the SAMBAH study area (SAMBAH 2016)



According to the results of the SAMBAH project, the BIII offshore wind farm region is an area with low predicted densities of porpoises, with densities slightly higher between November and April.

Taking into account all the above-described results of marine mammal surveys, it can be concluded that the region of the planned farm is not an area intensively used by this group of animals. The area is also not, as the results of the SAMBAH program indicate, a region of importance for the ecology and biology of any of the isolated populations of Baltic harbor porpoise. It can only represent an area of movement of individual individuals or periodic feeding grounds. However, due to the relatively low value of fish stocks, which are the main food of porpoises, it is not a feeding area of significant importance.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 11

Environmental characteristics - bats

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2. Characteristics of the occurrence of bats in the area of the OWF BIII 5

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Abbreviations and definitions

OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica	Baltica offshore wind farm
Baltic Power OWF	Baltic Power offshore wind farm

1. Introduction

This section presents the characteristics of the occurrence of bats over the area of the planned OWF BIII and in its vicinity during spring and autumn migration periods. This characterization was prepared on the basis of the results of bat monitoring conducted in the basin covering the area of OWF BIII with the buffer zone in 2013. The report with the results of the chiropterological monitoring along with a description of the methodology used is attached as Appendix L to the Report.

In addition, the section presents the results of bat activity monitoring carried out in areas adjacent to the BIII offshore wind farm area for the environmental impact assessment of the Baltica offshore wind farm and the Baltic Power offshore wind farm.

2. Characteristics of the occurrence of bats in the area of the OWF BIII

Twenty-two inspections (out of 25 planned) were carried out during the one-year period covering spring migration (April-May) and fall migration (August-September). The control consisted of monitoring cruises along a transect and listening at two listening points rotated during the surveys.

A total of 13 bat sounds were recorded in the area of the OWF and the buffer zone. Signals were found in the northeastern part of the study area. They were recorded during two monitoring cruises 11 and 12, during the spring migration period under suitable weather conditions. Four signals were recorded on the transect, and 9 were recorded while conducting listening sessions at listening point No. A. As a result of the analysis involving data extraction and transformation of the recorded signals, it was concluded that the collected sounds emitted by bats belong to a species of the gloomy bat family - the great boa constrictor. It is one of the largest bats in Poland, with a European distribution range from the Iberian Peninsula in the west to the Urals and Caucasus in the east. Its natural habitat is forested areas, but it is also observed in built-up areas. It is a species that migrates long-distance up to 1,600 km between summer (northeastern Europe) and winter (southwestern Europe) locations. It is seen during migration over the open sea.

Taking into account the number of recorded signals emitted by the Great Boer in the area of the Baltic Sea III offshore wind farm, an index of the activity of this species in the study area was calculated for the measurement period - spring migration, as well as for individual monitoring trips, during which the sounds of the Boer were recorded. The obtained values were compared with the adopted reference scale of bat activity, which was based on results from pre-investment surveys of planned onshore wind farms across Poland. The activity of the Great Boer ranked in the low activity range. Activity at this level does not require the need for preventive and mitigation measures.

The number of individuals observed does not clearly indicate the existence of a permanent migration corridor for this species in the BIII OWF area. In terms of wildlife, it can be concluded from the studies that the area of the planned Baltic III offshore wind farm is not a valuable region for bats.

Surveys of bat activity in the Baltica offshore wind farm area, adjacent to the BIII offshore wind farm area to the north and northwest, were carried out during the spring migration period (May 2016, April-May 2017) and the fall migration period (August-September 2016). A total of 79 records were recorded that showed evidence of bat activity. The records were attributed to the following species:

the great boar, greater carlik, lesser carlik and woodrat, and the red-legged nightjar. The Great Boer and Forest Boer have been recorded during the autumn migration period. The greater carnivore and the lesser carnivore were recorded during both spring and autumn migrations, while the red-legged nightjar was found once during spring migration. During the bat activity surveys, mainly low activity and a single moderate activity were recorded. The activity index for individual species for the entire spring and autumn migration period indicates low bat activity in the Baltic offshore wind farm study area (IMG Consortium and MEWO et al. 2017).

Of the listening points designated for bat activity surveys in the Baltica offshore wind farm area, the closest to the area of the planned BIII offshore wind farm were points P_N02 (to the north--west) and P_N03 (to the north). At the first of the aforementioned listening posts, no bat activity was recorded during all three inspections. On the other hand, during two of the three inspections carried out, greater carlik activity was found (low in May 2016 and moderate in May 2017). During the fall migration period at listening point P_N02, during an inspection conducted in August 2016. (one of two) recorded low activity of two bat species - the great bole and greater carnifex. However, at listening point P_N03, low activity of two other species - the lesser spotted carlik (in August 2016) and the woodrat (in August and September 2016) - was observed during fall migration*(ibid*).

In 2019, surveys were conducted at the Baltic Power offshore wind farm area adjacent to the BIII offshore wind farm to the east. Surveys during the spring migration period were carried out in April and May, while fall migration was carried out from August to October. A total of 83 records (11 in spring, 72 in autumn) were recorded, which showed evidence of bat activity. The records were assigned to the following species: greater carlik, lesser carlik, and great bole (for some of the signals it was not possible to assign to a specific species) (IMUMG Consortium and MEWO et al. 2020).

Previous surveys of the occurrence and timing of bat activity in the Baltic Sea and southeastern North Sea coasts and islands, conducted at 19 locations between 2007 and 2009, indicate that for the most part, migratory bats in the Baltic move in dispersal (broad front) (Rydell 2014). Thus, it cannot be ruled out that migratory flights of some of the listed bat species may occur over the BIII OWF area or in its vicinity at different times. The monitoring results presented above, however, indicate that bats are not active over the BIII offshore wind farm and in the area during seasonal migration periods and confirm the absence of significant bat migration corridors (flight concentrations) over the analyzed basin.

3. Literature and other sources

1. Consortium of the Maritime Institute in Gdansk (IMG) and MEWO S.A. together with Subcontractors, Environmental Impact Report of the Baltica Offshore Wind Farm, Gdansk, 2017
2. Consortium of the Maritime Institute of the Maritime University of Gdynia (IMG) and MEWO S.A. together with Subcontractors, Baltic Power Offshore Wind Farm Environmental Impact Report, 2020
3. Ordinance of the Minister of Environment of December 16, 2016 *on the protection of animal species* (Journal of Laws 2016 item 2183, as amended)
4. Rydell J., Bach l., et al., Bach P., Diaz L. G., Furmankiewicz J., Hagner-Wahlsten N., Kyheröinen E-M., Lilley T., Masing M., Meyer M. M., Pētersons G., Šuba J, Vasko V., Vintulis V., Hedenström A., Phenology of migratory bat activity across the Baltic Sea and the south-eastern North Sea, Acta Chiropterologica, 16(1): 139-147, 2014

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 12

Environmental characteristics - archaeology

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Abbreviations and definitions

AZP	An archaeological snapshot of Poland
BHMW	Navy Hydrographic Office
KEZA	Record Card of Archaeological Monument
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
PWKZ	Pomeranian Regional Conservator of Monuments

1. Introduction

This section presents a characterization of the cultural heritage found in the area of the planned BIII OWF and in its potential impact zone. The characterization in question was developed primarily on the basis of the results of archaeological surveys conducted in 2013-2014 by the Maritime Institute (see Appendix M to the Report).

Data on known objects in the Database of Underwater Objects (BDOP) of the Navy Hydrographic Office were also obtained for the development of this section.

2. Characteristics of cultural heritage in the offshore wind farm area BIII

The research involved analysis of archival materials, analysis of sonar data. Verification of objects was also carried out using an ROV underwater inspection vehicle. In addition, based on the data provided by the Maritime Institute on seismoacoustic surveys and the results of the analysis of geological survey material (core analysis), the possibility of the presence of remnants of human activity related to the Stone Age was determined.

Data on marine archaeological sites in waters adjacent to the Pomeranian Voivodeship are collected primarily by the National Maritime Museum[1] (NMM) in Gdansk in the Evidence of Underwater Archaeological Sites (EPSA). The data is submitted to the BHMW and the Pomeranian Regional Monument Conservator. The most valuable finds have also been registered in the AZP system since this year. The archives of the NMM and BHMW did not contain any information on heritage remains in the study area.

In accordance with the assumptions contained in the methodology, searches were carried out to capture the remains of Stone Age settlements using seismoacoustic, geological and ROV inspection methods.

Analysis of archival materials in the direction of the search for the remains of prehistoric settlements and wrecks of historic transport units did not detect any information on the remains of cultural heritage in the study area. An archival search for transport vessel disasters found information about the disappearance in the study area of 84 ships built between the 16th and late 18th centuries. This information was not confirmed during the field survey.

As a result of the operations, one shipwreck was discovered. The wreck is tentatively dated to the early 20th century. This is evidenced by both the steam propulsion system and the mixed steel and wood plating. The wreck is not of high historical value and can be made available for tourist diving. The site is listed in the EPSA Record of Underwater Archaeological Sites under the symbol B96.1 and has been granted a KEZA card.

During the analysis of the geological survey material, no archaeological relics were found in the shallow cores.

At the time of the survey, no relics of areas that potentially could have been in the zone of settlement influence were observed. No archaeologically valuable objects have also been found at the bottom of the OWF BIII area.

[1] Formerly: Central Maritime Museum

3. Literature and other sources

1. BHMW, Information on known objects in the Database of Underwater Objects (BDOP) of the Naval Hydrographic Office, July 2019

2. SMDI Advisory Group (SMDI), Environmental Impact Report "Morska Farma wiatrowa Bałtyk Środkowy III", Warsaw, 2015a

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Chapter 13

Environmental characteristics - fisheries

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Abbreviations and definitions

AIS	Automatic Identification Sysytem (Automatic Ship Identification System)
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
POM	Polish Maritime Areas
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
SZP	Special fishing permit
VMS	Vessel satellite monitoring system (Vessel monitoring system)

1. Introduction

This chapter presents the characteristics of fisheries in the area of the planned BIII OWF and in its vicinity. This characterization was developed primarily based on data from fishing vessel catch reports submitted to the Fisheries Monitoring Center taking into account fish species, month of catch and vessel size (vessels up to 12 meters and over 12 meters)[1]. The scope of the analyzed data covers the years 2015- 2020.

An analysis of changes in the volume[2] and value[3] of catches and fishing effort (number of fishing days[4] and number of Polish fishing vessels[5] involved in 2015-2020 in the area of the planned investment) was conducted. An analysis of the seasonality of fishing by month of the year was conducted.

Since data on fishing fleet activity, in the most detailed terms, is available for the areas of the Baltic squares (the area of a single square is about 400 square kilometers), the data compiled refers to the area of entire squares. Due to the nature of fish stocks, which both in terms of time and distribution are dynamic in nature, analyzing them in a very small area is not substantively justified. The analysis includes the area of squares N7, N8, M7, M8, within which the BIII OWF is located.

In order to determine (quantify) with as much accuracy as possible the impact of the investment on fisheries (determine potential losses of fisheries) in the area occupied by the BIII OWF (in the case of complete exclusion of the farm area from the possibility of fishing), the relative share of the area that the farm will occupy to the total area of fishing squares was taken into account. The area of OWF BIII is about 117 square kilometers, while the area of fishing squares N7, N8, M7, M8 is 1.58 thousand square kilometers. Thus, IMF BIII occupies about 7.4% of the squares.

A general characterization of the ichthyofauna occurring in the area of the planned OWF BIII and in its vicinity is provided in Chapter 7 of Volume III of the Report. Meanwhile, the results of surveys and analyses of ichthyofauna carried out in 2009-2013 by the Maritime Institute of Fisheries - National Research Institute in the area of OWF BIII, along with a description of the survey area, its scope and methodology used, are attached as Appendix H to the Report.

2. Legal conditions for the operation of the sector fisheries

At the global level, the most important operating framework document for fisheries is the Code of Responsible Fisheries[6], which sets out principles and standards for the conservation, management and development of all fisheries.

The overarching document in the European Union is the Treaty on the Functioning of the European Union[7]. It provides for exclusive or shared competence in a specific area. Setting fishing quotas is within the competence of the EU Council and is done through negotiations. Decisions on Baltic quotas are usually made at the October meeting of the EU Council of Ministers. Based on proposals from the

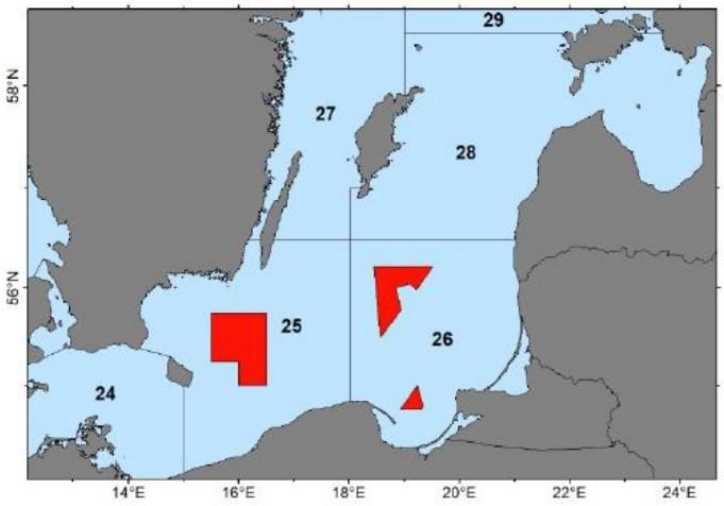
[1] The 12 m criterion was adopted to distinguish vessels that can be classified as small scale fisheries <12 m) in accordance with the provisions of Council Regulation 1198/2006.
[2] The total (annual, monthly) catch volume is the sum of the daily catch volumes reported by fishermen in their logbooks.
[3] The value of the catch was estimated based on the average annual price of fish of each species in a given year and the volume of catch.
[4] Annual or monthly fishing effort was defined as the sum of days in which a fishing vessel reported catching any amount of fish (the maximum theoretical number of days for one vessel is 365, for two vessels 730, for 10 vessels 3650, etc.)
[5] Fishing effort in terms of the number of fishing vessels was determined by the sum (annual or monthly) of all units that reported at least one fishing day (in a year or month). In statements containing fishing vessels by gear used, the number of vessels may be duplicated if a vessel fished with more than one gear (gear group) in a given year or month.
[6] Code of Responsible Fisheries https://www.fao.org/3/v9878pl/v9878pl.pdf, access date: 28.03.2022 r.
[7] Treaty on the Functioning of the European Union (OJ EU of 26.10.2012 C 326/47)

European Commission, the Council's agreed position is reflected in the annual regulation on the distribution of fishing quotas, i.e. quotas to be shared among eligible EU member states, including Poland. The Regulation on the Distribution of Fishing Quotas for 2018[8] introduced an eight-week closure period, from July 1 to August 31, to provide protection for Atlantic cod spawning stocks in subdivisions 25-26 of the eastern Baltic Sea.

Management of economically important fish stocks is based on multi-year management plans[9]. Established in accordance with Regulation (EU) 2016/1139 of the European Parliament and of the Council of July 6, 2016, the multi-year plan for cod, herring and sprat stocks in the Baltic Sea[10], the so-called multispecies plan, introduced areas of fishing prohibition in cod spawning areas, effective from May 1 to October 31. According to scientists, no-take areas are a sufficient protective measure for the eastern cod stock.

According to the current legislation, closed areas are located in basins: Bornholm, Gdansk and Gotland.

Figure 1. Areas of zones closed to fishing from May 1 to October 31 (source: ICES)



The Baltic Sea Plan is the first established plan under the new EU fisheries policy. Cod, herring and sprat are species that are heavily fished in the Baltic Sea. In practice, the size of cod stocks affects the size of herring and sprat stocks, and vice versa. According to the adopted Plan, management is to be based on the most up-to-date scientific, technical and economic data. The provisions in the Baltic Sea Plan are also intended to ensure that key tenets of the Common Fisheries Policy are carried out, such as the commitment to land[11] (so that fishermen do not discard fish they have already caught that they consider inferior, for example) and regional governance (a greater role for interested member states in the lawmaking process).

Pursuant to the Prime Minister's Order of October 27, 2021 on the detailed scope of activities of the Minister of Agriculture and Rural Development (Journal of Laws 2021, item 1950), the Minister of

[8] Council Regulation No. 2017/1970 of October 27, 2017 fixing the fishing opportunities for 2018 for certain fish stocks and groups of fish stocks in the Baltic Sea and amending Regulation (EU) 2017/127 (OJ EU 27.10.2017 L 295/1)

[9] Multiannual plans as a tool for fisheries management at EU level http://www.consilium.europa.eu/pl/policies/eu-fish-stocks/multiannual-management-plans/

[10] Regulation (EU) 2016/1139 of the European Parliament and of the Council of 6 July 2016 establishing a multiannual plan for cod, herring and sprat stocks in the Baltic Sea and the fisheries exploiting those stocks, amending Council Regulation (EC) No. 2187/2005 and repealing Council Regulation (EC) No. 1098/2007 (OJ EU 15.7.2016 L 191/1)

[11] article 15 of Regulation (EU) No. 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No. 1954/2003 and (EC) No. 1224/2009 and repealing Council Regulations (EC) No. 2371/2002 and (EC) No. 639/2004 and Council Decision 2004/585/EC (OJ 28.12.2013 L 354/22)

Agriculture and Rural Development is the public administration body in charge of the government administration department of fisheries.

The principal legal act in Poland, establishing rules for the practice of fishing, is the Act of December 19, 2014 *on Maritime Fisheries* (Journal of Laws 2022, item 540), which came into force on March 4, 2015, and repealed the Act of February 19, 2004 on Fisheries (Journal of Laws 2004 No. 62, item 574, as amended). The current law specifies the rules on the performance of fishing, the scope of tasks and the competence of the authorities with regard to the granting, revocation and suspension of fishing privileges, as well as the rules on the supervision of marine fisheries and the landing and handling of marine organisms. Detailed regulations are contained in the implementing acts of the Marine Fisheries Law. The performance of commercial marine fishing is a regulated activity. In order to operate it, one must be a shipowner, and the vessel must be listed in the register of fishing vessels (Article 13 of the Marine Fisheries Law), maintained by the minister in charge of fisheries. Once these conditions are met, a fishing license is issued (Article 33 of the Marine Fisheries Law), which confirms the right to engage in commercial fishing. In addition, the performance of commercial fishing in a calendar year requires a special fishing permit (SZP) (Article 40 of the Marine Fisheries Law). The SZP is issued upon application by the owner of a fishing vessel, which is submitted by October 31 of the year preceding the year for which the special fishing permit is to be issued. Scientific research fishing and recreational fishing also require appropriate permits (Article 84 and Article 90 of the Marine Fisheries Law, respectively). A package of detailed regulations governing the performance of fisheries has been issued for the Marine Fisheries Law. Among the most relevant from the point of view of fishing are the Regulation on the Distribution of Fishing Quotas[12] and the Regulation on Detailed Conditions for Commercial Fishing[13].

If a permanent navigational obstacle (in the case of OWF BIII, this may be the entire area specified in the PSZW permit) is identified by the relevant Marine Offices' cells, it is marked on maps accordingly, and in the case of an impossible obstacle threatening navigation, a safety zone closed to navigation, anchoring, water sports and fishing is established around it. It forms a circular area with a radius of 500 m from the location where the navigation obstacle was revealed. Under Article 24 of the Act on Maritime Areas of the Republic of Poland and Maritime Administration[14], the decision to establish a zone is made by the director of the relevant maritime office at the request of subordinate units of the office responsible for the safety of navigation. The decision is issued in the form of an order published in the Official Gazette of the relevant province. A navigation exclusion zone is used for safety reasons for developments in maritime areas. An application for the establishment of an exclusion zone and the justification for its introduction is submitted to the director of the relevant maritime office by the investor. The abolition of the safety zone is carried out by order of the director of the competent maritime office.

3. Characteristics of fisheries in the OWF area BIII

3.1. Species of fish subject to fishing found in the area of the farm

In the area of the BIII offshore wind farm and buffer zone, 15 fish species were recorded in research catches carried out with pelagic trawl and bottom set surveys, of which 9 were the subject of commercial fishing (Table 1).

[12] Ordinance of the Minister of Agriculture and Rural Development of February 15, 2019 on the detailed distribution of general fishing quotas and additional fishing quotas (Journal of Laws 2019, item 370, as amended)

[13] Ordinance of the Minister of Maritime Economy and Inland Navigation of August 21, 2019 on the dimensions and protection periods of marine organisms and detailed conditions for commercial fishing (consolidated text Dz. U. 2021 item 2056 as amended)

[14] Consolidated text OJ 2022, item 457

Similar to the total Baltic catches of the Polish fishing fleet, the most important fish species caught in the area of squares M7, M8, N7, N8 were cod, herring, sprat and flounder.

The volume of catches of Baltic cod of the Polish fishing fleet in 2015-2020 fluctuated between 0.47-13.6 thousand tons, herring 37.4-50.9 thousand tons, Baltic sprat 60.1- 74.5 thousand tons and flounder 9.4-16.7 thousand tons.

Table 1. Summary of species found in research fisheries in the area of the BS III OWF and in commercial fisheries in the area of squares M7, M8, N7, N8 and Polish Baltic fisheries in total in 2015-2020.

Species	Average annual catch 2015-2020 (kg)	
	M7, M8, N7, N8	Total Baltic
Stickleback	-	-
Stickleback	-	-
Dobijak	2800	17394000
Cod	865753	42961588
Plaice	18523	2476481
Hound of the devil	-	-
Vixen	-	-
Salmon	522 kg / 1534 pcs.	209767
Skarp	17877	333039
Orchid	484414	82124562
Sprat	327402	403419989
Herring	292693	251100157
Tasha	-	-
Eelam	-	4642
Zimnica	-	-

3.2. The abundance of species targeted by the fishery fisheries on an annual basis

In the survey catch, sprats (77.9%) were the most abundant species found in the BIII OWF and buffer zone, followed by cod (9.5%), herring (7.6%) and flounder (4.4%). Sprats and herring dominated the pelagic trawl fishery, while cod and flounder dominated the pound net fishery. In terms of weight, cod clearly dominated the survey catch (56.2% of the total weight of fish caught), followed by flounder (18.7%), sprat (17.6%) and herring (5.5%).

Commercial fishing, in the area of the four Baltic quadrants M7, M8, N7, N8 (i.e., wider than the research fishing region), was dominated by cod (54%), flounder (21%), sprat (16%) and herring (8%) in 2011-2013.

In comparison, in 2015-2020, commercial fishing, in the area of Baltic squares M7, M8, N7, N8, was dominated by cod (42% of the total weight of fish caught), flounder (23%), sprat (16.0%) and herring (14%).

3.3. Spatial distribution of species targeted by fisheries fisheries

As shown by ichthyofauna monitoring surveys, the distribution of the two most important fish species for fisheries (cod and flounder) in the area planned to be occupied by the farm varies during the year, which is primarily related to annual changes in water temperature, and to a lesser extent to the availability of the food base and migrations (foraging and spawning). During the winter period, cod are observed migrating from the farm area to deeper waters with higher temperatures. In summer, on the other hand, there was no relationship between water depth and the distribution of these fish. On the other hand, in the case of flounder, significant variation was observed in the abundance of these fish during different periods of the year. The highest concentrations were found in winter (January), which is associated with the migration of these fish from shallower waters (feeding grounds) to deeper waters (spawning grounds). At the same time, significant spatial variation in the occurrence of flounder was observed - more numerous in the zone proper compared to the buffer zone. A similar pattern was also observed in late spring and summer. It should be noted that the area of the OWF (see Appendix H of the Report), during the winter period - which is the highest fishing season for these fish - is not a target spawning ground for flounder (due to low salinity), nor is it a habitat for them.

It should be noted that the area of the farm is a small fraction of the area of possible activity of a fishing vessel during a fishing trip. Therefore, the degree of spatial differentiation of species within the Project only to a small extent, and only in the case of demersal species, can be relevant to assessing the fishing attractiveness of the entire area of operation of the fishing units concerned. In addition, bearing in mind, the dynamics and scale of movements of individual pelagic species (sprat and herring), it is pointless to analyze which part of the area of OWF BIII may be more attractive for fishing. The assessment should therefore focus on the impact of the farm's location itself on the region's fishing opportunities.

3.4. Fishing activities in the study area research

3.4.1. The volume of fish catch in the area of OWF BIII

The total volume of fish catches in the area of the analyzed squares fluctuated from about 185 to 477 tons in 2015-2020. The volume of total catches of the Polish Baltic fleet during the same period ranged from nearly 129,000 tons to 152,000 tons. The analyzed square is a relatively small area compared to the rest of the area of potential interest for the fishing fleet. Also, the sheer size of the catches realized in these squares is small in relation to the Polish total Baltic catches (much less than 1%) or the average catches per unit area (more on this later in section 3.4.2). Therefore, it can be presumed that the observed annual changes in catches, may depend on the activity of a small and quite variable group of vessels and is dependent on the subjective choice of the fishing ground by the skipper of the fishing unit. The activity of these vessels, over the long term, is not necessarily linked to the same fishing squares.

Table 2. Comparison of catches in fishing squares M7, M8, N7, N8 with total Polish Baltic catches, 2015-2020

Year	M7, M8, N7, N8 squares	Total Baltic fishing	Squares M7, M8, N7, N8 /Total
	Tone	Tone	-
2015	337	134712	0.003
2016	477.6	133295	0.004
2017	403.8	133595	0.003

Year	M7, M8, N7, N8 squares	Total Baltic fishing	Squares M7, M8, N7, N8 /Total
	Tone	Tone	-
2018	265.9	151591	0.002
2019	372.3	141063	0.003
2020	184.8	128674	0.001

Table 3. The volume of catches in the area of Baltic squares M7, M8, N7, N8 and the estimated volume of catches in the area of the investment itself (2015-2020)

Year	Fishing in squares M7, M8, N7, N8	Estimated catches in IMF BIII
	Tone	Tone
2015	337	24.94
2016	477.6	35.34
2017	403.8	29.88
2018	265.9	19.68
2019	372.3	27.55
2020	184.8	13.67
Average	340.2	25.18

The main fish species caught in the area of the analyzed fishing squares were cod, flounder, herring and sprat. The average share of cod, which was the most important species caught, in the volume of catches in 2015-2020 was 42%, flounder 23%, herring 14% and sprat 16%.

Table 4. Catch volume in fishing squares M7, M8, N7, N8 in 2015-2020, by major species

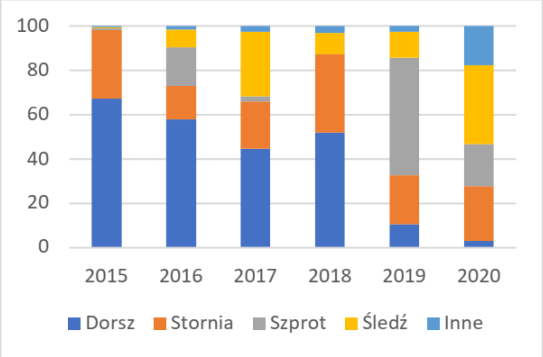
Species	2015	2016	2017	2018	2019	2020
	t	t	t	T	t	t
Cod	226.7	276.5	179.8	137.8	39.2	5.8
Orchid	103.9	71.8	86.9	93.9	82.2	45.7
Sprat	2.8	83.2	8.5	0.4	197.8	34.8
Herring	1.8	39.0	117.7	25.1	43.4	65.7
Other	1.8	7.1	10.9	8.7	9.8	32.8
Total	337	477.6	403.8	265.9	372.3	184.8

Over the analyzed years, the species structure of fish caught in the area of squares M7, M8, N7, N8 has been changing, although it is difficult to catch a clear and lasting trend in the noted changes. In general, a systematic and significant decline in the volume of catches and their value for cod is noticeable. With the exception of 2016 and 2019, the share of sprat was insignificant.

Information provided by scientists confirms that the eastern stock cod is in critical condition. Population status is affected by hydrological conditions. Record high water temperatures have been recorded in the Baltic, resulting in an increase in oxygen-deficient areas, lower salinity, and further deterioration of conditions for successful cod spawning. The growth of the gray seal population in the Baltic, over the

past two decades, has contributed to a sudden increase in cod feeding. Subsequently, the European Commission approved emergency measures banning commercial cod fishing in parts of the Baltic Sea by Executive Order 2019/1248 of July 22, 2019, with immediate effect.[15] The ban has been consistently extended, and is currently in effect under Council Regulation (EU) 2021/1888 of October 27, 2021.[16] The ban covers all fishing vessels and applies in those areas of the Baltic Sea where the largest portion of the stock is found, except for certain specified derogations.

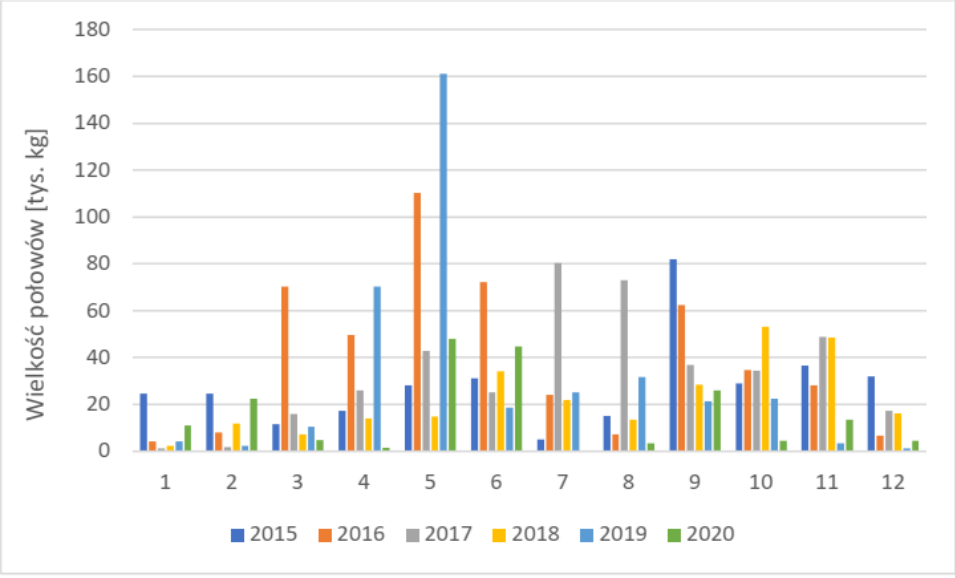
Figure 2. Species structure of catch volumes in the area of squares M7, M8, N7, N8 in 2015-2020



Dorsz	Cod
Stornia	Orchid
Szprot	Sprat
Śledź	Herring
Inne	Other

The analysis of monthly changes in catch volumes conducted for 2015-2020, despite notable significant differences for some months, showed that, in general, the period of lowest fishing fleet activity for the years analyzed was the winter months (December-February). The highest catch volumes occurred in May. A comparison of monthly catch volumes in quadrants M7, M8, N7, N8 is shown in Figure 3.

Figure 3. Seasonality of fish catch in the area of squares M7, M8, N7, N8 in 2015-2020



[15] Commission Implementing Regulation (EU) 2019/1248 of July 22, 2019, laying down measures to alleviate a serious threat to the conservation of the Eastern Baltic stock of Atlantic cod (Gadus morhua)

[16] Council Regulation (EU) 2021/1888 of October 27, 2021 fixing the fishing opportunities for 2022 for certain fish stocks and groups of fish stocks in the Baltic Sea and amending Regulation (EU) 2021/92 as regards fishing opportunities in other waters

Wielkość połowów [tys. kg]	Catch volume [thousand kg]

3.4.2. Fishery productivity in the BIII OWF area

In relation to the average size of Polish Baltic catches, converted to area (fishery productivity), realized in squares lying (partially or fully) in the Polish economic zone, the fishery productivity observed in the analyzed squares can be assessed as low. Between 2015 and 2020, it accounted for about 3.1% to about 7.9% (from about 116 $^{kg/km2}$ in 2020 to about 302 $^{kg/km2}$ in 2016) of the productivity observed in the POM. The average fishery productivity in fishing squares M7, M8, N7, N8 for 2015-2020 was about 215 $^{kg/km2}$ (which accounted for about 5.4% of POM productivity).

3.4.3. The amount of fishing effort in the area of OWF BIII

In 2015-2020, in the area of fishing quadrants M7, M8, N7, N8, there were 37 (2020) to 66 (2015) fishing units out of 803 (2020) and 816 (2015) total Baltic vessels registered in the Polish register. During the period under review, a steady decline in the number of units involved could be observed.

Table 5. Number of vessels involved in fishing in squares M7, M8, N7, N8 (2015-2020)

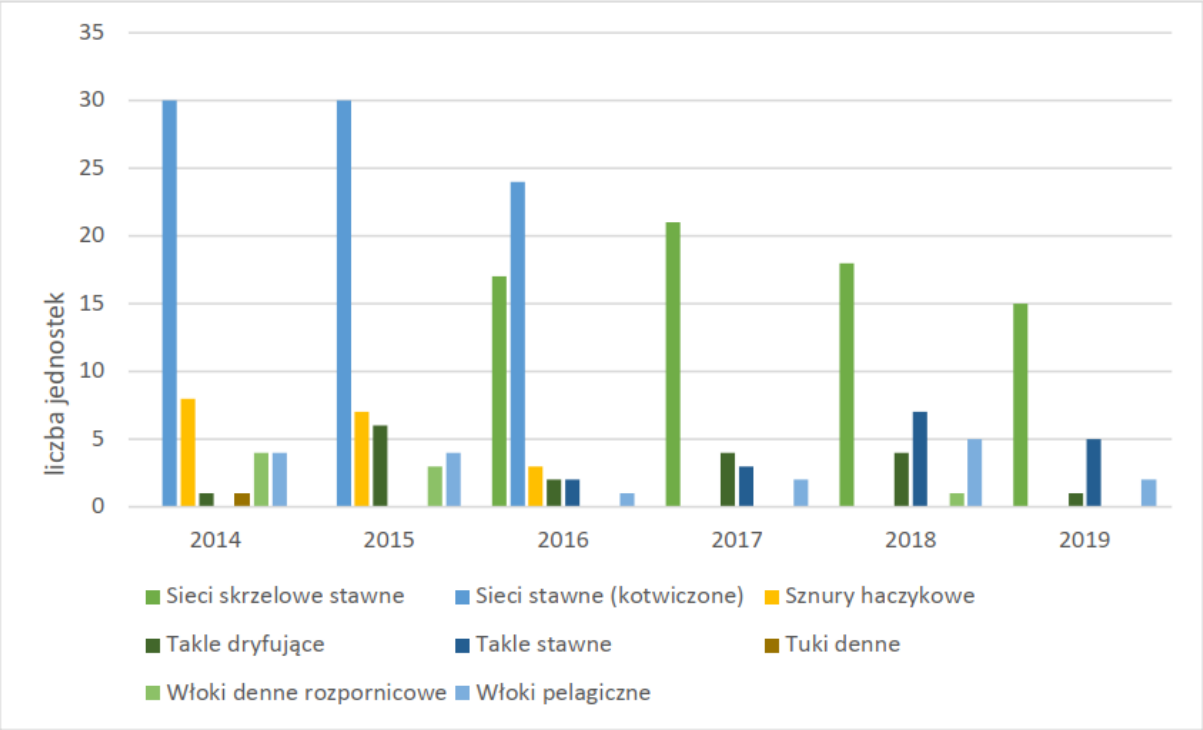
Year	2015	2016	2017	2018	2019	2020
Number of ships	66	56	56	52	40	37

The main gear used for fishing in the study area in 2015-2020 was set nets, as shown in Table 6 and Figure 4 .

Table 6. Number of vessels engaged in fishing in squares M7, M8, N7, N8 (2015-2020) by gear

Fishing gear	2015	2016	2017	2018	2019	2020
Jointed gillnets	0	20	28	26	21	21
Fixed (anchored) nets	33	27	0	0	0	5
Longlines	7	1	0	0	0	0
Drifting longlines	7	9	22	11	8	9
Joint tacos	0	0	3	13	8	0
Bottom tucks	0	2	0	0	0	0
Strut bottom trawls	34	19	15	18	11	10
Pelagic trawls	3	3	7	3	4	9

Figure 4. Number of vessels engaged in fishing in squares M7, M8, N7, N8 (2015-2020) by gear



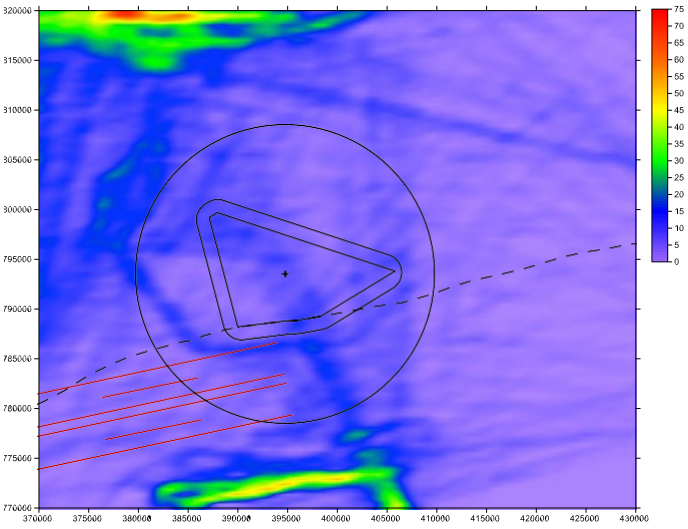
Liczba jednostek	Number of units
Sieci skrzelowe stawne	Jointed gillnets
Sieci stawne (kotwiczone)	Fixed (anchored) nets
Sznury haczykowe	Longlines
Takle dryfujące	Drifting longlines
Takle stawne	Joint tacos
Tuki denne	Bottom tucks
Włoki denne rozpornicowe	Strut bottom trawls
Włoki pelagiczne	Pelagic trawls

The average annual fishing effort (sum of fishing days of all fishing vessels fishing in squares M7, M8, N7, N8) in the analyzed area was 421 days. This represented just over 0.6% of the average effort of the Polish Baltic fleet overall (about 68,000 days per year) in 2015- 2020. Like the number of ships, it varied from year to year, with a marked decline over the years analyzed, particularly sharp in 2019 and 2020.

3.4.4. Fishing vessel traffic in the study area based on AIS data

The figure below shows visualizations of the data collected by a measurement set containing an AIS (Automatic Ship Identification System) sensor. According to the Ordinance of the Minister of Transport, Construction and Maritime Economy of November 29, 2011 on the categories of vessels exempted from the requirement to equip with Automatic Identification System (AIS) equipment (Journal of Laws 2014, item 651), fishing vessels with an overall length of less than 15 meters are exempted from the obligation to equip with AIS equipment. A detailed description of vessel traffic is included in Section 14 of Volume III of the ROIA.

Figure 5. Number of fishing vessel crossings in the study area recorded during the annual vessel traffic monitoring conducted in 2013-2014



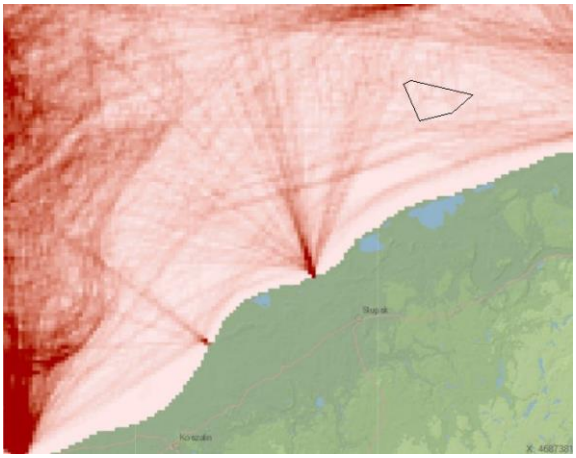
Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The area of OWF BIII is used to a relatively small extent by fishing vessels moving between the ports of Leba and (to a lesser extent) and Ustka to the fishing area within the Słupsk Trough. The intensity of fishing in the Slupsk Trough area can be seen in the upper left corner of the square. There are also traces of trawling or netting in the area of the planned project, especially its NW corner, but their number is not great. The number of registered vessels (in 2013-2014) in the observed area in the period was 123 units. More detailed data characterizing these vessels (e.g., port of registration) is not available.

Fishery data (FMC) shows that 52 units of fishing vessels were fishing in the area of the four analyzed fishing squares in 2018. As shown in the VMS data recorded (figure below) by fishing vessels over 12 meters in length from Leba going to fish in the waters of the Slupsk Trough, they most often sail a course that crosses the edge of the eastern area of the farm or sail past its border.

The above information is also confirmed by the latest Helcom data, according to which the intensity of fishing vessel traffic in the project area is low, as shown in Figure 7 below.

Figure 6. Routes of fishing vessel traffic in the area of the planned project based on 2016 Helcom data.



Source: https://maps.helcom.fi/ (accessed 20/04/2022)

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13. Act on maritime areas of the Republic of Poland and maritime administration (consolidated text Dz.U. of 2022, item 457)
14. Law of December 19, 2014 on marine fisheries (consolidated text OJ 2022, item 540)

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1. https://maps.helcom.fi/

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME III Section 14

Environmental characteristics - ship traffic

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Abbreviations and definitions

AIS	Automatic Identification Sysytem (Automatic Ship Identification System)
HELCOM	Helsinki Commission (Helsinki Commission)
IMO	International Maritime Organization (IMO)
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
POM	Polish Maritime Areas
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
PZP POM	Spatial development plan of Polish maritime areas in the scale 1:2000000
TSS	Traffic Separation System (Traffic Separation System)
VTS	Vessel Traffic Control Systems (Vessel Traffic Service)

1. Introduction

This section presents the characteristics of ship traffic in the area of the planned BIII OWF and in its zone of potential impacts. This characterization was developed primarily on the basis of the results of annual vessel traffic monitoring surveys conducted in 2013-2014 (see Appendix N of the Report).

For the purpose of describing the current state, materials from the work on the development of the Draft Spatial Plan for Polish Marine Areas and numerous HELCOM studies and data were also used, as well as the results of surveys conducted in areas adjacent to the BIII OWF area.

2. Legal conditions for shipping maritime

All seagoing vessels, regardless of flag, are subject to a series of regulations describing the standards that vessels must meet before they are allowed to operate at sea. This applies to all types of vessels in coastal shipping, domestic shipping, or international traffic. The regulations cited below cover all aspects of ship operation - from technical, to environmental protection, to crew time regulations (which has a huge impact on shipping safety). The main legal regulations governing traffic in attrition areas, i.e. where the usual routes on which ships navigate converge or intersect and where the volume of traffic needs to be strictly regulated, are the provisions of the International Maritime Organization in London (IMO), which acts as the formal regulator of ship traffic in areas under the jurisdiction of its member states and in international waters, which in practice means covering almost all maritime areas on Earth. In agreement with the IMO, local maritime administration offices (in Poland, the Maritime Offices in Gdynia, Slupsk and Szczecin) establish Traffic Separation Scheme (TSS), zones under special technical supervision (Vessel Traffic Control Systems - Vessel Traffic Service - VTS), in which there is an obligation for ships to report any maneuvering, the situation of entering and leaving the zone, crossing successive reporting points. In these areas, there is a system of close supervision of ship traffic (similar to that used in aviation), in which the ground center continuously supervises the safety of ship traffic, interferes with decisions made on the ship by ordering a change in speed, direction or rerouting.

In areas of the open sea, outside TSS and VTS zones, ship masters are not subject to the decisions of traffic surveillance centers and are free to decide the course and route on which they will sail to their destination port, unless a rescue operation at sea is currently underway in their area of residence and they are brought into this operation by the Rescue Coordination Center or other activities are being carried out, such as military exercises or construction work at sea, etc. In such a situation, they should immediately submit to the decisions issued by the supervision of these projects announced by the NAVTEX Nautical Information Broadcasting System. In other situations, they are guided by good maritime practice and the indications of the local locals. Notwithstanding the above, customary routes are used in shipping, taking into account safe distances and navigational obstacles, as well as the application of international regulations on the prevention of collisions at sea.

In Poland, Polish seagoing vessels are obliged to follow the recommendations of the Baltic Location (for the area of the Polish Economic Zone, territorial and internal waters, the Baltic Location 502 was issued. The Hydrographic Office of the Navy is responsible for the timeliness of the information contained in the locia. On ships of other flags, English-language (or issued in the language of the ship) equivalents of the Polish Baltic Locations are most often used. The English-language edition of Sailing Directions for the South Baltic area is called Baltic Pilot NP19 Vol II. Both documents include information on customary and mandated routes, TSS routes, traffic surveillance systems, information on hydrometeorological conditions in the described body of water, legal regulations and local rules for ports and approaches to those ports, information on the rescue system, radio communications, etc. neither loco prescribes sticking to established routes outside the TSS and VTS systems. Usually, customary sailing routes (usually

by the shortest route connecting the port of departure with the port of destination) are treated as recommended routes, unless the level of safety is understated on them, in which case the captain decides to go based on his experience and at his own risk, in which case such a customary route is not treated as a recommended route. Most often, locjes provide only general information on the route of passage, setting important limitations due to geographical conditions, regulations of the countries to which the locjes apply.

The passage routes of commercial, special, passenger, fishing and other vessels observed in the BIII offshore wind farm area - with the exception of the Traffic Separation Route (TSS Slupsk Shoal) located south of the farm's location - are not established as mandatory and their alignment depends mainly on the current shipping situation, obstacles located in the area (e.g., hydrotechnical structures such as offshore wind farms), current hydrometeorological conditions, etc. Thus, there is no need to regulate the routing of these routes in an official manner. When an obstacle arises (e.g., construction of an offshore wind farm), captains will make other sailing routing decisions that are optimal from their point of view, and traffic will naturally shift to areas that are convenient for navigation. This does not change the fact that at the moment registered a significant number of passes through the area of the planned farm belong to fishing, recreational and special vessels. Fishing vessels moving into the fishing areas benefit from the fact that the area currently allows free navigation. Recreational ships pass through the area on their way to Sweden, special ships (Navy ships, Coast Guard, Fisheries Surveillance) stay in the area following their own plans and needs, of which we have no information, and other ships avoid it, as it does not lie on any of the routes used for navigation.

The spatial development plan for the Polish maritime areas (PZP POM)

In 2021, a POM was developed and passed at a scale of 1:200,000. It was adopted by Cabinet decree on April 14, 2021. (Journal of Laws 2021, item 935), which became effective on May 22, 2021. Its provisions specify prohibitions or restrictions on the use of the area, permissible public purpose investments and conditions for the use of water bodies.

In the POM, 19 basins with the primary function of transportation were separated, with a total area of more than 6.7 square $^{\text{kilometers}}$, accounting for 20.65% of the area of the POM. More than 2,300 square kilometers, or about 7% of the POM area, have been allocated for renewable energy in the POM. Navigation safety is to be ensured by maintaining an adequate distance between areas with a primary function of transportation and areas with a primary function of renewable energy generation. Artificial islands, offshore wind farm structures and equipment, including offshore wind farms as well as the internal connection infrastructure of offshore wind farms, may not be closer than 2 nautical miles from the boundary of water bodies with the primary function of transportation, according to the Draft Plan and the issued PSZW Decision (No. MFW/2/12).

The ordinance stipulates that the erection of offshore wind turbines is permitted only in basins with the primary function E - renewable energy generation. The BIII offshore wind farm area is located within the boundaries of the POM.45E basin. The draft POM assumes an additional 9 permissible functions for the POM.45E basin:

1) aquaculture (A);
2) research (N);
3) cultural heritage (D);
4) technical infrastructure (I);
5) exploration and prospecting of mineral deposits and extraction of minerals from deposits (K);

6) fishing (R);

7) artificial islands and structures (W);

8) transportation (T);

9) tourism, sports and recreation (S).

Decisions regarding restrictions on navigation through the creation of a restricted vessel traffic zone can be made by the Maritime Administration.

According to the POM.45E basin charter, the following conditions are indicated in the context of OWF construction:

- At the time of commencement of the project of erecting artificial islands and structures, it is required to impose, by a decision of the competent director of the maritime office, a prohibition of navigation in the body of water occupied for construction in terms of safety, along with a 500 m safety zone around the body of water for the duration of construction;
- During the operation of offshore wind power plants, it is required to introduce, by decision of the competent director of the maritime office, restrictions on the operation of navigation in the safety zones established for each turbine and in places that threaten the safety of the internal technical infrastructure.

In addition, in the 45.E basin, it is recommended that a 100-meter safety zone be established around any functioning offshore wind turbine structure and that the development be laid out in such a way as to allow a transport corridor for vessels up to 150 meters in length.

3. Characteristics of ship traffic in the area of OWF BIII

As a result of the monitoring of ship traffic in 2013-2014 in the area of OWF BIII, information was collected on the basis of AIS (Automatic Identification System for Ships) data on the positions, movement and berthing of various types and purposes, which temporarily stayed in the area limited by a radius of 15 km from the focal point of the farm.

The survey covered areas of the BIII OWF field, the one-mile buffer zone and the adjacent area. A measurement set, including an AIS (Automatic Ship Identification System) sensor with a recorder, has been installed in the OWF area to measure and record AIS signals from vessels visible to the receiver, for navigational analysis.

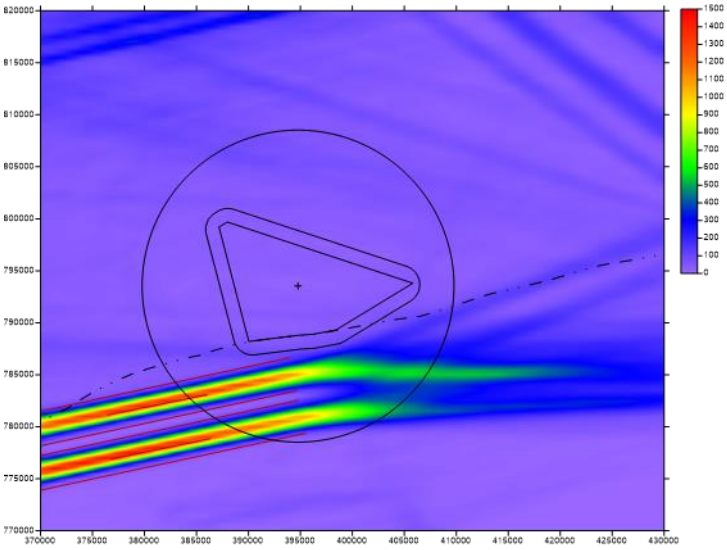
3.1. Intensity of traffic of ships

As a result of the measurements, information was collected on the positions, movement and berthing of 2653 vessels of various types and destinations that temporarily stayed in the area bounded by a radius of 15 km from the focal point.

The data was collected in one aggregate and in 6 groups specific to the construction and purpose of ships sailing in the region. These included commercial vessels, fishing vessels, passenger vessels, tankers, recreational vessels and all others that did not meet the main characteristics for the first five groups, which were referred to as special vessels.

Figures 1- 1 show the information that was obtained by studying the number of ship passes through areas of 500 x 500 meters.

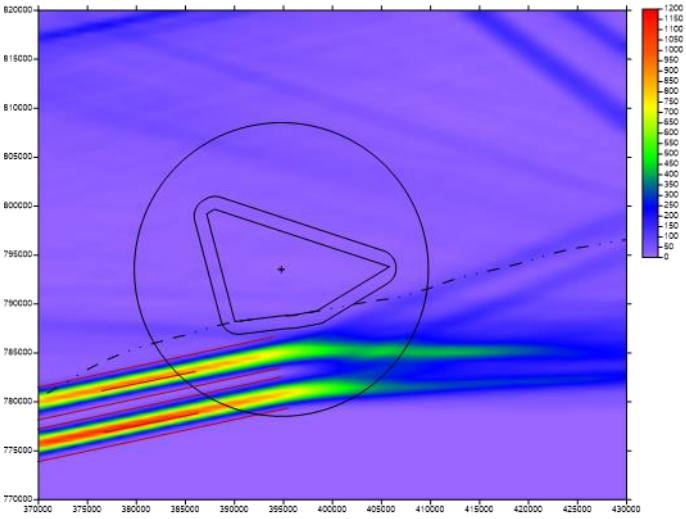
Figure 1. Intensity - the number of passages of a single ship through a square of 500 meters observed during one year. The study did not take into account the presence of IM survey vessels in Gdansk, i.e. IMOR, Baltic-i and Saphira -conducting measurements in the area of the BSIII offshore wind farm



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Visible in the figure (in the upper left corner of the region, the densities of passages from east to west correspond to the usual shipping routes of ships from Klaipeda, Riga to the region of the ports of Szczecin, Swinoujscie and Sasnitz and Mukram.

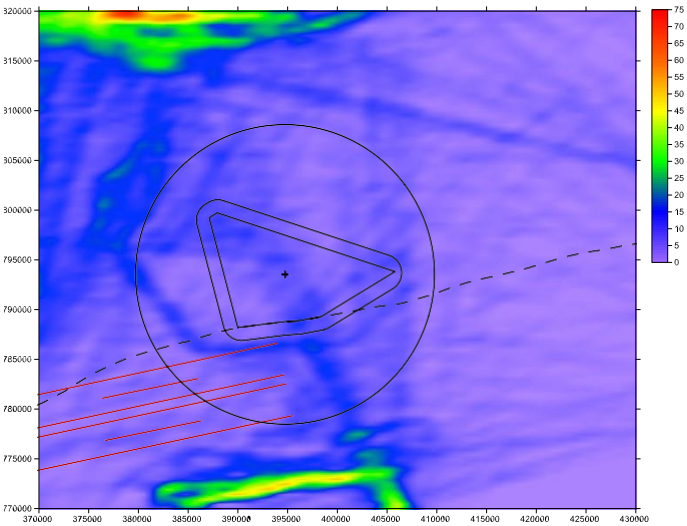
Figure 2. Observed numbers of commercial ship crossings in the study area



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Nearly all merchant ships moved on straight courses along recognized and recommended shipping routes, which is evident in the density of the routes of these vessels. This is particularly evident in the area south of the OWF BIII field, where the Traffic Separation System - Slupsk Shoal runs, leading commercial vessels from the Gdansk Bay area towards the Szczecin- Swinoujscie port complex and towards the Danish Straits.

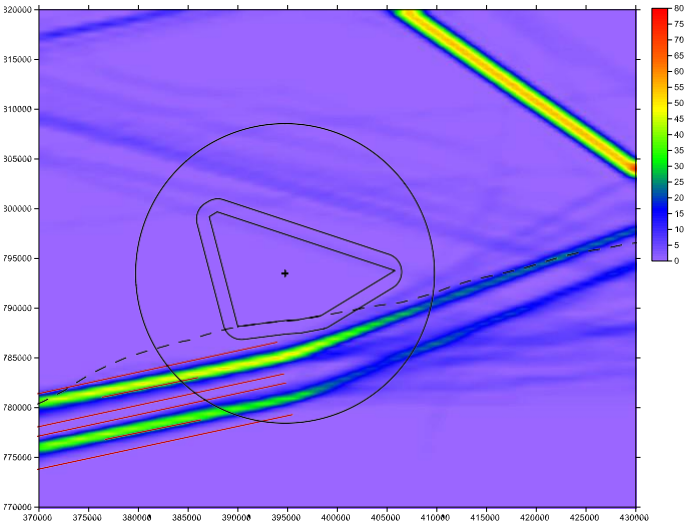
Figure 3. Observed numbers of fishing vessel crossings in the study area



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the southern part of the BIII OWF area, the intersection of routes of fishing vessels heading from the ports of Leba and Ustka to the fishing area within the Slupsk Trough is visible. The intensity of fishing in the Slupsk Trough area can be seen in the upper left corner of the square. Traces of trawling or netting can be seen throughout the area of the planned project, but their number is not great. This is evidenced by the complicated passage routes of fishing vessels.

Figure 4. Observed numbers of passenger ship crossings in the study area

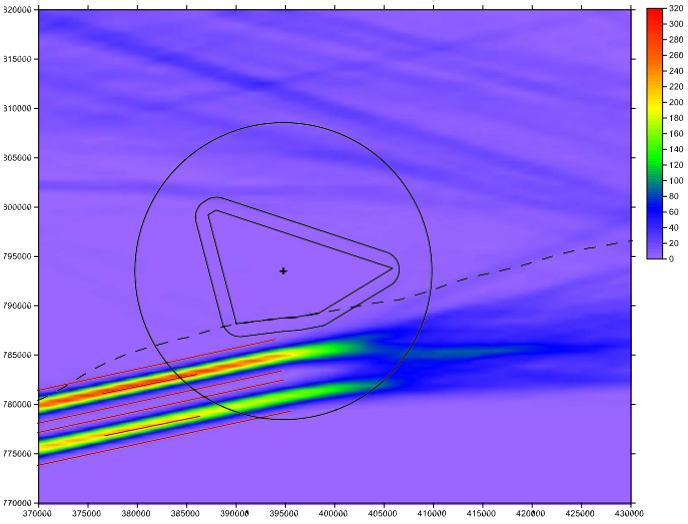


Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Large passenger ships use established shipping routes, mainly the Slupsk Shoal Traffic Separation Zone, located south of the study area. Passenger-cargo ferries, running on fixed lines, use the usual Gdynia (Gdansk) - Karlskrona route, on which they run regularly throughout the year. The apparent three passage routes of passenger ships north of the upper boundary of the OWF area should be considered as not subject to any offshore traffic rules. The activities of the captains of these ships are aimed at shortening their passage route from Polish ports to Swedish ports or towards the isthmus between Bornholm and Sweden, called the Bornholm Strait. They are not a typical routine activity. The law allows

captains to choose this route. With the change in the navigational situation (the development of this area of OWF BIII), this traffic will naturally move out of the area.

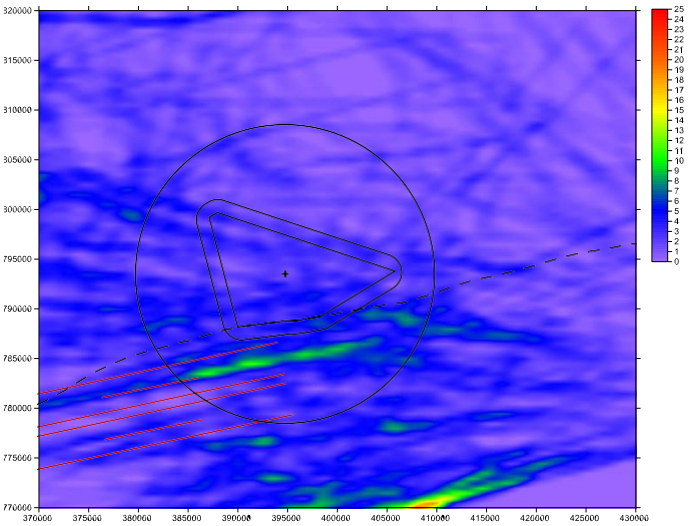
Figure 5. Observed numbers of tanker passages in the study area



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Tankers like merchant ships mainly traveled along prescribed routes (the route south of the field and east and north of the OWF, where the usual shipping route for tankers and large bulk ships passes through, planned as the future deepwater route D, designated for the largest merchant ships and for tankers). A number of small tankers choose routes that run north of the area of the planned OWF. These routes should be considered not subject to any offshore traffic rules. The activities of the captains of these ships are aimed at shortening their passage route from Polish ports to Swedish ports or towards the isthmus between Bornholm and Sweden, called the Bornholm Strait. The law allows captains to choose this route. With the change in the navigational situation (the development of this area of OWF BIII), this traffic will naturally move out of the area.

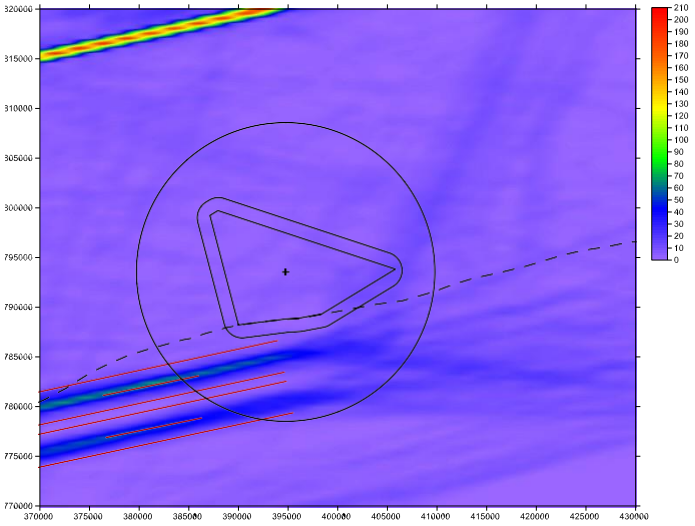
Figure 6. Observed numbers of recreational vessel passages in the study area



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Vessels designed for recreation, whether sailing or motor, most often take coastal routes, sailing from port to port. The figure clearly shows the density of routes in the area of the port of Leba, where there is a modern marina. A portion of the sailing vessels chose routes passing through IMF BIII, probably heading for Danish or Swedish ports. This activity lacks a clear pattern except for the choice of coastal routes leading from east to west and vice versa in close proximity to the shore, which helps to raise the value of amateur sailing.

Figure 7. Observed volumes of special vessel transitions



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Like merchant ships, larger research vessels, tugboats, border guards, SAR vessels and other commercial vessels than cargo ships moved on straight courses along recognized and recommended shipping routes, as evident by the density of the routes of these vessels. This is particularly evident in the area south of the OWF BIII field, where the recommended shipping route leading commercial ships from the Gdansk Bay area towards the Szczecin-Swinoujscie port complex and towards the Danish Straits runs.

The Baltic Sea is one of the most crowded seas in the world. It provides a route of connection between the Baltics and the rest of the world, allowing the constant movement of commercial vessels, ferries, passenger ships and pleasure craft.

However, due to the location of the planned project outside the area of intensive shipping traffic, it was found that there were no threats from the traffic of commercial vessels of all sizes, tankers and passenger ships. The project will pose some difficulties for fishing vessels heading from the ports of Leba and Ustka to the fishing grounds located north of the BIII OWF. Recently, the number of fishing vessels has decreased significantly due to the European Union's maritime policy and the reduction of the fishing fleet. The number of fishing vessels currently passing through the project area was estimated at 123 per year. The movement of yachts and non-commercial vessels will also not be a hindrance and will not affect the safety of the project, as these vessels will naturally divert to the recommended shipping lanes once the project is completed and the area is closed to navigation.

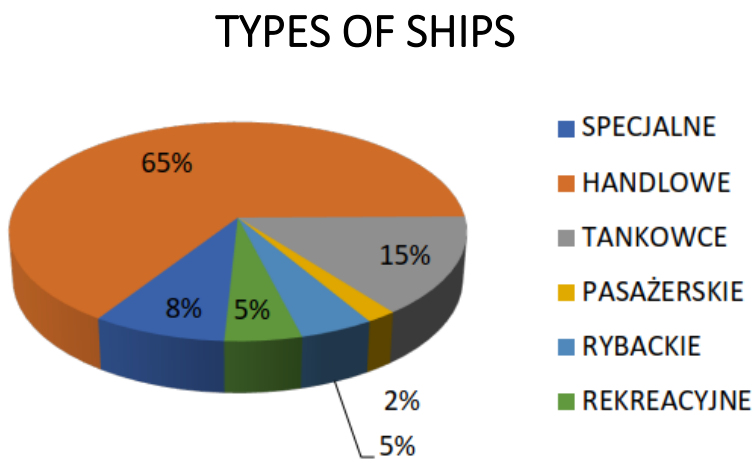
The area of the planned investment already during the construction of the wind farm, at the request of the investor, should be recognized by the Maritime Office in Slupsk as temporarily closed or as an area of restricted sailing due to the ongoing construction work. Upon completion of these works, the area, as an artificial island, may be declared a closed area for navigation and fishing, accessible only to ships and helicopters servicing the investment and services such as the Maritime Search and Rescue Service.

At the request of the investor, this decision is made by the Maritime Office competent for the area - in this case, the Maritime Office in Slupsk, based on the applicable regulations.

3.2. Qualitative composition of traffic of ships

The breakdown of the vessels registered by the AIS receiver device in terms of the detailed breakdown in the groups of vessels adopted for analysis is shown in the following figures Graphically these data are shown in Figure 8, and in terms of size parameters are shown in Figure 9.

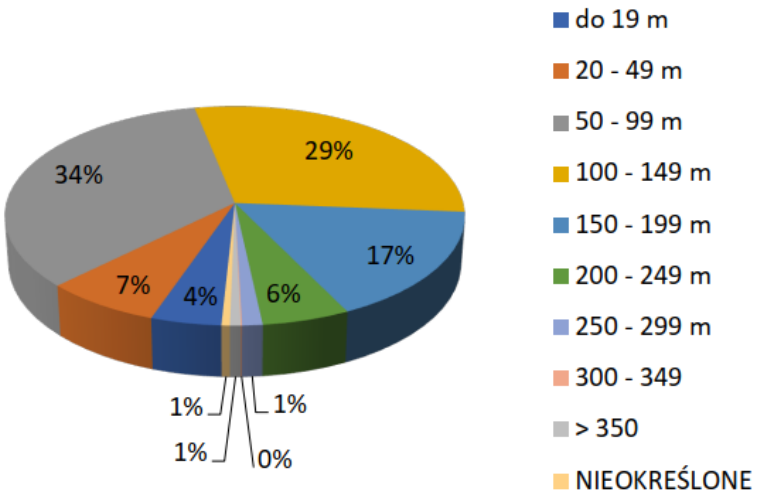
Figure 8. Division of units by type of vessels registered by the buoy ZOO_BŚ3_001



SPECJALNE	SPECIAL
HANDLOWE	COMMERCIAL
TANKOWCE	TANKS
PASAŻERSKIE	PASSENGERS
RYBACKIE	FISHING
REKREACYJNE	RECREATIONAL

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Figure 9. Breakdown of vessels by vessel size as recorded by the ZOO_BŚ3_001 buoy (length is given in meters)



do 19m	up to 19m

NIEOKREŚLONE	UNLIMITED

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The largest quantitative share of shipping in the area is held by commercial vessels (1,740 units), the second group clearly larger than the others are tankers (389 units), the share of fishing vessels is at the level of 123 units and is periodic, which is related to the cycle of fishing seasons imposed by European Union law, recreational vessels at the level of 128 units (their share is significantly higher in the summer season), while passenger ships are in the area of OWF BIII incidentally, mainly during the tourist season, i.e. from May to September (50 units). All other units of other types and purposes are a total of 223 special units, which, considering the great diversity of these units and the fact that intensive studies of the bottom, water, birds, mammals were carried out during the period, it should be considered that these units in the area are not many (the units performing measurements and surveys for this project were removed).

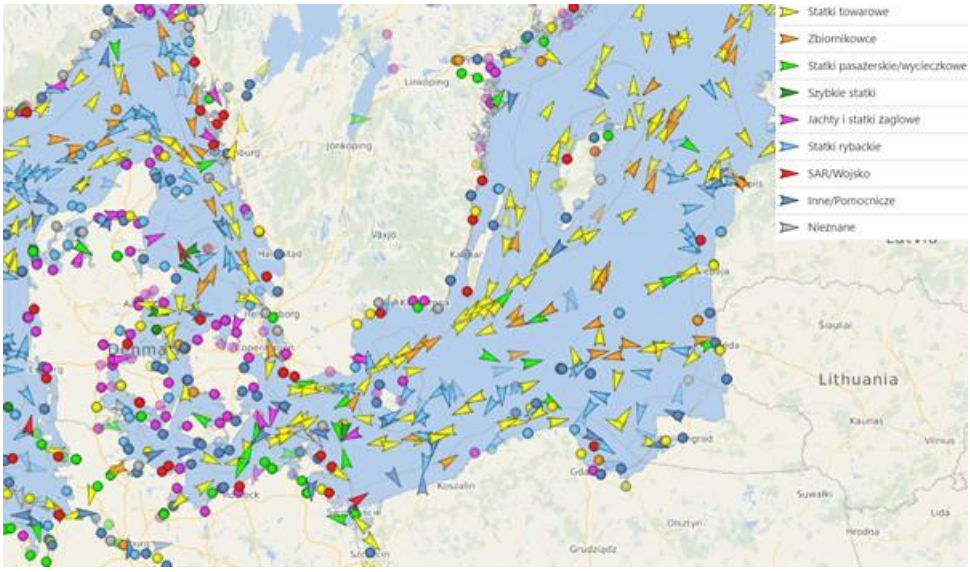
The largest number of medium- and large-sized vessels (from 50 to 199 meters in length - a total of 2,128 vessels) sail in the area, which corresponds to the typical size of commercial vessels and tankers operating in the shallow waters of the Baltic Sea. There have only been 18 vessels longer than 300 meters, and they always head for deepwater route D passing northeast of the planned project area.

4. Traffic volume forecasts ships

The Baltic Sea is one of the world's most congested seas, with maritime transport accounting for 15% of the world's seaborne freight. The Baltic Sea provides a route of connection between the Baltic countries and the rest of the world, allowing the constant movement of commercial vessels, ferries, passenger ships and recreational vessels. Based on 2015 data, it was estimated that about 7,900 vessels registered with the International Maritime Organization in London (IMO) operated in the Baltic Sea, of which 48% were cargo vessels, 22% were tankers, 5.4% were passenger vessels, 5.2% were service vessels, 4.3% were container vessels, 4.1% were fishing vessels, 3.1% were RO-RO vessels, 7.4% were other vessels, and 0.5% no information was available (HELCOM 2018). Although these ships still enter and leave the basin, according to HELCOM, at any given time, there are about 1,500 IMO-registered vessels in the Baltic Sea.

Error! The source of the reference cannot be found. depicts vessel traffic in the southern and western Baltic Sea obtained from information from the AIS automatic identification system. The figure shows an example situation captured as of 06/03/2022, showing the number of ships and their main types.

Figure 10. Ship traffic in the western and southern Baltic Sea

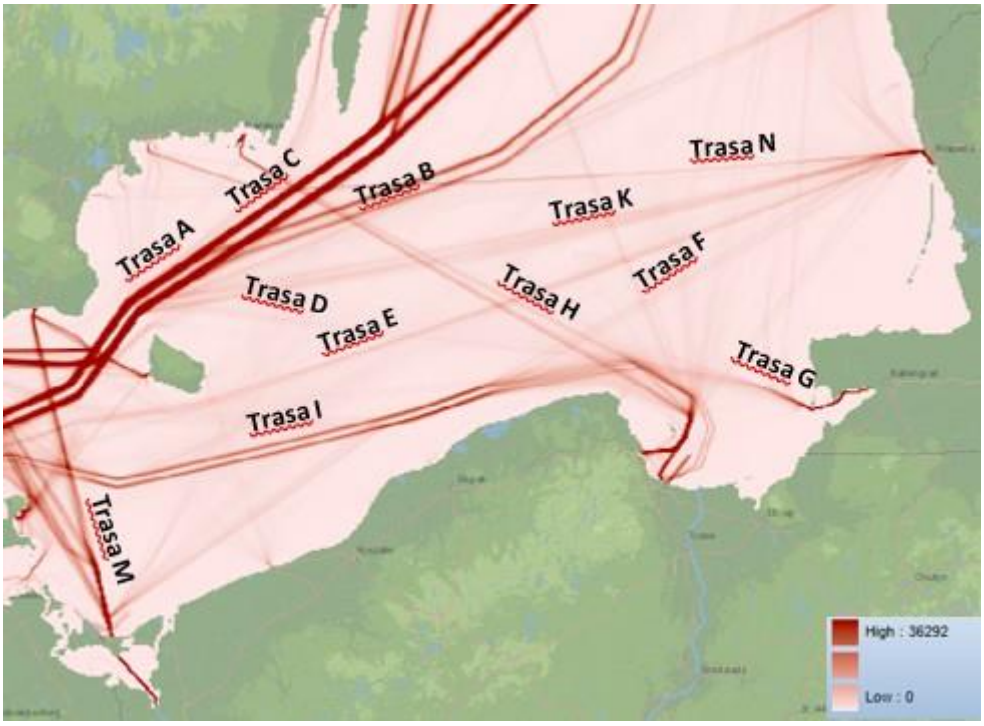


Statki towarowe	Cargo ships
Zbiornikowce	Tankers
Statki pasażerskie/wycieczkowce	Passenger/excursion vessels
Szybkie statki	Fast ships
Jachty i statki żaglowe	Yachts and sailing vessels
Statki rybackie	Fishing vessels
SAR/Wojsko	SAR/Military
Inne/Pomocnicze	Other/Auxiliary
Nieznane	Unknown

Source: https://www.vesselfinder.com/pl (Access date: 06.03.2022 r.)

Currently, there are more than a dozen major customary shipping routes in the Baltic. A figure showing an overview map of these routes is shown below.

Figure 11. Main routes of ship traffic (Southern and Central Baltic)



Trasa A	Route A
Trasa B	Route B
Trasa C	Route C
Trasa D	Route D
Trasa E	Route E
Trasa F	Route F
Trasa G	Route G
Trasa H	Route H
Trasa I	Route I
Trasa K	Route K
Trasa M	Route M
Trasa N	Route N

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The intensity of shipping traffic and the identification of shipping routes is shown in Figure 11, which shows the annual number of ships on these routes. Statistics show that there are about 2,000 ships in the Baltic Sea at any given time. An analysis of the structure of shipping types shows that cargo ship traffic dominates, a large group of ships are tankers of all types and passenger ferries and passenger ships. The intensity of the latter's traffic is highest between early May and late September.

To the north of the BIII offshore wind farm area runs a route (Route E) connecting the port of Klaipeda with the ports of the southern Baltic - mainly the ports of Swinoujscie, Sassnitz and Mukram. The main users of this route are freight-rail ferries (Mukram-Klaipeda) and cargo ships. Polish AIS stations (2015-2016 data) record that 761 ships pass through it. Mainly commercial vessels (46%), tankers (4%), ferries (45%) and others (5%) (IMG Consortium and MEWO et al. 2017).

To the north of the BIII OWF area runs a route connecting the ports of the Gulf of Gdansk with the Bornholm Strait (route D). In 2015-2016, 557 vessels used it (commercial 69%, tankers 24%, other 7%) (IMG Consortium and MEWO et al. 2017). AIS data indicate that in 2018-2019, vessels made about 600 trips along this route through the Baltic Power OWF area located about 2 km east of the Project area (MEWO and IMUMG Consortium, 2020). This route has been a component of the Polish Maritime Administration's planned deep-water route D of strategic importance (for large tankers and gas carriers) for many years. Due to the location decisions issued for the construction of offshore wind farms (PSZW), the Maritime Office in Gdynia, as part of its work on the draft POM, modified the route. Since the customary route in question has not previously passed through the Project area the above modification does not affect the conditions for implementation of the Project.

South of the BIII offshore wind farm area runs the second most heavily used customary shipping route (Route I), passing from east to west, south of Bornholm leading to Polish and Russian ports in the southern Baltic. Data recorded in 2015-2016 at Polish AIS stations indicated that the route was used by 5641 vessels. Mainly commercial vessels (78%), tankers (15%), passenger ships (1.5%), others (5.5%) (IMG Consortium and MEWO et al. 2017). AIS data indicate that in 2018-2019, ships made about 16,000 trips along this route (MEWO and IMUMG Consortium, 2020). The aforementioned TSS traffic separation system applies on this route

"Slupsk Shoal. IMO's Maritime Safety Committee, during its 102nd session, held November 4-11, 2020, adopted changes to the Traffic Separation System ("TSS" from Traffic Separation System) "Slupsk Shoal." The revised system became effective on June 1, 2021. Currently, the TTS "Slupsk Shoal" consists of three parts: western, central and eastern[1]. The northern branch of the route (Route F) carries ship traffic from

[1] official website of the Maritime Office in Szczecin: https://www.ums.gov.pl/bezpieczenstwo-morskie/przepisy-portowe-2/19-bezpieczenstwo-morskie/551-system-rozgraniczenia-ruchu-statkow-tss-lawica-slupska, access date: 10.05.2022 r.

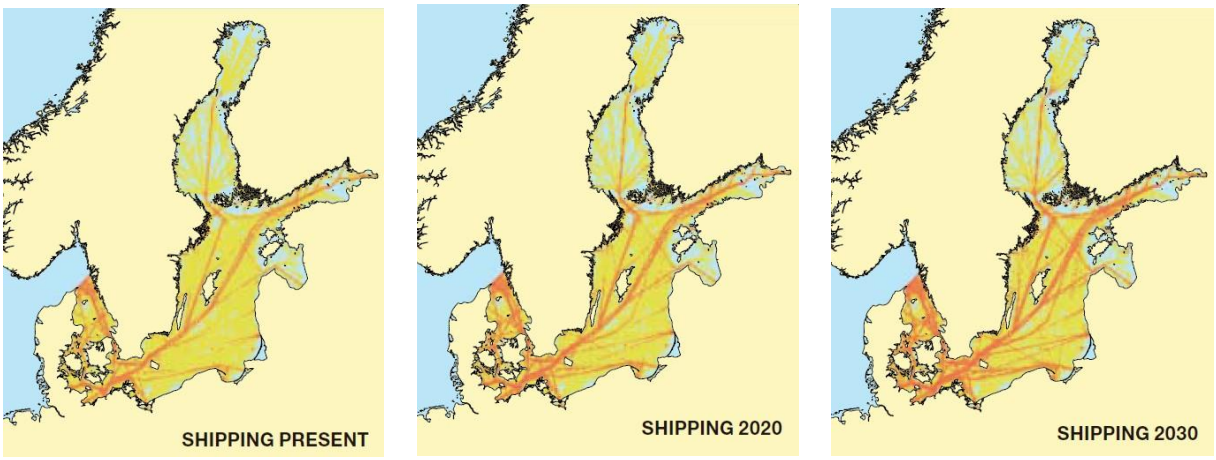
the area of the Danish Straits into the Gulf of Gdansk. After leaving the demarcation zone, the Slupsk Shoal heads for the ports of Lithuania and Latvia.

There are many more customary shipping routes than the routes indicated in Figure 11.

To the north of the BIII offshore wind farm area runs a route (Route E) connecting the port of Klaipeda with the ports of the southern Baltic - mainly the ports of Swinoujscie, Sassnitz and Mukram. The main users of this route are freight-rail ferries (Mukram-Klaipeda) and cargo ships. Polish AIS stations (2015-2016 data) record that 761 ships pass through it. Mainly commercial vessels (46%), tankers (4%), ferries (45%) and others (5%) (IMG Consortium and MEWO et al. 2017).

According to WWF projections, the number of ships is estimated to double by 2030, from about 3,000-5,000 ships per month to more than 9,000 ships each month. The size of ships sailing in the Baltic Sea will also increase. The WWF report predicts an increase in oil transportation - 64% by 2030. This huge growth in the shipping sector is mainly due to the expansion and construction of oil terminals on the shores of the Gulf of Finland and regional economic growth. In addition, the number of cruise ships in the area is increasing every year with a growing trend toward larger ships and international cruise ships.

Figure 12. Expected increase in traffic intensity of tankers, cargo ships and passenger ships



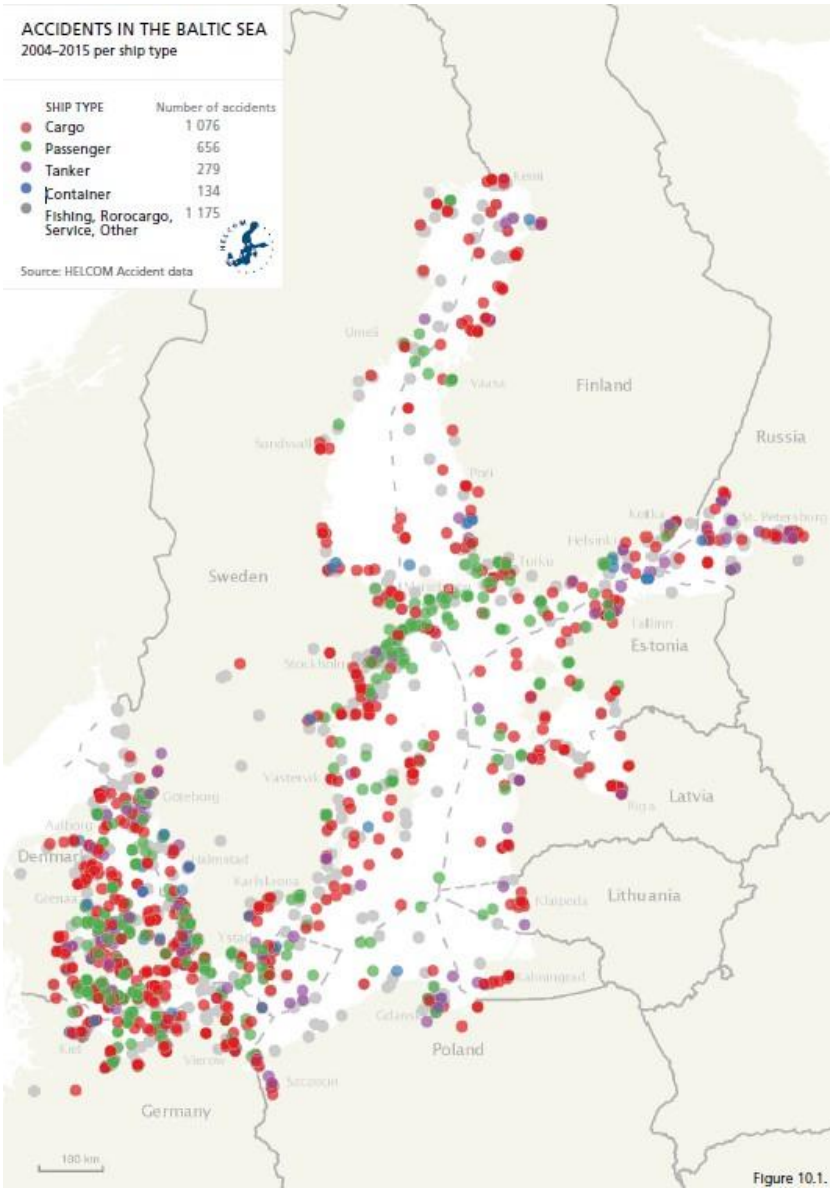
Source: https://wwfeu.awsassets.panda.org/downloads/wwf_future_trends_in_the_baltic_sea_2010_1.pdf (access date: 06.03.2022 r.)

5. Data on accidents marine

HELCOM data show that between 2011 and 2015, 1520 accidents occurred in the Baltic Sea, about 300 incidents per year. (HELCOM 2018). The most common causes of emergency incidents between 2011 and 2015 were shoaling (21%), equipment damage (21%) and collisions (16%).

A catastrophic spill of a substance harmful to the ecosystem has not yet occurred in Polish marine areas. However, a serious accident, posing a real threat to the environment and human health and life, involving a ship carrying a chemical cargo occurred on January 1, 1979. Near Karwia, the Dutch chemical tanker m/s Anna Broere with a cargo of 2,400 tons of paraxylene was washed ashore. The successful operation to pull the vessel from the shoal took less than three weeks.

Figure 13. Spatial distribution of accidents in the Baltic Sea from 2004 to 2015



Source: HELCOM Assessment on maritime activities in the Baltic Sea 2018

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3. Maritime Institute in Gdańsk, Studium uwarunkowania zagospodarowania przestrzennego Polskich Obszarów Morskich wraz z analizami przestrzowymi, Gdańsk 2015
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7. WWF, Future Trends in the Baltic Sea, 2010 https://wwfeu.awsassets.panda.org/downloads/wwf_future_trends_in_the_baltic_sea_2010_1.pdf

6.2. Websites websites

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2. www.vesselfinder.com/pl
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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 1

Introduction

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting the environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision
EIA	Environmental impact assessment
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report / EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (consolidated text, Journal of Laws of 2022, item 1029)

1. Introduction

This, Volume IV of the Report, contains the environmental impact assessment for the amendment of the environmental decision for the Baltic III offshore wind farm project. This volume fulfills the requirements of Article 66 (1) (2) and (3) of the EIA and constitutes an environmental impact analysis, with Volume II and Volume III of the Report as the basis for its execution.

For the preparation of this part of the EIA Report, the starting point was Volume IV of the Environmental Impact Report[1] which is the basis for the issuance of the current Environmental Decision[2]. The very nature of the proceedings being conducted, i.e. the amendment of the environmental decision, requires that it is the project assessed within the proceedings in the course of which the Environmental Decision was issued as the point of reference. This is because, unlike the standard environmental impact assessment procedure, in this case it is not the project itself that is being assessed, but the changes proposed to be made to the project before the investor began its implementation. Also, the assessment methodology in such a case must be adapted to the purpose of the proceedings, as the essence of the assessment is not to evaluate the environmental impact of the project, but to assess the impact of the proposed changes. The evaluation methodology used is described in Section 5 of Volume I of the Report.

In this volume, an analysis of the environmental impact of updating and refining the parameters of the Project in relation to the parameters of the Project under evaluation in the 2015 Report is presented. Due to the fact that the environmental assessment in the 2015 Report was carried out against a set of parameters causing the most far-reaching impacts called the furthest-reaching scenario - NIS 2015, and this assessment formed the basis for the acceptance of the parameters of the Project in the implementation variant from the 2015 Report, which was made in the Environmental Decision, therefore the analyses carried out in this volume refer to two sets of parameters of the Project, viz:

- parameters of the Project approved by the Environmental Decision, which is also the environmentally most favorable variant under the impact assessment conducted in the 2015 Report, consisting of no more than 120 offshore wind farms with associated infrastructure,
- parameters of the Project comprising the most far-reaching scenario - NIS 2015 - which assumed as one of the main parameters of the Project the location of no more than 200 power plants in the area of the farm, together with associated infrastructure.

The framework of the methodology was presented in Section 5 of Volume I, while the detailed conditions, conducting the assessment were carried over from the 2015 Report to ensure full comparability of the results of the conducted assessment.

In addition to the normal operation of the farm, the possibility of emergencies, including major accidents, and their potential impact on the environment were analyzed.

The content of Volume IV of the report fulfills the requirements of the provisions of the EIA indicated below.

According to Article 66 (1) (6) of the EIA, the report shall include a determination of the anticipated environmental impact of the analyzed variants, including in the event of a major industrial accident, as well as the possible transboundary environmental impact.

[1] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

[2] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KSZ.22 dated March 7, 2016.

According to Article 66 (1) (7) of the EIA, the report shall include a justification of the variant proposed by the applicant, indicating its impact on the environment, in particular on:

- people, plants, animals, fungi and natural habitats, water and air,
- the earth's surface, including earth mass movements, and the landscape,
- material goods,
- monuments and cultural landscape, covered by existing documentation, in particular, a register or record of monuments,
- forms of nature protection, including on the goals and objects of protection of Natura 2000 areas, as well as the continuity of ecological corridors connecting them
- the interaction between the elements mentioned above,
- traffic safety for a road in the trans-European road network.

In accordance with Article 66 (1) (8) of the EIA, the report includes a description of the forecasting methods used by the applicant and a description of the anticipated significant environmental impacts of the planned project, including direct, indirect, secondary, cumulative, short-, medium- and long-term, permanent and temporary environmental impacts resulting from:

- existence of the venture,
- the use of environmental resources,
- emissions.

In addition, the information referred to in Article 66 (1) (4-8) shall take into account the anticipated impact of the analyzed variants on the objectives and object of protection of the Natura 2000 area and the integrity of the area.

Due to the very large number and variety of research and analysis results obtained, it was decided to divide Volume IV into sections in the form of stand-alone studies. Each of them is devoted to a different element of the environment and, in accordance with the above-mentioned requirements of Article 66 of the UoA, analyzes the impact of the BIII OWF on a particular element of the marine ecosystem:

- abiotic environment (including seabed, mineral resources, hydrological and hydrochemical conditions, physical and chemical conditions of sediments),
- bentos,
- fish,
- birds,
- marine mammals,
- bats,
- natura 2000 areas (included under individual sections)
- other protected areas and ecological corridors
- biodiversity

- climate
- cultural heritage,
- landscape,
- fishing,
- other users of maritime areas (including shipping, aviation).

The submitted Report, with respect to the 2015 Report, is supplemented with content that, due to a change in the regulations on the content of the environmental impact report, was not explicitly included and presented in separate chapters, particularly the sections related to impacts on climate and climate change and biodiversity.

A summary of the entire environmental impact assessment, gathering the results and conclusions of the sub-assessments, along with recommendations on the environmental conditions of the Project, is presented in Volume V.

2. Literature and other sources

2.1. Acts legislation

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 2

Assessment of the impact on the abiotic environment

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Abbreviations and definitions

DSU	Decision on environmental conditions
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
GBS	Gravity-based foundations (gravity-based structure)
LOI	Loss of ignition (loss of ignition)
IMF	Offshore wind farm
IMF BII	Offshore wind farm OWF Central Baltic III
MIP	Offshore transmission infrastructure
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting the environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision
NTU	Turbidity unit
OBC	Ocean Bottom Cables seismic method
EIA	Environmental impact assessment
PCB	Polychlorinated biphenyls
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
PZPPOM	Spatial development plan for Polish maritime areas
Report/EIA	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
ROV	Remotely Operated Vehicle (ROV)
TBT	Tributyltin
TSS	Traffic Separation Scheme (Traffic Separation Scheme)
WWA	Polycyclic aromatic hydrocarbons

1. Non-specialist summary

A non-specialist summary of the results of the assessment of the impact on the abiotic environment of the change in the conditions of implementation and operation of the Project - OWF BIII, for which the Environmental Decision was issued, is included in Section 5 of Volume VI of the Report.

2. Introduction

This section of the report assesses the potential impacts of updating and changing the conditions of implementation and operation of the Project - OWF BIII on the abiotic environment, i.e. the bottom with bottom sediments, marine waters and mineral deposits.

The assessment was carried out on the basis of the results of the performed environmental characterization (see Volume III of the Report with annexes of the EIA), the characteristics of the Project (see Volume II of the EIA), expert knowledge and analysis of industry literature. The assessment used the environmental impact assessment conducted in 2015 as part of the Report[1], on the basis of which the current environmental decision[2]was issued. Also used, discussed in the aforementioned 2015 Report, were models of suspended solids spreading, wave attenuation and changes in sea currents that may occur as a result of the Project. The assessment addresses changes in the project's implementation and operation conditions compared to the variant, which is the subject of the currently valid Environmental Decision, and analyzes whether they will potentially increase the previously identified impacts.

The abiotic elements of the marine environment, particularly water and sediment, are closely related. A change in one component (e.g., sediment) entails changes in another (e.g., water) and vice versa, so it is extremely important to consider the abiotic elements of the environment in conjunction with each other in an impact assessment. In addition, it should be borne in mind that sediments and waters are the habitat of living organisms, the functioning of which is very much dependent on the quality of sediments and waters, hence the assessment of the impact on the abiotic environment should also be considered as a starting point for analysis in terms of biotic elements of the environment.

3. Description of the planned project

3.1. Parameters of the BIII OWF relevant to the assessment of the impact of the project on the abiotic environment

The parameters of the BIII OWF that are relevant to the assessment of the project's impact on the abiotic environment are:

- farm location;
- area of the farm - total and buildable;
- foundations - types, number, dimensions and seabed area occupied by them, compaction, acoustic power of the pneumatic hammer used to drive pile foundations;

[1] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

[2] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016.

- power cables - their length and the surface of the bottom disturbed during their laying.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, as well as their changes from the variant specified in the DWA, are presented and characterized in terms of potential emissions and environmental disturbances in Volume III of the Report.

3.2. Projects whose impacts may cumulate with those of OWF BIII on the abiotic environment

Information on existing, ongoing and planned projects, the impacts of which may cumulate with the impacts of the BIII OWF, causing their amplification, and the basic assumptions for the analysis of cumulative impacts of the planned farm are presented in Section 13 of Volume II of the Report.

In the area of OWF BIII, there were no existing, ongoing or planned projects for which an environmental decision has been issued that could potentially, together with OWF BIII, cause cumulative impacts on the abiotic environment.

4. Existing pressures anthropogenic

No significant anthropogenic pressures that could affect the abiotic environment have been recorded in the area of the proposed BIII OWF.

However, it should be remembered that the Baltic Sea is the body of water with the highest volume of shipping traffic in the world. The BIII offshore wind farm area is located outside the shipping lane, but in close proximity to it (TSS

- approximately 0.8 km to the south). More information on this topic of maritime transport and ship traffic in the area of the proposed OWF is included in Section 14 of Volume III of the Report.

There is seasonal fishing-related tourist traffic in the area. During the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality, which may have an indirect effect on sediments.

Commercial fishing by fishing boats is carried out in or near the study area. One form of fishing that affects sediment status is fishing trawling. This action can disrupt the structure of the sediment and promote the passage of metals and other harmful substances from the sediment into the water body, ultimately worsening water quality. However, the intensity of this measure is low, especially since, in general, fishery productivity (catch per area) in the area of the planned wind farm, as well as in its immediate vicinity, is low in relation to the average fishery productivity in Polish marine areas. The area also saw significantly lower-than-average fishing fleet activity. A detailed description of the fishery is presented in Section 13 of Volume III of this Report.

There are also no anthropogenic pressures in the analyzed area that could affect mineral resources - there are no mining activities related to exploration, prospecting and exploitation of deposits.

No other offshore activities were observed in the BIII OWF area that could affect seabed development, i.e.: nature conservation areas (based on the GDOŚ geoportal), cultural heritage areas, resource extraction areas, areas of military activities (no need to apply for survey permits), munitions dumping sites (HELCOM report), anchoring sites, flapping sites (i.e. sites for deposition of dredged material from dredging of port channels), according to the FMP.

5. Description of anticipated effects on the environment if the project is not undertaken project

This chapter analyzes the effects on the abiotic environment if the project is not undertaken. In doing so, three scenarios were considered:

- offshore wind energy will not be developed in the Polish maritime areas, and therefore the assessed project or one similar to it will not be implemented, nor will other activities such as the extraction of deposits;
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented;
- in Polish maritime areas, investments in offshore wind energy are not being made, but the mining industry is developing.

The results of the analyses are shown in Table 1 below. Given that the Project has not been relocated, but only slightly reduced in scope, the effects of not undertaking it are the same as those discussed in the 2015 Report.

Table 1. Effects on the abiotic environment if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy and mining industry will not grow	No action related to the construction, operation or decommissioning of offshore wind farms would mean no environmental impact. The area designated for OWF BIII will remain unchanged and will continue to be used as before (no change in the structure of the bottom surface, no navigational impediments, a larger fishing area). In the analyzed area, due to the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality and indirectly - sediments.
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	From the point of view of impacts on the condition of bottom sediments and water quality, the type of sediments present at the planned OWF site is important. A greater impact involving greater redistribution of pollutants deposited in the sediment into the water body and the formation of greater long-lived suspended solids will be observed for clayey sediments (with a high content of organic matter and fine fractions), which are generally characterized by higher contents of metals, nutrients and organic pollutants. The least impact will occur when offshore wind farms are located in the area of coarse sands (with low organic matter and fine fractions), which are characterized by low levels of metals, nutrients and organic pollutants. Impacts will be observed in the area of planned investments. The area designated for OWF BIII will remain unchanged and will continue to be used as before (no change in the structure of the bottom surface, no navigational impediments, a larger fishing area). In the event that the BIII OWF is not built, but other wind farms are built in neighboring locations as a result of offshore wind energy development, no impact on mineral resources is expected in the BIII OWF area. It will be possible to explore, identify and extract potential deposits in the area. At the same time, however, with the establishment of farms on other sites, access to potential raw materials in these areas will be made much more difficult or impossible. This will reduce the South Baltic's raw material resources. Due to the lack of information on geological conditions and potential resource deposits in neighboring fields, it is impossible to

Lp.	Script	Environmental implications
		determine conclusively whether another location for the project would be more favorable.
3.	Offshore wind power will not develop, but mining industry will grow	If the mining industry develops, significant disturbance of the sediment structure will be observed. Depending on the type of sediment and the type of excavation work, a significant amount of metals, nutrients and organic or petroleum pollutants may be observed to pass into the water depths. The area designated for OWF BIII will remain unchanged and will continue to be used as before (no change in the structure of the bottom surface, no navigational impediments, a larger fishing area). If the mining industry is developed, the extraction of crumb raw materials in the study area will reduce the resource base of the South Baltic. At the same time, the area will be able to be surveyed for hydrocarbons. Other types of projects, such as fishing, shipping, will not affect raw materials in the BIII OWF area. They can only hinder the extraction of potential raw materials.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

6. Methodology for assessing the impact on environmental

The impact assessment of the Project was conducted in accordance with the framework methodology adopted by the project, described in Section 5 of Volume I of the Report.

7. Potential impacts of offshore wind farms offshore wind farms

Information summarizing the most important emissions that the offshore wind farm may cause during the various stages of construction, operation and decommissioning, along with the identification of the type of emissions and impacts with a matrix of relationships, is presented in Section 7 of Volume II of the Report.

This chapter identifies the potential impacts of offshore wind farms on the abiotic environment at different stages of investment. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report.

7.1. Stage construction

Table 2. Potential impacts of the OWF on the abiotic environment - construction phase

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
Disruption of sediment structure	During the construction of the OWF, work will be carried out that will disturb the structure of the bottom sediments. These include, in particular, the installation of foundations and the laying of power cables. Such disturbances will also be caused by anchoring vessels.

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
	As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and dissolve in the water depths, and then be re-deposited on the bottom. The most important parameters affecting the level of impact are: • dimensions and number of foundations to be built and cables to be laid, • a type of rock material that forms the seabed.
Release of pollutants and nutrients from the sludge into the water body	Construction activities that disturb the sediment structure promote the passage of contaminants and nutrients from the sediment to the water body (Uścinowicz, 2011; Bojakowska, 2001; Frostner, 1980; Bourg and Loch, 1995; Dembska, 2003). Among other things, labile forms of metals, organic pollutants, i.e. polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), biogenes (nitrogen and phosphorus compounds) will pass into the water. The most important parameters affecting the level of impact are: • dimensions and number of foundations, • the length of the cable sections and the width and depth of the cable trench, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.
Change in the substrate composition of sediments	Some types of foundations, particularly gravity and monopiles, require layers of leaching protection around their bases. It will also depend on the materials that make up the seabed. For this purpose, rock ballast, stones and boulders are most often used. In addition, during the foundation of gravity foundations, it is necessary to replace the subsoil with soil of higher bearing capacity. Rock ballast or gravel is also usually used for this purpose. These activities change the substrate composition of bottom sediments. The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Disruption of the bottom structure	During the construction of the OWF, work will be carried out that will disturb the bottom structure. These include, in particular, the need to properly prepare the bottom before laying the foundation, drilling or driving foundations, locating towers, installing support structures (monopiles and piles of jacket and tripod foundations to depths of several tens of meters), laying or possibly burying cables, dredging work, and dumping rock material. The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
Change in bottom morphology	The foundation of wind farm elements is associated with a change in the morphology (shape) of the bottom. Changes in the morphology of the bottom will also occur as a result of possible storage of excavated rock from the preparation of the bottom for foundations (primarily gravity). The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Ground settlement	Depending on the mass, the foundation can cause soil compaction, that is, compaction due to a reduction in the number of free spaces between sediment grains, resulting in settlement. The most important parameters affecting the level of impact are: • types, dimensions, weight and number of foundations, • a type of rock material that forms the seabed.
Occupation of the seabed area	Foundations and cables belonging to the OWF occupy certain areas of the seabed. During the construction phase, the area of occupied bottom will gradually increase. The most important parameters affecting the level of impact are the diameter of the base and the number of foundations, as well as the length of the cable.
Use of sand as foundation ballast	Dredged material for the foundation is often used as ballast for a gravity foundation, provided it is sandy sediment (Peire et al., 2009). This can lead to a loss of reservoir properties (reduction of surface area, separation of the reservoir field). Identical applications can be found in sand deposits. The most important parameters affecting the level of impact are the type of foundation (will only occur with gravity foundations) and their number.
Washing out, stripping or burying mineral deposits	During the construction of the OWF, works are carried out that cause disturbance to the structure and morphology of the seabed. Sediment movement in the bottom zone may also be disturbed during the construction phase. The constructed foundations of the power plant are an obstacle to the displaced sediment. As a result, this can lead to the accumulation and/or leaching of sediment, resulting in the leaching of bed deposits or their backfilling. The most important parameters affecting the level of impact are the diameter of the base and the number of foundations to be built, as well as the length of cables to be laid.
Impediment to access to mineral deposits	Foundations and cables belonging to the OWF occupy certain areas of the seabed, hindering possible exploration and extraction of mineral resources. The most important parameters affecting the level of impact are the diameter of the base and the number of foundations being built. The foundation that occupies the largest bottom area is the gravity foundation. This foundation also requires additional bottom preparation. Some of the raw sediment may be excavated when

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
	preparing the ground for foundations. Other types of foundations, despite occupying a smaller area of the bottom, can make mining and resource exploration difficult or impossible (James McElfish, Adam Schempp, and Jordan Diamond, 2013).
Pollution of water bodies and bottom sediments with petroleum substances	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. From this source, about 33% of the oil entering the environment enters the waterways (mainly due to increased ship traffic in the Baltic Sea region (Kaptur, 1999). In comparison, about 37% of the oil that enters the sea comes from river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster). Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. There they can be bound by bottom sediments. The most important parameters affecting the level of impact are: • the type and aterial of rock forming the seabed.
Contamination of water depths and bottom sediments with antifouling agents	At each stage of the project, vessels (ships, barges, etc.) will be used, from whose hulls some amounts of antifouling substances may be released into the water depths during normal operation. They can then contaminate the sediments. The most important parameters affecting the level of impact are: • the type and amount of antifouling substances released, • a type of rock material that forms the seabed.
Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage	At each stage of the project, on the vessels as well as at the construction facilities located on land (at the port serving the implementation of the project), waste will be generated, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from the construction of the farm	During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at the construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
	foundation and power plant components, and other chemicals used during construction work. They can be accidentally released accidentally into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Changes in the regime of sea currents	The foundation structures built during the construction of the farm may cause changes in the regime of sea currents. The most important parameters affecting the level of impact are the dimensions, number and density of foundations.
Wind wave attenuation	The foundation structures built during the construction of the farm may cause wind wave attenuation. The most important parameters affecting the level of impact are the dimensions, number and density of foundations.
Increase in water turbidity	Construction work will disrupt the structure of bottom sediments and raise suspended solids, resulting in an increase in water turbidity. The most important parameters affecting the level of impact are: • the type, dimensions and number of foundations, • the length of the cable sections and the width and depth of the cable trench, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

7.2. Stage operation

Table 3. Potential impacts of the OWF on the abiotic environment - operation stage

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
Disruption of sediment structure	During the operation of the OWF, work will be carried out to disturb the structure of the bottom sediments, such as replacing damaged sections of the power cable. Disturbance will also be caused by anchoring vessels. In addition, the bottom sediments in the immediate vicinity of the foundation structures will be washed out. To prevent this from happening, leaching protection will be used. The most important parameters affecting the level of impact are: • dimensions and number of foundations, • a type of rock material that forms the seabed.

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
Release of pollutants and nutrients from the sludge into the water body	Maintenance work that disrupts the sediment structure promotes the passage of pollutants and nutrients from the sediment into the water body. The leaching of bottom sediments in the immediate vicinity of the foundations will have a similar effect. Labile forms of metals, organic pollutants, i.e. polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), biogenes (nitrogen and phosphorus) can pass into the water. The most important parameters affecting the level of impact are: • dimensions and number of foundations, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.
Change in the substrate composition of sediments	Some types of foundations, particularly gravity and monopiles, require layers of leaching protection around their bases. It will also depend on the materials that make up the seabed. For this purpose, rock ballast, stones and boulders are most often used. These activities change the substrate composition of bottom sediments. The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Disruption of the bottom structure	Disturbance of the bottom structure, which was created at the stage of construction work, for example, due to the driving of foundation piles or the replacement of the sediment layer with gravel, will be permanent, and thus will exist throughout the life of the farm. No additional work (drilling, hammering) is expected to take place during this time, so the scale of this impact will not increase. The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Change in bottom morphology	The foundation of wind farm components involves a change in the shape of the bottom. Changes in bottom morphology will also occur during the operational stage. There may be changes in the geological processes of the seabed at wind turbine foundation sites. Locally, erosion may occur - foundation washout or sediment accumulation in the vicinity of foundations. The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Ground settlement	Depending on the mass, the foundation can cause soil compaction, that is, compaction due to a reduction in the number of free spaces between sediment grains, resulting in settlement. This phenomenon will also occur at the operational stage, especially if heavy gravity foundations are used. The most important parameters affecting the level of impact are: • types, dimensions, weight and number of foundations,

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
	• a type of rock material that forms the seabed.
Occupation of the seabed area	Foundations and cables belonging to the OWF occupy certain areas of the seabed. The occupation of the bottom will continue throughout the life of the farm. The most important parameters affecting the level of impact are the diameter of the base and the number of foundations.
Washing out or burying mineral deposits	During the operation stage, sediment movement in the bottom zone may be disturbed. The constructed foundations of the power plant are an obstacle to the displaced sediment. As a result, this can lead to the accumulation and/or leaching of sediment, resulting in the leaching of bed deposits or their backfilling. The most important parameters affecting the level of impact are the diameter of the base and the number of foundations.
Impediment to access to mineral deposits	Foundations and cables belonging to the OWF occupy certain areas of the seabed, hindering possible exploration and extraction of mineral resources. The most important parameters affecting the level of impact are the diameter of the base and the number of foundations.
Pollution of water bodies and bottom sediments with petroleum substances	See description for construction phase
Contamination of water depths and bottom sediments with antifouling agents	See description for construction phase
Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage	See description for construction phase
Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from the operation of the farm	During the operation of the wind farm, waste directly related to the operation of the wind farm will be generated on vessels, at the construction facilities located onshore (at the port serving the project) and at the project site. These may include damaged parts of farm components, cement, grout, mortar, operating fluids and other chemicals used or replaced during maintenance work. They can be accidentally released into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Pollution of water bodies and bottom sediments with compounds from corrosion protection agents	Steel foundation structures require the use of corrosion protection. The most common anti-corrosion method used in the marine environment is cathodic protection. It can be implemented as galvanic or electrolytic protection. Galvanic cathodic protection involves installing aluminum or zinc anodes on the foundations. Anodes are gradually consumed and Al or Zn passes into the water depths and accumulates in bottom sediments.

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
	In electrolytic cathodic protection, the protected object becomes the cathode of an electrolytic cell supplied with DC current from an external source. The anode used in this circuit is mostly insoluble. Among the most durable anode materials used in this method are platinum and titanium electrodes coated with a 2-3 µm layer of platinum. With electrolytic cathodic protection, no impact on water quality or sediment is observed. The most important parameters affecting the level of impact are: • the type and amount of elements released, • water quality in the project area, • a type of rock material that forms the seabed.
Change in water and sediment temperature	The electric current, flowing through the power cable, causes it to heat up, caused by power losses on the resistance, according to Joule's law. As the temperature of the cable rises above ambient temperature, heat transfer to the surrounding environment begins. Raising the temperature of the sediment in which the cable is buried and the interstitial waters can cause: • increased bacterial activity, resulting in accelerated decomposition of organic matter, • a reduction in the oxygen content of the water, • release of harmful substances, including metals, from the sediment into the water's surface, • adverse effects on benthic organisms. The most important parameters affecting the level of impact are: • depth of cable burial, • a type of rock material that forms the seabed.
Changes in the regime of sea currents	The foundation structures of individual farm facilities may cause changes in the regime of sea currents. The most important parameters affecting the level of impact are the dimensions, number and density of foundations.
Wind wave attenuation	The foundation structures of individual farm facilities may cause wind wave attenuation. The most important parameters affecting the level of impact are the dimensions, number and density of foundations.
Increase in water turbidity	Some maintenance work (e.g., replacing a damaged section of cable), as well as anchoring ships, will disturb the structure of bottom sediments and raise suspended solids, resulting in an increase in water turbidity. The most important parameters affecting the level of impact are: • the volume of disturbed bottom sediments, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

7.3. Stage decommissioning

Table 4. Potential impacts of the OWF on the abiotic environment - decommissioning stage

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
Disruption of sediment structure	During the decommissioning of the OWF, work will be carried out that will disturb the structure of the bottom sediments. These include, in particular, dismantling foundations and removing power cables. Such disturbances will also be caused by anchoring vessels. As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and dissolve in the water depths, and then be re-deposited on the bottom. The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Release of pollutants and nutrients from the sludge into the water body	During the decommissioning of the OWF, work will be carried out that causes agitation of bottom sediments, such as the removal of foundations, cables and anchoring of ships. They will favor the passage of pollutants and nutrients from the sediment into the water body. Labile forms of metals, organic pollutants, i.e. polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), biogenes (nitrogen and phosphorus) can pass into the water. The most important parameters affecting the level of impact are: • the dimensions and number of decommissioned foundations and the length of cables, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.
Disorders of the structure of the fundus	Disturbances to the bottom structure that occurred during the construction phase, such as from the driving of foundation piles, will be permanent, so they will also exist during and after the decommissioning of the farm. The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Change in bottom morphology	The effect of removing foundations or cables, or leaving some elements of the farm in the seabed will be changes in its morphology (such as foundation holes). The most important parameters affecting the level of impact are: • types, dimensions and number of foundations, • a type of rock material that forms the seabed.
Occupation of the seabed area	Foundations and cables (if left on the seabed during the decommissioning of the farm), will occupy permanently defined areas of the seabed. The most important parameters affecting the scale of the impact are the diameter of the base and the number of foundations, as well as the length of the cables.

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
Washing out or burying mineral deposits	During the decommissioning of the OWF, work is carried out on dismantling the various elements of the farm, causing disruption to the structure and morphology of the seabed. They can cause the deposits of crumb raw materials to be washed out or buried. The most important parameters affecting the scale of the impact are the diameter of the base and the number of foundations being eliminated.
Impediment to access to mineral deposits	Foundations and cables (if left on the bottom during the decommissioning of the farm), will permanently obstruct access to raw material deposits. The most important parameters affecting the scale of the impact are the diameter of the base and the number of foundations, as well as the length of the cables.
Pollution of water bodies and bottom sediments with petroleum substances	See description for construction phase
Contamination of water depths and bottom sediments with antifouling agents	See description for construction phase
Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage	See description for construction phase
Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from the decommissioning of the farm	During the decommissioning of the wind farm, waste directly related to the decommissioning of the wind farm will be generated on vessels, at the construction facilities located onshore (at the port serving the project) and at the project site. These may include damaged parts of farm components, operating fluids, etc. They can be accidentally released accidentally into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Changes in the regime of sea currents	The foundation structures of individual farm facilities (if left on the bottom during decommissioning of the farm) may cause changes in the regime of sea currents. The most important parameters affecting the level of impact are the dimensions, number and density of foundations.
Wind wave attenuation	The foundation structures of individual farm facilities (provided they are left in the seabed during decommissioning of the farm) may cause wind wave attenuation. The most important parameters affecting the level of impact are the dimensions, number and density of foundations.
Increase in water turbidity	Maintenance work (e.g., removing foundations and cables from the bottom), as well as anchoring ships, will disturb the structure of bottom

Potential impact	Rationale for selection and key parameters and factors affecting the level of impact
	sediments and raise suspended solids, resulting in an increase in water turbidity. The most important parameters affecting the level of impact are: • the volume of disturbed bottom sediments, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

8. Receptors subject to environmental impact assessment environment

As with Section 7 of this volume, since information on potential receptors of impacts is specific to the type of offshore wind farm projects and is independent of detailed solutions, the chapter directly cites the description that was provided in the 2015 Report.

8.1. Basic characteristics of abiotic environmental resources in the area of the proposed farm

The abiotic environmental resources (receptors) assessed in the Report are the seabed, bottom sediments, marine waters and mineral deposits in the area of the proposed project. Surveys of these resources were conducted by the Maritime Institute in Gdansk, and detailed descriptions and their current status are presented in Sections 2 - 5 of Volume III of the Report.

In the seabed survey report, the farm area was divided into five sub-areas (P1 - P5) with different structure, seabed sediment genesis and structure, which will be addressed by the impact assessment performed and presented below (see Sections 3 and 5 of Volume III of the EIA).

8.2. Sensitivity of abiotic environmental resources to potential impacts project

The sensitivity of individual receptors to the impacts of offshore wind farms during the construction, operation and decommissioning stages is shown in the tables below.

The sensitivity/susceptibility of a given receptor to IMF impacts is understood as a function of the resource's ability to adapt to the potential change resulting from the project and its ability to return to baseline.

Table 5. Vulnerability (sensitivity) of abiotic receptors to OWF impacts - construction phase

Potential impact	Vulnerability / Sensitivity				
	Seabed with sediments		Marine waters	Mineral deposits	
	Areas P1 and P3	Areas P2, P4 and P5		Gravelly sands	Hydrocarbons
Disruption of sediment structure	Low	Medium (areas P2 and P4) or high (area P5)	-	-	-
Release of pollutants and nutrients from the sludge into the water body	Low	Medium (areas P2 and P4) or high (area P5)	Average	-	-
Change in the substrate composition of sediments	Low	Low (P2, P4) or medium (P5)	-	-	-
Disruption of the bottom structure	High	Average	-	-	-
Change in bottom morphology	Low	Medium (areas P2 and P4) or high (area P5)	-	-	-
Ground settlement	Low	Medium (areas P2 and P4) or high (area P5)	-	-	-
Occupation of the seabed area	Low	Low	-	-	-
Use of sand as foundation ballast	-	-	-	High	-
Washing out, stripping or burying mineral deposits	-	-	-	High	-
Impediment to access to mineral deposits	-	-	-	High	Average
Pollution of water bodies and bottom sediments with petroleum substances	Low (normal operation) / low (failures)	Low (normal operation) / medium (failures)	Low (normal operation) / high (failures)	-	-
Contamination of water depths and bottom sediments with antifouling agents	Average	Average	Average	-	-
Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage	Low	Low	Low	-	-

Potential impact	Vulnerability / Sensitivity				
	Seabed with sediments		Marine waters	Mineral deposits	
	Areas P1 and P3	Areas P2, P4 and P5		Gravelly sands	Hydrocarbons
Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from the construction of the farm	Average	Average	Average	-	-
Changes in the regime of sea currents	-	-	Very low	-	-
Wind wave attenuation	-	-	Very low	-	-
Turbidity of water	-	-	Very low	-	-

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Table 6. Vulnerability (sensitivity) of abiotic receptors to OWF impacts - operational stage

Potential impact	Vulnerability / Sensitivity				
	Seabed with sediments		Marine waters	Mineral deposits	
	Areas P1 and P3	Areas P2, P4 and P5		Gravelly sands	Hydrocarbons
Disruption of sediment structure	Low	Medium (areas P2 and P4) or high (area P5)	-	-	-
Release of pollutants and nutrients from the sludge into the water body	Low	Medium (areas P2 and P4) or high (area P5)	Low	-	-
Change in the substrate composition of sediments	Low	Low (P2, P4) or medium (P5)	-	-	-
Disruption of the bottom structure	High	Average	-	-	-
Change in bottom morphology	Low	Medium (P2, P4) or high (P5)	-	-	-
Ground settlement	Low	Medium (P2, P4) or high (P5)		-	-
Occupation of the seabed area	Low	Low	-	-	-
Washing out or burying mineral deposits	-	-	-	High	-

Potential impact	Vulnerability / Sensitivity				
	Seabed with sediments		Marine waters	Mineral deposits	
	Areas P1 and P3	Areas P2, P4 and P5		Gravelly sands	Hydrocarbons
Impediment to access to mineral deposits	-	-	-	High	Average
Pollution of water bodies and bottom sediments with petroleum substances	Low (normal operation) / low (failures)	Low (normal operation) / medium (failures)	Low (normal operation) / high (failures)	-	-
Contamination of water depths and bottom sediments with antifouling agents	Average	Average	Average	-	-
Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage	Low	Low	Low	-	-
Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from the operation of the farm	Average	Average	Average	-	-
Pollution of water tone and bottom sediments with compounds from corrosion protection agents	Low	Average	Average	-	-
Change in water and sediment temperature	Average	Average	Average	-	-
Changes in the regime of sea currents	Very low	Very low	Very low	-	-
Wind wave attenuation	Very low	Very low	Very low	-	-
Turbidity of water	Very low	Very low	Very low	-	-

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Table 7. Vulnerability (sensitivity) of abiotic receptors to OWF impacts - decommissioning stage

Potential impact	Vulnerability / Sensitivity				
	Seabed with sediments		Marine waters	Mineral deposits	
	Areas P1 and P3	Areas P2, P4 and P5		Gravelly sands	Hydrocarbons
Disruption of sediment structure	Low	Medium (areas P2 and P4) or high (area P5)	-	-	-
Release of pollutants and nutrients from the sludge into the water body	Low	Medium (areas P2 and P4) or high (area P5)	Average	-	-
Disorders of the structure of the fundus	High	Average	-	-	-
Change in bottom morphology	Low	Medium (areas P2 and P4) or high (area P5)	-	-	-
Occupation of the seabed area	Low	Low	-	-	-
Washing out or burying mineral deposits	-	-	-	High	-
Impediment to access to mineral deposits	-	-	-	High	Average
Pollution of water bodies and bottom sediments with petroleum substances	Low (normal operation) / low (failures	Low (normal operation) / medium (failures)	Low (normal operation) / high (failures)	-	-
Contamination of water depths and bottom sediments with antifouling agents	Average	Average	Average	-	-
Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage	Low	Low	Low	-	-
Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from the decommissioning of the farm	Average	Average	Average	-	-

Potential impact	Vulnerability / Sensitivity				
	Seabed with sediments		Marine waters	Mineral deposits	
	Areas P1 and P3	Areas P2, P4 and P5		Gravelly sands	Hydrocarbons
Changes in the regime of sea currents	Very low	Very low	Very low	-	-
Wind wave attenuation	Very low	Very low	Very low	-	-
Turbidity of water	Very low	Very low	Very low	-	-

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

8.3. The importance of abiotic resources of the environment

Water as well as bottom sediments are very important elements of the aquatic ecosystem of the Baltic Sea, which is a shallow and small sea with limited water exchange through the narrow and shallow Danish Straits. The surface area of the sea is about four times smaller than its catchment area. About 85 million people live in the area. Such conditions mean that any interference with the marine environment - fishing, shipping, discharge of municipal and industrial wastewater, surface runoff from industrialized and agricultural areas, but also bottom mining and development activities - affects the delicate ecological balance of the sea (Uscinovich, 2011). Water and sediment in water bodies are closely related. There is a kind of state of equilibrium between the various components of the marine environment, especially between water and bottom sediment. A change in one component (e.g., sediment) entails changes in another (e.g., water) and vice versa.

Most of the pollutants (heavy metals and toxic organic compounds with low solubility and difficult to degrade) released into the environment as a result of human economic activities and reaching surface waters are retained in sediments (Bojakowska, 2001). However, sediments are not only the main repository of persistent and toxic pollutants entering the environment, but also the habitat, nutrition, reproduction and growth of many aquatic organisms. Contaminated aquatic sediments pose a major threat to the biosphere, since some of the harmful components contained in the sediments can pass into the water through chemical and biochemical processes and be available to living organisms (Frostner, 1995; Bourg and Loch, 1995). In addition, the movement of contaminated sediments, whether natural or man-made (transport, dredging, local turbulence, etc.) or rising temperatures, can cause them to move to higher water layers, where open water organisms will also be exposed to contaminants. The above relationships between abiotic and biotic elements of the environment are discussed in Section 10 (Related Impacts).

In determining (according to the methodology) the importance of a given receptor (resource) was taken into account:

- the baseline condition of the resource found in environmental studies,
- is that none of the resources are subject to legal protection,
- their susceptibility (sensitivity) to the impacts of the farm.

The assumed importance of each resource is shown in the table below.

Table 8. Identify the importance of abiotic receptors/resources for ecosystem functioning

Receptor	The importance of the receptor (resource)
Seabed with sediments (areas P1 and P3)	Large
Seabed with sediments (areas P2, P4 and P5)	Medium
Marine waters	Medium
Gravelly sand deposits	Medium
Hydrocarbon deposits	Small

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

9. Assessment of the impact of OWF BIII on abiotic resources environment

This chapter evaluates the variant of the project that will be implemented on the basis of the Environmental Decision, amended in accordance with this application.

9.1. Stage construction

During the construction of the BIII OWF, works will be carried out that affect the seabed and seawater in the project area, the most significant of which are:

- drilling performed during geotechnical studies;
- preparation of the bottom prior to the installation of the foundation, including dredging of the bottom, removal of the sediment layer with a thickness of about 2 - 3 m and replacing it with rock material with a higher bearing capacity (only in the case of gravity foundations, which can be used in the currently proposed variant of the Project only for supporting infrastructure);
- drilling or driving foundations (only in the case of monopiles, jacket or tripod foundations, while in the currently requested variant of the Project tripod foundations can be used only for supporting infrastructure);
- anchoring jack - up platforms and support units during the assembly of farm components;
- burying cables in the seabed;
- heaping of rock material serving as protection against leaching;
- storage of excavated material from the preparation of the bottom for foundations.

A full description of the construction work can be found in Section 4 of Volume II of the EIA.

The following impacts of OWF BIII on the abiotic environment are expected at the construction stage:

- disruption of sediment structure;
- the release of pollutants and nutrients from the sediment into the water body;
- changing the substrate composition of sediments;
- disruption of the bottom structure;

- change in bottom morphology;
- ground settlement;
- seabed area occupation;
- washing out, picking out or burying accumulations of mineral resources;
- making access to mineral accumulations more difficult;
- changing the regime of sea currents;
- wind wave attenuation;
- water turbidity.

There may also be unplanned impacts during the construction of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the construction of the farm.

Unplanned impacts are described in detail in Section 12 of Volume II of the Report and in Chapter 11 of this section.

9.1.1. Disruption of the structure of sediments

During the construction of offshore wind farm BIII, there will be works that cause local disturbance of the structure of the bottom sediments. These include, in particular, the installation of foundations and the laying of power cables. Disturbance will also be caused by anchoring vessels and driving the legs of ships and jack - up barges into the seabed to stabilize their position. The predicted level of sediment agitation and redeposition and the conditions adopted for the analysis are described in detail in Section 4 of Volume II of the Report.

As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and spread (resuspension) in the water depths and be re-deposited on the bottom. The dredging of sediment during wind farm construction depends primarily on the volume of sediment moved during the work (for example, single-pile foundations do not require any dredging). The choice of gravity foundations assumed in the 2015 NIS, which formed the basis for conducting the assessment in the 2015 Report, would have resulted in an increase in the volume of sediment removed by dredging, thereby increasing the rate of sediment lift,

The 2015 Report estimated that the agitated sediment would move primarily within the farm area and up to a dozen kilometers from the farm boundaries, and falling over most of the area would cover the bottom to an average thickness of about 0.2 - to about 0.4 mm (see Section 4 of Volume II of the EIA).

However, in the variant selected` for implementation, this type of foundation is considered only for associated infrastructure, which will significantly reduce the negative impact on the sediment structure. As a consequence of the proposed changes to the Project, the use of gravity foundations for power plants has been excluded (foundations have been limited to monopile or jacket foundations), the number of foundations has been reduced to 60 for power plants (compared to the 120 provided for in

the Environmental Decision and 200 in the 2015 NIS), and the number of supporting infrastructure elements has been reduced from 6 pieces to one. The proposed change in conditions for the Project will have a significant impact on the magnitude of impacts associated with the disturbance of sediment structure.

Some heavy metals, pollutants and nutrients will be released from the bottom sediments as a result of the agitation, as discussed in detail in the next section. There will also be a temporary turbidity of the water.

Aggradation of bottom sediments can also affect potential deposits of crumb raw materials. It can lead to the leaching or extraction of raw materials during foundation preparation or cover them with an additional layer of sediment from the excavated material, making it impossible to extract them, by increasing the thickness of the overburden above the deposit.

There may also be a disturbance of sediment movement in the bottom zone. The successively rising foundations of the power plant will be an obstacle to the displaced sediment, leading to the accumulation and/or leaching of sediment, as well as - the leaching of bed sediment or its backfilling.

The most important technical parameters affecting the level of impact are the dimensions and number of foundations. The greatest impact on sediment would occur if the ground for gravity foundations with the maximum expected base diameter, i.e. 40 m, along with a leaching protection layer (the basis of the assessment in the 2015 Report, the most far-reaching scenario - NIS 2015). However, the variant that is the subject of the amendment to the Environmental Decision does not provide for gravity foundations under the turbines, but only under elements of supporting infrastructure, so the impact will be limited compared to that assessed in the 2015 Report.

Laying cables, on the other hand, involves plowing the bottom or washing out the sediment with a high-pressure water jet to create a cable trench.

The type of rock material forming the seabed will also affect the level of impact (see Section 3 of Volume III of the EIA).

Areas P1 and P3, located in the northern and northwestern parts of OWF BIII, are outcrops of glacial till with a variable sand and gravel cover, where there is no loose sediment on the surface or the layer is thin, and with numerous pebbles on the surface. A compact deposit such as clay is difficult to dilute under natural conditions. Due to the discontinuous layer of sands and gravels of variable thickness and the compact structure of the clay, the susceptibility to agitation of the surface sediment is low. Disturbance of the sediment structure will be of little importance here, even if large gravity foundations are used.

Areas P2 and P5 (silty-muddy sediments with a thick cover of sandy sediments), as well as area P4 (glacial till covered by a layer of sandy sediments with single boulders on the surface), in the central, eastern and southwestern parts of the farm, constitute a substrate that is not very stable, so it is necessary to replace it before the foundation of gravity foundations. Suspension (resuspension) of greater intensity may be triggered in these areas.

At the same time, the disturbance of bottom sediments can slightly improve their quality (increasing oxygenation and reducing the amount of pollutants and nitrogen compounds in the sediment due to their transition to the water tone). Better oxygenation of the sediment, on the other hand, can reduce (limit) the passage of phosphorus from the sediment, since this process occurs under anaerobic (reducing) conditions (Alloway and Ayres, 1999).

Due to the lack of significant impacts, minimization measures are not required, while the planned use of monopal or jacket foundations will significantly reduce the scale of impacts.

Violation of bottom sediment structure, is a direct, negative impact during the construction phase that is local in scope, short-term, reversible, repeatable during the construction period, with intensity ranging from low (areas P1 and P3) to medium or high (areas P2, P4 and P5).

The 2015 Report, the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario, as quoted below in Table 9, with the impacts for the variant approved by the Environmental Decision assessed as lower.

Table 9. Impact assessment involving disturbance of bottom sediment structure (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low (areas P1 and P3)	During the construction of the farm, the structure of the bottom sediments will be disturbed	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Negligible (scale of exposure - local, duration - short-term, intensity - medium to high)	Negligible (magnitude of impact - insignificant, Importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In summary, the variant that is the subject of this Report will build about 70% fewer foundations than envisioned in the 2015 NIS and twice as many as specified in the Environmental Decision, it also excludes the use of gravity foundations under the power plants and reduces the number of foundations for supporting infrastructure to one unit with a slight increase in the unit area of one. As a result, violations of the bottom sediment structure will occur over a much smaller area. It is therefore considered that the project will cause significantly lower impacts than both those assessed for the 2015 NIS and the variant approved in the DWA.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are significantly smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.2. Release of pollutants and nutrients from the sludge into the water body water

Agitation (disturbance) of the bottom sediment associated with the construction (foundation) of foundations for farm facilities, anchoring ships or burying cable is a process that promotes the passage of contaminants from the sediment to the water depths (Uścinowicz, 2011; Bojakowska, 2001; Frostner, 1980; Bourg and Loch, 1995; Dembska, 2003). This way they can get to it:

- pollutants, including heavy metals and PAHs and PCBs;
- biogenic elements - nitrogen and phosphorus.

Detailed assumptions and analysis of predicted sediment emission levels are described in detail in Section 4 of Volume II of the Report.

The phenomenon of depletion of the surface layer of sediment in areas of sediment agitation is confirmed by scientific studies. This process was observed by Bolalek and Pustelnikovas (1995) at Klaipeda Port at the site where hydrofoils and ships turn back, as well as Protasowicki et al. (1992), studying the bottom sediments of the fairway in the Szczecin Lagoon.

The intensity and effects of the processes described will depend on:

- sediment type (grain size);
- the content of pollutants and nutrients in sediments;
- the type of foundation chosen.

Sediment types in the study area vary from location to location. In the seabed survey report, the farm area was divided into five sub-areas (P1 - P5) with different structures and origins (see Section 3 and Section 5 of Volume III of the EIA).

The most unfavorable situation (see Section 4 of Volume II of the EIA) may occur in the case of sludge characterized by an elevated content of noxious substances and nutrients and a large amount of fine fractions (clay and silt fractions). In this case, there may be a significant deterioration of water quality due to an increase in the concentration of harmful and biogenic substances (due to the passage from the sediment to the water body as a result of sediment uplift processes). These sediments will also promote the formation of more suspended solids, which will persist in the water depths for a long time. Intense resuspension can cause the release of nutrients immobilized in the sediment and contribute to eutrophication. In the case of sandy sediments with low organic matter content (e.g., coarse-grained sandy sediments), the processes described will be less intense. These sludges are generally characterized by small amounts of fine fractions and low concentrations of metals and persistent organic pollutants. Accordingly, it is estimated that the processes associated with the release of nutrients will occur with low intensity in P1 and P3 areas and with much higher intensity in P2, P4 and P5 areas.

The content of pollutants and nutrients in the collected bottom sediments from the BIII offshore wind farm area does not differ from the average concentrations of these substances in the bottom sediments of the South Baltic. This issue is discussed in detail in Section 5 of Volume III.

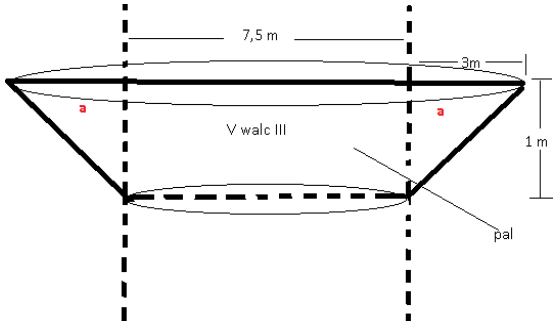
The type of foundations that will eventually be used on the farm will affect the amount of pollutants and nutrients released during construction, due to the different volumes of bottom sediments that will be stirred up during their installation. The basic technical parameters of the foundations are described in Section 3 of Volume III.

The most far-reaching scenario that forms the basis for conducting the assessment in the 2015 Report, is the use of gravity foundations (NIS 2015). Their construction would require the preparation of the bottom, which would involve the removal of a layer of bottom sediments, not only at the foundation site, but also in its immediate vicinity.

In the case of the technologies currently under consideration (the variant chosen for implementation - monopal or jacket), the volume of disturbed sediment will be many times smaller, which is related to the fact that they do not require bottom preparation in most cases, as well as the fact that the diameter of the driven foundation piles will be many times smaller than the diameter of the gravity foundation. The sediment around the driven piles will liquefy due to the vibrations caused by the operation of the jackhammer. The following is an example calculation of the amount of shaken sludge for a monopile with a diameter of 10 m (the maximum diameter of the monopile).

Assuming that piles with a diameter of 10 meters (i.e., a radius of 5 meters) will be driven into the bottom at a depth of several tens of meters, it can be assumed that sediment at a depth of about 1.5 meters and in a radius of about 3 meters around the pile Figure 1, below, shows in a very simplified (illustrative) manner that part of the sediment that may be moved, which would result in the passage of contaminants and nutrients from the sediment to the water depth, during the driving of the pile into the bottom.

Figure 1. Schematic diagram of how to determine the sediment stirred up during pile driving at the bottom



7,5 m	7,5 m
V walc III	V waltz III
pal	pal

The volume of sediment to be stirred up when the pile is driven into the seabed was calculated from the formula below:

$$_{Va_=}$$ V st ¶c.-V val.III,

where:

$_{Va}$ - the volume of the sediment layer that is stirred up when the pile is driven into the seabed,
V st ¶c. - volume of a truncated cone,
V cylinder III- volume of cylinder III

After substituting the data into the formula, the volume of sediment to be stirred up during the driving of one pile into the seabed is about 78.5$^{m3\ of}$ sediment per foundation (monopile).

In addition, regardless of the type of foundation chosen, the sediment will be stirred up when the cable is laid. The width of the cable trench is about 1.5 meters, the average depth is up to 1.5 meters, and the length is up to 200 kilometers, making a total of 450,000$^{m3\ of}$ shaken sediment (for the entire internal cable network).

In addition, the stirring of bottom sediment associated with ship anchoring will be observed during foundation placement and tower installation. The anchoring process itself is short-lived, in a small area (spot), at a depth of about 3 meters, so the volume of disturbed sediment will also be small.

Based on the above assumptions and the concentrations of pollutants and nutrients found in the area of the farms (see Section 5 of Volume III of the EIA), the 2015 Report made an estimate of their emissions to the water body in the most far-reaching scenario (NIS 2015), which may occur due to the construction of 200 foundations (Table 10). The calculations assumed an average volumetric density of the sludge of 1.52 $^{g/cm3}$ (1520 $^{kg/m3}$) and an average sludge moisture content of 17.7%.

Table 10. Estimated maximum emissions of pollutants from agitated sediments for the furthest-reaching scenario (NIS 2015) of OWF BIII

Pollution	Estimated maximum value of emissions from sludge
	NIS [kg]
lead (Pb)	3274 kg
copper (Cu)	1592 kg
chromium (Cr)	2,373 kg
nickel (Ni)	1592 kg
zinc (Zn)	8,291 kg
cadmium (Cd)	Concentration in the area below the limit of quantification
mercury (Hg)	Concentration in the area below quantification
pCB group congeners	1.5 g - 57 g
pAH group analytes	150 g - 12917 kg
assimilable phosphorus (P)	159.2 Mg

The volumes of pollutant emissions that may be released during construction will be negligible, compared to the loads carried into the Baltic Sea annually from rivers and wet precipitation (Uścinowicz, 2011), which does not significantly affect water quality.

No measures are envisaged to minimize impacts in the form of the release of pollutants and nutrients from stirred up bottom sediments.

The processes associated with the construction (foundation) of the foundations for the towers may result in better oxygenation of the sediments, and thus increase the intensity of nitrification processes and multiply the release of nitrates into the water table. It can also upset the overall pattern of the nitrogen cycle by reducing the intensity of denitrification processes that occur under anaerobic conditions and involve the conversion of nitrate to molecular nitrogen (O'Neil, 1998; Trzeciak, 1995). Since nitrogen cycling in the environment is a very complex process and its intensity depends on many factors (e.g., oxygenation, temperature, season, primary production, etc.), as well as the amount of nutrient input from point sources, diffuse sources and deposition from the atmosphere (Boynton et al., 1995; Fisher et al., 1988), it is impossible to calculate the nitrogen load that will enter the water column from the sediment during foundation placement activities.

It was assumed that all of the sediment that would be removed from the foundation sites during bottom preparation would be left in the farm area. Similarly, in the case of the use of a different type of foundation (planned to be implemented - monopal or jacket, other types of foundations may involve only one foundation for supporting infrastructure), where the area of disturbance of the bottom and the sediments on it is much smaller, the impact will be at a level many times lower.

At the same time, the processes of stirring up bottom sediments can slightly improve sediment quality (increasing sediment oxygenation and reducing the amount of pollutants and nitrogen compounds in the sediment due to their transition to the water tone). Better oxygenation of the sediment, on the other hand, can reduce (limit) the passage of phosphorus from the sediment, since this process occurs under anaerobic (reducing) conditions (Alloway and Ayres, 1999).

Substances released from the sediment will pass into the water body, however, during a period of about 1 year after the cessation of construction activities, these substances will pass back into the sediment after reaching equilibrium.

The release of pollutants and nutrients from bottom sediments is a direct, negative impact during the construction phase that is regional in scope, short-term, reversible or irreversible, repeatable during the construction period, with an intensity ranging from low (areas P1 and P3) to medium or high (areas P2, P4 and P5).

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 11, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 11. Impact assessment involving the release of pollutants and nutrients from sediment into the water body (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low (areas P1 and P3)	During the construction of the farm, there will be a release of pollutants and nutrients from the sediment into the water body	Negligible (scale of exposure - regional, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Small (scale of exposure - regional, duration - short-term, intensity - medium to high)	Small (magnitude of impact - low, importance of the resource - medium)
Marine waters	Medium	Average		Small (scale of exposure - regional, duration - short-term, intensity - low to high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In summary, the variant that is the subject of this Report will build about 70% fewer foundations than the furthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which is associated with a smaller area of disturbed sediment and, consequently, correspondingly fewer heavy metals, pollutants and nutrients released from it. It is therefore considered that the project will cause significantly lower impacts than both those assessed for the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that the nature of the impacts does not change, while their scope and intensity are significantly smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.3. Changing the substrate composition of bottom sediments bottom sediments

A change in the substrate composition of bottom sediments can occur as a result of two types of work carried out during the construction phase of the farm:

- laying a protective layer against leaching around the base of the foundation;
- replacement of the subsoil at the site of the planned gravity foundation with a material with a higher bearing capacity.

Foundations used for OWF facilities, especially gravity and monopiles, are susceptible to leaching of bottom sediments in the immediate vicinity of their bases. Therefore, a so-called "leaching protection layer" is laid around them. For this purpose, rock ballast, stones and boulders are most often used, with which the base of the foundation is surrounded by a width of several to several meters (see Sections 3 and 4 of Volume II of the EIA). Environmentally neutral materials are used. Hydraulic stone, obtained from granite, dolomite, sandstone or basalt rock, is commonly used in marine hydraulic engineering. It is used, among other things, in the construction and upgrading of breakwaters, shorelines, banks and bottoms of water channels, strengthening of the bottom and slopes of river channels (as flood protection), rock erratics, foundations, as well as port facilities, marinas and ferries.

Currently, the developer assumes that such a layer can be used in any type of foundation that is being considered for use in the BIII OWF project. The most far-reaching scenario (NIS 2015), which formed the basis for conducting the assessment in the 2015 Report, envisioned the construction of a maximum of 200 gravity foundations, for which the change in substrate composition would occur over the largest area (50 m - the diameter of the foundation plus 10 m of leaching protection layer counting from the foundation periphery). A layer of stones and boulders can also be used to cover power cables if they are not buried to the proper depth. The decision on the use of the protective layer and its width can be made only at the stage of the construction project, after determining the field conditions at specific locations of the foundations. The variant currently planned for implementation involves the construction of only 60 foundations for turbines, and provides for the possibility of using gravity foundations only for associated infrastructure (1 unit), while for wind power plants the choice of foundations has been limited to monopile or jacket foundations.

The degree of change in sediment substrate composition at a given location will depend directly on the structure of the seabed (see Section 3 and Section 5 of Volume III of the EIA). Bottom sediments in the P1 and P3 areas (outcrops of glacial till with a variable sand and gravel cover, with numerous pebbles on the surface) will have a low susceptibility to changes in the sub-saturated composition due to poor sorting (presence of all fractions in the composition). The clays also provide a stable foundation for power plant construction. Areas P2 and P5 (silty-muddy sediments with a thick cover of sandy sediments), as well as area P4 (glacial till covered by a layer of sandy sediments with individual boulders on the surface), constitute a substrate that is not very stable, so it will be necessary to replace it before the foundations are laid. Sensitivity to changes in substrate composition was rated as low to medium. These areas are characterized by a high and very high degree of sorting, and the change in sediment substrate composition will be more noticeable here.

The appearance of coarse rock crumbs can contribute to the creation of new habitats for sessile benthic organisms. Therefore, the change in sediment substrate composition should be considered a positive impact.

Due to the lack of significant impacts, minimization measures are not required, while the selection of appropriate foundations at the stage of construction design can reduce the scale of impacts.

The change in sediment substrate composition is a direct, positive impact at the construction stage that is local in scope, long-term, irreversible, and repeatable during the construction period. The intensity of

the impact in the P1 and P3 areas was determined to be medium, and in the P2, P4 and P5 areas it was determined to be high.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 12, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 12. Impact assessment involving changes in the substrate composition of bottom sediments (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the construction of the farm, there may be a change in the sub-fractional composition of the bottom sediments	Small (scale of exposure - local, duration - long-term, intensity - medium)	Small (magnitude of impact - low, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Low (P2, P4) or medium (P5)		Moderate (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% less foundation than envisioned for the farthest-reaching scenario - the NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as much as specified in the Environmental Decision. In the currently proposed variant selected for implementation for wind turbines, the use of gravity foundations has been ruled out, while this type of foundation can be used for the construction of an internal offshore substation (1 unit). In the case of the latter foundation, the unit size of the occupied area is larger, but nevertheless, as the number changes from six to one, the total impact will decrease.

Accordingly, the change in the subfractional composition of bottom sediments will occur in a correspondingly smaller number of locations and over a correspondingly smaller area. It is therefore considered that the Project will cause significantly lower impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are significantly smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.4. Structural disorder bottom

Disturbance of the bottom structure can occur as a result of several types of construction work, in particular:

- laying a protective layer against leaching around the base of the foundation;

- replacement of the subsoil at the site of the planned gravity foundation with a material of greater bearing capacity and deposit the excavated material in the farm area;
- preparation of the bottom for other types of foundations or cables, if necessary;
- driving or drilling foundation piles.

The 2015 Report assessed impacts on the bottom structure for the gravity foundation option, which was analyzed at the time as the parameters comprising the most far-reaching scenario (NIS 2015).

If gravity foundations are used, the disturbance of the bottom structure will be related to the need for proper preparation of the subsoil before foundation. This construction requires a stable foundation, so it will be necessary to replace it with rock material with a higher bearing capacity. Typically, a layer of sediment about 2 - 3 meters thick is removed, while if the sediment beneath the bottom surface has too little bearing capacity, it may be necessary to remove the entire overburden up to the parent layer, on which foundation is possible. This is especially true for areas P5 and P2 located in the western part of the BIII OWF, where silty clay sediments are present in the deep structure. If the slope of the bottom is too steep, the ground should be leveled.

Thus, it can be assumed that for a 40 m diameter gravity foundation and the application of 15 m wide scour protection from the foundation perimeter, it will be necessary to remove a sediment layer of about 11,539.5^{m3} and replace it with rock ballast.

Currently, the proposed variant involves the use of a less invasive solution, i.e. monopal or jacket foundations for power plants, while gravity foundations will only be allowed for associated infrastructure, with the number of such foundations reduced from 6 to 1 unit.

If monopiles are used, disruption of the bottom structure will be caused by drilling or driving the foundation pile. Driving or drilling the pile causes vibrations that can liquefy the top layer of sandy sediments within a few meters of the pile. This effect can occur in areas P2 and P5, where there is a thick layer of sandy sediments or sands on silts and clays. The liquefaction process usually leaves no molds on the bottom (it brings the bottom surface into alignment) and stops when the vibration ends. Monopiles can be used on gravel, sand or clay substrate provided there is a stable bedding layer. The monopile technique is less suitable under conditions of high density of boulders and rocks, and where silty-muddy sediments predominate in the deep structure (Hammar, et al., 2008). With regard to the aforementioned limitations, areas P1, P3, P4 (due to the presence of stonework) and area P5 (the presence of a thicker clay layer) may show low suitability for this type of foundation. However, this must be confirmed by geotechnical testing, which will take place only at the stage of the construction project.

The foundation of tripod and jacket foundations involves digging or drilling three to four piles up to 70 meters long (depending on terrain conditions) into the bottom, on which the foundation structure will then be set. Pile driving causes vibrations that can liquefy the sediment, similar to monopiles. The liquefaction process can occur where sandy or silty-clay deposits are present (areas P2, P5). The liquefaction process stops when the vibration stops. Due to piling, jackets are not the best alternative in areas of dense rock cover, so areas P1, P3 and P4 will have low suitability for this type of foundation. However, this must be confirmed by geotechnical testing.

Disturbance of the bottom structure will also occur during the laying of power cables. It is assumed that the breach will occur in sections with a total length of up to 200 km, its depth will be up to 1.5 m, and its width - about 1.5 m.

The degree of disturbance to the bottom structure in a given location will depend directly on its structure.

The seabed in areas P1 and P3 (outcrops of glacial till with a variable sand and gravel cover, with numerous pebbles on the surface) will have a high sensitivity to the analyzed impact, because when the clay structure is disturbed (drilling, digging), the processes to restore it to its original state are long.

The bottom in areas P2 and P5 (silty-muddy sediments with a thick cover of sandy sediments), as well as area P4 (glacial till covered by a layer of sandy sediments with individual boulders on the surface) will be easily disturbed in structure, but the process of restoration is much shorter than in areas P1 and P3. Sensitivity was rated medium in this case.

Due to the lack of significant impacts, minimization measures are not required, while the selection of appropriate foundations at the stage of construction design can reduce the scale of impact.

Disturbance of the bottom structure is a direct, negative impact of local extent at the construction stage, long-term, irreversible, repeatable during the construction period. The intensity of the impact in the P1 and P3 areas was determined to be medium, and in the P2, P4 and P5 areas it was determined to be high.

As mentioned above, the 2015 Report, the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario, as quoted below in Table 13, with the impacts for the variant approved in the Environmental Decision assessed as less.

Table 13. Impact assessment involving disturbance of bottom structure (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	High	During the construction of the farm, the bottom structure will be breached	Moderate (scale of exposure - local, duration - long-term, intensity - high)	Moderate (magnitude of impact - moderate, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Average		Small (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisioned for the furthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so violations of the bottom structure will occur over a significantly smaller area. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect

the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.5. Change in morphology fundus

A change in the morphology (shape) of the bottom can occur as a result of several types of construction work, in particular:

- laying a protective layer against leaching around the base of the foundation;
- replacement of the subsoil at the site of the planned gravity foundation with a material of greater bearing capacity and deposit the excavated material in the farm area;
- preparation of the bottom for other types of foundations or cables, if necessary;
- driving or drilling foundation piles.

The 2015 Report assessed impacts on bottom structure for the gravity foundation option, which was analyzed at the time as the most far-reaching scenario (NIS 2015).

The use of gravity foundations involves a change in the shape of the bottom as a result of the work being carried out. Material that is excavated as a result of foundation work must be temporarily deposited on the seabed immediately adjacent to the location where the work is being carried out, and can then be used as a protective layer, ballast (Peire et al., 2009) or to backfill internal infrastructure cables of the OWF.

Currently, the proposed variant assumes less bottom-interfering solutions, i.e. monopal or jacket foundations for power plants, while gravity foundations will only be allowed for associated infrastructure (1 unit).

If monopiles are used, the change in bottom morphology will be primarily related to the placement of a leaching protection layer around the pile.

The foundation of jacket foundations is associated with relatively minor changes in the morphology of the bottom, compared to gravity or monopile foundations, because they involve a much less frequent application of a protective layer against leaching. On soft ground (silt, clay) it is possible to use additional mats to increase the bearing capacity of the soil near the piles (so-called mudmats).

A slight change in the shape of the bottom can also occur during the laying of power cables. The bottom sediments disturbed during these works may be diluted. This will create a cavity along the cable or / and it may be temporarily exposed.

The degree of change in the morphology of the bottom in a given location will depend directly on its structure. Compact formations such as glacial till are not very susceptible to a change in morphology, however, if the morphology changes, it takes a long time to return to its original state (P1, P3). Vulnerability of areas P2, P4, P5 is high, but on the other hand, they return to their initial state just as easily due to bottom processes (movement of sediments by currents and wave action).

Due to the lack of significant impacts, minimization measures are not required, while the selection of appropriate foundations at the stage of construction design can reduce the scale of impacts.

Changing bottom morphology is a direct and negative impact during the construction phase, with a local scope. In P1 and P3 areas, it will be irreversible, long-term and high-intensity, while in P2, P4 and P5 areas it was considered a reversible, medium-term and medium-intensity impact.

The 2015 Report, the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario, the 2015 NIS, as quoted below in Table 14, with the impacts for the variant approved by the Environmental Decision assessed as lower.

Table 14. Impact assessment involving alteration of bottom morphology (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low (areas P1 and P3)	During the construction of the farm, the morphology of the bottom will change	Moderate (scale of exposure - local, duration - long-term, intensity - high)	Moderate (magnitude of impact - moderate, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Small (scale of exposure - local, duration - medium-term, intensity - high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisioned for the furthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so violations of bottom morphology will occur over a correspondingly smaller area. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.6. Settlement of the ground

A foundation planted on the seabed will cause soil compaction, that is, compaction due to the reduction of free spaces between sediment grains. As a result, the foundation will settle.

This process will occur mainly in the case of heavy gravity foundations, which weigh up to about 7,000 tons (see Section 2 of Volume II of the EIA). Such a solution was analyzed as an alternative (which is also the most far-reaching scenario - NIS 2015) in the 2015 Report. The impact of the currently proposed solution of using other types of foundations for power plants (monopile or jacket type) and allowing gravity foundations only for associated infrastructure, due to their lighter weight, will be much smaller.

The degree of soil compaction in a given location will depend directly on the construction of the bottom. The impact will be more noticeable in areas of silty clay sediments (P2, P5) and loosely packed sandy-gravel sediments (P4). Areas P1 and P3 are subject to lesser levels of ground subsidence. This is because

clays have a low sensitivity to sediment compaction under pressure, so they make a stable foundation for building foundations.

Due to the lack of significant impacts, minimization measures are not required, while the selection of appropriate foundations (abandonment of gravity foundations) will reduce the scale of impact.

Land subsidence is a direct, negative, long-term, irreversible, local impact. In P1 and P3 areas it will be characterized by low intensity, in P2 and P5 areas by high intensity.

The 2015 Report, the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario, as quoted below in Table 15, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 15. Impact assessment involving ground settlement (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the construction of the farm there will be a process of subsidence of the bottom	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Moderate (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisaged in the case of the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so the phenomenon of land subsidence will occur in a correspondingly smaller number of locations and over a correspondingly smaller area. It is therefore considered that the Project will cause significantly lower impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are significantly smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.7. Use of sand as ballast for foundations gravity

Gravel sand deposits identified in the farm area could be used as ballast to fill gravity foundations, if such would be used in the project (possibly to produce concrete gravity foundations). During construction, the demand for raw materials increases, in order to reduce construction costs, such

solutions are used. However, this would require obtaining a license in accordance with the Law of June 9, 2011. Geological and Mining Law (ie: Journal of Laws 2021 No. 1420) and the Regulation of the Minister of the Environment of July 1, 2015 on geological documentation of a mineral deposit, excluding hydrocarbon deposits (Journal of Laws No. 987) and the performance of a separate EIA to determine the possible negative effects of the extraction of these raw materials.

The extraction of raw materials for the construction of gravity foundations is beneficial to the investor, but at the same time the raw material resource of the South Baltic will be reduced irreversibly. This would be a direct, positive or negative impact on these raw materials, local in scope, long-term, irreversible, repeatable during the construction period, with very high intensity.

The impact does not apply to hydrocarbon deposits. Minimization measures are not required.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 16, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 16. Impact assessment involving the use of gravel sands from exposed deposits for gravity foundations (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Four small potential gravel sand deposit fields have been identified within the boundaries of the future BSIII OWF and its buffer	Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisaged for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under power plants has been ruled out (only such a foundation under a substation has been allowed), so the potential demand for raw materials for foundation construction will be significantly lower, or not at all. Thus, it is considered that the Project will cause significantly lower impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are much smaller than in the case of the variant approved by the Environmental Decision (or the impact will not occur at all), and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.8. Wiping out, shoveling out or backfilling accumulations of raw materials minerals

During the construction of the BIII offshore wind farm, work will be carried out that will disturb the structure and morphology of the seabed.

Potential deposits of crumb raw materials may be affected by the uplift of bottom sediments caused by construction activities. This can lead to leaching or depletion of mineral accumulations during

foundation preparation or covering them with an additional layer of sediment from the excavated material, preventing their extraction, by increasing the thickness of the overburden above the deposit.

There may also be a disturbance of sediment movement in the bottom zone. The successively rising foundations of the power plant will be an obstacle to the displaced sediment. As a result, this can lead to the accumulation and/or leaching of sediment, resulting in the leaching of bed deposits or their backfilling.

The stored excavated material can bury potential deposits of crumb raw materials.

Thus, these will be direct negative impacts on crumbling raw materials at the construction stage, local in scope, short-term, reversible, repeatable during the construction period, with high intensity.

This impact does not apply to hydrocarbon deposits. Minimization measures are not required.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 16, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 17. Impact assessment of leaching, selection or backfilling of mineral accumulations (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Four small potential gravel sand deposit fields have been identified within the boundaries of the future BSIII OWF and its Buffer	Small (scale of exposure - local, duration - short-term, intensity - very high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the NIS 2015 furthest-reaching scenario that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so that leaching, excavation or backfilling of mineral accumulations will occur over a correspondingly smaller area. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.9. Occupation of the seabed area seabed

Subsequent foundations, embedded in the seabed during construction, will occupy an increasing area until their target number is reached.

Occupied by the gravity foundation, analyzed as an alternative option and also the most far-reaching scenario (NIS 2015) in the 2015 Report, the bottom area is about 3848.5^{m2} (including the 40 m diameter of the foundation and additionally the assumed maximum width of the leaching protection layer, i.e. 15 m from the edge of the foundation, giving a total diameter of 70 m). For 208 foundations (200 power plants and 8 foundations under supporting infrastructure), this gives a total of about 800,384^{m2} (0.8 ^{km2}).

Currently, other solutions (monopile and jacket foundations) are provided for wind power plants, while gravity foundations are allowed only for supporting infrastructure (1 unit).

Thus, in the case of the currently proposed solutions for the power plant, the area will be significantly smaller. With a monopile, the area for one foundation is about 1,963^{m2} (monopile diameter 10 m, width of protective layer 20 m), with a jacket for one foundation is 1,493^{m2} (pile diameter 1.8 m, width of protective layer around each of 4 piles - 10 m), and with a tripod for one foundation - 1,193^{m2} (pile diameter 2.5 m, width of protective layer around each of 3 piles - 10 m).

With a maximum of 200 kilometers of cable and 1.5 meters of cable trench width, the area occupied by the cable will be 300,000^{m2} (0.3 ^{km2}).

As can be seen from the above calculations, the area of occupied seabed for the set of parameters of the Project constituting the furthest-reaching scenario in the 2015 Report - NIS 2015, will be only about 1.1 ^{km2}, or about 0.94% of the area of the farm specified in the PSZW (about 117 ^{km2}) and about 1.17% of the area actually possible to develop with power plants (about 94 ^{km2}). In both the variant approved by the Environmental Decision and the variant that is the subject of this Report, this area will be even smaller.

Minimization measures are not required.

Seabed occupation is a direct, negative, long-term, reversible, localized impact during the construction phase. The intensity of impact when gravity foundations were used was assessed as high, and when other foundations were used as medium.

As mentioned above, the 2015 Report, the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario, as quoted below in Table 17, with the impacts for the variant approved in the Environmental Decision assessed as less.

Table 18. Impact assessment involving seabed occupation (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	The seabed will be occupied during the construction of the farm	Moderate (scale of exposure - local, duration - Long-term, intensity - high)	Moderate (magnitude of impact - moderate, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Low		Moderate (scale of exposure - local, duration -	Small (magnitude of impact -

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
				long-term, intensity - high)	moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the currently proposed variant selected for implementation, there has been a reduction in the number of wind power plants planned to be built to 60 units (by 70% compared to the furthest-reaching scenario - NIS 2015 - that formed the basis of the assessment in the 2015 Report, and by half compared to the variant approved by the Environmental Decision) and the types of foundations on which they can be placed to monopile foundations and jacket foundations. Clarifying the types of foundations and reducing their number has a direct bearing on the scale of seabed occupation in connection with the Project, since the use of gravity foundations causing the greatest interference with the seabed and its occupation for a single foundation among all the types of foundations considered so far has been ruled out for wind power plants.

In the variant selected for implementation, the largest occupation of the bottom for a single wind turbine foundation will be for the installation of a 10-meter-diameter monopile foundation and will amount to 78.5^{m2}. Since the type of foundation for the internal offshore substation was not specified, it was assumed that the largest bottom occupation for it would occur in connection with the installation of a gravity foundation with a base diameter of 50 m and would amount to 1,963.5^{m2}. The maximum seabed occupation for all foundations of the BIII offshore wind farm in the variant selected for implementation, i.e. 60 monopile foundations and 1 gravity foundation, will amount to 6,673.5^{m2}, a reduction of about 99% from the original preferred option. Including scour protection layers with an estimated width counted from the perimeter of each foundation of 25 m for a monopile foundation and 10 m for a gravity foundation, the bottom occupation in this variant would be 173,492.5^{m2}, about 77% less than in the original preferred variant.

The above-described reduction in the maximum anticipated area of the seabed occupied by the implementation of the Project in the variant selected for implementation will result in a significant reduction in the area where seabed interference (sediment structure) will occur, as well as the destruction and permanent transformation of natural benthic habitats. Thus, the negative impacts of OWF BIII on the benthic habitats and benthic communities found in its area will be reduced.

With the reduction in the area of new hard substrate introduced into the environment due to the Project, the "artificial reef" phenomenon will be reduced. Instead, it should be emphasized that the environmental benefits of reducing interference with natural bottom habitats far outweigh any positive effects of the above-mentioned phenomenon.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.10. Obstruction of access to mineral accumulations minerals

Installing foundations on the bottom will occupy the surface and prevent access to potential accumulations of crumb raw materials. The impact of foundations will depend on their type.

At this stage, it is difficult to determine the target number of wind turbines that may be built on the surface of the designated potential crumb accumulation fields in the BIII OWF field (see Section 4 of Volume III of the EIA). For the purposes of the 2015 Report, the following assumptions were made (for the set of parameters analyzed there that represent the most far-reaching scenario - NIS 2015):

- the occupation of the bottom area (including the protective layer) by the gravity foundation on a unit scale is about 3,848.5^{m2} (0.004 ^{km2});
- uniform distribution of foundations over the buildable area;
- the areas of designated potential fields of accumulation of crumb raw materials in the BIII OWF field will be used (see Section 4 of Volume III of the EIA);
- field No. 1 can include a maximum of 9 gravity foundations; Field No. 2 (total) - a maximum of 66 foundations; Field No. 3 - a maximum of 32 foundations; Field No. 4 - a maximum of 11 foundations; Field No. 5 - a maximum of 35 foundations;
- the area of the field occupied by foundations possible for foundation, expressed in %: P1 - 0.68%, P2 - 1.36%, P3 - 0.67%, P4 - 0.66%, P5 - 0.66%;
- the remaining undeveloped area of the field: P1 - about 5.05 ^{km2}, P2 - about 37.25 ^{km2}, P3 - about 18.22 ^{km2}, P4 - about 6.34 km2, P5 - about 20.31 ^{km2}.

In the currently proposed variant, gravity foundations are allowed only for associated infrastructure (1 piece), while for the power plant, solutions occupying a smaller area (monopile foundations or jacket types) will be used.

It is also important to note the positive aspect - temporary (i.e., until the farm is decommissioned) prevention of access to potential raw material deposits may result in treating them as a strategic resource for the future.

It will be at the stage of construction a direct, positive or negative impact on the deposits of crumb raw materials, with a local scale of impact, long-term, reversible (after the decommissioning of the farm facilities), with very high intensity.

On the other hand, analyzing the possibilities of exploration for hydrocarbon deposits, it should be noted that modern technology makes it possible to conduct reconnaissance even during the construction or operation of a wind farm. The technology requires the installation of special hydrophone lines (OBCs) on the bottom and the movement of a ship with a seismic wave source along and across the stretched hydrophone lines. However, this method makes it possible to eliminate towing behind the survey vessel of multi-kilometer sequences of survey equipment, and thus conduct surveys in a built-up body of water.

Exploration of hydrocarbon deposits in the area of a developed wind farm is much more expensive than those carried out by conventional methods. It is estimated that these are twice the cost of those using traditional methods.

While exploration can be carried out, resource exploitation in the OWF area can only take place to a limited extent. This is primarily related to the organization of ship traffic and its restriction in the case of development of the basin. The stream of vessels required to service a single mining platform would require the creation of separate corridors free of development. The risk of collision with the constructed wind farm infrastructure would also increase. It is possible to conduct limited extraction from a platform placed on the edge of a body of water developed by a wind farm, but using horizontal wells.

Occupation of the bottom surface is at the stage of construction is a direct negative impact on hydrocarbon deposits, local in scope, long-term, reversible, repeatable during the construction period (installation of subsequent foundations), with low intensity.

Minimization measures are not required.

An assessment of the significance of this impact for the furthest-reaching NIS 2015 scenario assessed in the 2015 Report is presented in Table 18, below.

Table 19. Impact assessment of impeding access to mineral accumulations (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Four small potential gravel sand deposit fields have been identified within the boundaries of the future BSIII OWF and its buffer	Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)
Hydrocarbon deposits	Small	Average	Two hydrocarbon exploration and appraisal licenses encroach slightly on the farm area	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so the area of this impact will be significantly reduced. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

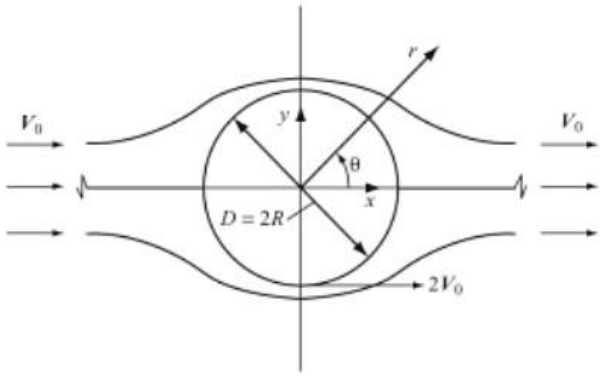
Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.11. Changes in the regime of currents seas

During the construction phase, more foundations for the power plant and other farm facilities will be located on the seabed and in the seabed. The ocean currents in the water's depths put a strain on OWF structures through hydrodynamic thrust. According to field measurements carried out by the Maritime Institute in Gdansk in the southern Baltic Sea (see Section 2 of Volume III of the EIA), they generally show similar intensity throughout the depth, i.e. have a similar distribution of velocities and flow directions in the vertical profile.

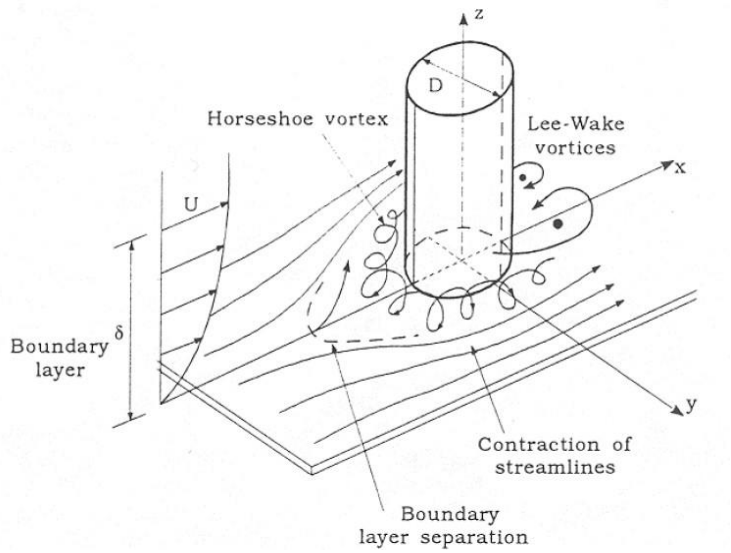
The impact of wind turbines on hydrological conditions manifests itself primarily in the modification of the flow field of marine currents. These currents, encountering an obstacle in the form of a support structure, flow around it. Then in the immediate vicinity of the structure there is a change in the velocity and direction of flow and water pressure. This results in a local increase in water velocity due to the narrowing of the flow stream and the formation of turbulence around the structure. The phenomenon of circumnavigation of a circular obstacle for potential flow is shown schematically in the figure below.

Figure 2. Surrounding by currents an obstacle with a circular cross-section (illustrative drawing)



Particularly important, and difficult to predict, is the formation of vortices around the structure - vortices can form both on the downstream side and directly in front of the obstacle (Figure 3).

Figure 3. Disturbance of the flow field around a vertical cylindrical structure exposed to the sea current (Hughes S.A., 2001)



The range of influence of the substructure on the flow of water in the seabed is equal to only a few diameters of the structure. In contrast, the distances between individual power plants are on the order of several hundred meters. This means that no overlap is expected between these impacts.

There are several factors that can affect the way the water flow field is modified due to the installation of wind turbines, such as:

- the number of wind turbines, the distance between them and how they are deployed;
- the dimensions and shape of the individual towers;
- type and dimensions of foundations;

- flow field characteristics (velocities, dominant directions, etc.);
- bathymetry with special attention to surface gradients and natural obstacles.

The assessment of the wind farm's impact of inducing changes in the regime of sea currents was based on the analyses contained in the hydrographic modeling report performed for the Central Baltic offshore wind farm III (SMDI, 2015).

The aforementioned hydrographic report modeled the changes in the regime of sea currents that will occur after the construction of the BSIII OWF. The analysis was performed for all project alternatives considered.

The analysis was performed for NIS 2015, for the months of January and July, for 5 control points located inside and outside the farm area. Once the farm is built, there will be a minimal reduction in the speed of the flow of ocean currents inside the farm. These will be velocity changes of up to about 0.5 cm/s in July and up to 1 cm/s in January. The average flow velocities recorded (see Section 2 of Volume II of the EIA) ranged from 8.44 to 17.73 cm/sec. The reduction in the speed of currents inside the wind farm will be offset by a slight increase in their speed outside the farm. The sensitivity of marine waters in the area of the farm was assessed as very low (negligible). The impact during the construction phase will therefore be even smaller, depending on how many foundations are installed at any given time.

Due to the lack of significant impacts, minimization measures are not required, while the selection of appropriate foundations at the stage of construction design can reduce the scale of impacts.

Changes in the regime of sea currents are direct, negative impacts of local scope, short-term (during the construction phase), irreversible, repeatable during the construction period, with low intensity.

An assessment of the significance of this impact for the furthest-reaching scenario assessed in the 2015 Report (NIS 2015), is presented in Table 19, below.

Table 20. Impact assessment involving change of sea current regime (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	The foundation of the wind farm will affect the regime of sea currents in the investment area	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the case underlying the assessment in the 2015 Report of the most far-reaching scenario, the 2015 NIS, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, thus reducing the potential impact on ocean currents proportionally. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect

the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.12. Wave attenuation wind

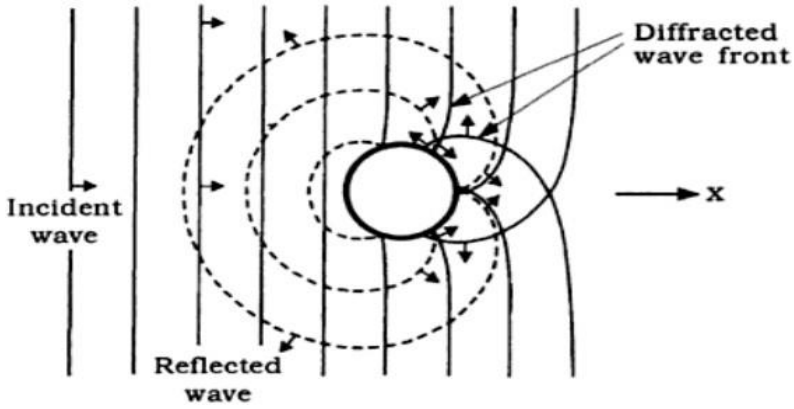
During the construction phase, more foundations for the power plant and other farm facilities will be located on the seabed and in the seabed. When waves hit the foundation of a wind turbine, some of their energy is reflected. This causes wave changes inside the wind farm and in its leeward zone.

Both wind waves on the free surface of the sea and ocean currents in the ocean's depths put stress on wind turbine towers through hydrodynamic thrust, with the impact of wind waves mainly confined to the water surface layer.

Since there is an interaction of hydraulic structures with hydrological phenomena occurring in the sea, the designs of individual wind turbines can also affect them to a certain, limited degree. This issue is primarily concerned with the impact on surface waves and currents.

If the diameters of wind power support structures are less than one-fifth the length of the waves propagating in their direction (Massel, 1992), we can consider such towers as streamlined structures. This means that they will not cause significant disturbance to the wave field. Otherwise, the waves approaching the structure will partly undergo reflection and partly symmetrical deflection of the wave ray behind the obstacle encountered, i.e. diffraction. This phenomenon is schematically shown in Figure 4, below.

Figure 4. Impact of a large diameter vertical cylindrical structure on the wave regime (Sumer B.M., Fredsøe j., 2005)



In the shadow area, i.e. immediately behind the obstacle encountered by the waves, there is no wave motion, but water turbulence can form there. In front of the structure, on the other hand, the reflected waves interferes with the incoming waves, resulting in standing waves. As a result, using rope theory for simplicity, the vertical orbital velocity doubles directly in front of the structure. If such waves are long enough to affect the bottom, they can, in cooperation with sea currents, contribute to sediment pick-up and consequently lead to erosion in the immediate vicinity of the structure's foundation.

The assessment of the wind farm's impact on marine waters, consisting of surface wave attenuation, was based on the environmental characteristics (see Section 2 of Volume III of the EIA) and on the analyses contained in the hydrographic modeling report performed for the Central Baltic III OWF (SMDI, 2015).

The aforementioned hydrographic report modeled the changes in wave patterns that will occur after construction of the BIII OWF. The analysis was performed for all project alternatives considered at the time.

The wave model in the area of the fully built-up farm indicates very small changes in wave height, on the order of a few centimeters, compared to the baseline. Meanwhile, the highest wave recorded during the survey by the Maritime Institute in Gdansk was 6.14 meters high, and the highest significant wave was 3.89 meters.

The average wave height (calculated as the average of all recorded average waves) for checkpoint 001 was 0.57 m, and 0.54 m for checkpoint 002.

The impact during the construction phase will therefore be even smaller, depending on how many foundations are installed at any given time.

No measures are expected to minimize this impact.

Wave attenuation during the construction stage of the farm is a direct, negative impact of local scope, short-term (during the construction stage), irreversible, repeatable during the construction period, low intensity.

An assessment of the significance of this impact for the furthest-reaching scenario assessed in the 2015 Report (NIS 2015), is presented in Table 20, below.

Table 21. Impact assessment involving surface wave attenuation (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	The foundation of the wind farm will have an impact on the surface wave in the area of the project	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so its impact on wave action will be reduced proportionally. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.13. An increase in the amount of suspended solids in the water

During the construction phase, more foundations for the power plant and other farm facilities will be located on the seabed and in the seabed. This will cause stirring of bottom sediments and temporary floating of suspended solids in the water depths.

The assessment of the wind farm's impact of reduced water transparency, caused by the floating of suspended solids in the water depths, was based on the environmental characteristics (see Sections 2,

3 and 5 of Volume III of the EIA) and analyses performed in 2015 for the Central Baltic III OWF (SMDI, 2015).

The seabed consists of fine sand and sand on clay substrate (see Sections 3 and 5 of Volume III of the EIA). It is a material prone to being picked up from the bottom and remaining suspended in the water's depths for some time. The possibility of this occurring in this area has been confirmed by modeling studies (SMDI, 2015). In addition, engineering practice shows that the most sludge is mobilized during the placement of gravity foundations, i.e., those originally considered for the power plant in the area of the proposed OWF BIII farm (the most far-reaching scenario evaluated in the 2015 Report - NIS 2015). However, it should be added here that this phenomenon is short-lived and locally limited. However, an increase in the concentration of suspended solids in the seabed may have a negative impact on the benthos, fish and marine mammals in the range.

In the aforementioned hydrographic report, the suspended solids uplift that will occur during the construction of OWF BIII was modeled. The analysis was performed for all project alternatives considered at the time. The average suspended solids concentration calculated by the model (SMDI, 2015a) is a maximum of 20 mg/l within the farm area and 10 mg/l outside the farm area, but will only average about 8 mg/l over most of the analyzed area. The average content of suspended solids in the near-surface and bottom layers in the BIII OWF area varies from about 1 mg/l to about 6 mg/l, depending on the time of year (increases occur in spring). It is estimated that suspended solids above 2 mg/L will not persist for more than approx. 40 h after agitation (IMG Consortium and MEWO et al., 2017; SMDI, 2015a).

There is no need for minimization measures.

The increase in suspended solids in water during the construction stage of the farm is a direct negative impact of local extent, medium-term (during the construction stage), reversible, repeatable during the construction period, with high intensity.

Assess the significance of this impact for the furthest-reaching scenario assessed in the 2015 Report (NIS 2015), Table 21 below.

Table 22. Impact assessment involving increase in suspended solids in water (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	Construction of wind farm foundations will cause water turbidity in the project area	Small (scale of exposure - local, duration - short-term, intensity - very high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the 2015 NIS - and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so the level of potential water turbidity will decrease proportionally. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.14. Impacts cumulative

Assumptions for analyses of the cumulative impacts of the BIII OWF and other projects on abiotic elements of the environment are presented in Chapter 3.2. On the other hand, a broad description regarding this issue can be found in Section 13 of Volume II of the EIA.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for wind farm development in the POM for cumulative impact analyses presented below:

Between 2019 and 2021, power plants with a total capacity of 900 MW will be built, including 600 MW in OWF BIII and 300 MW in OWF Baltica 3. Assuming that the average power plant will have a capacity of 6 MW, it was assumed that 150 of them would be built. Associated infrastructure (substations, etc.) will also be built. It was assumed that 158 foundations and about 158 km of internal cables would be installed on the seabed in this connection.

The scenario estimates that the level of cumulative impacts on abiotic environmental elements will be about 75% of the level analyzed in the 2015 report as an alternative, the NIS.

Between 2023 and 2026, power plants with a total capacity of 1,350 MW will be built, including 600 MW under OWF BIII and 750 MW under OWF Baltica 2. It was assumed that a total of 225 wind turbines would be built. Associated infrastructure will also be built. It was assumed that 232 foundations and about 232 km of internal cables would be installed on the seabed in this connection.

It was estimated that in the above scenario, the level of cumulative impacts on abiotic environmental elements will be only about 16.5% higher than the level analyzed in the 2015 report for the set of parameters of the Project constituting the 2015 NIS.

Potential cumulative impacts may arise from the dissipation of suspended solids due to the disturbance of the bottom sediment structure, thereby releasing a certain pool of pollutants and nutrients from the sediment into the water body, turbidity of the water, and the possibility of covering raw material deposits with an additional layer of sediment. However, it was found that the level of this accumulation would be small or minimal (depending on the structure of the seabed).

Accumulation may also be associated with increased seabed occupation, however, the significance of this impact was assessed as low.

The variant that is the subject of this Report will build about 70% fewer power plants than envisaged in the case of the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so that even in the case of cumulative impacts with those associated with the simultaneous construction of other power plants, the total impacts will be less than those assessed in the 2015 Report. It is therefore considered that the Project will contribute less to cumulative impacts, both from the Project in the parameters constituting the 2015 NIS and from the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect

the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2. Stage operation

During the operation of OWF BIII, works affecting the seabed and seawater will be carried out in its area, mainly maintenance works. In addition, the abiotic environment will be affected by foundation structures sited on the seabed.

A full description of the work during the operation stage is provided in Section 5 of Volume II of the Report.

The following impacts of OWF BIII on the abiotic environment at the stage of operation are expected:

- disruption of sediment structure;
- the release of pollutants and nutrients from the sediment into the water body;
- changing the substrate composition of sediments;
- disruption of the bottom structure;
- change in bottom morphology;
- ground settlement;
- seabed area occupation;
- leaching out or burying mineral accumulations;
- making access to mineral accumulations more difficult;
- contamination of the water tone and sediments with anti-corrosive agents;
- changing water and sediment temperatures;
- changing the regime of sea currents;
- wind wave attenuation;
- water turbidity.

Unplanned impacts may also occur during operation of the farm, which are described in detail in Section 12 of Volume II of the Report and in Chapter 11 of this section.

9.2.1. Disruption of the structure of sediments

During the operation of OWF BIII, works will be carried out to disturb the structure of the bottom sediments, such as replacing damaged sections of the power cable. There will also be an observation of the stirring of bottom sediment associated with the anchoring of ships during inspections, servicing and sudden emergency repairs (such as replacing a section of damaged cable). The anchoring process is short-lived, in a small area (spot), to a depth of about 3 meters. The amount of sediment that can be stirred up from the anchorage is small.

In addition, bottom sediments in the immediate vicinity of foundation structures will be washed away (scour effect). The average leaching value is 1.3 foundation diameters. Simulations conducted for typical North Sea conditions have shown this value to be much smaller, equal to 0.3 of the foundation diameter during periods of large waves (Nielsen, Hansen, 2007). As a result of the agitation of bottom sediments, some heavy metals, pollutants and nutrients will be released from them, and water turbidity may also occur. Aggradation of bottom sediments can also affect potential deposits of crumb raw materials. It can lead to leaching of raw materials or covering them with an additional layer of sediment, making it difficult to extract them, by increasing the thickness of the overburden above the deposit.

Given the hydrodynamic conditions in the Baltic Sea (see Section 3 of Volume III of the EIA), the depth of leaching is expected to be as low as or less than in the North Sea. In addition, at the stage of the construction project, foundation types suitable for the site conditions will be selected and, if necessary, a protective layer against leaching, which will significantly reduce this impact during the operational period.

Smaller disturbances to the sediment structure will occur in the P1 and P3 areas, and larger disturbances will occur in - P2, P4 and P5. The characteristics of these areas are presented in Sections 3 and 5 of Volume III of the Report.

The magnitude of the impacts will be reduced by a scour protection layer laid around the foundations, possibly along cable routes.

Due to the lack of significant impacts, minimization measures are not required, while the selection of appropriate foundations and leaching protection layers at the stage of construction design can reduce the scale of impacts.

Violation of the bottom sediment structure is a direct, negative impact at the operational stage that is local in scope, short-term, reversible, repeatable during the operational period, with intensity ranging from low (areas P1 and P3) or high (areas P2, P4 and P5).

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 22, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 23. Impact assessment involving disturbance of bottom sediment structure (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the operation of the farm, there will be minor disturbances to the structure of the bottom sediments	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Negligible (scale of exposure - local, duration - short-term, intensity - high)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisioned for the furthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so the disturbance of the bottom sediment structure will occur over a correspondingly smaller area. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2. Release of pollutants and nutrients from the sludge into the water body water

During the operation of the BIII OWF, works will be carried out that cause agitation of bottom sediments, such as servicing of foundations, cables and anchoring of ships. They will favor the passage of pollutants and nutrients from the sediment into the water body.

Labile forms of metals, organic pollutants, i.e. polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), biogenes (nitrogen and phosphorus) can pass into the water, as described in section 9.1.2 of this section. Higher contents of these substances may be found in silty clay sediments due to their greater absorption capacity (P2, P4, P5).

Since the bottom sediment in the area of the planned OWF is characterized by a low content of harmful substances (metals, PAHs, PCBs, TBT) and biogenic substances, thus the risk of their passage into the water body is low (it will cause a slight deterioration in water quality). The sensitivity of the bottom sediments to the above impacts was determined to be low or medium, depending on the type of substrate, and the sensitivity of the water was determined to be low.

The magnitude of the impacts will be reduced by a scour protection layer laid around the foundations, possibly along cable routes.

Due to the lack of significant impacts, minimization measures are not required, while the selection of appropriate foundations and leaching protection layers at the stage of construction design can reduce the scale of impacts.

The release of pollutants and nutrients from bottom sediments is a direct, negative impact at the operational stage that is local in scope, short-lived, reversible, repeatable during the operational period, and of low to medium intensity.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 23, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 24. Impact assessment involving the release of pollutants and nutrients from sediment into the water body (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the operation of the farm, there will be spot stirring of the bottom sediments and release of the pollutants and nutrients contained therein into the water body	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Marine waters	Medium	Low		Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will construct about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the NIS 2015, and twice as many as specified in the Environmental Decision, and excludes the use of gravity foundations under the power plants, which entails a smaller area of disturbed sediment and, consequently, correspondingly fewer heavy metals, pollutants and nutrients released from it. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.3. Change in the substrate composition of sludge

A change in the substrate composition of the bottom sediments may occur as a result of two types of work carried out during the construction stage of the farm, i.e. the laying of a leaching protection layer around the base of the foundation and the replacement of the substrate at the site of the planned gravity foundation with a material of greater bearing capacity. This is described in detail in section 9.1.3 of this section. The leaching protection layers introduced during construction will be applied throughout the life of the farm.

During maintenance work, it is possible to introduce additional hardened elements to prevent scouring, which can introduce changes (if rock erratics are used) to the sediment substrate composition. Rock surcharges and other forms of protection from scouring provide a so-called "artificial reef," a new habitat for benthic organisms and fish. The impact will be particularly significant in areas of loose sandy and silty-clay deposits (see Section 3 of Volume IV of the EIA).

No measures are expected to minimize this impact at the operation stage.

A change in the substrate composition of sediments is a direct, positive impact at the operational stage that is local in scope, long-term, irreversible, one-time. The intensity of the impact in the P1 and P3 areas was determined to be medium, and in the P2, P4 and P5 areas it was determined to be high.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 24, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 25. Impact assessment involving changes in the substrate composition of bottom sediments (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the operation of the farm, leaching protection layers may be used to change the substrate composition of the sediments	Small (scale of exposure - local, duration - long-term, intensity - medium)	Small (magnitude of impact - low, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Low (P2, P4) or medium (P5)		Moderate (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which also involves changing the substrate composition of sediments at a correspondingly smaller number of locations. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.4. Structural disorder bottom

Disturbance of the bottom structure will occur during construction activities, as described in detail in section 9.1.4 of this section, but most of them are continuous changes (once the structure is disturbed, it will not return to its original state), so they will also remain during the operation stage (e.g., changes in the bottom associated with driving foundation piles into it). No additional work (drilling, hammering) is expected to take place during this time, so the scale of this impact will not increase. The evaluation of these changes therefore remains the same as for the construction phase.

No measures are expected to minimize this impact at the operation stage.

Disturbance of the bottom structure is a direct, negative impact at the stage of operation that is local in scope, one-time, long-term and irreversible. The intensity of the impact in the P1 and P3 areas was determined to be medium, and in the P2, P4 and P5 areas it was determined to be high.

Disturbance of the bottom structure is a direct, negative impact at the stage of operation that is local in scope, one-time, long-term and irreversible. Due to the absence of additional work, the intensity of impact in all areas was determined to be low.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 25, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 26. Impact assessment involving disturbance of bottom structure (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Medium or high	During the construction of the farm, there will be a breach in the structure of the bottom, which will remain during the operation stage	Insignificant (scale of exposure - local, duration - long term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium or high		Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisioned for the farthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so that the disturbance of the bottom structure will occur over a correspondingly smaller area. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.5. Change in morphology fundus

The foundation of wind farm elements is associated with a change in the morphology (shape) of the bottom. Changes in bottom morphology will also occur during the operational stage. There may be changes in the geological processes of the seabed at wind turbine foundation sites. Locally, erosion may occur - foundation washout or sediment accumulation in the vicinity of foundations.

As a result of the geophysical surveys carried out in the BIII OWF area, which formed the basis for the 2015 Report, it was possible to identify areas of current bottom erosion. The bottom is washed out at least periodically in the southwestern and western parts of the P1 area, in the western part of P3, in the central part of P2 and in places in the valley (P4). It should be assumed that sediment flushing in the vicinity of OWF BIII infrastructure elements is possible at these sites. In the rest of the area, with regard to the dynamics of the aquatic environment (see Section 2 of Volume III of the EIA), minor, non-threatening to infrastructure elements, bottom scouring on the upstream side of bottom-founded facilities and the formation of sand drifts on the downstream side are expected. The emerging bottom forms should not be larger than those currently existing and moving. This phenomenon may be more intense in the P1 area (the area of sand waves), but the expected changes in the relief of the bottom will not be greater than the scale of the current and emerging forms on the bottom. There may be locally exposed or buried elements of the farm's internal cable infrastructure (cables connecting individual power plants within the field). A slight change in the shape of the bottom can also occur during maintenance work and, for example, replacement of power cables. The bottom sediments disturbed during these works may be diluted. This will create a cavity along the cable and/or it may be temporarily exposed.

No minimization measures are expected to be required at the operation stage.

The change in bottom morphology is a direct and negative, local in scope, irreversible and long-term impact at the operational stage. Its intensity in P1 and P3 areas will be low, in P4 medium and in P2 and P5 high.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 26, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 27. Impact assessment involving change in bottom morphology (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the operation of the farm, changes in the morphology of the bottom will occur	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - low, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (P2, P4) or high (P5)		Low or moderate (scale of exposure	Small (magnitude of

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
				- local, duration - long-term, intensity - medium or high)	impact - low or moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which also involves changing the bottom morphology at a correspondingly smaller number of locations. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.6. Settlement of the ground

The foundations of individual wind farm facilities, depending on the mass, can cause soil compaction, i.e. compaction due to a reduction in the number of free spaces between sediment grains, resulting in foundation settlement.

At the operational stage, the process of ground settlement under their weight will be slower than during construction, but still noticeable. It mainly concerns the use of heavy gravity foundations, assessed in the 2015 Report in the most far-reaching scenario (NIS 2015). In the current variant, the use of gravity foundations under the power plants was abandoned, and this solution was allowed only for the associated infrastructure (1 piece).

The impact will be more noticeable in areas of silty-clay sediments and loosely packed sandy-gravel deposits (P2, P4, P5). Areas P1 and P3 are also subject to ground subsidence, but to a lesser extent.

No measures are expected to minimize this impact at the operation stage.

Land subsidence is a direct, negative, long-term, irreversible, local impact at the operational stage. In P1 and P3 areas it will be characterized by low intensity, in P2 and P5 areas by high intensity. In the P4 area, the impact would have a high intensity only if gravity foundations are used, while it will be medium for the other types.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 27, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 28. Impact assessment involving land subsidence (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the operation of the farm there will be a process of subsidence of the bottom	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (P2, P4) or high (P5)		Moderate (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which is also associated with the occurrence of less soil subsidence and in a correspondingly smaller number of locations. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.7. Occupation of the seabed area seabed

The occupied bottom area of the gravity foundation is approximately 3848.5^{m2} (including the 40 m diameter of the foundation and, in addition, the assumed maximum width of the leaching protection layer, i.e. 15 m from the edge of the foundation, giving a total diameter of 70 m). The use of such foundations was analyzed in the 2015 Report as the most far-reaching scenario (NIS 2015). For the 208 foundations in the farthest-reaching scenario evaluated in the 2015 Report, this gives a total of about 800,384^{m2} (0.8 ^{km2}).

In the current variant, the use of gravity foundations under the power plants was abandoned, and this solution was allowed only for the associated infrastructure (1 piece).

In the case of the monopile, the area for one foundation is about 1,963^{m2} (monopile diameter 10 m, width of the protective layer 20 m), with the jacket for one foundation is 1,493^{m2} (pile diameter 1.8 m, width of the protective layer around each of 4 piles - 10 m), and with the tripod for one foundation - 1,193^{m2} (pile diameter 2.5 m, width of the protective layer around each of 3 piles - 10 m).

As can be seen from the above calculations, the area of occupied seabed if gravity foundations are used (as applied in the 2015 NIS) will be only about 0.8 ^{km2}, or about 0.68% of the area of the farm specified in the PSZW (about 117 ^{km2}) and about 0.85% of the area actually possible to develop with power plants (about 94 ^{km2}).

If other than gravity types of foundations are used, this area will be even smaller. For the variant selected for implementation (values given for 60 foundations), seabed occupation will amount to about 0.12 ^{km2} with monopiles, about 0.07 km2 with tripods, about 0.09 ^{km2} with jackets, respectively.

Seabed occupation is not expected to change during the operation of the farm. No measures are expected to minimize this impact at the operation stage.

Seabed occupation during the operation stage is a direct, negative, long-term, reversible, localized impact. The intensity of impact when gravity foundations were used was assessed as high, and when other foundations were used as low or medium.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 28, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 29. Impact assessment involving seabed occupation (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the operation of the farm, seabed occupation will occur	Moderate (scale of exposure - local, duration - long-term, intensity - high)	Moderate (magnitude of impact - moderate, importance of the resource - high)
	Medium (areas P2, P4 and P5)			Moderate (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the currently proposed variant selected for implementation, there has been a reduction in the number of wind turbines planned for construction to 60 units and the types of foundations on which they can be placed to monopile foundations and jacket foundations. Clarifying the types of foundations and reducing their number has a direct bearing on the scale of seabed occupation in connection with the Project, since the use of gravity foundations causing the greatest interference with the seabed and its occupation for a single foundation among all the types of foundations considered so far has been ruled out for wind power plants.

In the variant selected for implementation, the largest occupation of the bottom for a single wind turbine foundation will be for the installation of a 10-meter-diameter monopile foundation and will amount to 78.5^{m2}. Since the type of foundation for the internal offshore substation was not specified, it was assumed that the largest bottom occupation for it would occur in connection with the installation

of a gravity foundation with a base diameter of 50 m and would amount to 1,963.5^{m2}. The maximum seabed occupation for all foundations of the BIII offshore wind farm in the variant selected for implementation, i.e. 60 monopile foundations and 1 gravity foundation, will amount to 6,673.5^{m2}, a reduction of about 99% from the original preferred option. Including scour protection layers with an estimated width counted from the perimeter of each foundation of 25 m for the monopile foundation and 10 m for the gravity foundation, the bottom occupation in this variant would be 173,492.5^{m2}, about 77% less than in the original preferred variant approved in the Environmental Decision.

The above-described reduction in the maximum anticipated area of the seabed occupied by the implementation of the Project in the variant selected for implementation will result in a significant reduction in the area where seabed interference (sediment structure) will occur, as well as the destruction and permanent transformation of natural benthic habitats. Thus, the negative impacts of OWF BIII on the benthic habitats and benthic communities found in its area will be reduced.

With the reduction in the area of new hard substrate introduced into the environment due to the Project, the "artificial reef" phenomenon will be reduced. Instead, it should be emphasized that the environmental benefits of reducing interference with natural bottom habitats far outweigh any positive effects of the above-mentioned phenomenon.

In summary, the variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which also entails correspondingly less occupation of the bottom area - as indicated in the calculations above. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are significantly smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.8. Washing out or covering up accumulations of raw materials minerals

During the operation stage, sediment movement in the bottom zone may be disturbed. The constructed foundations of the power plant are an obstacle to the displaced sediment. As a result, this can lead to the accumulation and/or leaching of sediment, resulting in the leaching of bed deposits or their backfilling.

The impacts of the exploited OWF BIII on the bottom sediments and the associated disturbance of the sediment structure, associated with foundation washout, will be negligible.

The impact of this type of disturbance on accumulations of crumb raw materials is similarly assessed. These will be at the stage of operation direct negative impacts on accumulations of crumb raw materials, local in scope, long-term, reversible, repeatable during the period of operation, with low intensity.

There will be no impacts on hydrocarbon deposits.

No measures are expected to minimize this impact at the operation stage.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 29, with the impacts for the variant approved in the DWA assessed as lower.

Table 30. Impact assessment of leaching or burial of mineral accumulations (mining phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Four small potential gravel sand deposit fields have been identified within the boundaries of the future BSIII OWF and its buffer	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which is also associated with correspondingly less leaching or burial of mineral accumulations. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and from the variant approved in the DWA.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.9. Obstruction of access to mineral accumulations minerals

Foundations and cables belonging to the BIII offshore wind farm occupy certain areas of the seabed, hindering possible exploration, prospecting and extraction of mineral resources.

These will be at the stage of exploitation direct negative impacts on mineral deposits, local in scope, long-term, reversible, one-time, with very high (crumbly raw materials) or low (hydrocarbons) intensity.

No measures are expected to minimize this impact at the operation stage.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 9, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 31. Impact assessment of obstructing access to mineral accumulations (mining phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Four small potential gravel sand deposit fields have been	Moderate (scale of exposure - local, duration - long-term,	Small (magnitude of impact - moderate,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			identified within the boundaries of the future BSIII OWF and its buffer	intensity - very high)	importance of the resource - medium)
Hydrocarbon deposits	Small	Average	Two hydrocarbon exploration and appraisal licenses encroach slightly on the farm area	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the farthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, with correspondingly less access to mineral accumulations. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.10. Contamination of water bodies and bottom sediments with compounds from corrosion protection agents

Steel structures of power plant and substation foundations will corrode in the marine environment. Accordingly, appropriate protective measures will be necessary.

The most common anti-corrosion method used in the marine environment is cathodic protection. It can be implemented as galvanic or electrolytic protection.

Galvanic cathodic protection involves installing aluminum or zinc anodes on the foundations. Anodes are gradually consumed and Al or Zn passes into the water depths and accumulates in bottom sediments.

The most common protector for steel in seawater is zinc. Its current efficiency reaches 90% at the same time as its relatively low manufacturing cost. The disadvantage of zinc is the low potential difference with respect to steel, of ~0.25 V. Zinc is used as pure (99.99%, with limited Fe, Cu and Pb impurities) or as a matrix of alloys containing: Zn + 0.1÷0.15% Hg, Zn + 0.12÷0.18% Al + 0.05÷0.1% Cd, Zn + ~0.5% Al + ~0.1% Si (Surowska, 2002).

Aluminum is used only in the form of alloys: with zinc (3÷6% Zn), with tin (0.1÷1% Sn), with Zn+In, Zn+Hg, Zn+Sn. The current efficiency of these alloys is high, on the order of 80%. Aluminum alloys have the

same uses as zinc. They belong, along with zinc and its alloys, to low potential protectors (Surowska, 2002).

The advantages of the cathodic galvanic method are independence from power sources, ease of installation, the possibility of local protection and negligible impact on neighboring structures. In contrast, the most important disadvantages include the irreversible loss of anode material, the possibility of environmental contamination by protector corrosion products, limited application due to environmental resistance and low protective current.

During the initial period of operation, zinc and aluminum emissions from the anodes will not be observed. This process will continue as the years pass and the degree of damage to the protective coating on the components subject to corrosion protection. It is assumed that complete dissolution of the anodes occurs over a period of about 25 years. The metals in question will primarily pass into the water table, from which they can be precipitated and accumulated in the sediment. This is especially true for aluminum compounds, since its solubility in natural waters (with a pH of about 8) is very low. It will be largely sorbed by bottom sediments in the form of stable compounds. Zinc compounds can persist longer than aluminum in the water table because most of them are water-soluble. Zinc will be adsorbed and co-precipitated with hydrated Fe, Mn and Al oxides found in the sediments; however, this process will be slow due to the low content of clay minerals in the BII OWF area, which favor zinc adsorption (Alloway and Ayres, 1999).

Aluminum is one of the most widespread elements on Earth, found in soil, water and air. Aluminum is found in all natural waters, where it can occur in soluble and insoluble forms, in organic compounds and inorganic compounds. Its amount varies from 0.0001 to 1 $^{mg/dm3}$, in acidic waters (pH < 5) Al concentration can exceed 100 $^{mg/dm3}$ (Widlak, 2011 for: Langauer-Lewowicka, 2005; Szteke, 1993). Dissolved Al concentrations in seawater are generally low, ranging from 0.008 to 0.68 µg/l (open ocean), 0.5 to 0.68 µg/l (coastal waters) and 0.6 to 0.9 µg/l (North Sea) (Kirchgeorg et al., 2018 after Angel et al., 2015).

For marine structures, Al-based anodes are mainly used for galvanic cathodic protection, which, depending on the specific alloy, manufacturer and standard used, also contain Zn (2.5-5.75%) and In (0.015-0.04%). The amount of anodic material required to protect offshore wind farm steel structures from corrosion depends primarily on the type of foundations (their surfaces), the planned service life (e.g., at least 25 years), seawater conditions, the placement of anodes, and the possible use of additional corrosion protection methods, such as epoxy or polyurethane-based coatings. Chemical emissions are similar to the amount of anode material used, assuming that the bulk of it will be "used up" within 25 years of operation and enter the marine environment (Kirchgeorg et al., 2018). Simplified calculations of the necessary amounts of Al-Zn-In anode material made based on DNVGL-RP-B401 (2017) by Kirchgeorg et al. were used to estimate the potential Al and Zn emissions associated with the Project for various foundation designs used in offshore wind farms, with and without additional coating. (2018). According to these calculations, for foundations without additional coating, the required amount of anodic material ranges from 13.0 Mg (monopal) to 32.0 Mg (tripod), while the additional coating reduces it significantly to 6.0 and 10.7 Mg, respectively. It should be noted that the indicated calculations do not take into account additional factors, such as the distribution of anodes throughout the structure, which must be taken into account when designing corrosion protection and which may change the total number of anodes required. The results of the estimation of expected emissions from corrosion protection for the Project are presented in the table below.

Table 32. The amount of Al and Zn that could potentially be released to the environment during the 25-year operation of the Project with the parameters envisioned in the 2015 NIS and in the currently proposed

implementation option as a result of the application of galvanic cathodic corrosion protection, assuming 5% Zn content in the Al-Zn-In anode material in the most far-reaching scenario.

Type of foundation	Additional protective coating	Mass of Al-In-Zn anode material, including 5% Zn [Mg]	The amount of Al and Zn released		
			1 foundation, the amount of element released over the life of the farm (25 years)	The most far-reaching scenario for NIS 2015 (208 foundations), the amount of element released annually by the entire farm	The most far-reaching scenario for the currently proposed implementation variant (61 foundations), the amount of element released annually by the entire farm
Monopal	not	approx. 13,0	approx. 12.35 Mg of Al approx. 0.65 Mg Zn	approx. 101.76 Mg of Al approx. 5.36 Mg Zn	approx. 30.13 Mg of Al approx. 1.59 Mg Zn
	yes	approx. 6,0	approx. 5.70 Mg Al approx. 0.30 Mg Zn	approx. 46.97 Mg of Al approx. 2.47 Mg Zn	approx. 13.91 Mg of Al approx. 0.73 Mg Zn
Jacket	not	approx. 22,5	approx. 21.38 Mg of Al approx. 1.13 Mg Zn	approx. 176.13 Mg of Al approx. 9.27 Mg Zn	approx. 52.16 Mg of Al approx. 2.75 Mg Zn
	yes	approx. 7,5	approx. 7.13 Mg Al. approx. 0.38 Mg Zn	approx. 58.71 Mg of Al approx. 3.09 Mg Zn	approx. 17.39 Mg of Al approx. 0.92 Mg Zn
Tripod	not	approx. 32,0	approx. 30.40 Mg of Al approx. 1.60 Mg Zn	approx. 250.50 Mg of Al approx. 13.18 Mg Zn	approx. 74.18 Mg of Al approx. 3.90 Mg Zn
	yes	approx. 10,7	approx. 10.17 Mg of Al approx. 0.54 Mg Zn	approx. 83.76 Mg of Al approx. 4.41 Mg Zn	approx. 24.80 Mg Al approx. 1.31 Mg Zn

Source: own compilation based on Kirchgeorg et al. (2018).

The estimate made shows that the largest annual emissions of Al and Zn resulting from the Project will occur when tripod foundations are used.

The estimated Zn emissions associated with the Project with the parameters envisioned in the 2015 NIS, amounting to approximately 13.18 Mg/year in the furthest scenario (tripod foundations, without additional coating), are negligible in relation to the load of this element entering the Baltic Sea with rivers each year. In 2006, a total of 3,157.3 Mg of Zn was discharged into the Baltic Sea with water, 256.65 Mg of which came from Poland (HELCOM, 2011). The projected Zn emissions in the farthest-reaching scenario thus represent only about 0.4% of this load. By comparison, for the currently proposed Project variant in the farthest-reaching scenario, estimated Zn emissions are about 3.9 Mg/year, representing about 0.1% of the element's load discharged with water into the Baltic Sea in 2016.

The use of Zn-based anodes for the Project would increase the total annual emissions from corrosion protection, due to their lower current capacity compared to Al-based anodes, and thus the need for more anode material. For this type of anode, 99% of the emissions are Zn. Although Zn anodes are technically suitable for offshore wind farms, the larger number required causes design difficulties. Therefore, Zn anodes are not currently used in offshore wind farms in the German exclusive economic zone (Kirchgeorg et al., 2018).

Recently, there was a report on the use of metallic coating (Al, 350 µm) applied by thermal spraying in combination with organic coatings for a wind farm in the Baltic Sea as an alternative technique to avoid the use of anodes and thus reduce metal emissions (Kirchgeorg et al., 2018).

If a decision is made to use galvanic cathodic protection for the Project, additional protective coatings or other analogous solutions will be included in the design to reduce the amount of anodic material required, and thus also the emissions from this protection. Detailed solutions in the subject area will be determined at the design stage of the Project's corrosion protection.

In electrolytic cathodic protection, the protected object becomes the cathode of an electrolytic cell supplied with DC current from an external source. The anode used in this circuit is mostly insoluble. Among the most durable anode materials used in this method are platinum and titanium electrodes coated with a 2-3 µm layer of platinum. With electrolytic cathodic protection, no impact on water quality or sediment is observed.

If electrolytic cathodic protection is used, emissions of metals (Al, Zn) to the aquatic environment will not be observed due to the use of non-degradable anodes - therefore, this impact has not been assessed.

No measures are expected to minimize this impact at the operation stage.

Pollution of the environment with Al or Zn released during operation is a direct, negative impact of local extent, long-term, irreversible, permanent during the period of operation, of medium intensity.

An assessment of the significance of this impact for the most far-reaching scenario, which was evaluated in the 2015 Report, is presented in Table 32, below.

Table 33. Impact assessment involving contamination of seawater and bottom sediments with zinc or aluminum from corrosion protection agents (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Average	During the operation of the farm, there will be emissions of Zn or Al used in anodes used for corrosion protection of steel structures	Small (scale of exposure-local, duration-long term, intensity-medium)	Small (magnitude of impact - low, importance of the resource - medium)
Seabed / bottom sediments	Large (areas P1 and P3)	Low			Small (magnitude of impact - low, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Average			Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the currently proposed variant, there has been a reduction in the total number of foundations and the types of foundations on which wind turbines can be placed. In this variant, only monopile and jacket type foundations can be used in the Project for the installation of wind turbines. If galvanic cathodic protection is used, reducing the number of BIII OWF foundations, as well as excluding tripod-type foundations (which potentially require the largest number of anodes) from further consideration for wind power plant siting, will reduce the total amount of anode material required, and thus emissions to the marine environment. The impact in this regard will therefore remain insignificant.

In summary, the variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, which also entails the use of a correspondingly smaller number of anodes for corrosion protection, and thus fewer emissions. The calculations presented showed that with the application of an additional protective coating of the amounts of Zn and Al, additional reductions in the elements released into the environment will be achieved, and thus the project will cause lower impacts both from the Project in the parameters constituting the NIS and from the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.11. Change in temperature of water and sediments

The electric current, flowing through the power cable, causes it to heat up, caused by power losses on the resistance, according to Joule's law. With the increase in cable temperature above ambient temperature, heat transfer to the surrounding environment begins.

Accurate quantification of the heat given off is difficult, as there are phenomena of heat conduction, lift and radiation, subject to different physical laws (Stiler et al., 2006).

A 1°C increase in sediment temperature can cause a 10-fold increase in bacterial activity, which can accelerate and increase organic matter decomposition processes. This situation can also promote the decomposition of organic nitrogen, which becomes more available due to increased and accelerated mineralization to inorganic compounds (the amount of inorganic nitrogen forms, which is generally well soluble in water, increases). An increase in temperature can also cause a decrease in the oxygen content of the water (Miętus, Sztobryn, 2011; Zalewska et al, 2012; Ramsing and Gundersen, 2012) and promote the transformation of ammonium nitrogen compounds contained in water and sediment into a gaseous form, which is harmful to living organisms (Falkowska et al, 1999). At a temperature of 5°C and a pH of 8.2, about 2% of ammonium compounds convert to the gaseous form, while at 25°C about 8% of ammonium compounds convert to the gaseous form (about a 4-fold increase). The contribution of the different forms of ammonia is very important because of fish and other marine organisms, for which the gaseous form ($_{NH3}$) is toxic, unlike the $^{NH4+}$ ion (Falkowska et al., 1999). According to Directive 76/464/EEC, the lethal concentration of ammonia for rainbow trout is 5 $^{mg\text{-}dm\text{-}3}$, and for crustaceans is 8 $^{mg\text{-}dm\text{-}3}$.

Heating of the bottom sediment and interstitial waters (waters filling the spaces between sand grains in the sediment) can also promote (intensify the processes of) the passage of metals from the sediment to the water table and accelerate the processes of decomposition (degradation) of organic contaminants in the bottom sediment. An increase in sediment temperature can also adversely affect the condition of benthic (benthic) organisms (OSPAR 2008-3). In addition, nutrient and oxygen content may be altered as a result of the disrupted temperature profile (Worzyk, 2009).

At the Nysted Offshore Wind Farm, the temperature rise emitted by a transmission cable (132 kV) buried at a depth of 1 m, did not exceed 1.4°C in the layer 20 cm above the cable, and already at the bottom surface, temperature changes were invisible (Merck 2009). This cable was buried in gravelly sediment, which promotes much greater heat loss in the interstitial spaces between sediment grains than in fine-grained sediment (Merck 2009). Both of these sediment types are common in the area of the planned BII OWF. It should be assumed that the heat dissipation (24 W/m, on the cable surface) emitted by the internal 33 or 66 kV cables belonging to OWF BIII will be less (or at most similar) to that recorded at the Nysted offshore wind farm. In general, the benthic fauna is naturally adapted to large seasonal temperature changes and is not sensitive or shows very low sensitivity to a 2°C (2 K) temperature increase (Birklund 2009). According to standards proposed by the German Federal Agency for Nature Conservation, the temperature increase due to heat emission of the transmission cable in the layer 20 cm below the bottom surface, which is biologically the most active habitat for infauna, must not exceed 2 K (2°C). According to Royal Haskonng DHV (2014) technical assumptions, heat emission over MIP cables in the sediment will be local (from a few cm to a maximum of 1 m), and the effect will be imperceptible if the cable is buried deeper than 1 m. Therefore, no significant impact of this parameter on the abiotic environment is expected.

Therefore, minimization measures are not required.

Heat emission from cables is a direct, negative impact of local extent, long-term, irreversible, permanent during the period of operation, of medium intensity.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 33, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 34. Impact assessment involving water and sediment temperature change (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Average	During the operation of the farm, there will be an increase in the temperature of the interstitial waters and sediments due to the heating of the cables	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)			Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Marine waters	Medium			Small (scale of exposure - local, duration - long-term, intensity - medium)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, but at this stage it is assumed that the total length of cable sections

for all variants will be the same. In the variant selected for implementation, only the lengths of individual cable sections will increase, due to the greater distances between power plants. The result of the impact assessment is therefore convergent in all the parameters of the Project considered.

Thus, it should be considered that both the nature of the impacts remain unchanged, and their scope and intensity are comparable as in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.12. Changes in the regime of currents seas

The impact of operating wind turbines on hydrological conditions manifests itself primarily in the modification of the flow field of marine currents. These currents, encountering an obstacle in the form of a support structure, flow around it. Then in the immediate vicinity of the structure there is a change in the velocity and direction of flow and water pressure. This results in a local increase in water velocity due to the narrowing of the flow stream and the formation of turbulence around the structure. Particularly important, and difficult to predict, is the formation of turbulence around the structure. Vortices can be formed both on the downstream side and directly in front of the obstacle. The range of influence of the substructure on the flow of water in the seabed is equal to only a few diameters of the structure. In contrast, the distances between individual power plants are on the order of several hundred meters. This means that no overlap is expected between these impacts.

There are several factors that can affect the way the water flow field is modified due to the installation of wind power plants. Here it is necessary to distinguish first of all:

- the number of wind turbines, the distance between them and how they are deployed;
- the dimensions and shape of the individual towers;
- type and dimensions of foundations;
- flow field characteristics (velocities, dominant directions, etc.);
- bathymetry with special attention to surface gradients and natural obstacles.

The assessment of the wind farm's impact of inducing changes in the regime of sea currents was based on the analyses contained in the hydrographic modeling report performed for the Central Baltic offshore wind farm III (SMDI, 2015). The aforementioned hydrographic report modeled the changes in the regime of sea currents that will occur after the construction of the BIII OWF. The analysis was performed for all project alternatives considered.

The simulation was performed for the months of January and July, for 5 control points located inside and outside the farm area. As it shows, there will be a minimal reduction in the speed of the flow of sea currents inside the farm after it is built. These will be velocity changes of up to about 0.5 cm/s in July and up to 1 cm/s in January, and these values vary very little for the different variants analyzed. Meanwhile, average flow velocities recorded by the Maritime Institute in Gdansk during year-long surveys at two measurement points in the farm area ranged from 8.44 to 17.73 cm/sec. The reduction in the current speed of currents inside the wind farm will be offset by a slight increase in their speed outside the farm. The sensitivity of marine waters in the area of the farm was assessed as very low (negligible).

The impact itself during the operation of the farm will be no different from the impact at the final stage of construction (i.e., when all foundations are placed).

No measures are expected to minimize this impact at the operation stage.

Changes in the regime of sea currents at the stage of operation of the farm is a direct, negative impact of local scope, long-term (at the stage of operation), irreversible, low intensity. The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 34, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 35. Impact assessment of changing the regime of sea currents (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	Operation of the wind farm foundations will affect the regime of sea currents in the area of the project	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer turbines, and thus foundations, than envisioned for the farthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so the potential impact on ocean currents will be reduced proportionately. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.13. Damping ripples

The impact of operating wind turbines on hydrological conditions is also manifested in the attenuation of wind waves, as detailed in section 9.1.11 of this section. The impact itself during the operation of the farm will be no different from the impact at the final stage of construction (i.e., when all the foundations are in place).

No measures are expected to minimize this impact at the operation stage.

Wave attenuation during the operation stage of the farm is a direct, negative impact of local extent, long-term, irreversible, of medium intensity.

An assessment of the significance of this impact to the NIS, which was assessed in the 2015 Report, is shown in Table 35, below.

Table 36. Impact assessment involving surface wave attenuation (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	The operation of the wind farm foundations will affect surface wave action in the project area	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer turbines, and thus foundations, than envisioned in the 2015 NIS, and twice as many as specified in the Environmental Decision, so it will reduce its impact on wave action proportionately. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.14. An increase in the amount of suspended solids in the water

Minor violations of the structure of the bottom sediments that will occur at the stage of operation, primarily associated with anchoring of ships and replacement of cable fragments (e.g., due to damage to the cable), will cause an impact consisting in a reduction in water transparency, caused by the floating of suspended solids in the water depths (water turbidity), but not affecting the structure and functioning of the resource (not causing changes).

There is no need for minimization measures.

The increase in the amount of suspended solids in water at the stage of operation of the farm is a direct, negative impact of point in time, temporary, reversible, repeatable during the period of operation, with low intensity.

An assessment of the significance of this impact in the 2015 Report, the basis for the current Environmental Decision, was made for the most far-reaching scenario (NIS 2015), as shown in Table 36, below.

Table 37. Impact assessment of increase in suspended solids in water (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	During the operation of the farm there will be violations of the structure of the bottom	No change - water turbidity not affecting the structure and functioning of the resource	No change

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			sediments, resulting in a slight turbidity of the water		

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer turbines than envisioned for the furthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, while the total cable length will remain unchanged. The level of potential turbidity in the water may decrease, as a result of a reduction in the number of anchor vessels arriving for turbine maintenance. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.15. Impacts cumulative

Assumptions for the analyses of cumulative impacts of the BIII OWF as it will be implemented after the amendment of the Environmental Decision and other projects on the environment are presented in Section 3.2. On the other hand, a broad description regarding this issue is provided in Section 13 of Volume II of the EIA report.

The 2015 Report, which formed the basis for the impact assessment for the Project in the parameters approved in the Environmental Decision, assumed two cumulative impact scenarios.

According to the first scenario, it was assumed that between 2021 and 2025, a total of 150 power plants and associated infrastructure would be operated under the BSIII offshore wind farm and Baltica 3 offshore wind farm projects. Thus, it was considered that in the above scenario, the level of cumulative impacts on abiotic environmental elements would be only 75% of the level analyzed in the 2015 Report for the set of parameters of the Project constituting the 2015 NIS.

After 2026, the number of total power plants in operation with connection infrastructure may increase to 375 if additional connection conditions are obtained under the BIII OWF. Accordingly, the level of cumulative impacts on abiotic environmental elements will be 87.5% higher than the level analyzed in the 2015 Report for the set of parameters of the Project constituting the 2015 NIS.

It was also noted that most of the impacts described in Chapter 9 will not be cumulative, due to the scope being limited to the site of the foundation in question or its immediate surroundings.

Potential accumulation may include the release of zinc from corrosion protection, seabed occupation, disturbance of the bottom sediment structure, thereby dispersing suspended solids and releasing pollutants and nutrients. However, the significance of these impacts was assessed to be negligible or low, while that of seabed occupation was assessed to be moderate.

The variant that is the subject of this Report will build about 70% fewer power plants than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so that even in the case of cumulative impacts with those associated with the operation of other power plants, the total impacts will be less than those assessed in the 2015 Report. It is therefore considered that the Project will contribute less to cumulative impacts, both from the Project in the parameters constituting the 2015 NIS and from the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3. Stage decommissioning

The decommissioning phase will most likely see the removal of most of the farm's facilities from the seabed, in accordance with international regulations for installations and structures in marine areas (United Nations Convention on the Law of the Sea - UNCLOS).

These regulations set conditions for the removal of elements and installation of wind farms in the areas of the continental shelf and the exclusive economic zone. Decommissioning work should be carried out in such a way that it does not impede navigation or adversely affect the marine environment.

The standards also define exceptional situations in which there is no obligation to completely remove infrastructure elements. It is possible to leave such objects when:

- the weight of the foundation in the air exceeds 4,000 tons or is located at a depth of more than 100 meters, provided that it does not cause hindrance to the use of marine areas by other industries;
- decommissioning of elements is technically impossible or too costly;
- there is a threat to the lives of personnel decommissioning the wind farm;
- decommissioning entails an unacceptable risk of pollution of the marine environment.

In some locations, such as straits or archipelagic waters used for international shipping, it is necessary to completely remove installations and structures of structures, with no exceptions.

If some elements are left on the seabed, appropriate studies should be conducted to determine whether the farm's remains will not interfere with ship traffic and will not have a negative impact on biotic and abiotic elements of the environment. Make sure that the parts of the structure left behind do not begin to move under the influence of waves, tides, currents or storm surges, causing a hazard to shipping.

The following environmental impacts are expected to occur during decommissioning of the BIII OWF:

- disruption of sediment structure;
- the release of pollutants and nutrients from the sediment into the water body;
- disruption of the bottom structure;

- change in bottom morphology;
- seabed area occupation;
- leaching out or burying mineral accumulations;
- making access to mineral accumulations more difficult;
- changing the regime of sea currents;
- wind wave attenuation;
- water turbidity.

Unplanned impacts may also occur during decommissioning of the farm, which are described in detail in Section 12 of Volume II of the Report and in Chapter 11 of this section.

9.3.1. Structural disorders sediments

Works related to decommissioning of the entire farm or its individual facilities (removal of foundations and cables, anchoring of ships) will involve resuspension of surface sediments and their re-deposition.

In areas where there is no loose sediment on the surface or the layer is thin (P1, P3), the impact will be of little significance. In areas with a thicker layer of sands or silty clay sediments (P2, P4, P5), the agitated sediment will float longer.

Disturbance of bottom sediment structure is, at the stage of decommissioning, a direct negative impact of local extent, short-term, reversible, recurrent (during the period of decommissioning), with low to medium intensity (depending on the area).

During the decommissioning phase, no measures are expected to minimize this impact.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 37, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 38. Impact assessment involving disturbance of bottom sediment structure (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the decommissioning of the farm, the structure of the bottom sediments will be disturbed	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Negligible (scale of exposure - local, duration - short-term, intensity - medium to high)	Negligible (magnitude of impact - insignificant, Importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built (and thus potentially decommissioned) than envisioned for the furthest-reaching scenario - NIS 2015 - that forms the basis of the assessment in the 2015 Report, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so the disturbance of the bottom sediment structure will occur over a correspondingly smaller area. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts remains unchanged, and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.2. Release of pollutants and nutrients from the sludge into the water body water

As a result of disturbance during the decommissioning of the farm, bottom sediments may release pollutants and nutrients from them. This process is described in more detail in section 9.1.2 of this section.

In areas P1 and P3, where there is no loose sediment on the surface or the layer is thin (the northern and northwestern parts of the field), the impact will be of little significance. In areas with a thicker layer of sands or silty clay sediments (P2, P4 and P5 - central, eastern and southwestern parts), the agitated sediment will float longer.

During the excavation of foundations and cables from the bottom, the impact on water and sediment quality will be similar to the stage of foundation placement on the bottom during the construction phase. If the foundations are left in the bottom sediment, the impact on sediment and water quality will be negligible.

During the decommissioning phase, no measures are expected to minimize this impact.

The release of pollutants and nutrients from the sludge into the water body is a direct, negative impact at the decommissioning stage that is regional in scope, short-term, reversible, repeatable, with medium to high intensity, depending on the location.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 38, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 39. Impact assessment involving the release of pollutants and nutrients from sediment into the water body (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the decommissioning of the farm, there will be a release of	Negligible (scale of exposure - regional, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			pollutants and nutrients in the sediment into the water body		the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Small (scale of exposure - regional, duration - short-term, intensity - medium to high)	Small (magnitude of impact - low, importance of the resource - medium)
Marine waters	Medium	Average		Small (scale of exposure - regional, duration - short-term, intensity - medium to high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the variant that is the subject of this Report, about 70% fewer foundations will be built and then decommissioned than envisaged in the case of the most far-reaching scenario forming the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so there will be a smaller area of disturbed sediment, and consequently a correspondingly smaller amount of pollutants and nutrients released from it. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.3. Structural disorder bottom

Disturbance of the bottom structure will occur during construction activities, as described in detail in section 9.1.4 of this section, but most of them are continuous changes (once the structure is disturbed, it will not return to its original state), so they will remain even after the decommissioning of the farm, such as changes in the bottom associated with driving foundation piles into it, as they will not be pulled out of the bottom, but will most likely be cut off at a depth of about 3 m below its surface.

No measures are expected to minimize this impact.

Disturbance of the bottom structure is a direct, negative impact of local scope, permanent, long-term and irreversible at the stage of decommissioning. The intensity of the impact was determined to be low.

The 2015 Report, the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 39, with impacts for the variant approved by the Environmental Decision assessed as less.

Table 40. Impact assessment involving disturbance of bottom structure (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed	Large (areas P1 and P3)	Medium or high	During the decommissioning of the farm, the bottom structure will be breached	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium or high		Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so the disruption of the bottom structure associated with their removal will occur in a correspondingly smaller number of locations and over a smaller area. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the implementation and operation of the Parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.4. Change in morphology fundus

During the decommissioning stage of the farm, there will be a change in the morphology (shape) of the seabed. If pile foundations are removed, holes remain on the seabed. The process of backfilling due to wave or storm surges, or suspended sedimentation, will take a long time. It will also depend on the type of substrate. In areas with clayey formations (P1, P3), the process takes much longer due to the low susceptibility to dilution. It will be faster in areas of loose sediment (P2, P4, P5).

No measures are expected to minimize this impact.

The change in bottom morphology during the decommissioning stage is a direct, negative impact of local extent, medium- to long-term, reversible, one-time, of medium to high intensity.

An assessment of the significance of this impact to the NIS, which was evaluated in the 2015 Report, is presented in Table 40, below.

Table 41. Impact assessment involving alteration of bottom morphology (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	During the decommissioning of the farm, there will be a change in the morphology of the bottom	Moderate (scale of exposure - local, duration - long-term, intensity - high)	Moderate (magnitude of impact - moderate, Importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Small (scale of exposure - local, duration - medium-term, intensity - medium to high)	Small (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will construct about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which entails less change in bottom morphology during their decommissioning. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.5. Occupation of the seabed area seabed

If some elements or entire foundations are left on the bottom during the decommissioning stage, it will be permanently occupied. Pile foundations will be removed to a depth of about 3 meters below the bottom surface. The elements left behind will deteriorate the quality of the bottom. Heavy gravity foundations, due to their weight, are likely to remain entirely on the seabed.

No measures are expected to minimize this impact at the operation stage.

Seabed occupation in the event that foundations and cables are left in the seabed during the decommissioning phase is a direct, negative, permanent, reversible, long-term impact of local scope. The intensity of the impact in the case of leaving gravity foundations on the seabed was assessed as high, and in the case of using left foundations as low or medium.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 41, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 42. Impact assessment involving seabed occupation (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low	If all or part of the farm's facilities are left in the decommissioning stage, they will permanently occupy the seabed	Moderate (scale of exposure - local, duration - long-term, intensity - high)	Moderate (magnitude of impact - moderate, importance of the resource - high)
	Medium (areas P2, P4 and P5)			Moderate (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will construct about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which also entails correspondingly less occupation of the bottom surface in case the foundations or parts of them have to be left in the bottom during decommissioning. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.6. Washing out or covering up accumulations of raw materials minerals

During the decommissioning of the BIII OWF, work will be carried out to dismantle the various elements of the farm. They can cause backfilling or leaching of sediments. A positive impact, however, will be to allow access to mineral accumulations by freeing up the previously occupied bottom area by foundations (if these are removed).

These will be at the decommissioning stage direct negative impacts on crumbling raw materials, local in scope, short-term, reversible, repeatable during the decommissioning period, with very high intensity.

There will be no impacts on hydrocarbon deposits.

No measures are expected to minimize this impact.

The 2015 Report, which is the basis for the issuance of the current Environmental Decision, assessed the significance of this impact for the most far-reaching scenario (NIS 2015), as quoted below in Table 42, with the impacts for the variant approved in the Environmental Decision assessed as lower.

Table 43. Impact assessment of leaching or burial of mineral accumulations (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Four small potential gravel sand deposit fields have been identified within the boundaries of the future OWF BIII and its buffer	Small (scale of exposure - local, duration - short-term, intensity - very high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the farthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which is also associated with correspondingly less leaching or burial of mineral accumulations during decommissioning of the farm. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.7. Obstruction of access to mineral accumulations minerals

During the decommissioning phase, a decision may be made not to remove some of the farm facilities, including foundations, for the reasons described at the beginning of Section 9.3 of this section. In such a situation, it will permanently hinder access to raw material accumulations even after the decommissioning of the investment.

No measures are expected to minimize this impact.

Obstruction of access to mineral accumulations during the decommissioning stage is a direct, negative impact of local scope, permanent, long-term, irreversible, one-time, with intensity ranging from low to very high.

An assessment of the significance of this impact to the NIS, which was evaluated in the 2015 Report, is shown in Table 43, below.

Table 44. Impact assessment of obstructing access to mineral accumulations (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Four small potential gravel sand deposit	Moderate (scale of exposure - local, duration -	Small (magnitude of impact -

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			fields have been identified within the boundaries of the future OWF BIII and its buffer	long-term, intensity - very high)	moderate, importance of the resource - medium)
Hydrocarbon deposits	Small	Average	Two hydrocarbon exploration and appraisal licenses encroach slightly on the farm area	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which is also associated with correspondingly less difficulty in accessing raw material accumulations during and after decommissioning of the farm. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.8. Changes in the regime of currents seas

If during the decommissioning of the hydrotechnical infrastructure at the wind farm only the visible elements of the infrastructure, i.e. those protruding above the water table, are removed, the impact on hydrological parameters is not expected to change compared to the operation stage of the wind farm. In the event of the removal of underwater facilities, the hydrological parameters will return to the baseline, i.e. before the construction of the farm.

The impact of foundations left in the seabed during the decommissioning stage on hydrological conditions manifests itself primarily in the modification of the flow field of sea currents, as detailed in section 9.1.10 of this section.

No measures are expected to minimize this impact.

Changes in the regime of sea currents at the decommissioning stage of the farm are direct, negative impacts of local extent, permanent, long-term, reversible, of medium intensity.

An assessment of the significance of this impact to the NIS, which was evaluated in the 2015 Report, is presented in Table 44, below.

Table 45. Impact assessment involving regime shift of ocean currents (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	Possible leaving the foundations of the wind farm after its decommissioning will affect the regime of sea currents in the area of the project	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will construct about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which also entails correspondingly less occupation of the bottom surface in case the foundations or parts of them have to be left in the bottom during decommissioning. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.9. Wave attenuation wind

As mentioned earlier, impacts on hydrological conditions at the decommissioning stage will only occur if the structural elements of the farm are left in the water.

The impact of wind turbine foundations left in the water on hydrological conditions may manifest itself, among other things, in the attenuation of wind waves, as detailed in section 9.1.11 of this section. The impact itself after the decommissioning of the farm will be no different from the impact during the operation stage.

During the decommissioning phase, no measures are expected to minimize this impact.

Wave attenuation at the decommissioning stage of the farm is a direct, negative impact of local scope, permanent, long-term, reversible, low intensity.

An assessment of the significance of this impact to the NIS, which was evaluated in the 2015 Report, is shown in Table 45, below.

Table 46. Impact assessment involving surface wave attenuation (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	Possible remaining foundations of the wind farm after its decommissioning will have an impact on the surface wave in the area of the project	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the 2015 NIS - and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so its impact on wave action will be proportionately reduced if the foundation structures are left in the water. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.10. An increase in the amount of suspended solids in the water

During the decommissioning stage, more power plant foundations and other farm facilities will be removed from the seabed (unless a decision is made to leave them in the seabed). This will cause stirring of bottom sediments and temporary floating of suspended solids in the water depths. The level of impact will be similar to that during the construction phase, described in detail in section 9.1.12 of this section.

The increase in suspended solids in water at the decommissioning stage of the farm is a direct negative impact of local extent, medium-term (during the decommissioning period), reversible, repeatable during the decommissioning period, with high intensity.

An assessment of the significance of this impact to the NIS, which was evaluated as part of the 2015 Report, is presented in Table 46, below.

Table 47. Impact assessment involving increase in suspended solids in water (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	Removal of wind farm foundations and cables will	Small (scale of exposure - local, duration - short-	Small (magnitude of impact - low,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			cause water turbidity in the project area	term, intensity - very high)	importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the farthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, so the level of potential water turbidity will decrease proportionally. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.11. Impacts cumulative

Assumptions for the analyses of cumulative impacts of the BIII OWF as it will be implemented after the amendment of the Environmental Decision and other projects on the environment are presented in Section 3.2. On the other hand, a broad description regarding this issue is provided in Section 13 of Volume II of the EIA report.

The 2015 Report, which formed the basis for the impact assessment for the Project in the parameters approved in the Environmental Decision, analyzed the possibility of cumulative impacts in the most far-reaching scenario - NIS 2015, in which all built power plants will be decommissioned at the same time (i.e., depending on the scenario and obtaining additional connection conditions), e.g., as a result of legal changes that make their operation completely unprofitable. In this case, a maximum of a total of 415 power plants with infrastructure will be decommissioned, 110% more than in the assessed NIS 2015. Nonetheless, it was concluded that the impact assessment remains unchanged and does not differ from the assessment for the 2015 NIS and the variant approved in the Environmental Decision.

Impacts during decommissioning will be broadly similar to those during the construction phase. Potential accumulation may be associated with the disturbance of bottom sediments, but the level of accumulation has been assessed as minimal or low. If the foundations are left in the seabed, the impacts will differ little from those during the operational stage.

If the foundations are left in the bottom, the seabed occupation will also remain unchanged from the operational period.

The variant that is the subject of this Report will build about 70% fewer power plants than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the 2015 NIS - and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, so that even in the case of cumulative impacts with those associated with the simultaneous decommissioning of other power plants, the total impacts will be less than those assessed in the 2015 Report. It is therefore considered that the Project will contribute less

to cumulative impacts, both from the Project in the parameters constituting the 2015 NIS and from the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

10. Impacts related

Related impacts are understood as a chain of all impacts that may occur in the ecosystem, following the occurrence of an impact on one of its elements. The purpose of assessing associated impacts is to verify that direct impacts on one receptor will not become a source of indirect impacts on another receptor or on the ecosystem as a functional whole, especially in conjunction with direct impacts on that receptor.

A direct impact on one element of the abiotic environment in the study area will usually result in an indirect impact on another abiotic element, and then also on biotic elements. Section 7 of Volume II of the Report presents a matrix of interrelationships, arranged by emission source - emission - impact - direct impact receptor - indirect impact receptor. Associated impacts during the construction phase will be particularly significant.

Impacts in the form of seabed disturbance, particularly the outermost layer of bottom sediments, may cause the following indirect impacts:

- washing out or picking up mineral deposits (especially sands) when preparing the bottom for foundations;
- backfilling mineral deposits with dredged material from bottom dredging for gravity foundations;
- destruction and alteration of habitats, especially benthic habitats;
- reduction in benthic populations, which in turn will reduce the feeding base of fish and birds;
- damage to historic objects on the bottom (provided that other objects are discovered, in addition to the wreck already identified at the stage of environmental studies, which will be protected before the start of work by designating a protection zone).

One of the effects of bottom sediment disturbance will be an increase in the concentration of suspended solids in the water, especially in areas P2, P4 and P5. He, in turn, will cause:

- temporary reduction in transparency (water turbidity);
- change the living conditions for all aquatic organisms, especially for benthos and fish in the juvenile stages of development;
- Another consequence of the agitation of bottom sediments will be the release of pollutants and nutrients from them, and as a result:
- an increase in the amount of pollutants and nutrients in the water;
- changing habitat conditions for aquatic organisms;

- a decrease in the population of pollution-sensitive organisms;
- an increase in plant biomass due to the increased amount of available nitrogen and phosphorus compounds in the water;
- an increase in the concentration of contaminants in the bodies of fish from consuming species.

As a result of the construction work, foundation structures will be placed on the seabed. They, in turn, will have a long-term impact:

- sea currents and wave action in the project area;
- living organisms, by creating an artificial reef and creating favorable conditions for their development;
- navigation and navigation, by creating a navigation exclusion zone in the area of the farm;
- the maritime industry, which will gain from orders of foundations or cables.

Associated impacts at the stage of eventual decommissioning of the farm will be similar to those at the stage of construction. No impacts associated with seabed disturbance are expected on tourism and recreational activities.

A detailed assessment of the associated impacts on the biotic environment, resulting from impacts on the abiotic environment, has been made in the relevant subsequent sections of Volume IV of the Report.

11. Impacts unplanned

Potential unplanned events that may be a source of negative impacts on abiotic and biotic elements of the environment are described in Section 12 of Volume II of the Report.

This chapter assesses the impact of the effects of unplanned events (identified in Section 12 of Volume II of the EIA) on various elements of the abiotic environment, such as:

- pollution of water depths and bottom sediments with petroleum substances (during normal ship operations);
- contamination of the water tone and bottom sediments with petroleum substances (in an emergency);
- contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage;
- contamination of the water tone and bottom sediments with accidentally released chemicals and waste from the construction, operation or decommissioning of the farm;
- contamination of the water tone and bottom sediments with antifouling agents;
- disruption of sediment structure, sediment agitation, secondary sedimentation on the bottom and increased suspended solids associated with unexploded conventional weapons (UXO) explosions.

11.1. Pollution of water depths and bottom sediments with petroleum substances (during

normal operation of ships)

During normal ship operation, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) can occur.

They may contribute slightly to the deterioration of water quality. Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. There they can be bound by bottom sediments. However, due to the nature of the sediments in the BIII offshore wind farm area (small amount of organic matter and low content of fine fractions), they will not cause any noticeable deterioration in their quality. It should be assumed that these spills will be small (stage I), up to 20^{m3}. Visible traces of such contamination under favorable conditions can disappear spontaneously due to evaporation and dispersion in the water. The size of these spills will be practically limited to the OWF area. The sensitivity of seawater and bottom sediments to small oil spills from normal ship operations was determined to be low.

The contamination of sediments with petroleum substances is independent of the type of foundation used. It will be more noticeable in areas with fine-grained sediments, which have a greater capacity to absorb petroleum substances.

As a primary minimization measure, it is recommended that vessels be supplied with means to deal with minor oil spills. Mitigation measures are described in more detail in Section 12 of Volume II of the Report.

Pollution of seawater and/or bottom sediments with petroleum substances released during normal ship operations is a direct, negative impact of local scope, temporary or short-term, reversible, repeatable, low intensity during the construction phase.

An assessment of the significance of this impact for the most far-reaching scenario (NIS 2015), which was assessed in the 2015 Report, is presented in Table 47, below.

Table 48. Impact assessment involving contamination of seawater and/or bottom sediments with petroleum substances during normal ship operations (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Low	During the normal operation of the ships at each stage of the project, small spills of oil substances may occur	Negligible (scale of exposure - local, duration - temporary or short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Seabed / bottom sediments	Large (areas P1 and P3)				Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and Negligible P5)				Negligible (magnitude of impact - insignificant, importance of

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, involving the use of a correspondingly smaller number of vessels for project implementation, operation or decommissioning. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.2. Pollution of water bodies and bottom sediments with petroleum substances (in an emergency situation)

During the construction, operation or decommissioning of the farm, leakage of petroleum substances may occur, resulting in pollution of the water table and bottom sediments. A spill can occur as a result of a shipwreck or collision, a construction disaster at one of the farm's facilities, or during maintenance work. In the event of a collision or collision between ships, a Grade III spill can be expected, i.e. more than 50^{m3} (Pawelec et al., 2014).

The visible result of an oil spill is the formation of an oil stain, which, under the influence of gravity and surface tension, spreads at a speed that depends on the type of oil and external conditions. The influence of factors such as oil volume, density, viscosity, temperature, wind speed and time determine the size of the spill. The estimated speed of movement of the oil patch in large bodies of water is about 2 - 3% of the wind speed. It was found that a spill of 1.6 t (1.8^{m3}) of oil in one day of spreading over an area of 1 ^{km2} results in a film thickness of 2µm and a dark color. In contrast, 40 kg of oil results in a spill over an area of 1 ^{km2} with a film thickness of 0.05 µm.

The oil film formed on the surface of the water can cause:

- impeded gas exchange, especially oxygen, between water and the atmosphere;
- a 5 - 10% decrease in light intensity below the water surface (mainly due to the presence of heavy oil and sulfur fractions) limiting photosynthesis;
- increase in water temperature during the day due to absorption of light rays by the oil layer.

At the same time as the spread of the oil slick, other degradation processes run, aiming to reduce the concentration of hydrocarbons on the water surface (e.g., the release of low molecular weight hydrocarbons). Heavier oil fractions, on the other hand, can sorb on the surface of organic and mineral suspensions, which can cause their specific gravity to increase and gradually sink to the bottom. Thus, heavier oil fractions can be bound by bottom sediments, causing contamination. The susceptibility of bottom sediments to contamination depends on the grain size of the sediment and its packing. Loose

sandy sediments and fine silty clay sediments (areas P2, P4, P5) are more susceptible to contaminant absorption. Compact clay sediments inhibit the penetration of contaminants deep into the sediment (areas P1, P3). For these reasons, it was estimated that the intensity of this impact on the seabed would be low in P1 and P3 areas, and medium or high in the remaining areas.

The likelihood of a shipwreck or collision in the Baltic Sea is low. Approximately 2,000 ships (including 200 tankers with oil and other liquids) sail on Baltic waters daily, the number of collisions and accidents in recent years has remained more or less constant (with a slight increase marked) at about 120-140 marine accidents each year. However, most accidents in the Baltic do not cause significant pollution. The number of incidents of pollutants entering the sinkhole remains at about 10-11 per year. However, it should not be forgotten that even just one large-scale accident can seriously threaten the marine environment. The two most serious accidents in the Baltic Sea area since 2001 occurred with the "Baltic Carrier" in 2001 (2,700 tons of oil spilled) and the "Fu ShanHai" in 2003 (1,200 tons of oil spilled). In 2012, 149 ship accidents occurred in the Baltic Sea, 10 of which resulted in pollution. None of the accidents that resulted in water pollution occurred in the area of the Polish economic zone (HELCOM, 2014).

If, on the other hand, one takes into account cases during which more than 5,000 tons of oil pollution would be released into the environment (e.g., an unsealing of a tanker's cargo), the risk of such a situation occurring in the entire Baltic Sea area was estimated (according to data from the BRISK project) at 1 case per 26 years. For the area of the southeastern Baltic, which may include the analyzed area of the BSIII OWF, the risk of such a collision was estimated at 1 case per 1060 years, with the areas of the Wolin Island and Rügen Island, as well as the Hel Peninsula indicated as the most vulnerable areas (www.brisk.helcom.fi; Pawelec et al., 2014a).

During investment works, vessels develop low speeds and in this situation the risk of damage to the fuel tank is very low. Generally, a ship has fuel in several tanks, which reduces the risk of a large spill in the event of a collision. The vessels used for investment work in the construction of wind power plants can have fuel tanks with a total capacity of about 1,200^{m3}. Assuming the failure or collision of the largest units used during the construction, operation or decommissioning stages of the BIII OWF (during inspections, servicing and sudden emergency repairs) and the destruction of the largest tanks, a maximum of (in the worst-case scenario) about 200^{m3} of diesel fuel, 15^{m3} of machine oil and about 2.5 m3^{of} hydraulic oil may leak from one unit (Pawelec et al., 2014; Veldhuizen et al., 2014).

In the event of a construction disaster at the farm (a tower capsizing, or a ship colliding with a tower or substation), a spill of diesel fuel (up to 100^{m3}), machine oil (up to 15^{m3}), hydraulic oil (up to 2.5^{m3}) or transformer oil (up to^{m3}) may occur.

During maintenance of wind turbine components, leakage of various types of oil-based substances can occur, which are replaced during maintenance activities of wind turbines and substations. Transformers will be equipped with devices to minimize such risks. They have sealed oil pans and storm drains will be equipped with an oil separator (Stryjecki et al., 2011; Pawelec, 2014). For this reason, the spill is not expected to spread significantly outside the facility (Pawelec et al., 2014).

The significance of the impact, due to the randomness and sporadic nature of failures and collisions, was assessed as low.

As a minimizing measure, it is recommended that vessels be supplied with means to deal with oil spills. Mitigation measures are described in more detail in Section 12 of Volume II of the Report.

In addition, plans have been developed for the BIII OWF to counteract risks and pollution during construction, operation and decommissioning of the farm. These plans identify the potential area of the basin at risk for various accident and disaster scenarios, as well as specifying methods for counteracting and eliminating oil spills (Pawelec et al., 2014). It should be emphasized that these are preliminary

studies, based on the state of knowledge that is available at the current stage of the project. These plans will be updated, particularly at the construction project stage.

Pollution of the water body or bottom sediments with petroleum substances released in an emergency is a direct, negative impact that is regional in scope, short-term, reversible, repetitive, of low to high intensity (depending on the location).

An assessment of the significance of this impact for the 2015 NIS, which was evaluated in the 2015 Report, is shown in Table 48, below.

Table 49. Impact assessment involving contamination of seawater and bottom sediments with petroleum substances in an emergency (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	High	In emergency situations, contamination of water depths and bottom sediments with oil-based substances may occur	Small (scale of exposure - regional, duration - short-term, intensity - high)	Small (magnitude of impact - low, importance of the resource - medium)
Seabed / bottom sediments	Large (areas P1 and P3)	Low		Negligible (scale of exposure - regional, duration - short-term, intensity - low)	Small (magnitude of impact - negligible, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Average		Small (scale of exposure - regional, duration - short-term, intensity - high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the 2015 NIS - and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, involving the use of a correspondingly smaller number of vessels for construction, operation and decommissioning of the project, thereby reducing the likelihood of spills proportionally. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.3. Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage

During the construction, operation or decommissioning of the wind farm, waste, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage, will be

generated on the vessels, as well as at the construction facilities located on land (at the port serving the investment). Their expected types and quantities, as well as how they will be handled, are presented in Section 10 of Volume II of the Report. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident, causing a local increase in nutrient concentrations and deterioration of water and sediment quality. However, the pollutants should quickly disperse, so they will not contribute to permanent deterioration of the environment in the project area. The sensitivity of marine waters and bottom sediments to this type of impact is assessed as low.

As a minimizing measure, it is recommended to create procedures related to waste and wastewater handling.

Contamination of water and/or bottom sediments with municipal waste or domestic sewage is a direct, negative impact of local extent, temporary or short-term, reversible, repetitive, low intensity.

An assessment of the significance of this impact for the most far-reaching scenario, which was evaluated as part of the 2015 Report, is presented in Table 49, below.

Table 50. Impact assessment involving contamination of seawater and bottom sediments with municipal waste or domestic sewage (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Low	During any stage of the project, there may be an accidental release of municipal waste or domestic sewage into the sea	Negligible (scale of exposure - local, duration - temporary or short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Seabed / bottom sediments	Large (areas P1 and P3)				Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P1 and P3)				Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will construct about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the 2015 NIS - and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, involving the use of a correspondingly smaller number of vessels for project implementation, operation or decommissioning, thereby reducing proportionately the possibility of releasing municipal waste or domestic sewage into the water. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.4. Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from the construction, operation or decommissioning of the farm

During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at the construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that about $5^{m3\ of}$ product could sink during handling. Grouts, mortars and other binders often contain hazardous substances. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 $^{g\text{-}cm\text{-}1}$, they sink and are deposited on the bottom. These substances are considered a serious threat because they cannot be easily removed from the bottom and are toxic to marine organisms. The scale and estimated probability of their release were estimated in the Plan for Counteracting Risks and Pollution during Construction and Decommissioning of the Offshore Wind Farm "OWF Central Baltic III" (Pawelec et al., 2014).

During the operation of the farm, maintenance of its facilities will be carried out. Accidental release of small amounts of waste or operating fluids into the sea cannot be ruled out.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out this work (cf. description of the decommissioning stage), and the greatest contamination may occur if gravity foundations have to be crushed.

The anticipated types and quantities of waste are presented in Section 10 of Volume II of the Report.

For this type of investment like an OWF, a detailed plan is generally developed to deal with risks and pollution arising during construction, operation and decommissioning, which develops minimization measures and how to deal with such events. It is recommended that such procedures be created as a minimization measure.

Contamination of water and/or bottom sediments with chemicals or wastes associated with the process of construction, operation or decommissioning of the farm is a direct, negative impact of local extent, medium-term, irreversible, repetitive, of medium intensity.

An assessment of the significance of this impact to the NIS, which was evaluated in the 2015 Report, is shown in Table 50, below.

Table 51. Impact assessment involving contamination of seawater and bottom sediments with waste associated with the construction process or operational fluids (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Average	During the construction or decommissioning of the farm, there may be an accidental release into the sea of waste associated with the process, and at any stage of the project there may be an accidental release of operating fluids	Insignificant (scale of exposure - local, duration - medium-term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Seabed / bottom sediments	Large (areas P1 and P3)				Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)				Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and it excludes the use of gravity foundations under the power plants, so the possibility of releasing waste or chemicals into the water during the construction, operation or decommissioning of the farm will be proportionately reduced. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.5. Contamination of water depths and bottom sediments with agents antifouling

To protect the hulls of ships from overgrowth, biocides are used, which may include, for example, copper compounds, mercury compounds, organotin compounds (such as tributyltin - TBT). These substances can pass into the water's depths and eventually be retained in the sediment. It should be assumed that the emission of these compounds will be limited by dilution in the water depths. Of the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. TBT (the most harmful substance) is currently banned in antifouling paints, but the presence of these compounds

in older units cannot be ruled out. The sensitivity of seawater and bottom sediments to biocides released from hulls was determined to be medium.

As a minimizing measure, it is recommended that vessels whose hulls have not been coated with TBT-containing antifouling paint be used at any stage of the project. This will eliminate this most harmful impact on aquatic organisms.

Contamination of water and/or bottom sediments with antifouling substances is a direct, negative impact of local or regional extent, short-term, reversible, repeatable, low intensity during the construction phase.

An assessment of the significance of this impact for the 2015 NIS, which was evaluated as part of the 2015 Report, is presented in Table 51, below.

Table 52. Impact assessment involving contamination of seawater and/or bottom sediments with antifouling substances (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Average	The release of antifouling substances may occur during normal ship operations	Negligible (scale of exposure - local or regional, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Seabed / bottom sediments	Large (areas P1 and P3)				Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)				Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will construct about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the 2015 NIS - and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which entails the use of a correspondingly smaller number of vessels to implement, operate or decommission the project, thereby reducing proportionally the possibility of releasing antifouling substances. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect

the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.6. Disruption of sediment structure, sediment agitation, secondary sedimentation on the bottom and increase in suspended solids associated with UXO explosions

If UXO detonation is carried out, it is possible to disrupt the structure of bottom sediments, agitate and redeposit them, and increase suspended solids in the water.

In the case analyzed, impacts are expected to be analogous to those from physical interference with the bottom during the construction phase (see Chapter 9.1 of this section).

As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and dissipate (resuspension) in the water depths, potentially releasing pollutants and nutrients into the water, re-depositing on the bottom. Some heavy metals, pollutants and nutrients may be released from the bottom sediments as a result of the agitation, analogous to the construction phase. In this case, there may be a deterioration of water quality due to an increase in the concentration of harmful and biogenic substances (due to the passage from the sediment to the water body as a result of sediment uplift processes). These sediments will also promote the formation of more suspended solids, which will persist in the water depths for a long time. Intense resuspension can cause the release of nutrients immobilized in the sediment and contribute to eutrophication. In the case of sandy sediments with low organic matter content (e.g., coarse-grained sandy sediments), the processes described will be less intense. These sludges are generally characterized by small amounts of fine fractions and low concentrations of metals and persistent organic pollutants.

It is also assumed that there may be temporary turbidity in the water due to an increase in suspended solids in the water. Aggradation of bottom sediments can also affect potential mineral accumulations.

It is estimated that the scale and extent of impacts associated with a possible detonation will vary depending on the size of the detonated charge and the type and volume of agitated sediments, but will not exceed the regional scale. These will be high-intensity impacts.

The following is an assessment of the impact on the abiotic environment due to the decommissioning of UXO.

Table 53. Impact assessment of disruption of bottom sediment structure due to UXO detonation (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed/bottom sediments	Large (areas P1 and P3)	Low (areas P1 and P3)	Due to the detonation of UXO, the structure of the bottom sediments will be disturbed	Negligible (scale of exposure - local, duration - short term, intensity - high)	Small (magnitude of impact - insignificant, importance of the resource - medium/large)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)			

Table 54. Impact assessment involving the release of contaminants and nutrients from the sediment into the benthic water table as a result of UXO detonation (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed/bottom sediments	Large (areas P1 and P3)	Low (areas P1 and P3)	Due to the detonation of UXO, there will be a release of contaminants and nutrients from the sediment into the water body	Negligible (scale of exposure - regional, duration - short-term, intensity - high)	Small (magnitude of impact - insignificant, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Small (scale of exposure - regional, duration - short-term, intensity - high)	Small (magnitude of impact-small, importance of resource-medium)
Marine waters	Medium	Average		Small (scale of exposure - regional, duration - short-term, intensity - high)	Small (magnitude of impact - low, importance of the resource - medium)

Table 55. Assessment of the impact involving the disruption of the bottom structure as a result of UXO detonation (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed/bottom sediments	Large (areas P1 and P3)	High	Due to the detonation of UXO, there will be violations of the bottom structure	Moderate (scale of exposure - local, duration - long-term, intensity - high)	Moderate (magnitude of impact - moderate, importance of the resource - high)
	Medium (areas P2, P4 and P5)	Average		Small (scale of exposure - local, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Table 56. Assessment of the impact involving the change in bottom morphology as a result of UXO detonation (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Seabed / bottom sediments	Large (areas P1 and P3)	Low (areas P1 and P3)	Due to the detonation of UXO, there will be a change in	Moderate (scale of exposure - local, duration - long-	Moderate (magnitude of impact - moderate,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			bottom morphology	term, intensity - high)	importance of the resource - high)
	Medium (areas P2, P4 and P5)	Medium (areas P2 and P4) or high (area P5)		Small (scale of exposure - local, duration - medium-term, intensity - high)	Small (magnitude of impact - low, importance of the resource - medium)

Table 57. Assessment of impacts involving leaching, selection or burial of mineral accumulations as a result of UXO detonation (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Gravelly sand deposits	Medium	High	Due to the detonation of UXO, there will be a change in mineral accumulations	Small (scale of exposure - local, duration - short-term, intensity - very high)	Small (magnitude of impact - low, importance of the resource - medium)

Table 58. Impact assessment of the increase of suspended solids in water due to detonation of UXO (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Marine waters	Medium	Very low (negligible)	Due to the detonation of UXO, there will be water turbidity at the detonation site	Small (scale of exposure - local, duration - short-term, intensity - very high)	Small (magnitude of impact - low, importance of the resource - medium)

The 2015 report did not include an assessment of unplanned impacts associated with UXO detonation. The assessment carried out in this report showed low magnitude and significance of the impact. At the same time, it should be emphasized that the proposed modifications to the Project do not affect the Project's impacts in relation to the Project in the parameters approved by the Environmental Decision. The possibility of such an impact is related to the area of the seabed covered by the works during the course of the Project, and this will remain unchanged both after the implementation of the proposed modifications to the Project.

11.7. Cumulative impacts in emergency situations emergencies

The only unplanned impact that may be cumulative will be contamination of the water tone and bottom sediments with petroleum substances.

During the preparation of the 2015 Report, it was found that even assuming that the number of vessels in the construction / operation / decommissioning stages doubles compared to the most far-reaching scenario (i.e., a maximum of 400 power plants will be operated), the assessment will remain unchanged, as shown in the table below.

Table 59. Assessment of cumulative impacts involving contamination of seawater and bottom sediments with petroleum substances (unplanned impacts, any phase, NIS 2015)

Impact	Seabed and bottom sediments	Marine waters	Mineral deposits	
			Gravelly sands	Hydrocarbons
Pollution of water bodies and bottom sediments with petroleum substances (emergency situations)	Small	Small	-	-
Pollution of the water tone and bottom sediments with petroleum substances (normal operation)	Negligible / Small*	Skip		

* depending on the bottom structure

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The variant that is the subject of this Report will build about 70% fewer turbines, and thus foundations, than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - the 2015 NIS - and twice as many as specified in the Environmental Decision, which entails less vessel traffic at each stage, and thus less likelihood of accidents and the cumulative effects of them, if any. It is therefore considered that the Project will cause lesser impacts from both the Project in the parameters constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

12. Assessment of the impact on the integrity, coherence and object of protection of Natura sites 2000

This chapter analyzes the potential impact of the BII OWF, at each of its stages, on abiotic environmental elements protected under the Natura 2000 network. The assessment was performed in accordance with the methodology described in Section 5 of Volume I of the Report.

12.1. Initial assessment - screening

Pre-assessment is the process by which the project's likely impacts on Natura 2000 sites are identified (either singly or in conjunction with other projects or plans) and an analysis is made of whether the anticipated impacts are likely to have a significant effect on these sites.

After the analysis of the impacts of the BIII OWF, conducted in the 2015 Report, it was concluded that the project's impacts on the abiotic environment will be overwhelmingly limited to the area of the farm.

The only impact that was found to have the potential to significantly extend beyond the farm area was the rise and spread of suspended solids in the water depths and their redeposition to the bottom. This indirect impact is a direct result of the disturbance of the bottom sediment structure during construction activities (and to a lesser extent during operation and decommissioning of the farm). For a detailed description of this impact, see Section 9.1.12 of this section of the Report, above.

As can be seen from the analyses performed, the results of which are presented in Section 4 of Volume II of the Report and Chapter 9 of this section, the sediment stirred up during the farm's construction work will fall, depending on the variant of the project, covering the bottom to an average thickness of 0.2 - to 0.4 mm. The amount of suspended solids carried is so small that it can be compared with the rate of sedimentation in Baltic waters, which ranges from 0.005 to about 0.2 mm/year per year (Gradzinski et al., 1986). The amounts of suspended solids transferred to Natura 2000 sites are therefore unmeasurable from a practical point of view.

Some heavy metals, pollutants and nutrients will be released from the bottom sediments as a result of the agitation, as discussed in section 9.1.2 of this section. There will also be a temporary turbidity of the water. However, these impacts will not result in significant associated impacts on benthic habitats, as well as on birds that are the subject of protection h Natura 2000 areas, as further described and evidenced in sections 3 and 5 of Volume IV of the Report.

Significantly, the variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of the most invasive gravity foundations under the power plants has been excluded, limiting the permissible foundation types to monopile and jacket type only, and only for additional infrastructure has the possibility of gravity foundations been retained, but their number has been limited to one. It is associated with a significantly lower extent of all impacts on abiotic elements during construction, operation and decommissioning. Thus, it is considered that if the proposed modifications are implemented, the disturbance that is a source of suspended solids uplift and dissipation in the water body will also be significantly reduced, thereby further reducing the potential for impacts on Natura 2000 sites compared to the Project in the parameters constituting the 2015 NIS, as well as the variant approved in the Environmental Decision.

13. Impacts transboundary

The BIII OWF is not expected to cause transboundary impacts on abiotic elements of the environment lying within the borders of other countries (including their exclusive economic zones).

An analysis of the scale of the proposed farm's impacts on the seabed, bottom sediments, seawater and mineral deposits showed that the impact on these receptors will be almost exclusively local, at most regional (see Chapter 9 of this section of the EIA, above), reaching a maximum of several kilometers from the farm's borders, while the nearest exclusive economic zone of another country (Sweden) is about 52 km away.

There are also no deposits of raw materials of international importance in the area of the planned project. Due to the distance of the BIII OWF from the borders of the Polish EEZ, there is no risk of interference with raw material exploration through the construction of the farm's infrastructure. There are also no exploration techniques for which the impact of the construction of the farm infrastructure would have an impact at distances greater than 20 kilometers.

14. Proposal monitoring

The proposed changes to the terms of the Environmental Decision do not affect the conditions for monitoring specified in the Environmental Decision. The conditions and rules for conducting monitoring, including for abiotic elements of the environment, are specified in the Environmental Decision in section II.2. The subject of this report is also not a change in these conditions.

15. Summary and conclusions

According to the results of the 2015 Report's assessment of the impact of the BIII OWF on the abiotic environment, the planned wind farm will not have a significant negative impact on the seabed (including bottom sediments), marine waters and mineral deposits in the area of the Project either in the variant selected for implementation or in the reasonable alternative variant.

Given the significantly smaller scope of the currently proposed variant of the project, it is even less likely to generate any negative impacts on the abiotic elements of the environment.

It should be borne in mind that the carried out assessment of the impact on abiotic elements of the environment is also the starting point and an important element of the assessment of the impact of OWF BIII on biotic elements, i.e. living organisms, whose functioning depends very much on the quality of sediments and waters. The results of the impact assessment on abiotic elements of the environment, particularly water and sediment, were used in the impact assessments on benthos, fish, mammals and birds, which are included in the following sections of Volume IV of the Report.

It is not expected that there could be any cumulative impacts on the seabed or seawater during the simultaneous operation of several neighboring projects in the area of the farm, since any impacts will be limited to the immediate vicinity of the individual farm facilities.

The wind farm is located in Poland's exclusive economic zone. Impacts on the abiotic environment are local. The BIII OWF is not expected to cause transboundary impacts, i.e. in the maritime areas of neighboring countries.

Unplanned impacts, primarily related to the decommissioning of UXO and vessel accidents and spills, will not significantly affect the abiotic environment. Potential contaminants will largely be dispersed in the water, and the amount of substances that could potentially be released as well as the likelihood of an emergency is low.

The BSIII OWF is located at a distance of about 5.5 km from the nearest Natura 2000 area, the subject of protection of which are abiotic habitats. Due to the local scale of impacts, the possibility of significant negative impacts of the farm on the seabed, bottom sediments and marine waters in Natura 2000 network areas, as well as other protected areas, is not expected.

A summary of the assessment of the impact of the amendments to the Environmental Decision on the results of the assessment of the impact on the abiotic environment of the Project is presented in the following tables.

15.1. Seabed and sediments bottom

Table 60. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the seabed and bottom sediments - construction phase

Impact	Importance of the resource	Actions to minimize the	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Disruption of sediment structure	Large (P1 and P3)	No	Insignificant	Small	Significant reduction in impact
	Medium (P2, P4 and P5)		Insignificant	Skip	Significant reduction in impact
Release of pollutants and nutrients from the sludge into the water body	Large (P1 and P3)	No	Insignificant	Small	Significant reduction in impact
	Medium (P2, P4 and P5)		Small	Small	Significant reduction in impact
Change in the substrate composition of bottom sediments	Large (P1 and P3)	No	Small	Small	Significant reduction in impact
	Medium (P2, P4 and P5)		Moderate	Small	Significant reduction in impact
Violations of the bottom structure	Large (P1 and P3)	No	Moderate	Moderate	Reducing the impact
	Medium (P2, P4 and P5)		Small	Small	Reducing the impact
Change in bottom morphology	Large (P1 and P3)	No	Moderate	Moderate	Reducing the impact
	Medium (P2, P4 and P5)		Small	Small	Reducing the impact
Ground settlement	Large (P1 and P3)	No	Insignificant	Small	Significant reduction in impact
	Medium (P2, P4 and P5)		Moderate	Small	Significant reduction in impact
Seabed surface occupation	Large (P1 and P3)	No	GBS: Moderate	GBS: Moderate	Reducing the impact

Impact	Importance of the resource	Actions to minimize the	Magnitude of impact		The significance of the impact		The impact of updating the parameters of the Project on the significance of the impact
	Medium (P2, P4 and P5)		Monopal, tripod, jacket	Small	Monopal, tripod, jacket	Small	Reducing the impact

Table 61. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the seabed and bottom sediments - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	
Disruption of sediment structure	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Insignificant	Skip	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Insignificant	Skip	Reducing the impact
Change in the substrate composition of sediments	Large (P1 and P3)	No	Small	Small	Reducing the impact
	Medium (P2, P4 and P5)		Moderate	Small	Reducing the impact
Disruption of the bottom structure	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Insignificant	Skip	Reducing the impact
Change in water and sediment temperature	Large (P1 and P3)	No	Insignificant	Small	Impact unchanged
	Medium (P2, P4 and P5)		Insignificant	Skip	Impact unchanged
Change in bottom morphology	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Small or moderate	Small	Reducing the impact
Ground settlement	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Moderate	Small	Reducing the impact
Occupation of the seabed area	Large (P1 and P3)	No	Moderate	Moderate	Reducing the impact
	Medium (P2, P4 and P5)		Moderate	Small	Reducing the impact

Table 62. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the seabed and bottom sediments - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	
Disruption of bottom sediment structure	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Insignificant	Skip	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Small	Small	Reducing the impact
Change in bottom morphology	Large (P1 and P3)	No	Moderate	Moderate	Reducing the impact
	Medium (P2, P4 and P5)		Small	Small	Reducing the impact
Occupation of the seabed area	Large (P1 and P3)	No	Moderate	Moderate	Reducing the impact
	Medium (P2, P4 and P5)		Moderate	Small	Reducing the impact
Disruption of the bottom structure	Large (P1 and P3)	No	Insignificant	Small	Reducing the impact
	Medium (P2, P4 and P5)		Insignificant	Skip	Reducing the impact

15.2. Waters marine

Table 63. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on marine waters - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Release of pollutants and nutrients from the sludge into the water body	Medium	No	Small	Small	Significant reduction in impact
Changes in the regime of sea currents		No	Insignificant	Skip	Reducing the impact
Wind wave attenuation		No	Insignificant	Skip	Reducing the impact

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Increase in suspended solids in water		No	Small	Small	Reducing the impact
Contamination with antifouling substances		Use of vessels whose hulls have not been coated with TBT-containing antifouling paint	Insignificant	Skip	Reducing the impact
Pollution with oil substances during normal operation		Provision of vessels with means for elimination of minor oil spills	Insignificant	Skip	Reducing the impact

Table 64. The impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on marine waters - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Release of pollutants and nutrients from the sludge into the water body	Medium	No	Insignificant	Skip	Reducing the impact
Change in water and sediment temperature		No	Small	Small	Impact unchanged
Contamination with compounds from corrosion protection agents		No	Small	Small	Reducing the impact
Changes in the regime of sea currents		No	Insignificant	Skip	Reducing the impact
Ripple suppression		No	Insignificant	Skip	Reducing the impact
Increase in suspended solids in water		No	Small	Small	Reducing the impact
Contamination with antifouling substances		Use of vessels whose hulls have not been coated	Insignificant	Skip	Reducing the impact

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
		with TBT-containing antifouling paint			
Pollution with oil substances during normal operation		Provision of vessels with means for elimination of minor oil spills	Insignificant	Skip	Reducing the impact

Table 65. The impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on marine waters - decommissioning stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Release of pollutants and nutrients from the sludge into the water body	Medium	No	Small	Small	Reducing the impact
Changes in the regime of sea currents		No	Insignificant	Skip	Reducing the impact
Ripple suppression		No	Insignificant	Skip	Reducing the impact
Increase in suspended solids in water		No	Small	Small	Reducing the impact
Contamination with antifouling substances		Use of vessels whose hulls have not been coated with TBT-containing antifouling paint	Insignificant	Skip	Reducing the impact
Pollution with oil substances during normal operation		Provision of vessels with means for elimination of minor oil spills	Insignificant	Skip	Reducing the impact

15.3. Mineral deposits minerals

Table 66. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on mineral deposits - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Washing out, shoveling or backfilling of gravel sand deposits	Medium	No	Small	Small	Reducing the impact
Use of sand for foundation construction	Medium	No	Moderate	Small	Reducing the impact
Obstructing access to gravel sand deposits	Medium	No	Moderate	Small	Reducing the impact
Obstructing access to hydrocarbon deposits	Small	No	Insignificant	Skip	Reducing the impact

Table 67. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on mineral deposits - exploitation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Washing out or backfilling gravel sand deposits	Medium	No	Insignificant	Skip	Reducing the impact
Obstructing access to gravel sand deposits	Medium	No	Moderate	Small	Reducing the impact
Obstructing access to hydrocarbon deposits	Small	No	Insignificant	Skip	Reducing the impact

Table 68. Impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on mineral deposits - decommissioning stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Washing out or backfilling gravel sand deposits	Medium	No	Small	Small	Reducing the impact

16. Shortcomings in technology and gaps in modern knowledge

The main problem for the contractors of the study and assessment of the impact of OWF BIII on abiotic elements of the environment was the lack of similar investments in Poland to assess the scope and scale of impacts. In this situation, the knowledge and experience of countries where offshore wind energy is developed has been used.

Making a fully objective and reliable assessment of the magnitude of the impact of wind farms on the marine environment, both in relation to the sites of planned locations and within further, adjacent bodies of water, is a very complex issue, and many theoretical, modeling and operational issues related to their impact on the hydrodynamics and hydrophysics of phenomena occurring across the entire section of the depths have not yet been sufficiently recognized. Therefore, the analyses presented and the resulting conclusions for the Polish areas of the South Baltic still require thorough research. Although wind farms of various sizes have been built and operated in the sea areas of neighboring Baltic states (Germany, Sweden, Denmark) for several - more than a dozen years, it is nevertheless difficult to fully adapt the experience and lessons learned from their construction and operation to the realities and requirements of Polish sea areas due to the different specificity of hydrological conditions, the relatively short time of operation at sea and limitations in access to operational information.

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17.1. Literature

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT
for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 3

Impact assessment on benthos and protected habitats

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Abbreviations and definitions

Bentofag	An animal that feeds mainly on benthos (benthic organisms) (Zmudzinski, 2002)
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
Epifauna (Epibentos)	Fauna living on the surface of the bottom (Zmudzinski, 2002)
EEZ	Exclusive Economic Zone (Exclusive Economic Zone)
FEW Baltic II	Baltic II wind farm
Phytophilous fauna	"Herbivorous" animals that live among plants (Zmudzinski, 2002)
IMGW-PIB	Institute of Meteorology and Water Management - National Research Institute
Infauna	A community of organisms living inside bottom sediments (Zmudzinski, 2002)
IPW	Internal connection infrastructure
NPS	National Electricity System
IMF Baltica 2	Baltica 2 offshore wind farm
IMF Baltica 3	Offshore wind farm Baltica 3
IMF BII	Offshore wind farm OWF Baltic II
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
MIR-PIB	Marine Fisheries Institute - National Fisheries Institute
MIP	Offshore Transmission Infrastructure
Mytilization	A word derived from English ("mytilization"), the intensive and rapid colonization of hard substrate by the mussel Mytilus trossulus, including the artificial substrate of the underwater part of wind power plants (Krone et al., 2013)
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
EIA	Environmental impact assessment
Opportunistic species	Easily adaptable to changing habitat and nutritional conditions, resistant to poor environmental conditions, resulting especially from high levels of environmental pollution (Zmudzinski, 2002)
Vagile organism	Free-living, not permanently attached to the substrate (Zmudzinski, 2002)
POM	Polish maritime areas
PEM	Electromagnetic field
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
EIA/ EIA Report/	Environmental impact report
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for

	Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
ROV	Remotely Operated Vehicle for underwater film inspection (Remotely Operated Vehicle)
Ecological succession	The process of ecosystem evolution, that is, gradual directional changes that lead to a change in the species structure of the ecosystem, that is, the transformation of one ecosystem into another (Zmudzinski, 2002)
Euryhaline taxon	Able to live in a relatively wide range of water salinity, such as in both brackish and brackish waters, and sometimes even in fresh water (Zmudzinski, 2002)
TBT	Tributyltin

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of the update of the conditions for implementation and operation of the Project - OWF BIII, for which the Environmental Decision was issued, on benthos and habitats protected within the Natura 2000 network is included in Section 5.2 of Volume VI of the Report.

2. Introduction

This section of the Report assesses the potential impacts of changing and updating the conditions for implementation and operation of the Project - BIII OWF on benthos and Natura 2000 protected habitats.

Characteristics of the benthos occurring in the area of OWF BIII and in the zone of its potential impacts are presented in Chapter 6 of Volume III of the Report. The assessment of the impact on natural habitats was not presented separately in the 2015 Report, so its current inclusion is also due to changes in the regulations defining the content of the environmental impact report.

Habitats of Community Interest have not been identified in the BIII offshore wind farm area, so the project will not directly affect these habitats, e.g. by physically transforming them. Nevertheless, two types of protected natural habitats - 1110 Sandbanks under the sea and 1170 Rocky and rocky seabed, reefs - are the subject of protection in the Slupsk Shoal PLC990001 Natura 2000 area, located about 5.5 km to the west of the BIII OWF area. Therefore, the characteristics of the habitats in question, as well as the assessment of the impact of OWF BIII on these habitats, are presented in section 12 of this chapter, in the context of the potential impact of the planned project on Natura 2000 sites.

3. Description of the planned project

3.1. Parameters of the project affecting the scale and type impacts

The parameters of the BIII OWF that are relevant to the assessment of the project's impact on benthos are:

- farm location;
- area of the farm - total and buildable;
- foundations - types, number, dimensions, method of foundation and the seabed area occupied by them;
- power cables - their length and the surface of the bottom disturbed during their laying.

With regard to natural habitats, potential impacts on them will be influenced by the parameters of the project that determine the zone of sediment redeposition extent, i.e. primarily the types, number, dimensions of foundations and the bottom area transformed for them (especially the total volume of dredging), as well as the length of power cables and the bottom area disturbed during their laying.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.2. Projects whose impacts may cumulate with the impacts of OWF BIII on benthos and natural habitats

Information on existing and planned projects whose impacts may cumulate with those of OWF BIII, resulting in their amplification, and the basic assumptions for the analysis of cumulative impacts of the planned farm are presented in Section 13 of Volume II of the Report.

In the area of the BIII OWF, no existing or planned projects for which an environmental decision has been issued that could potentially, together with the BIII OWF, cause cumulative impacts on benthos have been identified, with the exception of the planned project involving the construction of the BIII OWF Offshore Power Transmission Infrastructure (MIP BIII). The project in question has the potential to cause cumulative impacts with OWF BIII on benthos, related to the agitation of bottom sediments during the construction phase. The impact in question is assessed in Section 9.1.5 of this document.

On the other hand, taking into account that within the framework of the assessment of the impact of a project on the Natura 2000 area, the cumulative impact of the project with other executed, executed or planned projects is taken into account, regardless of whether a decision on environmental conditions has been issued for them, the assessment of cumulative impacts with regard to natural habitats protected within the Natura 2000 network (see: Chapter 12 of this document) includes projects that may cause cumulative impacts related to the agitation of bottom sediments at the stage of construction and decommissioning of the OWF BIII within a radius of up to approx. 10 km from its borders, i.e.:

- Baltica 3 offshore wind farm (Baltica 3 offshore wind farm area);
- MIP BIII;
- Baltic Power OWF;
- Aggregate mining on Slupsk Shoal.

4. Existing pressures anthropogenic

The area of the planned project is located at a distance of 23 kilometers from the coastline, along which no major industrial centers, as well as large concentrations of people, are located in the hinterland. The anthropogenic impacts, which include the area of the planned project in the depth range of 20-40 m, include the process of eutrophication or fishing pressure.

Eutrophication, which has been observed in the Baltic Sea since the 1950s, through excessive inputs of nitrogen and phosphorus compounds (from rivers and the atmosphere), partly as a result of economic activity, enriches the environment with nutrients, having a negative impact on the benthos (Andersen and Laamanen, 2009). Under the influence of eutrophication, the same trend is taking place among phytobenthos throughout the Baltic Sea (including POM): a decreasing proportion of perennial kelp and brown algae species (especially Fucus vesiculosus) in favor of fast-growing filamentous brown algae and anoxia-inducing algal mats lying on the bottom (Ciszewski et al, 1992; Kautsky et al, 1992; Kukk, 1995; Kruk-Dowgiałło, 1996; Eriksson et al, 1998). Oxygen deficits in bottom waters, which are unfavorable for macrozoobenthos, can occur as a result of stagnant waters, especially in the deep-water zone of the Baltic Sea, in the absence of inflows from the North Sea, and during cyanobacterial blooms. Most macrozoobenthos species are very sensitive to the growth of organic matter on the bottom and conditions of hypoxia (oxygen concentration < 2 ml O2/l) or anoxia (lack of oxygen, hydrogen sulfide appears) eventually perishing, while others are more tolerant and can survive even a few weeks under unfavorable conditions or undertake an escape from the area under oxygen deficient conditions (Janas

et al. 2004, Andersen and Laamanen 2009, HELCOM Secretariat 2013). In the central Baltic, cyanobacterial blooms have been occurring since 1960, especially in July and August (Rönnberg and Bonsdorf 2004), so late summer may see processes of intense mineralization of organic matter (Janas et al., 2004) leading to oxygen deficits. The more important inflows from the North Sea reaching the bottom waters of the southern Baltic occurred in 1993 and 2003. (Nausch et al., 2003). In 2013, inflows from the North Sea of 100-300 ^{km3} reached the central Baltic, so there was no hypoxic condition. The average minimum oxygen concentration in the bottom layer in the waters of the Central Coast, in the area where OWF BIII is planned to be sited, was 5.55 $^{cm3/dm3}$ in 2012. (Burakowska et al., 2013). In 2012, the status of eutrophication of the marine environment according to the Water Framework Directive in the waters of the area of the planned project was moderate (Figure 19.1., Chapter 19 in Lysiak-Pastuszak et al., 2013). In general, the region of the planned project, due to the possibility of good oxygenation (due to full mixing of the water by storms), has the greatest potential capacity to neutralize the effects of eutrophication, in contrast to the zone below the halocline (Andrulewicz et al. 2008), where long-term oxygen deficits may occur. In the Baltic Proper, the permanent halocline floods at a depth of 60-80 m (Andersen and Laamanen 2009). In addition, the load of pollutants carried into the coastal zone of the southern Baltic from the atmosphere (including nitrates, sulfates and heavy metals) is low (Danowska and Woroń, 2013). HELCOM (2005) shows that atmospheric nitrogen input to the Baltic Sea accounts for only 25% of the total marine nitrogen contribution from anthropogenic sources. In addition, it is necessary to consider the toxicity of POPs (DDT, PCBs, PAHs), which results from their accumulation in bottom sediments and subsequently in the downstream trophic chain of marine organisms (Pempkowiak, 1997). POPs present in sediments can have phytotoxic or stimulatory effects on plant growth and toxic effects on fauna by accumulating, including in the soft tissues of bivalves (Galer et al., 1997). As a result, this can lead to a decline in benthic abundance and biodiversity (Kingston, 1992; Grnat and Briggs, 2002). However, concentrations of POPs in bottom sediments and seawater in the area of OWF BII occurred at low levels and did not exceed values typical of sandy sediments or did not deviate substantially from typical contents for southern Baltic waters (Dembska et al., 2015). The above reasoning shows that the BIII OWF area is not under the direct influence of land-based pollution sources and the degree of anthropogenic pressure that could affect the benthos is insignificant.

Fishing, especially bottom trawling, destroys the seafloor to a sediment depth of 3-6 cm and can also negatively affect the structure, biodiversity and functioning of the benthos (Kaiser and de Groot, 2000; Kaiser et al. 2006). Slow-growing benthic species that reach large sizes are particularly sensitive to the effect of trawling (Kaiser et al., 2000), while low mortality is observed among organisms of small size in the face of the described impact (Gilkinson et al., 1998). The mortality rate of bivalves as a result of bottom fishing is 30-40% (Bergman and van Santbrink, 2000). The recovery of macrofaunal resources (reaching the initial biomass) after the bottom devastation process, even after a single bottom trale, is about 5 years (Dinmore et al., 2003). The share of bottom trawling in the Project area fluctuated between 11% (2017) and 21% (2015) in 2013-2018. Due to the low fishery productivity of the analyzed area, which accounted for 6% of the productivity of the Polish Baltic Sea zone in 2013-2018, the pressure from fishing on the benthos should be considered insignificant.

The BIII offshore wind farm area is located outside the main shipping lane, but in close proximity to it (TSS - about 0.8 km to the south). Seasonally, there is tourist traffic associated with fishing. During the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality and bottom sediments, which may indirectly affect the benthos.

5. Description of anticipated effects on the environment if the project is not undertaken project

This chapter analyzes three scenarios for the likely impact, or lack thereof, on benthos if the BIII OWF project is not undertaken:

- offshore wind energy will not be developed in Polish maritime areas, so the assessed project, or one similar to it, will not be implemented,
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind energy will not be made, but the mining industry will develop.

The results of the analysis are shown in the table below.

Table 1. Effects on benthos if the project is not undertaken

Lp.	Script	Impact on benthos
1.	Offshore wind power will not be developed	No activities related to the construction, operation or decommissioning of offshore wind farms would mean no impact on the benthos, so its assemblages on a short-term scale will remain in their current ecological state. The area designated for OWF BIII will remain unchanged and will continue to be used as before (no change in the structure of the bottom surface, no navigational impediments, a larger fishing area). In the analyzed area, as a result of normal ship operation, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality and sediments, and indirectly - the living conditions of benthic organisms. However, the qualitative and quantitative structure of the benthos of this region will be subject to processes occurring in the entire South Baltic seabed zone, in a similar depth range (20 - 40 m). Changes in the qualitative and quantitative parameters of the benthos in the long term are caused by large-scale processes, such as. progressive (or decreasing) eutrophication, increased water warmth as a result of global climate change, the effect of "water sweetening" when water exchange with the North Sea is reduced and at the same time increased river runoff, or "oceanization" as a result of increased saltwater inflow from the North Sea caused by extreme meteorological phenomena - intense and prolonged winds from westerly directions. The direction of possible changes cannot be determined with high probability by scientific methods.
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	In the event that the BIII OWF is not built, but other wind farms are built in neighboring locations as a result of offshore wind energy development, no significant impact on benthos is expected in the BIII OWF area. Only the suspended solids that will rise during the

Lp.	Script	Impact on benthos
		construction of these farms may settle in a small layer on the seabed. From the point of view of impacts on benthos, the type of sediments present at the planned OWF site will be important. A greater impact involving greater redistribution of pollutants deposited in the sediments into the water body and the formation of greater long-lived suspended solids will be observed for clay sediments (with high organic matter and fine fractions), which are generally characterized by higher contents of metals, nutrients and organic pollutants. There will be less impact when offshore wind farms are located in the area of coarse sands (with low organic matter and fine fractions), which are characterized by a low content of metals, nutrients and organic pollutants. The area allocated for OWF BIII will remain unchanged and continue to be used as before.
3.	Offshore wind power will not develop, but mining industry will grow	Potential changes in the benthos of the BIII offshore wind farm area could also result in other uses of marine resources in its immediate vicinity, such as aggregate extraction from the seabed or oil/gas extraction. The scale of potential short-term changes in the benthos will be limited if the requirement for operators to apply the principle of best available technology is met.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

6. Assessment methodology impact

The project's impact assessment was carried out in accordance with the **project's framework methodology, as described in Section 5 of Volume I of the report, with some modifications or refinements, as discussed below**.

6.1. Modifications or refinements to the framework methodology evaluation

The following modifications or refinements to the evaluation framework methodology were made in this study.

6.1.1. Sensitivity assessment of species benthos

It was necessary to introduce into the adopted methodology a detailed classification of the sensitivity of benthic species, which is in line with the practiced methodology for assessing the impact on this environmental element, among others in Denmark (Birklund, 2007a, 2009a).

Sensitivity assessment of benthic species was described based on the methodology of Hiscock and Tyler-Walters (2006). Sensitivity of benthic species was defined as a function of the population's ability to adapt to various changes occurring in the environment as a result of the project (known as susceptibility to change) and the population's ability to return to its original state after the cessation of the influencing factor (stressor).

The sensitivity classification of benthic species is shown in the table below.

Table 2. Sensitivity classification of benthic species

Vulnerability to change	Ability to restore populations/return to the original state						
	No	>25 years	> 10-25 years	> 5-10 years	> 1-5 years	< 1 year	< 1 week
None1	very high	very high	high	average	average	low	very low
Low2	very high	high	high	average	low	low	very low
Average3	high	average	average	low	low	very low	no
High4	no	no	no	no	no	no	no

1 - the population will be destroyed under the influence of the stressor

2 - part of the population will be destroyed under the impact of the stressor, and the remaining survival rate will be reduced

3 - the population will not be destroyed under the impact of the stressor, but its survival rate will be reduced

4 - the impact of the stressor does not affect the structure and functioning of the population

Source: Hiscock and Tyler-Walters, 2006

6.1.2. Assessment of the scale of exposure

In determining the scale of exposure of the impact, it was assumed that local scale means the impact on populations of local significance, i.e. limited to the area designated for the project, while regional scale means the impact on populations of regional significance, i.e. pertaining to physical-geographic units (e.g. mesoregions, macro-regions).

6.1.3. Assessment of the importance of resource

Definitions defining the importance of the environmental resource benthos have been revised. An in-house study was used, but based on definitions, criteria and classifications commonly used in benthic research (Dowgiałło and Brzeska, 2009; Węsławski, 2009; Węsławski et al, 2009; Kruk-Dowgiałło et al, 2011; Osowiecki et al, 2012).

The benthos is a group of organisms, so the impact factors (stressors) at the stage of construction, operation and dismantling of the wind farm will affect the entire assemblages/habitats, taking into account the relevance of individual species included in them for the course of ecological processes (e.g., rarity, sensitivity to environmental changes). The importance of the benthos is primarily ecological (functional) importance, that is, either a food role or a habitat-forming role. In addition, the status of the benthic population as an environmental resource is indicative of the ecological quality of marine areas (natural value), which can be assessed by the adopted criteria of natural value in the case of macrophytes (Kruk-Dowgiałło and Brzeska, 2009; Kruk-Dowgiałło et al., 2011) and using the multimetric index B for macrozoobenthos, among others. This indicator combines the results of quantitative measurements (alignment of abundance of individual taxa) and species diversity with qualitative information about the degree of ecological tolerance of individual taxa (Osowiecki et al., 2012).

The importance of the benthos determined separately for phytobenthos and macrozoobenthos on the basis of a 5 - step classification is shown in the following tables (Table 3, Table 4).

For assessing the importance of phytobenthos, the presence of communities, playing a habitat-forming role, is a more important feature than the presence of individual rare or protected species.

Table 3. Classification of the importance of the benthos

Meaning	Habitat-forming role	Presence of rare and protected species
Very small	lack of communities	lack of protected and rare species
Small	lack of communities	protected and/or rare species present
Medium	communities are present	lack of protected and/or rare species
Large	communities are present	protected and/or rare species present
Very large	communities are present	protected and rare species form communities

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The most important feature classifying the importance of macrozoobenthos is the feeding and habitat-forming role of the assemblages. The macrozoobenthos assemblage usually includes several clusters of benthic fauna, including bivalves, crustaceans, polychaetes, oligochaetes and gastropods, but the highest abundance/biomass or dominance of individual clusters in an assemblage determines its ecological significance (Table 7). The B Index is a multimetric index for assessing the ecological quality of Baltic coastal waters (POM) based on the status of benthic macroinvertebrates. The index was created in accordance with the requirements of the EU Water Framework Directive 2000/60/EC. Index B in its algorithm takes into account: abundance, sensitivity of individual species and the number of species in the assemblage (Osowiecki et al., 2012) and divides water status into 5 classes (Table 4.3. in Blenska et al., 2015 - Volume III Section 6 of the EIA).

Table 4. Classification of the importance of macrozobenthos

Meaning	Food and habitat-forming role	Indicator B	Presence of rare and protected species
Very small	no clams in the band	< 1.91 - poor state of ecological quality of the marine area	no
Small	the team is dominated by polychaetes tolerant to environmental degradation	≥ 1.91 - poor state of ecological quality of the marine area	none/ may occur
Medium	the band is made up of bivalves, polychaetes and crustaceans sensitive to environmental degradation	≥ 2.7 - moderate state of ecological quality of the marine area/ ≥ 3.18 - good state of ecological quality of the marine area	none/ may occur
Large	in the complex there are mainly various species of mussels, including the mussel - *Mytilus trossulus*	≥ 3.18 - good state of ecological quality of the marine area	may occur
Very large	in the assemblage there are various species of mussels, and especially	≥ 3.18 - good state of ecological quality of the marine area / > 3.72 -	may occur

Meaning	Food and habitat-forming role	Indicator B	Presence of rare and protected species
	dense aggregations of mussels - *Mytilus trossulus*	very good state of ecological quality of the area marine	

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In the classification of the importance of environmental resources, the category "insignificant" does not apply to the benthos, since every biotic element of the ecosystem is more or less important for its functioning. This category was replaced by the "very small" category and taken into account in the final impact significance assessment matrix covering impact magnitude and resource significance, as shown in the table below.

Table 5. Impact significance assessment matrix

Receptor importance (phytobenthos or macrozoobenthos)	Magnitude of impact				
	Large	Moderate	Small	Insignificant	No change
Very large	Very large	Large	Moderate	Small	No change
Large	Large	Moderate	Small	Small	No change
Medium	Moderate	Small	Small	Skip	No change
Small	Small	Small	Skip	Skip	No change
Very small	Small	Skip	Skip	No change	No change

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

6.1.4. The most far-reaching scenario of the venture - NIS 2015

In the 2015 Report, the assessment of potential impacts of the BIII OWF in the parameters approved by the Environmental Decision was based on the analysis of the most far-reaching scenario of the project - NIS 2015, i.e. such a set of parameters of the Project that negatively affects the benthos to the highest degree. The 2015 NIS assumed the construction of 200 wind power plants (this is the maximum number of plants according to the PSZW) and 7 offshore substations with associated infrastructure, placed on gravity foundations, surrounded by a leaching protection layer. Of the foundations proposed in the technical concept of the Royal Haskoning DHV (2014) - the gravitational one will have the most negative impact on the benthos due to the greatest width of the base. **It was considered that any other project scenario considered, would result in environmental impacts equal to or less than the NIS. The option approved by the Environmental Decision calls for 120 power plants, about 40% less than in the NIS.**

With the modified parameters of the Project vis-à-vis those approved by the Environmental Decision, there will be a further reduction in the number of power plants to 60 units, which is 50% of the number of power plants approved by the Environmental Decision and 30% of the power plants adopted for the NIS. In addition, the possibility of using gravity foundations has been restricted to supporting infrastructure only (foundations for power plants will be implemented as monopile or jacket foundations), and the number of such foundations has been reduced from 6 to 1 unit.

7. Potential impacts of offshore wind farms offshore wind farms

In the following, based on literature data and, above all, those presented in the 2015 Report, the potential impacts of offshore wind farms on benthos have been determined, at different stages of investment. The most important parameters and factors affecting the scale of impacts are also indicated.

7.1. Stage construction

A summary of the main, indirect and direct types of impacts of the wind farm on the benthos during the construction phase is presented in Table 6 (from most to least significant). Individual benthic taxa, depending on their sensitivity, as well as the biology of the species themselves, will tolerate the environmental changes that have occurred to varying degrees, as will be described in detail in Chapter 9 of this section.

Table 6. Potential impacts of OWF on benthos - construction phase

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
Disruption of sediment structure	During the construction of the OWF, work will be carried out that will disturb the structure of the bottom sediments. These include, in particular, the installation of foundations and the laying of power cables, as well as the storage of dredged bottom material. Such disturbances will also be caused by anchoring vessels. This mechanical intervention in marine sediment will physically destroy benthic communities by crushing, scraping, or carrying them to the bottom surface, where they will be subject to predation pressure. (Söker et al, 2000; Meissner and Sordyl, 2006; Zucco et al, 2006; Macnaughton et al, 2014). The most important parameters affecting the level of impact are: • the dimensions and number of foundations to be built, and the number and technique of cables to be laid, • a type of rock material that forms the seabed.
Increase in the concentration of suspended solids in the water depths	As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and spread in the water tone. Organic and inorganic particles larger than 0.45 µm floating in water form a suspension (Font et al., 1996). Fine particles float longer than larger particles and the range of their dispersion is wide (Hiscock et al., 2002). The higher the concentration of the suspension and the longer its exposure time, the more negatively it affects the condition of benthic organisms (Newcombe and MacDonald, 1991). An increase in suspended solids in the water tone will result in a decrease in water transparency, which adversely affects the photosynthetic process of phytobenthos.

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
	There will be a change in trophic conditions for organisms that filter or feed on suspended solids and organic matter deposited in the sediments. For some species of benthic macroinvertebrates that feed through filtration, a higher concentration of suspended solids will initially lead to an increase in the process and the condition of the organisms (Söker et al., 2000). However, once a species-appropriate threshold of suspended particle concentration in the water is exceeded, there is a rejection of the filtered material in the form of pseudofecal matter or a reduction in the filtration process causing an increase in mortality of benthic fauna, such as by clogging the filter apparatus of bivalves (Widdows et al., 1979; Cowie et al. 2000, Söker et al, 2000; Kooijman, 2006; Leonhard, 2006). Only in centipedes and bryozoans were the aforementioned physiological reactions not observed (Könnecker, 1977). A positive result of this phenomenon may be the release of additional nutrients from the sediments that provide additional food for macrozoobenthos (Schroeder, 1995; Cooper and Beiboer, 2002). The most important parameters affecting the level of impact are: • the dimensions and number of foundations to be built, and the number and technique of cables to be laid, • a type of rock material that forms the seabed.
Deposition of suspended solids on the seabed	Suspended solids raised due to ongoing construction activities will gradually re-deposit on the seabed. The deposition of suspended solids will have an adverse effect on the photosynthetic process of plant organisms. This will result in an increase in the intensity of the burial of vagile macrozoobenthos species from under the additional sediment layer. Epifaunal species and filter-feeders are unable to dig out from under an additional layer of sedimenting suspension greater than 1 cm. Infaunal organisms can tolerate backfilling with a layer between 5 and 10 cm thick, although this also depends on the type of sediment and time of impact (Maurer et al., 1986; Hiscock et al., 2002). However, after a month, there is increased mortality of all benthic species by covering them with a 5 cm thick layer of sand and silt (Söker et al., 2000; Hiscock et al., 2002). The most important parameters affecting the level of impact are: • the dimensions and number of foundations to be built, and the number and technique of cables to be laid, • a type of rock material that forms the seabed.
Release of pollutants and nutrients from the sludge into the water body	Construction work that disturbs the sediment structure promotes the passage of pollutants and nutrients from the

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
	sediment to the water body (Frostner, 1980; Bourg and Loch, 1995; Bojakowska, 2001; Dembska, 2003; Uścinowicz, 2011). From the agitated sediments, labile forms of metals, organic pollutants, i.e. polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), biogenes (nitrogen and phosphorus), among others, will pass into the water. Harmful chemical compounds exist in marine sediment and water in various forms, but only some of them are assimilated by living organisms causing negative effects (Bryan et al., 1985) in the form of changes in the qualitative and quantitative structure of the benthos. The toxicity of heavy metals or chlorinated hydrocarbons (DDT, PCBs) is due to their accumulation in bottom sediments and subsequently in the downstream trophic chain of marine organisms (Pempkowiak, 1997). As a result, this can lead to a decline in benthic abundance and biodiversity, which will be dominated by opportunistic species (Kingston, 1992; Grant and Briggs, 2002). Accumulation of heavy metals by bivalves is the reason for deformation of their shells, as well as the occurrence of the neoplastic disease gill neoplasia (Hummel et al., 2000; Thiriot- Quievreux and Volovich, 2001). As early as the 1970s, a correlation was noted between the presence of tributyltin (TBT) compounds used as a biocide on ship hulls and the frequency of anomalies in marine mollusks (Wang et al., 2010; Yamamoto et al., 2009). At present, the use of TBTs is banned or explicitly restricted, unfortunately, these compounds accumulate in bottom sediments, where they remain for long periods of time, prolonging the exposure of aquatic organisms to their toxic effects. TBT's mechanism of toxicity is largely directed at reproductive dysfunction, due to its androgenic effects (Gosz et al., 2011). The increased amount of available nitrogen and phosphorus compounds in the water can increase plant biomass. The most important parameters affecting the level of impact are: • dimensions and number of foundations, • the length of the cable sections and the width and depth of the cable trench, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.
Oil spill	The release of petroleum substances may occur in emergency situations (ship failure or collision, failure at a substation) and is an unplanned impact. Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom.

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
	Contamination of water and bottom sediments can negatively affect benthic organisms, causing contamination of organisms at all levels of the food chain in the failure area (Malaczynski and Czarnecki, 2010). The most important parameters affecting the level of impact are: • the type and amount of oil substances released, • weather conditions, • a type of rock material that forms the seabed.
Contamination of the seabed with construction materials	During the construction of the offshore wind farm, the project site will generate waste directly related to with the process of building wind turbine components. These may include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation elements and power plant towers, and other chemicals used during construction work. They can enter the sea in an unplanned manner and then be deposited on the bottom. The most important parameters affecting the level of impact are: • the type and amount of waste released, • weather conditions, • a type of rock material that forms the seabed.
Underwater noise emissions	The benthos will be exposed to underwater noise and vibration emissions during the installation of monopile, jacket and tripod foundations. The detrimental effects of these interactions on the physiology of the above organisms are little known, as there are only selective literature data on the results of studies that were conducted under laboratory conditions. The average sound intensity during piling is 133- 145 dB in the frequency range of 50-200 Hz (Leonhard, 2003). Among benthic invertebrates, only crustaceans of the order Decapoda (lobsters, shrimp, garnets, crabs) are sensitive to the low-frequency noise (Budelmann and Young, 1994). In Crangon crangon garnels, exposure of individuals to noise conditions reaching 30 dB (at 25 - 400 Hz) led to a decrease in growth and reproduction rates, and their increased mortality (Lagardere, 1982). In the lobster Homarus americanus, a slowing of the heart rate was observed in the sound frequency range of 10 - 75 Hz at 150 dB (Offut, 1970). The most important parameters affecting the level of impact are: • number of foundations, • diameter of the pile(s), • power of the jackhammer, • piling time.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

7.2. Stage operation

A summary of the main types of impacts of the wind farm on benthos during the operation stage is presented in Table 7, from most to least significant. Individual benthic taxa, depending on their sensitivity, as well as the biology of the species themselves, will tolerate the environmental changes that have occurred to varying degrees, as will be described in detail in Chapter 9 of this section of the EIA.

Table 7. Potential impact of the OWF on benthos - operation stage

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
Loss of habitat	The foundations, along with a layer of protection against leaching from offshore wind farms, occupy certain areas of the seabed. The occupation of the bottom by the foundations will continue throughout the life of the farm. There will be a permanent loss of benthic habitat at the site of the farm's underwater installations (foundations and scour protection layer) (Söker et al, 2000; Meissner and Sordyl, 2006; Zucco et al, 2006; Macnaughton et al, 2014). The most important parameters affecting the scale of impact are: • number and diameter of the foundation base, • the width of the leaching protection layer (anti-erosion layer).
The creation of an "artificial reef"	One of the impacts of the OWF at the operational stage will be the "artificial reef" effect. It is formed by a hard and stable foundation for wind turbine foundations along with a leaching protection layer made of stones, boulders or rock ballast (Biowind, 2005). As a result, a new habitat is created through very rapid colonization by plant and animal communities (Norsker, 1997; Newell et al., 1998). This leads to an increase in the biodiversity of biocoenoses and an increase in the food base for fish and diving birds. The increase in biological production of the seafloor is also manifested by an increased load of organic matter in the form of dying organisms or fecal and pseudo-fecal matter of bivalves falling to the bottom (Biernacka, 1972; Mankowski and Rumek, 1975; Qvarfordt et al, 2006; Wilhelmsson and Malm, 2008). The process of succession - overgrowth with macroalgae and invertebrates of underwater power plant structures - begins as early as the first growing season of organisms from the time of plant foundation and relatively stabilizes after about 3 to 5 years, when the longest-lived bivalve species reach maximum size (Metoc Plc, 2000).

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
	In the case of plants, the overgrowth of underwater farm structures (piles) is zonal, determined by light conditions with a maximum depth to about 20 m from sea level, i.e. to the limit of the range of the euphotic zone in the open waters of the Polish Baltic zone (Kruk-Dowgiałło et al., 2011). The species assemblages of the epiphytic flora may include not only species common in Polish marine areas, but also species that are rare, protected or never recorded in Polish waters. Spores of these species or their vegetative forms may be brought with currents to the area of the planned farm from other areas of the Baltic Sea. A clear effect of the OWF's impact on the benthos, as already observed in the example of operating farms in the North Sea, is the process of "mythmaking" (Krone et al., 2013). The hard substrate of the farm's underwater structures is a new artificial element for the macrozoobenthos community, but it differs from the natural one (People, 2006; Wilhelmsson and Malm, 2008). Dominant among the benthic fauna, mussels, through filtration, take an important part in the flow of energy through the ecosystem. The process of biodeposition of suspended matter by mussels is more beneficial to ecosystem functioning than the process of natural sedimentation (Kautsky and Evans, 1987) and are themselves attractive substrates for epifauna, such as Anthozoa corals and Hydrozoa helminths (Riis and Dolmer, 2003; Norling and Kautsky, 2007). The most important parameters affecting the scale of impact are: • number and shape of foundations, • the shape and sidewall area of support structures (piles) below the sea surface, • the surface of the anti-erosion layer.
Changes in the regime of sea currents affecting changes in sediment granulometry	The foundations of the wind turbines, along with the stone scour protection layer, will modify the velocity distribution of ocean currents, also affecting sediment transport (Cooper and Beiboer, 2002; Köller et al, 2006; Zucco et al, 2006). As a result of changes in hydrodynamics and water stratification throughout the farm area, there will also be changes in the granulometry of bottom sediments in the immediate vicinity of the foundations. They, in turn, will cause a reconstruction of the qualitative and quantitative structure of the phyto- and zoobenthic communities in places where the benthos has not been completely destroyed. The most important parameters affecting the level of impact: • the number, dimensions and compaction of foundations.

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
Disruption of sediment structure	During the operation of the OWF, work will be carried out to disturb the structure of the bottom sediments, such as replacing damaged sections of the power cable. Disturbance will also be caused by anchoring vessels. In addition, the bottom sediments in the immediate vicinity of the foundation structures will be washed out. To prevent this from happening, leaching protection called an erosion control layer will be used. The most important parameters affecting the level of impact are: • dimensions and number of foundations, • a type of rock material that forms the seabed.
Change in water and sediment temperature	Installation of cables between wind turbines is associated with heat emissions and temperature increases in the sediment, in extreme cases by as much as several degrees Celsius (Kelvin) in the immediate vicinity of a cable buried more than 1 meter deep in the seabed. Electric current flowing through a power cable causes it to heat up, caused by power losses to resistance, according to Joule's law. With the increase in cable temperature above ambient temperature, heat transfer to the surrounding environment begins. This can lead to changes in oxidation-reduction potential, biogen content, or reduce microbial activity in sediments (Zucco et al., 2006). The data regarding the increase in sediment temperature in the vicinity of the cable connecting the wind turbines comes from conducting various theoretical models. It was noted that the temperature of the sediment increases only in the layer 20 - 30 cm from the surface of the cable buried at a depth of 1 m and does not exceed 2 K (2°C). No deleterious effect of elevated temperatures on benthic organisms has been observed, as these live mostly buried from the sediment surface to a depth of 35 cm (Worzyk and Böngeler, 2003; Brakelmann, 2005). In general, benthic fauna are naturally adapted to large seasonal temperature changes and are not sensitive or show very low sensitivity to a 2°C (2 K) temperature increase (Birklund, 2009). In this case, the impact is poorly documented in terms of effects on physiological and behavioral changes, reproduction and survival of benthic organisms. The most important parameters affecting the level of impact are: • depth of cable burial, • a type of rock material that forms the seabed.
Emission of electromagnetic fields and radiation	Cables that transmit electricity transmit electromagnetic fields. To date, the literature reporting on the potential impact of this parameter on benthic fauna is poorly documented and inconclusive (Andrulewicz et al, 2003; Meissner and Sordyl, 2006; Zucco et al, 2006). Electromagnetic fields can affect the migratory abilities of some crustaceans that are sensitive to the

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
	Earth's magnetic field (Gill et al., 2005), such as in the Baltic subspecies Idotea balthica (Ugolini and Pezzani, 1992). In contrast, no effect of the magnetic field was found on the following crustaceans: the gargoyle Crangon crangon, the American crab Rhitropanopeus harrisi and the great doubloon Saduria entomon based on laboratory experiments (Bochert and Zettler, 2004). The most important parameters affecting the scale of impact are: • the length and type of power cable, • the depth of foundation of the power cable.
Oil spill	See description for construction phase
Contamination of the seabed with consumables	During the operation of the wind farm, the project site will generate waste directly related to the operation of the wind farm. These may include damaged parts of farm components, cement, grout, mortar, operating fluids and other chemicals used or replaced during maintenance work. They can enter the sea in an unplanned manner and then be deposited on the bottom. The most important parameters affecting the level of impact are: • the type and amount of waste released, • weather conditions, • a type of rock material that forms the seabed.
Emission of underwater noise and vibration	At the operation stage of the farm, noise and vibration are associated with the operation of the turbines. The deleterious effects of these factors on the epiphytic fauna colonizing underwater structures of wind turbines are not known (Vella et al., 2001).

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

7.3. Stage decommissioning

Table 8. Potential impacts of OWF on benthos - decommissioning phase

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
Disruption of sediment structure	During the decommissioning of the offshore wind farm, work will be carried out that will disturb the structure of the bottom sediments. These include, in particular, the removal of foundations and power cables. Such disturbances will also be caused by anchoring vessels.

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
	Dismantling methods depend on foundation types, local environmental conditions, available vessel types and tools (Nedwell et al., 2003). There may be partial destruction of the benthic assemblage that repopulated the farm area during the operation stage around the foundations and over the power cables. Full succession of destroyed habitats can take 3 to 5 years, when the longest-lived species reach maximum size and biomass. The most important parameters affecting the level of impact are: • the number, types and dimensions of foundations, • a type of rock material that forms the seabed.
Increase in the concentration of suspended solids in the water depths	As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and spread in the water tone. The impact will not differ from the analogous impact during the construction phase. In addition, the disassembly sites will be backfilled with sand.
Deposition of suspended solids on the seabed	As a direct result of disturbing the structure of bottom sediments, the process of sedimentation of suspended solids through redeposition on the bottom will occur. The impact will not differ from the analogous impact during the construction phase. In addition, the disassembly sites will be backfilled with sand.
Elimination of the "artificial reef"	A micro-ecosystem of "artificial reefs" on the hard substrate of wind turbine structures will already be formed during the operation of the farm. If the farm's facilities are removed, not only will the habitat of benthic organisms be destroyed, but also the potential habitat, feeding, shelter and breeding grounds of many fish species and the potential food of birds - bentophagous. The most important parameters affecting the scale of impact are: • number and shape of foundations, • the shape and sidewall area of support structures (piles) below the sea surface, • the surface of the anti-erosion layer.
Release of pollutants and nutrients from the sludge into the water body	During the decommissioning of offshore wind farms, work will be carried out that causes agitation of bottom sediments, such as the removal of foundations, cables and anchoring of ships. They will favor the passage of pollutants and nutrients from the sediment into the water body.

Type of potential impact	Impact on benthos and key parameters and factors affecting the level of impact
	Labile forms of metals, organic pollutants, i.e. polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), biogenes (nitrogen and phosphorus) can pass into the water. The most important parameters affecting the level of impact are: • number and dimensions of decommissioned foundations and length of cables, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.
Oil spill	See description for construction phase
Contamination of the seabed with decommissioning materials	During the decommissioning of the wind farm, the project site will generate waste directly related to the decommissioning of the wind farm. These may include damaged parts of farm components, operating fluids, etc. They can unintentionally enter the sea and be deposited on the bottom. The most important parameters affecting the level of impact are: • the type and amount of waste released, • weather conditions, • a type of rock material that forms the seabed.
Underwater noise emissions	During the decommissioning phase of an offshore wind farm, noise and vibration arise from the demolition of wind turbine structural components and are associated with ship operations. The impact of these sounds on the physiological state of benthic organisms is the same as at the stage of construction of the farm (see: section 7.1.).

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

8. Species subject to environmental impact assessment environment

This chapter briefly characterizes the benthic organisms found in the area of the proposed OWF BIII. A full characterization is provided in the results of the benthic surveys conducted by the Maritime Institute in Gdansk, which constitute Section 6 of Volume III of the EIA. In addition, the chapter defines the sensitivity of the receptors (phytobenthos and macrozoobenthos) to the most important impacts of the farm and indicates the importance of these two communities to the ecosystem.

8.1. Phytobenthos

Phytobenthos inhabits the bottom of the overexposed zone, where the amount of light ensures that photosynthesis is sustained (Andrulewicz et al., 1998). Plants provide habitat for numerous species of crustaceans, bivalves and ichthyofauna (Węsławski, 2009). Multispecies underwater meadows form diverse plant communities and are a valuable element of the marine environment that increases

biodiversity and the productivity of the water body (Kruk-Dowgiałło and Brzeska, 2009). The function of phytobenthos in stabilizing bottom sediments and preventing coastal erosion is well known (Fonseca, 1989). The structure of the qualitative and quantitative composition of the phytobenthos, including, among other things, information on the presence of rare, protected or habitat-forming species, can also provide information on the state of the studied region of the seabed (Osowiecki and Kruk-Dowgiałło, 2006; Kruk-Dowgiałło et al., 2011).

As a result of the 2013 inventory survey, **phytobenthos was found only in the buffer zone of the OWF area and only on 1% of the area of the entire study area.** 4 taxa of phytobenthos (macroalgae) were identified, which mostly sparsely overgrow (coverage < 1%) unattached to the bottom aggregations of mussels, moving freely on the sand with the sea currents (vegetation temporarily present in the area). Single plant specimens attached to boulders and pebbles (permanent vegetation in the area) were found in only two locations, in the 23 - 25 m depth range. It was a filamentous *kelp* probably from the family *Rhodomelaceae* (Blenska et al. 2014). All phytobenthic species were subjected to impact assessment.

The characteristics of phytobenthic species subject to impact assessment are shown in Table 9.

Table 9. Characteristics of phytobenthic species subject to impact assessment and found in June 2013 in the BIII offshore wind farm area and the one-mile buffer zone

Lp.	Species Latin name/ customary	Cluster Latin/common name	The habit of the mold	Reproduction	Environmental preferences	Occurrence in POM	Occurrence * in the buffer zone of the OWF
1.	*Ectocarpus siliculosus* (Dillwyn) Lyngbye 1819/ Siliceous spikelet	Ochrophyta browns	The mold is yellowish or brownish, irregularly fork-branched, up to 30 cm high.	Annual plant. It reproduces vegetatively by producing spores and fragmenting the mold, from May to July.	Hard substrate (pebbles, shells), algae and vascular plants to which it attaches. It floods on the bottom and/or floats in the depths of the water in the form of mats (very often co-occurs with P. littoralis).	A common species, noted in the Puck Bay and areas of rocky bottoms in open waters (e.g., the boulder field of Slupsk Shoal, Ditches).	Accessory
2.	*Pylaiella littoralis* (Linnaeus) Kjellman/ Coastal *Pylaiella*	Ochrophyta browns	Brown mold composed of alternate branching threads, not twisted together or loosely twisted, up to 40 cm high.	Annual plant. It reproduces vegetatively by producing spores and fragmenting the mold.	Hard substrate (pebbles, shells), algae and vascular plants to which it attaches. It settles on the bottom and/or floats in the depths of the water in the form of mats (very often co-occurs with E. siliculosus).	A common species, noted in the Puck Bay and areas of rocky bottoms in open waters (e.g., the boulder field of Slupsk Shoal, Ditches). Water eutrophication index.	Accessory
3.	*Polysiphonia* sp. - the most commonly recorded in POM: *Polysiphonia fucoides* (Hudson) Greville 1824/	Rhodophyta crayfish	Dark red mold branching in a rod-like fashion, up to 25 cm high.	Perennial plant. It reproduces vegetatively by producing spores, and bears fruit in spring and summer.	Hard substrate (pebbles, shells) to which it attaches.	A species common to rocky bottoms, recorded in the Puck Bay and in open waters (e.g., the boulder pit of Slupsk Shoal, Ditches).	Accessory

Lp.	Species Latin name/ customary	Cluster Latin/common name	The habit of the mold	Reproduction	Environmental preferences	Occurrence in POM	Occurrence * in the buffer zone of the OWF
	The hermaphrodite						
4.	*Rhodomela confervoides* (Hudson) P.C.Silva, 1952/ None	Rhodophyta crayfish	Purple or brownish-red mold, alternately branched, debarked, up to 20 cm high.	Perennial plant. It bears fruit in autumn and winter. It reproduces mainly by producing spores, rarely by fragmenting the mold and sexually.	Hard substrate (pebbles, shells), larger algae to which it attaches.	A rare species, recorded in the rocky bottom regions of the Puck Bay and open waters (e.g., the boulder bed of Slupsk Shoal).	Fixed

* The nature of the occurrence of a given species in the study area was determined on the basis of the constancy index (Trojan, 1980), according to which taxa recorded at 0-25% of stations were considered incidental, 26-50% - accessory, 51-75% - constant, 76-100% - absolutely constant.

8.2. Macrozoobenthos

The macrozoobenthos includes the clusters:*bivalves (Bivalvia*),*crustaceans (Crustacea*),*polychaetes (Polychaeta*), scorpionfishes (*Oligochaeta*) and gastropods*(Gastropoda*). The importance of the macrozoobenthos of an area for the integrity of the Baltic ecosystem consists of the uniqueness of the area, the abundance of species and individuals, the condition of the community of organisms, the presence of habitat-forming species or those performing other functions for the benefit of the ecosystem, such as the oxygenation of the sediment by burrowing organisms, the provision of shelter or food (Węsławski, 2009). Bivalves are often the most important component of the benthic macrofauna. They play a very important role, filtering and purifying huge amounts of bottom water. Bivalves, polychaetes and crustaceans are fed by bentophages: fish and seabirds (Zmudzinski, 1990). Bivalve eggs and larvae are food for zooplankton and fish larvae (Szaniawska, 1991). Belonging to the mussel family, the mussel - *Mytilus trossulus* feeding on organic suspended solids filtered from the water tone (biofilter) locally increases water transparency and contributes to reducing the effects of water body overfertilization (eutrophication). The concentration of this species provides a favorable habitat for a diverse associated fauna, consisting mainly of crustaceans and many other small invertebrates (Kruk-Dowgiałło et al., 2011). A different type of benthic assemblages is formed by polychaetes, as organisms that feed on organic matter from the sediment and positively transform the physical and geochemical structure of the sediment through bioturbation (life activity in the seabed, such as scrambling in the sediment) (Osowiecki and Kruk-Dowgiałło, 2006).

Among the macrozoobenthos, 27 species and higher (not designated to species) taxonomic units were found. No rare or protected species were found. The taxonomic composition, abundance and biomass of the macrozoobenthos were typical of the shallow to intermediate deep bottom of the open zone of the southern Baltic Sea in both the BIII OWF area and the one-mile buffer zone. Accordingly, the species most common in the area under evaluation, i.e. occurring at more than 25% of the stations surveyed, were selected for the environmental assessment. They are represented by 12 species belonging to 5 clusters*(Polychaeta, Oligochaeta, Malacostraca, Gastropoda, Bivalvia*) occurring absolutely continuously (76 - 100%), continuously (51 - 75%) or accessorially (26 - 50%) in the study area, with abundances ranging from 10 to 669 $^{\text{sediments/square}}$ meter and biomasses from 0.05 to 27.82 $^{\text{g/m2}}$ (Trojan 1980, Bleńska et al. 2014).

Characteristics of macrozoobenthos species subject to impact assessment are shown in Table 10.

30 | S t r o n g

Table 10. Characteristics of macrozoobenthos species subject to environmental impact assessment and found in the summer of 2013 and spring of 2014 both in the relevant area of the farm and in the buffer zone of OWF BIII

Lp.	Species Latin/common name	Cluster Latin/common name	Biology and ecology	Occurrence and population status in Polish marine areas	BIII offshore wind farm area with one-mile buffer zone	
					Occurrence*	Abundance/Biomass (average values)
1.	Hediste diversicolor/ Nereida	Polychaeta Polychaetes	• a predatory polychaete that builds habitable tubes in the sediment or crawls along the bottom and plants; a detritophage • euryhaline species, tolerating periodic decrease in oxygenation of bottom water • playing an important role in bioturbation processes; a component of the diet of flatfish	• commonly found along the entire Polish coast, especially in shallow water areas • inhabiting mainly sands and silts • occurring in smaller numbers on the barren sands of the open sea and Slupsk Shoal, where individuals reach relatively small sizes	Absolutely constant	35 pers. $\cdot^{m-2}$/ 1.02 g m. m. $\cdot^{m-2}$
2.	Pygospio elegance/ Pygospio	Polychaeta polychaetes	• a small polychaete that builds long, flexible habitable tubes from sand grains and shell debris, rising above the surface of the bottom • propagating in early spring	• very common throughout the sandy bottom POM, often in significant density • most abundant inhabiting shallower bottoms • forming numerous concentrations both on the barren sands of the open sea and on the organic matter-rich	Absolutely constant	669 pers. $\cdot^{m-2}$/ 0.94 g m. m. $\cdot^{m-2}$

Lp.	Species Latin/common name	Cluster Latin/common name	Biology and ecology	Occurrence and population status in Polish marine areas	BIII offshore wind farm area with one-mile buffer zone	
					Occurrence*	Abundance/Biomass (average values)
				bottom of Gdansk and Pomeranian bays		
3.	Marenzelleria neglecta / Marenzelleria	Polychaeta polychaetes	• non-native invasive species in the Baltic fauna - representative of infauna • by building burrows up to 25 cm deep, it plays an important role in bioturbation processes • feeding on particles suspended in the water depths or detritus from the sediment surface • food for many species of fish	• occurring in large numbers throughout the POM, both on sandy and silty bottoms, to a depth of 80 m • the maximum size (2000 - 3000 persons $^{/m2}$) • was found in the Gulf of Gdansk	Absolutely constant	236 pers. .$^{m-2/}$ 4.80 g m. m. .$^{m-2}$
4.	Oligochaeta non det./ Angiosperms	Oligochaeta scorpionfishes	• scorpionfish with a strongly elongated, cylindrical body with clearly distinguishable segments • detritus-eating hermaphrodites	• living mainly on the sandy bottom of the coastal zone, and partially on the muddy bottom of deeper regions of the sea	Accessory	69 pers. .$^{m-2/}$ 0.07 g m. m. .$^{m-2}$
5.	Saduria entomon / Double great	Malacostraca armored ships	• the largest Baltic crustacean, a relict species of Arctic origin • inhabiting cold and often poorly oxygenated waters	• preferring mainly deeper bottoms, below the 40-50 m isobaths	Accessory	25 person .$^{m-2/}$ 1.46 g m. m. .$^{m-2}$

Lp.	Species Latin/common name	Cluster Latin/common name	Biology and ecology	Occurrence and population status in Polish marine areas	BIII offshore wind farm area with one-mile buffer zone	
					Occurrence*	Abundance/Biomass (average values)
			• feeding on detritus and carrion • an ingredient in the food of juvenile and adult cod	• showing no preference for sediment type (both sandy and muddy bottoms) • the highest concentrations are observed on the slope of the Hel Peninsula and the Slupsk Trough		
6.	Bathyporeia pilosa/ Sandfly	Malacostraca Armored Carriers	• transparent crustacean sensitive to oxygen deficits - an indicator of coastal water quality • feeding on the surface of sediments, eating algae and small invertebrates • reproducing in spring and summer • one of the most important species in the food of young bottom-feeding fish	• massively occurring on the sandy bottom of the coastal zone and shoals, to a depth of about 25 - 30 m • preferring habitats with high water dynamics, clean and non-growing sands • the highest densities were found on the slope of the Hel Peninsula and on the Oder and Slupsk Shoal	Accessory	24 person .$^{m-2}$/ 0.05 g m. m. .$^{m-2}$
7.	Monoporeia affinis/ Black-eyed Pontoporeia	Malacostraca Armored Carriers	• black-eyed amphipod crustacean • requiring a well-oxygenated environment with low temperatures and relatively low salinity	• common throughout the oxygenated area of the Polish zone, ranging in depth from about 10 to 70 m • in the zone of cold waters (about 30-70 m) forms	Accessory	10 person .$^{m-2}$/ 0.07 g m. m. .$^{m-2}$

Lp.	Species Latin/common name	Cluster Latin/common name	Biology and ecology	Occurrence and population status in Polish marine areas	BIII offshore wind farm area with one-mile buffer zone	
					Occurrence*	Abundance/Biomass (average values)
			• making vertical migrations to the sea surface at night • detritophage • an important ingredient in the food of pelagic and demersal fish	concentrations of up to 6,000 os./m2 • in the winter, swimming up to shallower areas		
8.	Hydrobia sp./ Hydrilla	Gastropoda snails	• some of the smallest Baltic snails with shell heights up to about 10 mm • reproducing mainly in spring • h. ventrosa, H. ulvae and H. neglecta are found in the Baltic Sea	• widely distributed, common Baltic snails, distributed to depths of up to 50 m • showing no specific preference for sediment type, more often found on muddy, rocky bottoms and among bottom vegetation	Fixed	90 person .m-2/ 0.15 g m. m. .m-2
9.	Mytilus trossulus/ Musselshell	Bivalvia clams	• mussel shell reaching a maximum of 55 mm • adult specimens attaching themselves to the substrate with byssal threads • biofilter, helping to reduce the effects of eutrophication • reproductive period falling in spring and early summer	• the bathymetric range of the mussel is determined by the presence of hard substrate and the availability of phytoplankton, which rarely occurs below the picocline • in POM inhabiting the boulder bed of the Slupsk Shoal in large numbers (up	Accessory	343 pers. .m-2/ 27.82 g m. m. .m-2

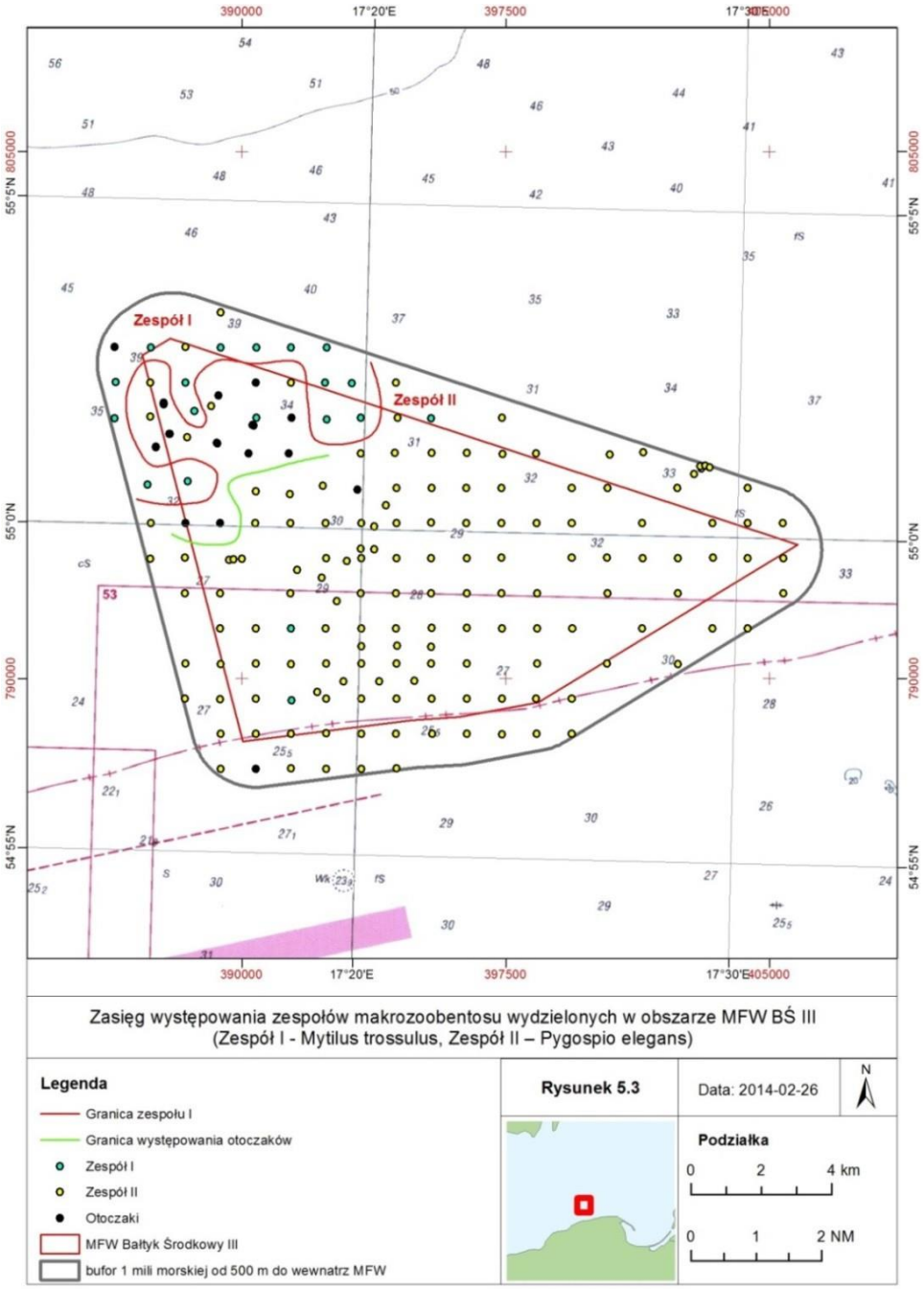
Lp.	Species Latin/common name	Cluster Latin/common name	Biology and ecology	Occurrence and population status in Polish marine areas	BIII offshore wind farm area with one-mile buffer zone	
					Occurrence*	Abundance/Biomass (average values)
			• the concentration of this species provides a favorable habitat for diverse associated fauna (e.g. barnacles, bryozoans) • an important ingredient in the food of flat fish, bull goby, many wintering birds, especially coots and ducks	to 3,000 os./m^2) and the sandy bottoms of the western parts of the Pomeranian and Gdansk Bays • on the sandy bottom forming aggregations of a dozen-odd individuals connected byssus, in the rest of the Polish zone only single individuals are encountered		
10.	Macoma balthica/ Baltic hornwort	Bivalvia clams	• a small Baltic clam that inhabits the surface layer of the bottom, projecting the ends of two siphons to the surface • feeding on detritus and food particles filtered from the water depths • species very resistant to oxygen deficiency • the staple food of flounder, eelgrass, as well as many diving birds, such as ducks	• in POM occurring throughout the bottom, both sandy and silty, to a depth of 90 m • the most abundant inhabiting the muddy bottom of the Gulf of Gdansk, reaching maximum abundances of more than 5,000 os./m^2 • numerous clusters also form in the Pomeranian Bay, on the sandy and silty bottom near the mouth of	Absolutely constant	45 pers. ./m^{-2}/ 13.99 g m. m. ./m^{-2}

Lp.	Species Latin/common name	Cluster Latin/common name	Biology and ecology	Occurrence and population status in Polish marine areas	BIII offshore wind farm area with one-mile buffer zone	
					Occurrence*	Abundance/Biomass (average values)
				the Oder River (more than 3,000 os./m^2)		
11.	Cerastoderma glaucum/ Common heartworm	Bivalvia clams	• a clam with a characteristic shell with 22-28 radial ribs • often hanging on byssal threads attached to macrophytes (juvenile heartworms) or living directly on the bottom (adults) • oxygen-loving species	• common shallow water species to a depth of 20 - 25 m, preferring sandy bottoms • most numerous in sheltered bays	Fixed	35 pers. ./m^{-2} 2.24 g m. m. ./m^{-2}
12.	Mya arenaria/Sandelder clam	Bivalvia clams	• the largest Baltic clam (up to 70 mm long), an Atlantic species that burrows deep in the sediments, in the southern Baltic at least to a depth of 25 cm, contacting the bottom surface with long siphons • expanding in the spring • filterer - which plays an important role in the transport of organic matter into the sludge and in the bioturbation process • fish food, mainly flatfish	• in Polish waters a common inhabitant of shallow bottoms, to a depth of 30 - 40 m • most abundant inhabiting the sandy-muddy bottom of the Pomeranian and Gdansk Bays, forming clusters of up to several thousand individuals per square meter	Fixed	16 person ./m^{-2} 6.85 g m. m. ./m^{-2}

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

The aforementioned species formed two bands. Band I - with the dominant edible mussel Mytilus trossulus occurred in the northern part of the project area, while Band II with the dominance of the pogyspio polychaete Pygospio elegans predominated in the rest of the project area, as shown in Figure 3. The area covered by Complex I is 20.3 square kilometers, which is nearly 11% of the area of OWF BIII, along with a one-mile buffer zone. To the south, the area settled by Complex I is adjacent to a small area dominated by a 16.6-square-kilometer rocky bottom. The remaining central and southern sandy area of the farm is dominated by Band II. The area occupied by this complex is 148.3 square kilometers.

Figure 1 Range of occurrence of macrozoobenthos communities in the area of OWF BIII



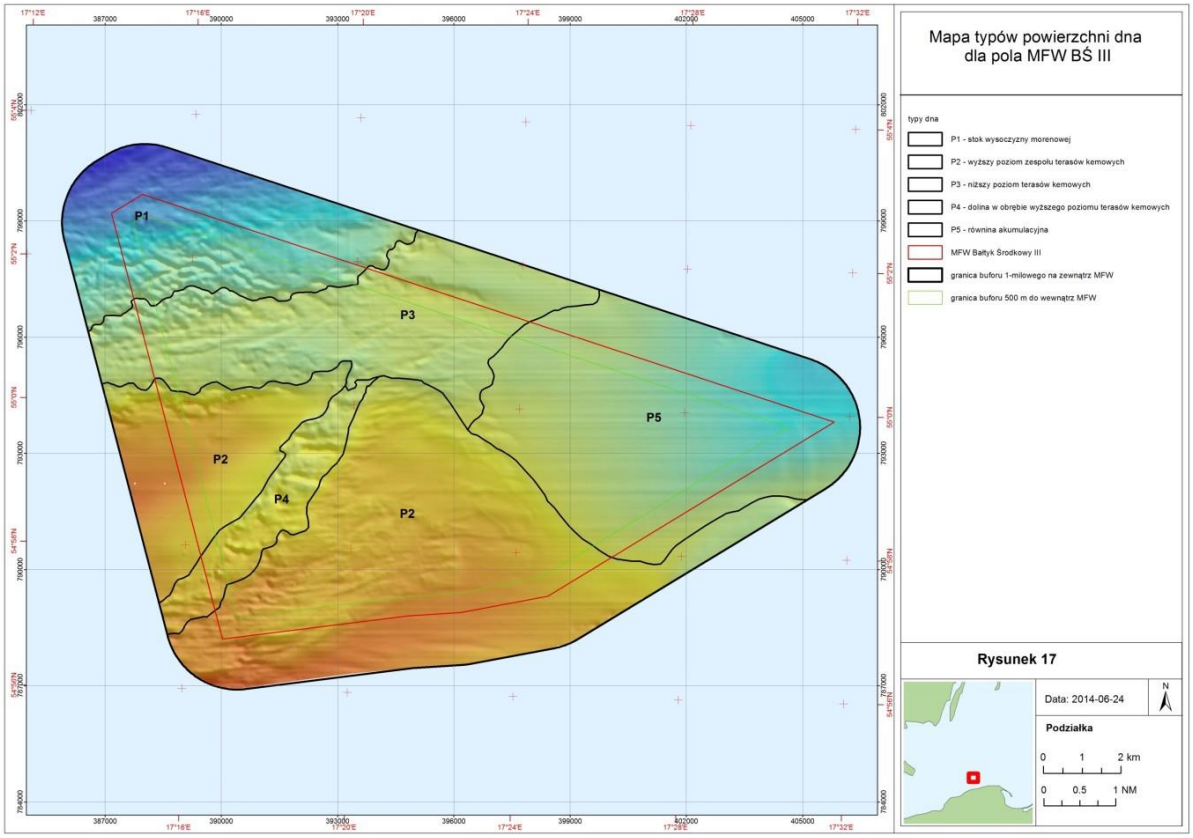
Zespół I	Team I
Zespół II	Team II
Zasięg występowania zespołów makrozoobentosu wydzielonych w obszarze MFW BŚ III (Zespół I – Mytilus trossulus, Zespół II – Pygospio elegans)	Range of occurrence of macrozoobenthos assemblages separated in the area of WBW III (Complex I - Mytilus trossulus, Complex II - Pygospio elegans)

Legenda	Legend
Granica zespołu I	Team boundary I
Granica występowania otoczaków	Boundary of pebble occurrence
Zespół I	Team I
Zespół II	Team II
Otoczaki	Pebbles
MFW Bałtyk Środkowy III	OWF Central Baltic III
Bufor 1 mili morskiej od 500 m do wewnątrz MFW	Buffer 1 nautical mile from 500 m to inside the OWF
Rysunek 5.3	Figure 5.3
Data: 2014-02-26	Date: 2014-02-26
Podziałka	Pitch

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

The distribution of the highlighted two benthic communities is closely related to the structure of the seabed in the project area, which is shown in Figure 2.

Figure 2 Map of bottom surface types for the OWF BIII field



Mapa typów powierzchni dna dla pola MFW BŚ III	Map of bottom surface types for the WBW III field
Typy dna	Bottom types
P1 – stok wysoczyzny morenowej	P1 - slope of the moraine upland
P2 – wyższy poziom zespołu terasów kemowych	P2 - higher level of kem terraces complex
P3 – niższy poziom teraasów kemowych	P3 - lower level of kem teraas
P4 – dolina w obrębie wyższego poziomu terasów kemowych	P4 - valley within the higher level of kem terraces
P5 – równina akumulacyjna	P5 - accumulation plain
MFW Bałtyk Środkowy III	OWF Central Baltic III
Granica buforu 1-milowego na zewnątrz MFW	The boundary of the 1-mile buffer outside the IMF
Granica bufor 500 m do wewnątrz MFW	Boundary buffer 500 m to inside the OWF
Rysunek 17	Figure 17
Data: 2014-06-24	Date: 2014-06-24

Podziałka	Pitch

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Areas P1 and P3 are outcrops of glacial till with a variable sand and gravel cover, and with numerous stonewalls on the surface. A compact sediment such as clay is difficult to dilute and change morphology under natural conditions. Due to the discontinuous layer of sands and gravels of variable thickness and the compact structure of the clay, the susceptibility to agitation of the surface sediment is low. Areas P1 and P3 provide suitable substrate for the existence of sessile benthos (e.g., blue mussel). Areas covered with stonewalls and boulder fields are feeding areas and shelter for fish.

Areas P2 and P5 (silty-muddy sediments with a thick cover of sandy sediments), as well as area P4 (glacial till covered by a layer of sandy sediments with single boulders on the surface), constitute a substrate that is not very stable, so it is necessary to replace it before the foundations are laid. Vulnerability to surface sediment agitation and disturbance is medium to high. Areas of fine-grained sediments (P2, P5, much of P4) are not a good substrate for the existence of bottom-attaching organisms (bivalves), while they create suitable conditions for organisms that scramble or burrow in the seabed. Due to the lack of shelter for fish, these areas are not good feeding grounds for fish.

8.3. The state of knowledge about the benthos occurring in the project area project

The area where the project is intended to be implemented had not been surveyed for the occurrence and structure of phytobenthos until the 2013 inventory survey, while it had been recognized fragmentarily regarding macrozoobenthos. On the one hand, the oldest literature data concern the assemblages of invertebrate benthic fauna of only the neighboring region of OWF BIII - the eastern slope of Slupsk Shoal, but there are selective data from the farm area itself (Warzocha et al. 2009).

Studies of the eastern slope of the Slupsk Shoal were undertaken by Demel and Mankowski (1951), Zmudzinski (1978) and Warzocha (1995) with the goal of identifying the macrozoobenthos of the bottom of the coastal zone of the open Baltic Sea.

Demel and Mankowski (1951) found that the benthic assemblages found there on a sandy bottom with an admixture of gravel and stones were the poorest among those they studied in the South Baltic. The presence of species such as: baltic hornworm Macoma balthica, sand clam Mya arenaria, common cockle Cerastoderma glaucum, garnela Crangon crangon, pygospio Pygospio elegans in the number of about 10 individuals per $1^{m2\ of}$ bottom surface (samples were taken with a Petersen-type bottom scoop), only at the station located in the eastern part of Slupsk Shoal the shoals of mussel Mytilus (edulis) trossulus reached 158 os./1^{m2}, while the abundance of the same species in other areas of the Baltic Sea was from 10 to even 200 times higher depending on the species.

Zmudzinski (1978) also found that along open seashores the shallow-water benthic fauna is not very diverse.

Based on research conducted in the 1980s. (Warzocha 1995) found three benthic communities there: Macoma balthica (Baltic hornwort) - Mya arenaria (sand clam) along with numerous polychaetes (Polychaeta) such as Pygospio elegans (pygospio), Macoma balthica (Baltic hornworm) - Saduria (Mesidotea) entomon (great double), and the assemblage Mytilus (edulis) trossulus (mussel) - Gammarus salinus (Baltic gudgeon) characteristic especially of the sandy-stone bottom of the eastern slope of Slupsk Shoal.

Recent literature data on the benthic fauna living precisely in the area of the foundation of OWF BIII is very sparse and scarce. The results from 1978 - 2007 only confirm the trend that in the planned area of OWF BIII such species as: Bathyporeia pilosa (sandpiper), Corophium volutator (common snipe), Hediste

diversicolor (nereid), Macoma balthica (Baltic hornwort), Mytilus trossulus (mussel), Monoporeia affinis (black-eyed pontoporeia), Pygospio elegans (pygospio), form low densities compared to the rest of the South Baltic (Warzocha et al. 2009).

Currently, none of the State Environmental Monitoring stations are located in the area of the planned project (Miętus and Sztobryn 2011). The most recent results obtained from benthic surveys conducted in June and November 2013 in the area of the planned farm site are presented in a separate results report (Blenska et al. 2014). Conducting this inventory study was very important to supplement the existing data on the distribution and qualitative-quantitative status of the benthos, including the phytobenthos in the area of the planned BIII offshore wind farm.

8.4. Sensitivity of the benthos to potential impacts of the of the project

The sensitivity of the benthic species selected for the EIA to the **most important** potential impacts for these marine organisms at the stage of construction, operation and dismantling of the offshore wind farm is shown in Table 11. A classification of species sensitivity based on the categories in Table 3 was used, in accordance with the methodology practiced, among others, in Denmark (Birklund, 2007a, 2009a), and this one is based on studies by Hiscock and Tyler-Walters (2006) and biological data updated by the *Marine Biological Association of the UK*[1].

The sensitivity of the benthos depends on the type of impact and on preferences based on the biology of the species itself. As such, it will vary from one species to another during the next stages of the project.

During the construction phase of the farm, the most destructive impact on the benthos is the physical removal of bottom sediments leading to the destruction of the benthos at the foundation site and the internal cable system between the wind turbines. The sensitivity of all benthic species at this stage of the project will be the highest, as it depends on the tolerance of a species' population to the magnitude and duration of the impact, as well as the ability of the population to return to its original state after the cessation of the impact factor (stressor). In the Baltic Sea, it will be a time of rebirth for the longest-lived clams, up to 5 years. During and after the construction period of the farm, photosynthesizing macrophytes and filter-feeding invertebrates will be sensitive to the growth of suspended solids and subsequent sedimentation. The same sensitivity of the benthos will occur at the dismantling stage of wind turbines.

At the stage of operation of the farm, the sensitivity of benthic species to changes in current flow in the area of the farm was considered.

Table 11. Sensitivity of benthos during construction, operation and dismantling of OWF BIII (categories according to Table 5 and sensitivity assessment according to MarLIN)

Lp.	Species Latin/common name	Cluster Latin/common name	Sensitivity/susceptibility to potential impacts of OWF BIII			
			Construction/ decommissioning stage			Operation stage
			Disruption of sediment structure	Increase in the concentration of suspended solids in the water depths	Deposition of suspended solids on the seabed	Changes in the regime of sea currents / wind wave attenuation
FITOBENTOS						

[1] www.marlin.ac.uk [access date: 05.2022]

Lp.	Species Latin/common name	Cluster Latin/common name	Sensitivity/susceptibility to potential impacts of OWF BIII			
			Construction/ decommissioning stage			Operation stage
			Disruption of sediment structure	Increase in the concentration of suspended solids in the water depths	Deposition of suspended solids on the seabed	Changes in the regime of sea currents / wind wave attenuation
1.	*Furcellaria lumbricalis/* Widlik	Rhodophyta crayfish	Average	Average	Average	Average
2.	*Rhodomelaceae/Rhodomelacea*	Rhodophyta crayfish	Average	Average	Average	Average
3.	*Pylaiella littoralis/* Coastal *Pylaiella*	Phaeophyta brown algae	Low	Low	Low	Low
4.	*Ectocarpus siliculosus/* Siliceous spikelet	Phaeophyta brown algae	Low	Low	Low	Low
MACROZOOBENTHOS						
1.	*Hediste diversicolor/* Nereida	Polychaeta polychaetes	Average	No	No	Low
2.	*Pygospio elegance/* Pygospio		Average	No	No	Low
3.	*Marenzelleria neglecta/* Marenzelleria		Average	No	No	Low
4.	-	Oligochaeta scorpionfishes	Average	No	No	Low
5.	*Saduria entomon/* Double great	Malacostraca armored personnel carriers	Low	No	Low	No
6.	*Bathyporeia pilosa/* Sandfly		Low	Very low	Low	Average
7.	*Monoporeia affinis/* Black-eyed Pontoporeia		Low	Very low	Low	Average
8.	*Hydrobia sp./ Hydrilla*	Gastropoda Snails	Average	No	Low	Low
9.	*Mytilus trossulus/* Musselshell	Bivalvia clams	Average	No	Low	Very low
10.	*Macoma balthica/* Baltic hornwort		Average	No	No	Low
11.	*Cerastoderma glaucum/* Common heartworm		Average	No	Average	Average
12.	*Mya arenaria/Sandelder* clam		Average	Low	Low	Low

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

8.5. Meaning benthos

The importance of the benthos to the ecosystem is shown in Table 12 below. An in-house study was used, but based on definitions, criteria and classifications commonly used in benthic research (Dowgiałło and Brzeska, 2009; Węsławski, 2009; Węsławski et al, 2009; Kruk-Dowgiałło et al, 2011; Osowiecki et al, 2012). The importance of the benthos was determined **separately for the phytobenthos and macrozoobenthos** based on the 5 - step classification scale presented in the methodological chapter 6.2.3. (cf: Table 3 and Table 4).

The importance of **phytobenthos** occurring only in the buffer zone (on 1% of the total area under consideration) was determined to be **low**. Vegetation here did not form communities, it occurred in the form of single specimens overgrowing very sparse mussel aggregations not attached to the bottom. These aggregates moved freely on the sand along with the sea currents, so it can be assumed that they come from other areas than the IMF study area. Only one protected species (forkbeard) was encountered.

The significance of the **macrozoobenthos** of the buffer zone and the right area of OWF BIII, where no rare or protected species were found, is **medium**. The two assemblages highlighted, Mytilus trossulus and Pygospio elegans, included bivalves that play a significant food and habitat-forming role in the Southern Baltic, but also polychaetes and crustaceans sensitive to environmental degradation. These assemblages were characterized by a similar degree of natural valuation expressed by the average value of the B index - 3.01 and 3.05 (cf. the report with the results of benthic surveys, Appendix G to the Report).
The categorization of the importance of each resource is shown in the table below.

Table 12. Determination of the importance of phytobenthos and macrozoobenthos occurring in the area of OWF BIII for the functioning of the ecosystem

Receptor	The importance of the receptor (resource)
Phytobenthos	Small
Macrozoobenthos	Medium

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

9. Assessment of the impact of OWF BIII on benthos

This chapter assesses the impact of the proposed changes and updates to the parameters of the Project - OWF BIII, on benthos.

Not all of the potential impacts described in Chapter 7 have been subjected to an environmental impact assessment. The impact of noise and vibration on benthos was not considered due to too sparse literature data, as well as a lack of expertise. The assessment conducted at this stage for these impacts would be speculative.

The assessment of the impact of the benthos inhabiting the project area was carried out separately for phytobenthic species (buffer zone), as well as for two types of macrozoobenthic communities (Complex I - *Mytilus trossulus*; Complex II - *Pygospio elegans*). Due to the same ecological importance (average) of the two macrozoobenthos assemblages, as well as the similarity of sensitivity of the species that compose them, the benthic impact assessment was ultimately divided based on phyto- and macrozoobenthos only.

9.1. Stage construction

During the construction of the BIII OWF, work will be carried out that will directly or indirectly affect the benthos. The most significant of these are:

- drilling performed during geotechnical studies,
- preparation of the bottom before the installation of the foundation, including dredging the bottom, removing a layer of sediment about 2-3 m thick and replacing it with rock material with greater bearing capacity (only if gravity foundations are used),
- drilling or driving foundations (only if monopiles, jacket or tripod foundations are used);
- burying cables in the seabed,
- heaping of rock material serving as protection against leaching,
- storage of excavated material from the preparation of the bottom for foundations,
- anchoring jack - up platforms and support units during the assembly of farm components.

A full description of the construction work can be found in Section 4 of Volume II of the EIA.

The following impacts on benthos are expected to occur at the construction stage of OWF BIII:

1) disruption of sediment structure,
2) an increase in the concentration of suspended solids in the water tone,
3) sedimentation of suspended solids on the seabed,
4) the release of pollutants and nutrients from the sediment into the water body.

There may also be unplanned impacts during the construction of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the operation of the farm, which may indirectly affect the benthos.

Unplanned impacts are assessed in Chapter 11.

9.1.1. Disruption of the structure of sediments

During the construction of offshore wind farm BIII, there will be works that cause local disturbance of the structure of the bottom sediments. These include, in particular, the installation of foundations and the laying of power cables. Disturbance will also be caused by anchoring vessels and driving the legs of ships and jack - up barges into the seabed to stabilize their position.

These works will cause physical destruction of benthic organisms that inhabit bottom sediments in construction sites and their immediate vicinity. This is especially true for macrozoobenthos, as phytobenthos was only recorded in the buffer zone of the farm during the environmental studies.

The largest area of the seabed will be affected if gravity foundations are used and will vary depending on the option considered. It is also assumed that the bottom area disturbed by the laying of internal power cables will be the same regardless of the variant (despite differences in distance between power plants, the sum of the lengths of individual cable sections will remain the same). A comparison of the predicted area of seabed disturbance, where total or partial destruction of benthic assemblages will occur under the different alternatives, is presented in the table below.

Table 13. Comparison of the disturbed area of the seabed being the area of mechanical destruction of benthic assemblages for the parameters constituting the 2015 NIS, the conditions approved by the Environmental Decision and for the updated parameters of the Project

Parameter	Parameters that constitute the NIS 2015	Parameters resulting from the Environmental Decision	Updated parameters of the Project
Diameter of the base of the power plant foundation	40 m	50 m	10 m
The width of the leaching protection layer from the edge of the power plant foundation	15 m	15 m	20 m
Diameter of the base of the substation foundation	40 m	50 m	50 m
The width of the leaching protection layer from the edge of the substation foundation	15 m	15 m	15 m
Bottom surface disturbed during the installation of one power plant foundation with a leaching protection layer	3848^{m2}	5027^{m2}	1963^{m2}
Bottom surface disturbed during installation of one substation foundation with leaching protection layer	3848^{m2}	5027^{m2}	5027^{m2}
Maximum number of foundations (power plants and substations)	208 (including 7 stations)	126 (including 6 stations)	61 (including one station)
Bottom surface disturbed with installation of all foundations including leaching protection layers	800 384^{m2}	633 402^{m2}	122 807^{m2}
Total length of sections of internal power cables	200 km	200 km	200 km
Cable trench width	1,5 m	1,5 m	1,5 m
Bottom surface disturbed when laying internal power cables	300 000^{m2}	300 000^{m2}	300 000^{m2}

Parameter	Parameters that constitute the NIS 2015	Parameters resulting from the Environmental Decision	Updated parameters of the Project
Total bottom surface area disturbed when installing all foundations including leaching protection layers and when laying internal power cables	1 100 384 m^2 (1.1 km^2)	933 402 m^2 (0.93 km^2)	422 807 m^2 (0.42 km^2)

Source: own materials, based on Investor data

The set of Project parameters constituting the most far-reaching scenario of the 2015 NIS, which was the basis for conducting the environmental impact assessment in the 2015 Report and formed the basis for issuing the Environmental Decision, was considered to be the variant that predicted the possibility of destroying the benthos over an area of about 1.1 km^2. Since the total area of the farm, designated in the PSZW is approx. 117 km^2, of which the development area will be no more than 94 km^2, (89 km^2 indicated in the 2015 Report with a different definition of the development area), and taking into account the exclusion of part of the area of OWF BIII, for the purpose of creating an unobstructed migration corridor for birds between the groupings of wind power plants, belonging to the projects located on the northern and northeastern slopes of the Slupsk Shoal is about 88 km^2, the destruction of the benthos may occur, even in the most far-reaching NIS 2015 scenario, on an area of only about 1.12% of the farm area, while in the case of the modified variant approved by the Environmental Decision it will be an area representing about 0.5% of the farm area.

Works related to the installation of the power plant's foundations will lead to the physical destruction of the organisms inhabiting this surface, which can burrow into the bottom up to a depth of 35 cm, as determined by the biology of individual macrozoobenthos species (Brakelmann 2005).

In total, the hard bottom accounts for about 20% of the area of the BIII offshore wind farm and buffer zone. Assuming a uniform distribution of wind turbines and with the implementation of the Project in the parameters adopted for the 2015 NIS, there will be a loss of hard bottom habitat under about 41 foundations including the protective layer, which accounts for 0.155 $km^2$and 0.17% of the area of OWF BIII, and a loss of soft bottom habitat under about 167 foundations including the protective layer accounts for 0.635 km2^{and} 0.71% of the area of OWF BIII.

Macrozoobenthos biomass in the BIII OWF area ranged widely, from 4.03 g to 757.34 g per 1m^2 (at station 10, where dense mussel aggregations were found). Maximum biomass values were found in the northwestern part of OWF BIII (cf: Figure 3 and Figure 4 in Chapter 8), which is associated with the presence of the mussel Mytilus trossulus on the bottom of coarse sediments and rocky bottoms (Bleńska et al. 2014).

If the average biomass of the Mytilus trossulus assemblage (clams and polychaetes) was 125.26 g/m^2, then under a single gravity foundation including a leaching protection layer of 3800m^2, there will be a permanent loss of biomass of this assemblage equal to 476 kg. Since the complex occupies only 11% of the area of the right area and buffer zone of the BIII OWF (Blenska et al. 2014), then in the NIS, assuming an even distribution of foundations, there could be a loss of biomass under only 22 foundations, which would amount to 10,472 kg.

For the Pygospio elegans (polychaetes, bivalves and crustaceans) assemblage characteristic of the majority of the sandy area of OWF BIII (80%), the average biomass was 34.85 g/m^2 (Blenska et al. 2014). Under one gravity foundation with a leaching protection layer of 3,800m^2, there will be a permanent loss of biomass of this assembly equal to 132 kg, but in NIS 2015, assuming a uniform distribution of foundations, there could be a loss of biomass under 166 foundations, which will amount to 21,912 kg.

The values given above are for the most far-reaching scenario (NIS 2015). If gravity foundations are used in the variant approved by the Environmental Decision (a maximum of 126 foundations in total), the numbers will be about 40% lower.

The disturbance of the bottom sediments in the immediate vicinity of the foundation and cable site will lead to partial destruction of the bottom communities at the site, but with an area smaller than the area of permanent degradation. In this case, the mortality of organisms brought to the surface of the sediment, where they will be subject to increased pressure from predators, mainly fish, may also increase.

The ability to restore the population of benthic communities to their original state applies to areas of the seabed where there has been no permanent degradation, that is, in the immediate vicinity of the foundations and along the internal connection infrastructure, as the site will be backfilled with sandy sediment.

The sensitivity of most macrozoobenthic organisms inhabiting the area considered for the project to physical disturbance of the seabed is medium, which means their low susceptibility to change and ability to restore the population to its original state after about 5 years. It is in the fifth growing season after degradation that the longest-lived clam species will reach maximum size. The sensitivity of crustaceans of the Malacostraca armadillo cluster to physical disturbance of the seafloor is low, as these mobile species can avoid adverse environmental conditions by escaping, so their mortality rate will be lower. Among bivalves, the *Cerastoderma glaucum* heartworm is the most vulnerable, as it is characterized by a slow recovery of the population.

Considering that even in the furthest-reaching NIS 2015 scenario, the significance of impact at the OWF construction stage on macrozoobenthos is low, and no changes are expected in the case of phytobenthos, minimization measures are not required.

Physical destruction of zoobenthos resulting from disturbance of bottom sediment structure is a direct, negative impact of local extent at the construction stage, long-term, i.e. it will last longer than 3 growing seasons, irreversible, repeatable during the construction period, with very high intensity. In the case of phytobenthos, there will be no loss of the resource or impact on its structure and functioning. This means that the natural qualities of the farm area will not change at this stage of the project and are very good in the southern, sandy part of the farm and slightly worse in the northern and central area of OWF BIII (Bleńska et al. 2014).

An assessment of the significance of this impact for the most far-reaching NIS 2015 scenario, which formed the basis for conducting the assessment for the Environmental Decision, is presented in Table 14 below.

In the case of the updated parameters of the BIII OWF , about 30% of the number of power plants envisaged in the NIS 2015 will be built, in addition, the possibility of using gravity foundations for power plant foundations has been excluded, while the number of foundations for related infrastructure - substations has been reduced from 6 to 1 unit, thus, violations of the structure of the bottom sediments leading to physical destruction of the benthos will occur on a significantly smaller area. It is recognized, thus, that the impacts caused by the updated parameters of the Project will be significantly less than both those assessed for the 2015 NIS and the variant approved in the Environmental Decision.

Table 14. Impact assessment involving physical destruction of benthos resulting from disturbance of bottom sediment structure (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the construction of the farm, the structure of the bottom sediments will be disturbed, leading to the physical destruction of the benthos	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact -no change, importance of resource - low)
Macrozoobenthos	Medium			Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)

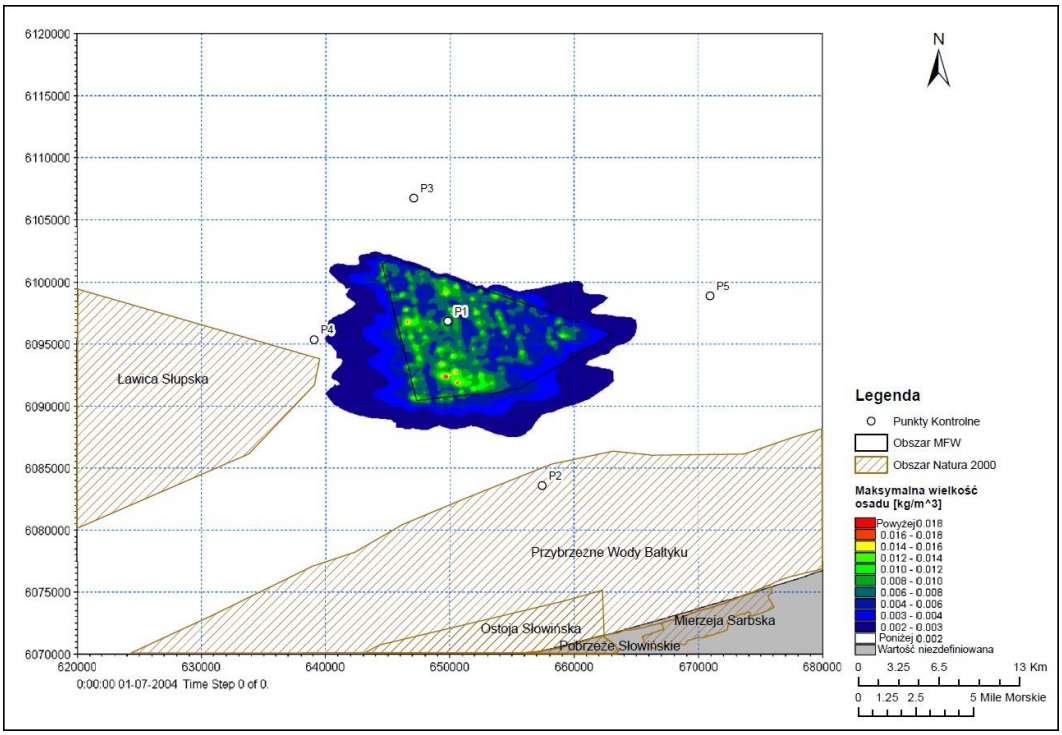
Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.2. An increase in the concentration of suspended solids in water water

As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and spread (resuspension) in the water tone. For the 2015 Report, a suspended solids spread model was performed for all project alternatives considered in the 2015 Report. The figures below show the extent of suspended solids spreading and concentration above the bottom, under typical summer conditions, during the construction of gravity foundations.

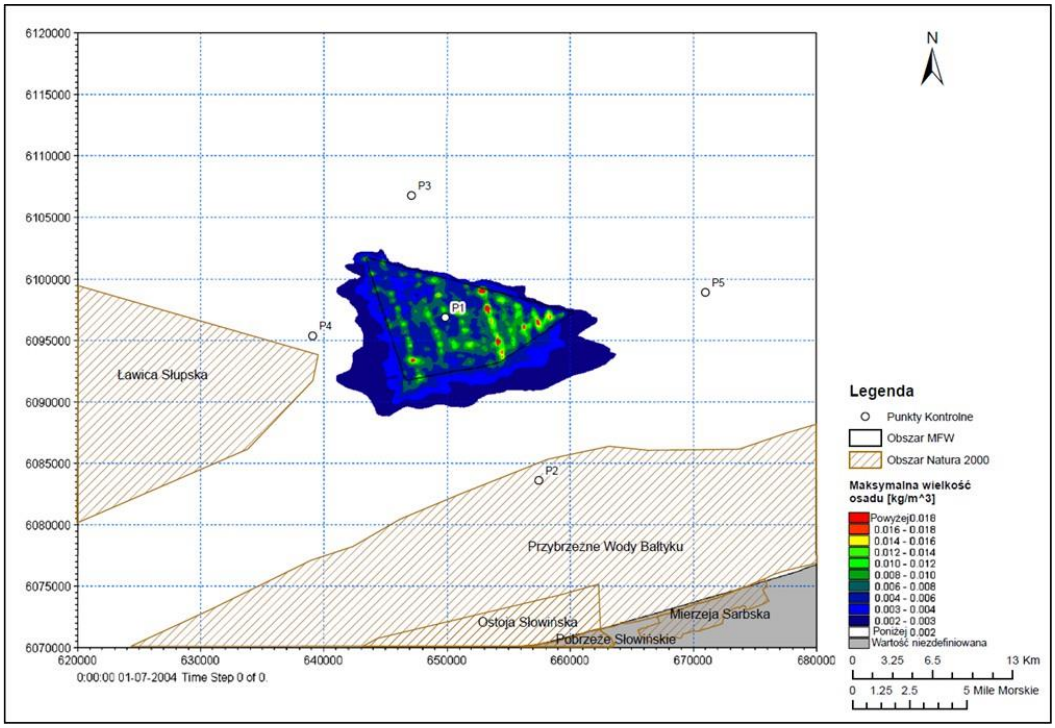
Figure 3. Spreading range of suspended solids resulting from the stirring up of bottom sediments during dredging operations and their maximum concentrations near the bottom for NIS 2015



Ławica Słupska	Slupsk Shoal
Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Ostoja Słowińska	Ostoja Słowińska
Mierzeja Sarbska	Sarbska Spit
Pobrzeże Słowińskie	Pobrzeże Słowińskie
Legenda	Legend
Punkty Kontrolne	Checkpoints
Obszar MFW	IMF area
Obszar Natura 2000	Natura 2000 area
Maksymalna wielkość osadu [kg/m^3]	Maximum sediment size [kg/m^3]
Powyżej 0.018	Above 0.018
Poniżej 0.002	Less than 0.002
Wartość niezdefiniowana	Undefined value
Mile Morskie	Sea Miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Figure 4. Spreading range of suspended solids resulting from the agitation of bottom sediments during dredging operations and their maximum concentrations near the bottom in the parameters approved by the Environmental Decision



Ławica Słupska	Slupsk Shoal
Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Ostoja Słowińska	Ostoja Słowińska
Mierzeja Sarbska	Sarbska Spit
Pobrzeże Słowińskie	Pobrzeże Słowińskie
Legenda	Legend
Punkty Kontrolne	Checkpoints
Obszar MFW	IMF area
Obszar Natura 2000	Natura 2000 area
Maksymalna wielkość osadu [kg/m^3]	Maximum sediment size [kg/m^3]
Powyżej 0.018	Above 0.018
Poniżej 0.002	Less than 0.002
Wartość niezdefiniowana	Undefined value
Mile Morskie	Sea Miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

A model of the distribution of agitated sediment in the BIII offshore wind farm area shows that there will be an increase of fine sediment (medium dust; diameter < 64 µm) in the water tone at 3% (Lech-Surowiec et al. 2015), which is negligible.

Dwarf algae identified in the buffer zone of OWF BIII have medium, and brown algae have low sensitivity to the described factor. The increase in suspended solids in the water depth will temporarily reduce the access of light (decrease in water transparency), used in photosynthesis by plants. However, there should be no greater disturbance of the qualitative and quantitative structure of macroalgae than what naturally occurs in the environment (agitation of sediments by bottom currents, storms). Thus, it should be concluded that the significant impact of the increased concentration of suspended solids in the water tone on phytobenthos is negligible.

Most macrozoobenthic organisms do not show sensitivity or have very low sensitivity to elevated concentrations of suspended solids, the concentration of which above the bottom in the area of OWF BIII will not exceed 20 mg/L, which corresponds to the range of natural variability of suspended solids concentration in the area (Lech-Surowiec et al. 2015).

Dispersion of suspended solids will be local, extending to the southern buffer zone of the BIII OWF, where single specimens of phytobenthos have been found. The concentration of suspended solids in this area will not even exceed 10 mg/L (Lech-Surowiec et al. 2015). The importance of phytobenthos in the buffer zone of the BIII OWF is very low. Approximately 99% of the area of the BIII offshore wind farm, including the one-mile buffer zone, has unfavorable environmental conditions for phytobenthos development (depths of more than 25 m). The benthic flora, among which no rare or protected species were recorded, was found in 1% of the study area. The vegetation was mostly overgrown (coverage < 1%) by aggregations of mussels carried by currents from place to place. Such phytobenthos does not form communities, does not play a habitat-forming role and is characterized by negligible natural values.

A higher concentration of suspended solids in the water means an increase in its turbidity and a reduction in the photosynthetic process of plant organisms, as well as hampering trophic conditions for filtering macroinvertebrates. In their case, the filtration apparatus can become clogged, leading to death (Moore 1977). However, benthic organisms can survive for a month under conditions of very high suspended solids concentrations of up to 100 mg/L (Berglund 2009).

Given that even in the most far-reaching scenario - NIS 2015, the significance of the impact at the OWF construction stage on the benthos was assessed as negligible, minimization measures are not required.

An increase in the concentration of suspended solids in the water, resulting from the disturbance of the bottom sediment structure during the construction phase, will cause a direct negative impact on the benthos of local extent, short-term, reversible, repeatable during the construction period, of medium intensity.

Given the short-term exposure of benthos to elevated suspended solids in the farm area and buffer zone and the insignificant magnitude of the process, the significance of the described impact will be negligible for this group of organisms.

An assessment of the significance of this impact for the most far-reaching NIS 2015 scenario, which formed the basis for conducting the assessment for the Project under the parameters approved by the Environmental Decision, is presented in Table 15 below.

As a result of the modification of the Project's parameters, fewer foundations will be built than provided for in the set of parameters constituting the 2015 NIS, as well as in the parameters approved by the Environmental Decision, nevertheless, one maximum value of suspended solids concentration above the bottom will be the same as in the case described by the NIS. The effect of slurry spreading depends most on the conduct of the power plant foundation installation processes themselves, however, given the reduction in the number of power plant installation operations by 70% compared to the parameters constituting the NIS, as well as the exclusion of the use of gravity foundations in the case of the power plant, both the total time associated with sediment disturbance activities and the spatial extent of interference will be significantly reduced, and thus, it should be recognized, will be less than that occurring with the parameters of the Project approved by the Environmental Decision. Thus, it is considered that the impacts on benthos caused by the Project under the revised parameters will be less than those caused by the Project under the parameters approved by the Environmental Decision.

Table 15. Assessment of impact on benthos by increasing suspended solids concentration in water (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the construction of the farm, the structure of the bottom sediments will be disturbed, leading to an increase in the concentration of suspended solids in the water	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	None, very low or low		Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, Importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

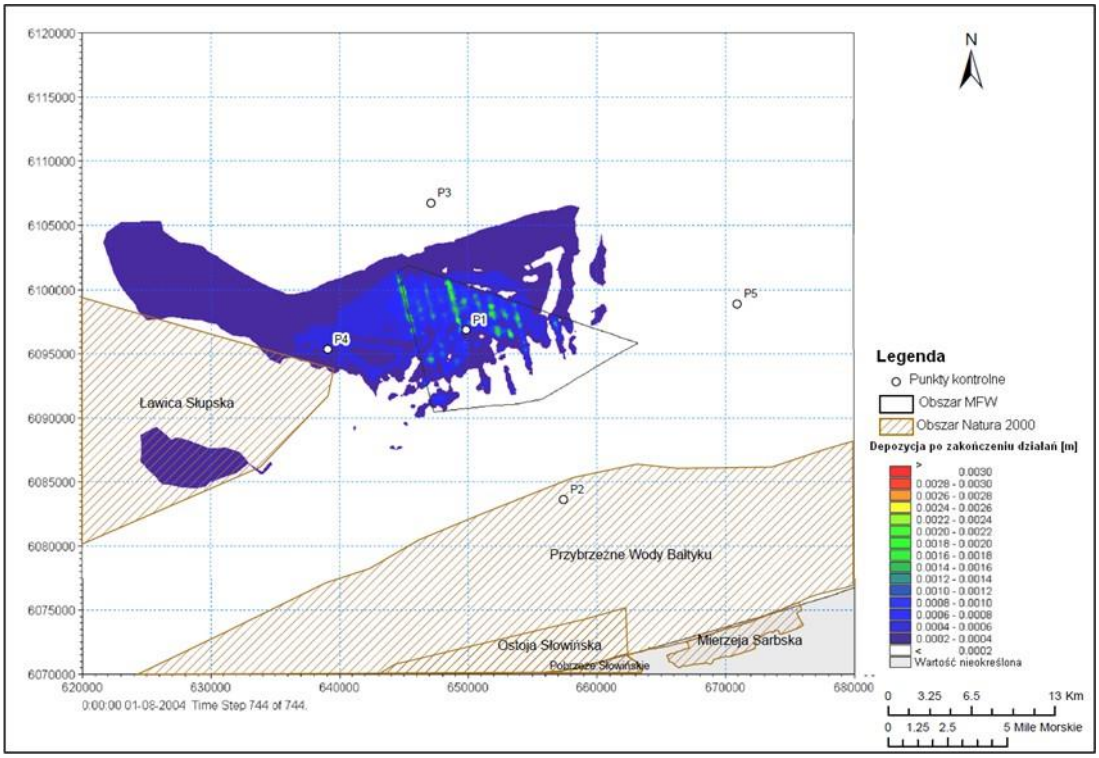
Thus, it should be considered that both the nature of the impacts, as well as their scope and magnitude will not change in relation to the Project in the parameters approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.3. Deposition of suspended solids on the seabed sea

As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and spread (resuspension) in the water depths, and be re-deposited on the bottom.

The suspended solids stirred up during construction activities will re-deposit on the seabed after a while. The figures below show the area over which sediment will fall after construction for the project alternatives considered in the 2015 Report.

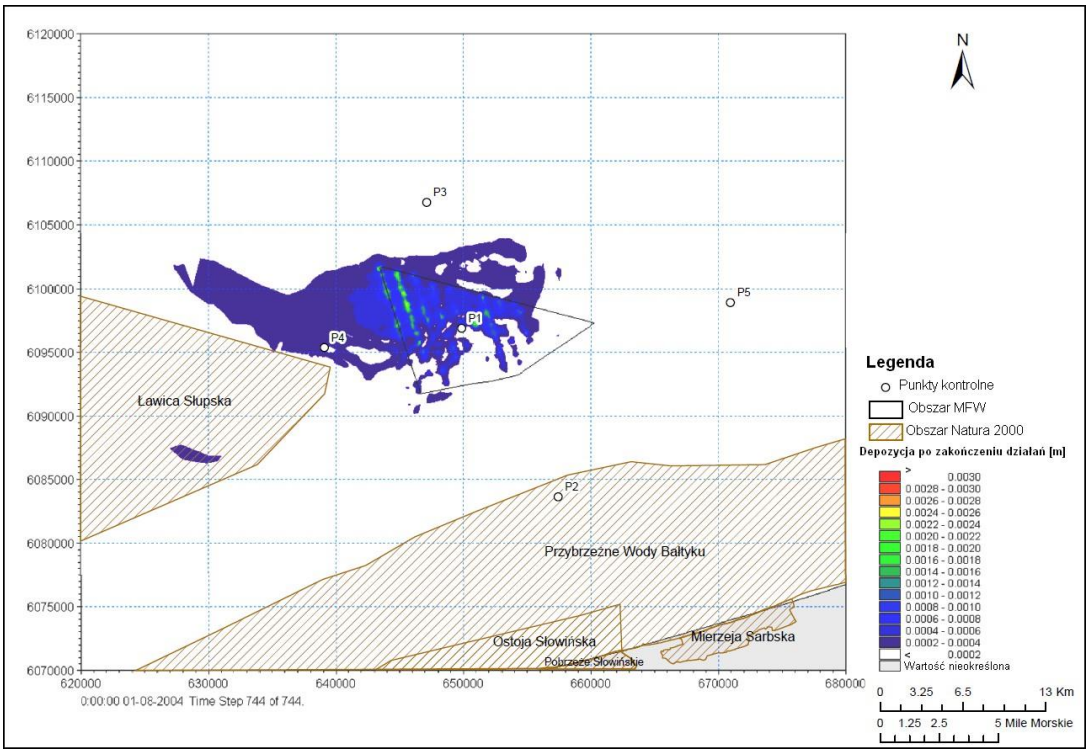
Figure 5 Area to which sediment will fall after construction - NIS 2015



Ławica Słupska	Slupsk Shoal
Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Ostoja Słowińska	Ostoja Słowińska
Mierzeja Sarbska	Sarbska Spit
Pobrzeże Słowińskie	Pobrzeże Słowińskie
Legenda	Legend
Punkty Kontrolne	Checkpoints
Obszar MFW	IMF area
Obszar Natura 2000	Natura 2000 area
Dyspozycja po zakończeniu działań [m]	Post-action disposition [m]
Wartość nieokreślona	Value not specified
Mile Morskie	Sea Miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Figure 6 Area to which sediment will fall after construction for the Project in the parameters approved by the Environmental Decision



Ławica Słupska	Slupsk Shoal
Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Ostoja Słowińska	Ostoja Słowińska
Mierzeja Sarbska	Sarbska Spit
Pobrzeże Słowińskie	Pobrzeże Słowińskie
Legenda	Legend
Punkty Kontrolne	Checkpoints
Obszar MFW	IMF area
Obszar Natura 2000	Natura 2000 area
Dyspozycja po zakończeniu działań [m]	Post-action disposition [m]
Wartość nieokreślona	Value not specified
Mile Morskie	Sea Miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

In the process of sedimentation in the area and vicinity of OWF BIII, the habitat of benthic organisms may be covered with 2 - 3.5 mm of additional sediment layer (Lech-Surowiec et al. 2015), which is a relatively low value. Modeling indicates that some of the suspended solids are carried with currents away from the study area, where sedimentation will occur after foundation and cable foundation work is completed in the seabed. The range of sedimented suspended solids will extend beyond the farm's boundaries to about 20 km to the northwest and southwest (a small section of the bottom of the Slupsk Shoal), but the thickness of the deposited sediment may be as little as 0.4 mm, a value that is practically difficult to detect and insignificant in terms of impact on the physiology of benthic organisms (Lech-Surowiec et al. 2015).

A model of suspended solids spreading, along with a full discussion of the process, can be found in Chapter 11 of Volume II of the report.

The sensitivity of **phytobenthos** to sedimenting suspended solids is medium to low (Table 11). This sensitivity is due to the life history strategy of the taxon in question. Carnivores are among the perennial

taxa whose growth is slow and population recovery takes up to 5 years. In addition, they exhibit only two types of asexual reproduction - mold fragmentation and spore production. Filamentous brine shrimp complete their life cycle in one year. During its course, they reproduce intensively using a variety of asexual and sexual reproduction methods. If backfilled with suspended solids, there should be no greater disturbance of the qualitative and quantitative structure of macroalgae than those that naturally occur in the environment (action of bottom currents, storms). Thus, it should be concluded that the significance of the impact of the backfilling of organisms with sedimentary suspension on phytobenthos is negligible.

The sensitivity of macrozoobenthic organisms additionally covered by up to 5 cm of sediment for a month is basically low (Berglund 2009), as in the mussel Mytilus trossulus characteristic of one of the distinguished assemblages.

In the second assemblage, *Pygospio elegans*, vagile infauna species (polychaetes) have the ability to burrow away, *crustaceans* to escape, and bivalves to project long siphons above an additional layer of sediment. In this assemblage, dominated in terms of biomass by the Baltic hornwort *Macoma balthica*, most populations of this species having a long siphon can survive for a month with a 7 cm increase in the sedimentary suspension layer (Turk and Risk 1991). Only the sensitivity of the common serpentine *Cerastoderma glaucum* is high, as this species has short siphons and does not tolerate admixtures of silt and organic matter on the surface of bottom sediments. In the case of the studied region of OWF BIII, the share of *Cerastoderma glaucum* in the *Pygospio elegans* assemblage did not exceed 22% in terms of biomass (Figure 5.12. in Blenski et al. 2014). Other literature data indicate that shallow-burrowed organisms feeding by filtration, especially juveniles, can survive even covered by an additional layer of sediment up to 50 cm thick (Hiscock et al. 2002).

The low sensitivity of backfilling the bottom fauna with an additional layer of sediment, up to a maximum of 3.5 mm, determines the insignificant magnitude of this process. In the case described, due to the local and short-term degree of impact, the overall significance of the impact of sedimentation on macrozoobenthos will be negligible.

Given that even in the most far-reaching scenario - NIS 2015, the significance of the impact at the OWF construction stage on the benthos was assessed as negligible, minimization measures are not required.

The deposition of agitated sediment on the seafloor, resulting from previous disturbance of the bottom sediment structure and suspended solids spreading during the construction phase, will cause direct negative impacts on the benthos of local extent, short-term, reversible, repeatable during the construction period, with low intensity.

An assessment of the significance of this impact for the furthest-reaching NIS 2015 scenario, which formed the basis for conducting the assessment for the Project under the parameters approved by the Environmental Decision, is presented in Table 16.

In the case of updating the parameters of the Project, fewer foundations will be placed than envisaged for both the 2015 NIS (about 70% less) and the parameters approved by the Environmental Decision (about 50% less) in addition, the possibility of using gravity foundations for power plant foundations will be excluded, while the number of foundations for related infrastructure - substations - will be reduced from 6 to 1 unit. The pointwise occurring maximum values of the additional sediment layer are lower for the modified parameters of the Project both against the 2015 NIS and for the Project under the conditions approved by the Environmental Decision. Suspended sedimentation sites will also cover a smaller area. The Project under the updated parameters will result in lower impacts on benthos from both the 2015 NIS and the Project under the conditions approved by the Environmental Decision.

Table 16. Assessment of the impact on benthos of suspended solids deposition on the seabed (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the construction of the farm, the structure of the bottom sediments will be disturbed, leading to an increase in the concentration of suspended solids in the water and their subsequent redeposition on the seabed	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	None, low or medium		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings in the course of which the Environmental Decision was obtained.

9.1.4. Release of pollutants and nutrients from the sludge into the water body water

Agitation of the bottom sediment associated with foundation placement for farm facilities, ship anchoring or cable burial is a process that promotes the passage of contaminants from the sediment to the water depths (Frostner, 1980; Bourg and Loch, 1995; Bojakowska, 2001; Dembska, 2003; Uścinowicz, 2011). This way they can get to it:

- pollutants, including heavy metals and PAHs and PCBs,
- biogenic elements - nitrogen and phosphorus.

This process is described in detail in Chapter 9.1.2 of the assessment of the impact of OWF BIII on the abiotic environment (Volume IV Section 2 of the EIA). During the construction of the farm, some amounts of heavy metals, persistent organic pollutants and phosphorus (biogen) will be released into the water depths, which, however, will be small compared to the load carried into the Baltic Sea with rivers and wet precipitation (cf.: abiotic environmental impact assessment - Volume IV Section 2 of the report, Chapter 9.1.2.).

Phosphorus, the content of which in the analyzed sediments from the BIII offshore wind farm area did not exceed values typical of Baltic Sea sediments (Dembska et al., 2015 - Volume III Section 5 of the report), is not expected to have an impact on limiting the development and occurrence of phytobenthos.

Bivalves can accumulate harmful and toxic substances: heavy metals and pesticides (Herra and Wiktor, 1985; Szaniawska, 1991). High concentrations of heavy metals can be toxic to aquatic plants (Lobban

and Harrison, 1997), leading, among other things, to a reduction in photosynthesis (Baumann et al., 2009). In the area of the planned location of OWF BIII, concentrations of persistent organic pollutants (i.e., PAHs, PCBs) and harmful substances, such as heavy metals and mineral oils, occurred at low levels and did not exceed values typical of sandy sediments of the southern Baltic Sea (Dembska et al., 2015 - Volume III Section 5 of the report). Also, the content of tributyltin (TBT) in the studied sediment from the BIII offshore wind farm area occurred at levels below 0.01 $^{mg\text{-}kg\text{-}1}$ s.m. (Dembska et al., 2015 - Volume III Section 5 of the report). These concentrations were typical of sandy sediments in the southern Baltic Sea (HELCOM 2002).

The release of pollutants and nutrients from the sediment into the water body, resulting from previous disturbance of the bottom sediment structure during the construction phase, is a direct, negative, local in scope, short-term, reversible, repetitive impact during the construction period, with high intensity.

Both for the set of parameters of the Project constituting the 2015 NIS, as well as for the parameters of the Project approved by the Environmental Decision, the possible impact of the released harmful substances and phosphorus from the sediments during the installation of foundations and the laying of internal cables in the seabed on the benthos will be insignificant, as the significance of this impact is negligible or small depending on the importance of the different benthic groups being assessed. **Consequently, the proposed changes to the Project will also be negligible, and minimization measures are not required.**

An assessment of the significance of this impact **for the most far-reaching NIS 2015 scenario,** is presented in Table 17 **below.**

In the case of updating the parameters of the Project, fewer foundations will be laid than envisaged in the NIS 2015, as well as than in the parameters of the Project approved by the Environmental Decision, moreover, the possibility of using gravity foundations for power plant foundations has been excluded, while the number of foundations for related infrastructure - substations - has been reduced from 6 to 1 unit, allowing to consider that the Project in the updated parameters will not cause impacts on benthos on a scale exceeding those caused by the parameters of the Project approved in the Environmental Decision.

Table 17. Assessment of impacts on benthos of released pollutants and nutrients (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the construction of the farm, the bottom sediment structure will be disturbed, leading to the release of pollutants and nutrients from the sediment into the water body, which may affect the benthos	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	None, low or medium		Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts remains unchanged, and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the result of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.5. Impact cumulative

Assumptions for analyses of cumulative impacts for the change of the Project - OWF BIII and other projects on benthos are presented in Chapter 3.2. An extensive description regarding this issue is provided in Section 13 of Volume II of the EIA.

At the stage of construction of the BIII offshore wind farm, cumulative impacts may arise if installation work on several offshore wind farms proceeds simultaneously, including foundation placement, as well as as as a result of dredging the bottom for internal and external connection infrastructure cables installed in it. Cumulative impacts involve investments located close to each other.

In the case of the BIII offshore wind farm, it will be adjacent to the Baltic offshore wind farm.

In any case, a potential type of impact that could negatively affect the benthic communities of OWF BIII is the agitation of bottom sediments leading to an increase in suspended solids in the water depths and the process of covering organisms with an additional layer of sediment during the sedimentation of suspended solids.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for cumulative impacts affecting the physiology and survival of the BIII OWF benthos:

The first of these assumed that in 2019 - 2021 for the built power plants with a total capacity of 900 MW, including 600 MW under the BIII offshore wind farm and 300 MW under the Baltica 3 offshore wind farm. Assuming an average power plant of 6 MW, 150 will be built. Associated infrastructure (e.g., substations, additional platforms, such as social) will also be built. It can be assumed that 158 foundations and about 158 km of internal cables will be installed on the seabed in this connection.

To these 2 farms, onshore export cables will be built with an estimated length of 95 km and 45 km, respectively. However, export cables will be built only for very short distances near the farm, and then, as they approach the shore - at a distance that causes no or negligible accumulation. In 2019-2021, geotechnical drilling may also take place in the areas of the Gaz South and Slupsk E concessions, but these impacts should also be considered negligible, due to the vastness of the concession areas and only minor overlaps with the areas of wind farms planned in the area. Export cables and geotechnical surveys in hydrocarbon concession areas were therefore not taken into account in further cumulative impact analyses.

In addition, there is a heavily used shipping route (*Traffic Separation Scheme* (TSS)) near the farm, in the area of which there is an increased risk of oil spills.

Some simplifications have been adopted due to the fact that no environmental studies have been carried out for the Baltica 3 offshore wind farm project at that time, and therefore it has been assumed that the environmental conditions will be similar to those at the BIII offshore wind farm, it has been considered that in the above scenario the level of cumulative impacts on benthos will be only 75% of the level analyzed in the report as NIS 2015.

It was also assumed that more power plants will be built between 2023 and 2026, with a total capacity of 1,350 MW, including 600 MW under OWF BIII and 750 MW under OWF Baltica 3. Assuming an average power plant of 6 MW, 225 will be built. Associated infrastructure (e.g., substations, additional

platforms, such as social) will also be built. It was assumed that 232 foundations and about 232 km of internal cables would be installed on the seabed in this connection.

A different **scenario** for the construction phase, assumes that the above numbers of power plants and associated infrastructure elements will be built not in the areas of OWF BIII and OWF Baltica 3, but as OWF **BII and OWF Baltica 2** (PSZWs belong to the same owners). However, such an alternative scenario did not significantly change the level of impacts.

According to the analyzed scenarios, it was estimated that the **level of cumulative impacts on benthos would be only 16.5% higher, from the level analyzed in the report as NIS 2015. And as a result, the impact significance assessment, for such a construction phase scenario, was found to be no different from the impact assessment presented in Chapter 9 for the 2015 NIS and the rational alternative and the BIII offshore wind farm variant.**

In doing so, it should be noted that most of the impacts described in Section 9.1 will not be cumulative, due to the scope being limited to the site of the foundation in question or its immediate vicinity.

Compared to the assumptions of the scenarios adopted in the 2015 Report, the timing of all planned projects has changed, and they have all been delayed.

In addition, an environmental decision has been issued for the Baltic Power MEW project. The environmental impact report for the Baltic Power MEW project shows that the exact timetable for the project is not known. However, even in the case of a situation of parallel execution of the BIII OWF project and the Baltic Power OWE, in the case of execution of the Project in the proposed modified parameters, there will be no more far-reaching impacts than those assessed in the proceedings during which the Environmental Decision was issued. The Baltic Power FEW Baltic II project involves the construction of 126 wind power plants. In contrast, the BIII OWF in its planned modified parameters assumes the construction of 60 wind turbines, which represents 30% of the wind turbines evaluated in the 2015 NIS, which is the basis of the BIII OWF benthic impact assessment. In addition, the modified parameters of the Project assume the abandonment of the possibility of gravity and tripod foundations, i.e. the solutions with the greatest significance from the point of view of the impacts of potential impacts on benthos. By the same token, it should be considered that the impacts caused by the implementation of the projects included in the scenarios forming the basis of the analyses adopted in the 2015 Report will not increase in the event of implementation of the Project in the proposed modified parameters, and the scenarios themselves can be considered valid for making inferences about cumulative impacts.

A summary of cumulative impacts during the construction phase of the BIII OWF is presented in Table 18 below.

Table 18 Assessment of the cumulative impact of the project on benthos during the construction phase regardless of the project variant - NIS 2015, variant approved by the Environmental Decision

Cumulative impacts on benthos	The significance of the impact	
	Phytobenthos	Macrozoobenthos
Disruption of sediment structure	No change	Small
Increase in the concentration of suspended solids in water	Skip	Skip
Deposition of agitated sediment	Skip	Skip

9.2. Stage operation

During the operation of OWF BIII, works affecting the seabed and seawater will be carried out in its area, mainly maintenance works. Among other things, their effect will be a slight disturbance of the sludge structure, causing further release of pollutants and nutrients from the sludge.

A full description of the work during the operation stage is provided in Chapter 5 of Volume II of the EIA.

The benthos will be impacted at the operational stage primarily by foundation structures that will occupy part of the seabed, leading to the loss of its habitat. During the operation of the OWF, benthic organisms will repopulate the degraded bottom area in the vicinity of the foundations and cables. Presumably, in places where sediment of a different granularity than the original one has been exposed, the newly formed macrozoobenthos assemblages will have a different structure than before the construction of the farm.

The following impacts of OWF BIII on benthos are expected to occur at the operational stage:

1) seabed area occupation,
2) the creation of an "artificial reef."
3) contamination of the water tone and sediments with anti-corrosive agents,
4) changing water and sediment temperatures,
5) changing the regime of sea currents,
6) wind wave attenuation.

There may also be unplanned impacts during the operation of the farm, particularly pollution of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the operation of the farm, which may indirectly affect the benthos.

Unplanned impacts are assessed in Chapter 11.

9.2.1. Occupation of the seabed area

The foundation of the foundations, along with the seabed leaching protection layer, will result in the occupation of the seabed area, and thus the complete loss of the natural benthic habitat at the site, which will last for the entire period of operation.

As already indicated in Section 9.1.1, in the most far-reaching scenario that may occur in the rational alternative, i.e. in connection with the construction of 208 foundations, they will occupy, including cables, about 1.1 ^{km2} or about 1.12% of the farm's area. In the variant approved by the Environmental Decision, the number of foundations will be about 40% lower (maximum 126 units), while the length of cables will remain unchanged, and in the case of the variant after conducting the proposed changes, the number of foundations will be about 70% lower (maximum 61 units) compared to the parameters of the Project constituting the 2015 NIS.

In the area occupied by the foundations, there will be a complete loss of macrozoobenthos habitat, which will continue throughout the operation period, and if the foundations are not subsequently removed, even after the decommissioning of the farm. Phytobenthos was only recorded in the buffer zone of the farm during environmental surveys.

A similar loss of habitat will occur as a result of the leaching protection layer. This is because the sub-fractional composition of the bottom sediments will change here (cf. Abiotic Environmental Impact Assessments, Volume IV Chapter 2 of the EIA). For this purpose, rock ballast, stones and boulders are usually used, with which the base of the foundation is surrounded by a width of several to several meters. Environmentally neutral materials are used. The appearance of coarse rock crumbs can contribute to the creation of new habitats for sessile benthos.

The sensitivity of benthos to habitat loss is low only for crustaceans - Crustacea due to their mobility. Other organisms have medium sensitivity.

It should be noted that as a result of the change in the parameters of the Project, fewer foundations will be placed than envisioned for both the NIS (about 70% less) and the parameters approved by the Environmental Decision (about 50% less). In addition, with regard to power plant foundations, the choice of foundation type was limited to monopile and jacket type, abandoning tripod and gravity type foundations for which the area where permanent loss of benthic habitat occurs is the largest. Consequently, minimization measures are also not required.

Habitat loss is a direct, negative impact on the benthos of OWF BIII of local scope, long-term, irreversible, permanent, with very high intensity.

An assessment of the significance of this impact for the furthest-reaching NIS 2015 scenario underlying the assessment in the 2015 Report is presented in Table 19 below.

If the parameters of the Project are updated, fewer foundations will be placed than envisaged for the parameters of the Project approved in the Environmental Decision and the 2015 NIS, and the use of gravity and tripod foundations has been ruled out; consequently, habitat loss will occur over a smaller area. For the above reasons, it should be considered that the Project in the updated parameters will cause significantly lower impacts on benthos compared to the set of parameters of the Project constituting the 2015 NIS, as well as the Project in the parameters approved by the Environmental Decision.

Table 19. Impact assessment of benthic habitat loss (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	small	Low	During the operation of the farm, there will be a loss of benthic habitat due to the occupation of the seabed area by foundations	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)
Macrozoobenthos	average	Low or medium		Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts remains unchanged and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the update of the Parameters of the project does not affect the result of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2. The creation of an "artificial reef"

Taking into account the significant reproductive potential of benthic bottom communities, the great adaptability of most of the species included in them, we should expect rapid colonization of the artificial substrate introduced into the environment, namely the surface of the underwater structure of wind turbines and the scour protection layer built of rocks and boulders. There will be a localized long-term colonization of the new hard substrate by animal and plant assemblages of epiphytes, followed by mobile epifauna.

Exemplary monitoring of the "artificial reef" effect from the operating Nysted OWF (Baltic Sea, Denmark) indicates that one year after the farm was put into operation, the first colonizers on underwater elements were barnacles*(Balanus improvisus*) and small individuals of mussels*(Mytilus edulis*) with shell lengths of less than 10 mm. Deeper than them, an increase in mobile crustaceans was observed: *Corophium insidiosum,* Microdeutopus sp. and the appearance of the crab *Carcinus maeans*. Among the phytobenthos, brown algae dominated, crayfish reached sizes larger than average, and green algae were rare (Birklund and Petersen, 2004). On the foundations of the operating Horns Rev offshore wind farms in the North Sea (Denmark), aggregations of the mussel *Mytilus edulis* dominated, making up 90% of the macrozoobenthos biomass on all monopiles as early as the third year of the farm's operation (Langhamer et al., 2009). An experiment conducted in the waters of the Baltic Sea (the Bay of Puck) on an artificially introduced structure, made it possible to observe the phenomenon of its overgrowth by plant and animal epiphytic organisms. Two sessile species stood out among the dominants: barnacles *Balanus improvisus* and mussels *Mytuilus trossulus*, which overgrew the structures first, followed by periwinkles, crustaceans, bryozoans, green algae and the brown alga *Pylaiella littoralis*. The proportion of barnacles and mussels on the structure decreased with depth (Dziubinska and Szaniawska, 2010).

It is not possible to predict a clear-cut scenario of what the colonization of the artificial substrate will actually look like. It is presumed that in the Baltic waters of the BIII OWF area, the dominant species of epiphytic fauna will mainly include the mussel *Mytilus trossulus*, barnacles *Balanus improvisus* and several species of phytophilous fauna (crustaceans: Gammarus sp., *Corophium volutator* or *Monoporeia affinis*). Macrozoobenthos colonization will occur when the larvae, after a period of reproduction that usually takes place in late spring, settle on structural elements and the bottom, and develop into adult forms. Recovery of the qualitative state (species composition) will occur no later than one year after the species' breeding period, while recovery of the quantitative state will occur after the mussel reaches its maximum size and biomass (about 5 years) (Vuorinen et al., 2002).

The ant flora will be most abundant during the initial phase of colonization, and its presence depends on depth and light availability. There will be a new refuge for juvenile fish and an attractive feeding, spawning and sheltering area for many fish species, as well as a food base for birds. Clams will also overgrow the stones surrounding the base of the foundation, and the spaces between the boulders can be used as shelter for small fish. The appearance of the "artificial reef" will partially compensate for the loss of damaged bottom assemblages. The role of mussels as biofiltrators in polluted and zeutrophicated waters is well known. Absorbing the suspended solids of the water tone, through their ability to agglutinate and excrete them in the form of fecal and pseudofecal matter, they contribute to the

purification of the reservoir, accelerate the sedimentation of suspended solids, enriching the bottom with detritus (biosolids) and organic matter. They can also accumulate harmful and toxic substances: heavy metals and pesticides (Herra and Wiktor, 1985; Szaniawska, 1991), but their concentration in the project area sediment is very low. The fecal and pseudo-fecal matter intensively produced by the mussels as they sink to the bottom will change the trophic state of the surface layer of bottom sediments, but will be partly carried with the currents out of the "artificial reef" habitat area.

Artificial substrate, which will appear even at a considerable distance from land, can be colonized by species of macroalgae, whose spores, along with currents, will reach the site of the wind farm. These may be organisms that would never appear in the area due to the considerable depths limiting their occurrence, such as green algae that prevail on hard substrate in the coastal zone to a depth of several meters. The development of macroalgae along with mussels and barnacles is observed on the concrete foundations of wind farm turbines and transformer stations (Roth et al., 2004).

In wind farms operating in Denmark, the new area of the farm's underwater structures was as much as 1.5 times larger than the area of the sand bed habitat destroyed at the site (Birklund, 2009). At the Nysted Offshore Wind Farm in the western part of the Baltic Sea, 5 years after the foundations had been laid, the biomass of the epiphytic organisms was 20 times higher than the biomass of the benthos (mainly infauna) of the sandy bottom that had been destroyed at the site (Leonhard, 2006).

Taking into account several assumptions, it is possible to calculate by how much the area of the hard bottom will change in the BIII OWF area. The natural hard bottom (gravel, pebbles) is located in the northwestern part of the BIII OWF proper and buffer zone (36.9 ^{km2}, about 20% of the total area of the farm), where the mussel *Mytilus trossulus* dominates in abundance and biomass (Bleńska et al. 2014). Assuming that the radius of the underwater part of the wind turbine pile above the foundation will be 5 m, and its height is 30 m, the area possible for the overgrowth of these structures by fauna and partly flora (up to 20 m deep) of epiphytes will be 943^{m2}. On the other hand, the area of the leaching protection layer around one pile (with a width of 15 m) possible for colonization will be 2591^{m2}, which gives a total of 0.0035 ^{km2} including the pile area. The area of loss of habitat and macrozoobenthos assemblage under a single foundation including the leaching protection layer is 0.0038 ^{km2}. This means that the surface area of the hard artificial substrate of underwater wind turbine structures is almost the same as that of the degraded natural environment. For the most far-reaching scenario (NIS), which may occur in the rational alternative, i.e. in connection with the construction of 208 underwater wind turbine structures and associated infrastructure, the new area of artificial hard substrate will be 0.728 ^{km2} (0.8% of the farm area).What is important from the point of view of the food base for bentophages is that the habitat-forming mussels that will be destroyed under the gravity foundations along with the leaching protection layer will be able to colonize the hard substrate of the underwater wind turbine structures with an area comparable to the area of the bottom destroyed by the foundation and stone protection layer. However, it is difficult to predict what the total biomass of the epiphytic fauna will be, as there have been no wind farm construction, operation or dismantling activities in the South Baltic, let alone monitoring of the "artificial reef" phenomenon. The closest operating offshore wind farms to the BIII offshore wind farm area are located in the Danish Straits. However, it is not valid to compare or use monitoring data on the biomass of biota from that area. For example, the average salinity of the waters of the Fehmarnbelt, where the Nysted Offshore Wind Farm (with a maximum height of underwater structures of up to 10 meters) is located (Birklund and Petersen 2004), is 15-23 PSU (Feistel et al. 2005). Under such conditions, the same species of mussel *Mytilus trossulus* reaches a large larger size and biomass than in the South Baltic, and the composition of the entire biota is much more diverse.

Although the phenomenon associated with the creation of the "artificial reef" is long-term and of very high intensity, its local scope ultimately affects the low significance of this impact. Moreover, the nature of the impact is difficult to determine clearly. On the one hand, the effect of the "artificial reef" will locally increase species diversity and biological production, especially in the context of a new food base for fish and birds, and this determines the importance of the habitat for the course of ecological

processes. On the other hand, any interference in the environment that destroys its naturalness makes such an impact take on a negative character with unknown effects on the ecosystem in the long term.

The "artificial reef" effect promotes the possibility of alien or invasive species becoming established due to favorable feeding and breeding conditions at the BIII OWF foundation site, which is a negative effect on preserving the naturalness of the local micro-ecosystem. The POM recorded 30 non-native species belonging to the following groups: phytoplankton, zooplankton, macrophytes, zoobenthos and avifauna, and 26 species of ichthyofauna. The highest number of alien species has been recorded in the Polish coastal zone of the Gulf of Gdansk (Krzymiński, 2013). Among the benthos, crustaceans account for the largest number of alien species, which can quickly displace native species leading to a change in the existing balance in the trophic network of the ecosystem. In the POM, 11 of the 56 crustacean species are alien species (Jażdżewski et al., 2005). Most of them, such as obunogs, are native to the Ponto-Caspian region (Black Sea, Caspian Sea, Sea of Azov). Others were brought from the Atlantic Ocean, and the crab *Eriocheir sinensis* from as far away as eastern Asia (Grabowski et al, 2005; Jażdżewski et al, 2005; Ovcarenko et al, 2006). The alien species *Palaemon elegans* is an excellent colonizer and shows a wide tolerance to colonize a variety of habitats. *P. elegans* is displacing the native species *P. adspersus* and has become a permanent part of the Baltic fauna (Grabowski, 2006). Most of the amphipods "foreign" to the Baltic get here from the Ponto-Caspian area, and they may be transported in ballast water from the Atlantic coast of North America (Jażdżewski et al. 2002).

Despite the small area of loss of natural habitat in OWF BIII, the effect of the "artificial reef" will make the natural valuation of the project area different from the state before human interference with the environment.

The formation of an "artificial reef" is a direct impact on the ecosystem of the BIII OWF of local scope, long-term, irreversible, permanent, with very high intensity. It should be noted, however, that in this case, the original assemblage of benthic communities of the BIII offshore wind farm area is no longer subject to assessment, but the biota. In the case of the "artificial reef" effect, the existing benthic community of OWF BIII is no longer evaluated, but only the scale, intensity and magnitude of the phenomenon can be assessed. Full information taking into account the qualitative-quantitative specifics of the "artificial reef" effect in the BIII OWF area will be provided by monitoring.

An assessment of the significance of this impact **for the set of parameters of the Project constituting the most far-reaching scenario, the 2015 NIS,** is presented in Table 20 below.

Updating the parameters of the Project means that fewer foundations will be built than envisioned in the parameters of the Project set forth in the Environmental Decision and fewer than in the 2015 NIS, thus the effect of the "artificial reef" in the context of the new artificial foundation on the pile support structures will be correspondingly less. It is considered that the Project in the modified parameters will cause less impact on the BIII OWF ecosystem than the Project in the parameters approved by the Environmental Decision and the 2015 NIS.

Table 20. Impact of the "artificial reef" on the BIII offshore wind farm ecosystem (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Average	An "artificial reef" will be built on the exploited foundations	Moderate (scale of exposure - local, duration - long term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - low)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Macrozoobenthos	Medium	Average		Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

9.2.3. Contamination of the water tone and bottom sediments with compounds from corrosion protection agents

Steel structures of power plant and substation foundations will corrode in the marine environment. Accordingly, appropriate protective measures will be necessary. The most common anti-corrosion method used in the marine environment is cathodic protection. It can be implemented as galvanic or electrolytic protection.

Galvanic cathodic protection involves installing aluminum or zinc anodes on the foundations. The anodes are gradually consumed, and Al or Zn passes into the water depths and accumulates in the bottom sediments. In the case of electrolytic protection, such interactions do not occur. Thus, the assessment applies only to galvanic cathodic protection.

This impact is described in detail in Section 9.2.10 of the abiotic impact assessment (Volume IV Chapter 2 of the EIA).

Projected amounts of Zn or Al per foundation during the entire operation of the farm and per farm per year are presented in Chapter 2 of Volume IV of the Report. The most far-reaching scenario is the installation of monopiles rather than gravity foundations. According to the information presented in the aforementioned chapter, during the 25 years of operation of the BIII OWF in the 2015 NIS, only 5.36 tons of Zn will pass into the environment annually. This is not much compared to the approximately 700 tons of Zn discharged into the Baltic Sea annually by rivers from Poland, but the above amounts, when released into the water's depths or accumulating in bottom sediments, can affect the benthos. However, this will be an impact at the threshold of detection.

In the currently requested variant, there has been a reduction in the total number of foundations.In this variant, only monopile and jacket foundations can be used in the Project for the installation of wind turbines. If galvanic cathodic protection is used, reducing the number of BIII OWF foundations, as well as excluding tripod-type foundations (which potentially require the largest number of anodes) from further consideration for wind power plant siting, will reduce the total amount of anode material required, and thus emissions to the marine environment. The impact in this regard will therefore remain insignificant.

In summary, the variant that is the subject of this Report will build about 70% fewer foundations than envisioned for the furthest-reaching scenario that forms the basis of the assessment in the 2015 Report - NIS 2015, and twice as many as specified in the Environmental Decision, which also entails the use of a correspondingly smaller number of anodes for corrosion protection, and thus fewer emissions. The calculations presented showed that with the application of an additional protective coating of the amounts of Zn and Al, additional reductions in the elements released into the environment will be achieved, and thus the project will cause lower impacts both from the Project in the parameters constituting the NIS and from the variant approved in the Environmental Decision.

Table 21 Assessment of the impact on benthos from contamination of water bodies and bottom sediments with compounds from corrosion protection agents (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Very low	During the operation of the foundations, corrosion protection measures will be applied, which involves Zn or Al emissions and which may affect the benthos	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)
Macrozoobenthos	Medium	Very low		No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.4. Change in temperature of water and sediments

Electric current, flowing through the power cable, causes it to heat up, caused by power losses on the resistance, according to Joule's law. With the increase in cable temperature above ambient temperature, heat transfer to the surrounding environment begins. This impact is described in detail in Section 9.2.11 of the abiotic impact assessment (Volume IV Section 2 of the EIA).

For example, in the operating Nysted Offshore Wind Farm, the temperature rise emitted by a transmission cable (132 kV) buried at a depth of 1 m, did not exceed 1.4oC in the layer 20 cm above the cable, and already at the surface of the bottom the temperature changes were invisible (Merck, 2009). The cable was buried in gravelly sediment, which promotes much greater heat loss in the interstitial spaces between sediment grains than in fine-grained sediment (Merck, 2009). Both of these sediment types are common in the area of the planned BIII OWF. It should be assumed that the heat dissipation (24 W/h/m on the cable surface) emitted by the internal 33 or 66 kV cables belonging to OWF BIII will be less (or at most similar) to that recorded at the Nysted offshore wind farm.

Heating the bottom sediment and interstitial waters (waters that fill the spaces between sand grains in the sediment) can also promote the passage of metals from the sediment to the water table and accelerate the decomposition processes of organic contaminants in the bottom sediment. In general, benthic fauna are naturally adapted to large seasonal temperature changes and are not sensitive or show very low sensitivity to a 2°C (2 K) temperature increase (Birklund, 2009). According to standards proposed by the German Federal Agency for Nature Conservation, the temperature rise due to the heat emission of an offshore wind farm transmission cable in the 20 cm layer below the bottom surface, which is the main habitat for infauna, must not exceed 2 K (2°C). Heat emission over the OWF BIII cables in the settlement will be local and the effect will be imperceptible if the cable is buried deeper than 1

m, while internal power cables are to be buried at a depth of 3 m. **Therefore, no impact of this parameter on the benthos is expected. Minimization measures are not required.**

The cable's thermal emissions will not have an impact on the structure and functioning of the benthos in the project area both for the set of parameters of the Project constituting the 2015 NIS and in the parameters approved by the Environmental Decision, as shown in Table 22 below .

Table 22 Assessment of impact on benthos by changing water and sediment temperature (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Very low	Operated power cables will emit heat, which may affect benthos	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)
Macrozoobenthos	Medium	Very low		No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

As a result of updating the parameters of the Project, the maximum length of the cables of the internal connection infrastructure of the farm will not change compared to the parameters approved by the Environmental Decision, thus it should be considered that the impacts generated by the Project in the modified parameters will not be of a different nature, scope or magnitude. Thus, the update of the Parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.5. Changes in the regime of currents seas

The foundation of gravity foundations disturbs the processes of water hydrodynamics, especially the flow of sea currents over the bottom, leading to changes in the granulometry of the upper sediment layer, increased bottom erosion and sedimentation processes. This impact is described in detail in Section 9.1.10 of the abiotic impact assessment (Volume IV Section 2 of the EIA).

Hydrological studies in the area of OWF BIII show that an increase in current flow and reduced stratification of the water column will only occur in the immediate vicinity of the foundations. Rather, in the area of the farm (excluding the vicinity of the foundations), a decrease in the speed of currents is expected to be balanced by its increase outside the farm region (Lech-Surowiec 2015).

The sensitivity of most of the macrozoobenthos species found in OWF BIII to this type of impact is low with the exception of the bivalve Cerastoderma glaucum. In fact, the benthic fauna is adapted to the same but natural processes, so the magnitude and significance of the impact is small.

Changes in the regime of sea currents are indirect and negative impacts on the benthos of local extent, long-term, irreversible, repetitive, of medium intensity. Given that even for the set of parameters of the Project constituting the 2015 NIS, the significance of the impact on the benthos is negligible, small or moderate, minimization measures are not required.

An assessment of the significance of this impact for the furthest-reaching NIS 2015 scenario that forms the basis for conducting the assessment in the 2015 Report is presented in Table 23 below.

Hydrographic modeling shows that differences in the characteristics of the sea current regime between the project alternatives analyzed for the 2015 Report, resulting from the type and number of foundations placed (Lech-Surowiec et al. 2015 - Volume II Section 11 report), are very small. In the section on hydrographic modeling, this impact was assessed as negligible for both the 2015 NIS and the Project under the parameters approved by the Environmental Decision. Changing the parameters of the Project means changing the number of realized foundations, this allows one to consider oneself that the impacts of the Project after modification will not be greater than both the set of parameters of the Project constituting the NIS 2015 and the impacts caused by the Project in the parameters approved in the Environmental Decision.

Table 23. Assessment of the impact on benthos of changing the regime of sea currents through foundation structures (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	small	Small	Exploited foundation structures will cause a change in the regime of sea currents in the project area, which will indirectly affect the benthos	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)
Macrozoobenthos	average	Average		Small (scale of exposure - local, duration - long-term, intensity - medium)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the updating of the parameters of the Project does not affect the result of the environmental impact assessment carried out as part of the proceedings in the course of which the Environmental Decision was obtained.

9.2.6. Damping ripples

The foundation of gravity foundations will cause wave attenuation. When waves hit the foundation of a wind turbine, some of their energy is reflected. This causes wave changes inside the wind farm and in its leeward zone. This impact is described in detail in Section 9.1.14 of the abiotic impact assessment (Volume IV Section 2 of the EIA).

The impact will be the same as in the case of the impact on the change of sea currents.

Given that even for the set of parameters of the Project constituting the 2015 NIS, the significance of the impact on the benthos is negligible, small or moderate, minimization measures are not required.

Wave attenuation by foundation structures is an indirect, negative impact on benthos of local extent, long-term, irreversible, repetitive, of medium intensity.

An assessment of the significance of this impact for the most far-reaching scenario that could occur under the rational alternative is presented in Table

Changing the parameters of the Project means changing the number of realized foundations, decreasing the number of fudaewas means decreasing wave attenuation, which in turn makes it possible to consider that the impacts of the Project after modification will not be greater than both the set of parameters of the Project constituting the 2015 NIS and the impacts caused by the Project in the parameters approved in the Environmental Decision.

Table 24 Assessment of the impact on benthos of wave attenuation by foundation structures (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Small	Exploited foundation structures will cause a change in the regime of sea currents in the project area, which will indirectly affect the benthos	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)
Macrozoobenthos	Medium	Average		Small (scale of exposure - local, duration - long-term, intensity - medium)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings in the course of which the Environmental Decision was obtained.

9.2.7. Impacts cumulative

The assessment carried out in the 2015 Report recognized that the possible cumulative impact at the stage of operation of the BIII OWF is related to the existence of other offshore wind farms in the vicinity of the BIII OWF, i.e., the BIII OWF. Baltica 3 offshore wind farm, Baltica 2 offshore wind farm, and BII offshore wind farm. It has been assumed that in 2021 - 2025, a total of 150 power plants with associated infrastructure will be operated under the BIII OWF and Baltica 3 OWF projects. While pointing out that in the above scenario, the level of cumulative impacts on abiotic environmental elements will be only 75% of the level analyzed in the report for the 2015 NIS.

It is also assumed that 225 more power plants will be built between 2023 and 2026, either within the framework of the OWF BIII and OWF Baltica 3 projects or, alternatively, on the surfaces of OWF BII and OWF Baltica 2. This would mean that as of 2026, a total of **375 power plants with infrastructure** will be in operation, in close proximity to each other, **i.e. 87.5% more than in the assessed 2015 NIS**, near the northeastern end of the Slupsk Shoal. **This was deemed not to affect the outcome of the evaluation.**

In doing so, it should be noted that most of the impacts described in Section 9.2 will not be cumulative, due to the scope being limited to the site of the foundation in question or its immediate vicinity.

In relation to the conditions related to the implementation of other OWF projects considered at the stage of the 2015 Report, a new circumstance is the fact that an environmental decision has been issued for the FEW Baltic II project and the Baltic Power OWF. The projects involve the construction of 44 and 126 wind power plants, respectively. In contrast, the BIII OWF in the updated parameters assumes the construction of 60 wind power plants, which is 50% of the number of plants envisaged by the Environmental Decision and 30% of those evaluated in the 2015 NIS. In addition, the modified parameters of the Project assume the abandonment of the possibility of gravity and tripod foundations, i.e. the solutions with the greatest significance from the point of view of the impacts of potential impacts on benthos. Consequently, updating the parameters of the Project offsets to some extent the impacts caused additionally by the planned OWF, thus contributing to the reduction of cumulative impacts that should be assessed in the environmental impact reports for the two projects.

Regardless of the scenario and the implementation of the Project in the parameters approved by the Environmental Decision, as well as in the case of the proposed modification of the Project, there will be an accumulation of "artificial reef" formation. A larger area of artificial ground than a single wind farm can develop a more diverse micro-ecosystem. This promotes an even greater possibility than in the case of a single offshore wind farm for alien or invasive species to establish themselves in this part of the Baltic, with negative consequences for the preservation of the naturalness of the local micro-ecosystem. The impact is local, and its magnitude is moderate.

An assessment of the described cumulative impacts is included in Table 24 below.

Table 25. Cumulative impacts of several "artificial reefs" on the BIII offshore wind farm ecosystem (operational phase, NIS 2015)

Cumulative impacts on benthos	The significance of the impact	
	Phytobenthos	Macrozoobenthos
The creation of an "artificial reef"	Small	Small

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

9.3. Stage decommissioning

The decommissioning phase will most likely see the removal of most of the farm's facilities from the seabed, in accordance with international regulations for installations and structures in marine areas (United Nations Convention on the Law of the Sea - UNCLOS).

These regulations set conditions for the removal of elements and installation of wind farms in the areas of the continental shelf and the exclusive economic zone. Decommissioning work should be carried out in such a way that it does not impede navigation or adversely affect the marine environment.

The standards also define exceptional situations in which there is no obligation to completely remove infrastructure elements. It is possible to leave such objects when:

- the weight of the foundation in the air exceeds 4,000 tons or is located at a depth of more than 100 meters, provided that it does not cause hindrance to the use of marine areas by other industries,
- decommissioning of elements is technically impossible or too costly,
- there is a threat to the lives of personnel decommissioning the wind farm,
- decommissioning entails an unacceptable risk of pollution of the marine environment.

If some items are left on the seabed, appropriate studies should be conducted to determine whether the farm's remains will not interfere with ship traffic and will not have a negative impact on elements of the living environment.

It should be noted that the removal of farm facilities is one of the options. If the foundations are left in/on the bottom, the impacts on the benthos at this stage will not differ from those at the operational stage.

At the decommissioning stage of OWF BIII, the following impacts on benthos are expected:

1) elimination of the "artificial reef",
2) disruption of sediment structure,
3) an increase in the concentration of suspended solids in water,
4) sedimentation of agitated sediment,
5) the release of pollutants and nutrients from the sediment into the water body.

There may also be unplanned impacts during the decommissioning of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the operation of the farm,

which may indirectly affect the benthos.

Unplanned impacts are assessed in Chapter 11.

9.3.1. Elimination of the "artificial reef"

The dismantling of the artificial hard substrate of the underwater parts of wind turbines is a process that irreversibly destroys the epiphytic assemblages, and partly influences the increase in mortality of the benthos that have colonized the hard substrate around each foundation. This will consequently lead to the loss of habitat and feeding grounds for representatives of ichthyofauna that inhabited the micro-ecosystem of the "artificial reef".

The decommissioning of the "artificial reef" is a direct impact on the BIII offshore wind farm ecosystem, local in scope, long-term, irreversible, repetitive during the decommissioning period, with very high

intensity. It should be noted, however, that in this case, the original assemblage of benthic communities of the BIII offshore wind farm area is no longer subject to assessment, but the biota. **Taking into account that even for the set of parameters of the Project constituting the NIS 2015, the impacts on benthos are not significant and minimization measures are not required, it should be considered that in the case of the Project in the updated parameters, where the number of power plants to be decommissioned and thus the area colonized by benthic organisms will be smaller than in the case of the set of parameters of the Project constituting the NIS 2015, the impacts will also be insignificant.**

An assessment of the significance of this impact **for the furthest-reaching NIS 2015 scenario** , which formed the basis for conducting the environmental assessment in the 2015 Report, is presented in Table 26 below.

Regardless of the variant of the project, all wind turbines will be decommissioned, i.e. the entire artificial reef within the OWF will be destroyed. It is considered that the Project in the revised parameters will not cause impacts on the epiphytic biota greater than the Project in the parameters approved by the Environmental Decision, as well as the 2015 NIS.

Table 26 Assessment of the impact on benthos of decommissioning the "artificial reef" (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Average	During the decommissioning stage, the "artificial reef" may be destroyed	Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - low)
Macrozoobenthos	Medium	Average		Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are not greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.2. Disruption of the structure of sediments

During the decommissioning of OWF B III, work will be carried out that will cause local disturbance of the bottom sediment structure. These include, in particular, the removal of foundations. Disturbance will also be caused by anchoring vessels and driving the legs of ships and jack-up barges into the seabed to stabilize their position. There will be physical destruction of benthic organisms that repopulated the seabed in the vicinity of the foundations during operations.

Full habitat regeneration at the site of removed foundations can take 3 to 5 years. This depends on the achievement of a stabilized quantitative structure by species forming assemblages characteristic of the sediment type of the BIII offshore wind farm region. The process is shorter for polychaetes and slightly longer for bivalves.

Physical destruction of the benthos resulting from disturbance of the bottom sediment structure at the decommissioning stage is a direct, negative impact of local scope, long-term, i.e. will last longer than 3 growing seasons, reversible, repeatable during the decommissioning period, with very high intensity. No impact is expected on the structure and functioning of the phytobenthos in the buffer zone. **The assessment conducted for the Project in the parameters approved by the Environmental Decision did not predict significant impacts and minimization measures.**

An assessment of the significance of this impact **for the set of parameters of the Project representing the furthest-reaching NIS 2015 scenario** , which formed the basis for conducting the impact assessment in the 2015 Report, is presented in Table 27 below.

Dismantling of foundations is a staged process, so it is considered that regardless of the maximum number of wind power plants (project variants) in a given unit of time a similar number of them will be decommissioned causing similar impacts on a local scale (within the area occupied by several decommissioned wind power plants). Most often, gravity foundations are eliminated by trimming them and hauling them ashore in several pieces. In addition, it is most likely that the internal connection infrastructure cables and the scour protection layer will not be excavated from the seabed, so the disturbance of bottom sediments will be negligible regardless of the project variant. **Therefore, it can be assumed that the Project after the changes will not cause an impact of a magnitude exceeding that assumed for the set of Project parameters constituting the 2015 NIS and for the Project in the parameters approved by the Environmental Decision, and thus the updating of the Project parameters does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained**

Table 27. Impact assessment involving physical destruction of benthos resulting from disturbance of bottom sediment structure (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the decommissioning of the farm, the structure of the bottom sediments will be disturbed, leading to the physical destruction of the benthos	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)
Macrozoobenthos	Medium			Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are not greater than in the case of the variant approved by the Environmental Decision, and

thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.3. An increase in the concentration of suspended solids in water water

As a direct result of the disturbance of the bottom sediment structure during the decommissioning of the farm's elements, there will be a rise and spread of suspended solids in the water-depth, with a range and intensity most likely somewhat less than during the construction phase described in Section 9.1.2 (if no cable decommissioning takes place).

The increase in the concentration of suspended solids in the water, resulting from the disturbance of the bottom sediment structure during the decommissioning stage, will cause a direct negative impact on the benthos of local extent, short-term, reversible, repeatable during the decommissioning period, of medium intensity. Given that the significance of the impact at the decommissioning stage of the BIII OWF on the benthos for the set of parameters of the Project constituting the 2015 NIS is negligible, minimization measures are not required.

An assessment of the significance of this impact for the most far-reaching NIS 2015 scenario, which formed the basis for conducting the impact assessment for the Project approved by the Environmental Decision, is presented in Table 28 below.

Dismantling of foundations is a staged process, so it is considered that regardless of the maximum number of wind power plants (project variants) in a given unit of time a similar number of them will be decommissioned causing similar impacts on a local scale (within the area occupied by several decommissioned wind power plants). Most often, gravity foundations are eliminated by trimming them and hauling them ashore in several pieces. In addition, it is most likely that the internal connection infrastructure cables and the scour protection layer will not be excavated from the seabed, so the increase in suspended solids concentration in the water will be negligible regardless of the project variant. In the case of updating the parameters of the Project, given that the number of power plants to be dismantled will be less than for the set of parameters of the Project constituting the 2015 NIS, as well as less than for the Project in the parameters approved by the Environmental Decision, it is reasonable to assume that it will not cause impacts greater than those caused by the Project approved by the Environmental Decision

Table 28. Assessment of the impact on benthos of increasing suspended solids concentration in water (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the decommissioning of the farm, the structure of the bottom sediments will be disturbed, leading to an increase in the concentration of suspended	Insignificant (scale of exposure-local, duration-short term, intensity-medium)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	None, very low or low		Negligible (scale of exposure - local, duration	Negligible (magnitude of impact - insignificant,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			solids in the water	- short term, intensity - medium)	importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are not greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.4. Deposition of agitated sediment

As a direct result of the disruption of the bottom sediment structure, suspended solids will be re-deposited on the bottom through the sedimentation process. Sedimentation is likely to be somewhat less extensive and intense than during the construction phase described in Section 9.1.3 (if cables are not decommissioned).

The deposition of agitated sediment on the seafloor, resulting from previous disturbance of the bottom sediment structure and suspended solids spreading, during the decommissioning stage will cause direct negative impacts on the benthos of local extent, short-term, reversible, repeatable during the decommissioning period, with low intensity. Taking into account the fact that even the significance of the impact at the stage of decommissioning of the OWF for the benthos in the variant approved by the Environmental Decision is negligible, and minimization measures are not required, it should be considered, due to the smaller number of power plants to be dismantled in the event of modification of the parameters of the Project, that in this case the scope and magnitude of impacts will not be greater than in the case of the Project in the parameters approved by the Environmental Decision.

An assessment of the significance of this impact for the set of parameters of the Project representing the furthest-reaching NIS 2015 scenario , which was the basis for conducting the assessment in the 2015 Report, is presented in Table 29 below.

Dismantling of foundations is a staged process, so it is considered that regardless of the maximum number of wind power plants (project variants) in a given unit of time a similar number of them will be decommissioned causing similar impacts on a local scale (within the area occupied by several decommissioned wind power plants). Most often, gravity foundations are eliminated by trimming them and hauling them ashore in several pieces. In addition, it is most likely that the internal connection infrastructure cables and the scour protection layer will not be excavated from the seabed, so the deposition of disturbed sediment will be negligible regardless of the project option evaluated in the 2015 Report. It is reasonable to assume that the Project in the parameters of the Project approved by the Environmental Decision will cause an impact on benthos no greater than the set of parameters of the Project constituting the 2015 NIS and no greater than the Project in the parameters approved by the Environmental Decision.

Table 29. Assessment of the impact on benthos of suspended solids deposition on the seabed (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the construction of the farm, the structure of the bottom sediments will be disturbed, leading to an increase in the concentration of suspended solids in the water, followed by their redeposition on the seabed	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	None, low or medium		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are not greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the result of the environmental impact assessment carried out as part of the proceedings during which the Environmental Decision was obtained.

9.3.5. Release of pollutants and nutrients from the sludge into the water body water

The agitation of the bottom sediment associated with the decommissioning of the foundations of farm facilities or the anchoring of ships promotes the passage of contaminants from the sediments to the water depths (Uścinowicz, 2011; Bojakowska, 2001; Frostner, 1980; Bourg and Loch, 1995; Dembska, 2003). This way they can get to it:

- pollutants, including heavy metals and PAHs and PCBs,
- biogenic elements - nitrogen and phosphorus.

This process is described in detail in Chapter 9.1.2 of the assessment of the impact of OWF BIII on the abiotic environment (Volume IV Section 2 of the EIA). The rate of redistribution of pollutants from the sediment to the water body will be slightly lower than during the construction phase of the farm, if the cables connecting the wind turbines are not removed.

The release of pollutants and nutrients from the sediment into the water body, resulting from previous disturbance of the bottom sediment structure during the decommissioning stage, will cause direct negative impacts on the benthos of local extent, short-term, reversible, repeatable during the decommissioning period, with low intensity. Taking into account the fact that during the impact assessment for the Project in the parameters approved by the Environmental Decision, the significance of the impact at the decommissioning stage of the OWF for the benthos for the set of parameters of the Project constituting the NIS 2015 is small or negligible, and minimization measures are not required, as well as the fact that in the case of updating the parameters of the Project the number of power plants

to be dismantled will be reduced, it allows us to conclude that the impacts will be smaller than in the case of the Project in the parameters approved by the Environmental Decision.

An assessment of the significance of this impact for the furthest-reaching NIS 2015 scenario , which formed the basis of the impact assessment conducted in the 2015 Report, is presented in Table 31 below.
The release of pollutants and nutrients from the sludge into the water body will be a process on the verge of measurability regardless of the project variant.

Table 30. Assessment of impact on benthos of released pollutants and nutrients (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	During the construction of the farm, the bottom sediment structure will be disturbed, leading to the release of pollutants and nutrients from the sediment into the water body, which may affect the benthos	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	None, low or medium		Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and magnitude are not greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.6. Impacts cumulative

At the liquidation stage, the accumulation scenario is the most difficult to predict. In the most far-reaching one, all wind farms built are decommissioned at the same time (i.e. depending on the scenario and obtaining additional connection conditions), e.g. as a result of legal changes that make their operation completely unprofitable.

At the decommissioning stage of the BIII OWF, similar cumulative impacts to those from the construction stage (section 9.1.5.) may occur if all underwater wind turbine structures are dismantled at the same time.

The potential accumulation of impacts can be spoken of primarily in the case of the spreading of suspended solids caused by the disturbance of the structure of the bottom sediments, and its subsequent sedimentation. However, the level of this accumulation will be minimal - the spreading of suspended solids resulting from the stirring up of bottom sediments during construction activities only

marginally exceeds the boundaries of the farm, and the thickness of the additional layer of sediment that can settle to the bottom is only 0.2 - 0.6 mm.

A significant portion of the impacts described in Section 9.3 will not be cumulative, due to the scope being limited to the site of the foundation in question or its immediate vicinity. It was considered that the same impacts as during the construction phase, i.e. the disturbance of the sediment structure, the associated increase in the concentration of suspended solids in the water and the deposition of agitated sediment, would accumulate.

An assessment of cumulative impacts during the construction phase is provided in Table 32.

Table 31 Assessment of cumulative impacts on benthos (decommissioning phase, NIS 2015)

Cumulative impacts on benthos	The significance of the impact	
	Phytobenthos	Macrozoobenthos
Disruption of sediment structure	No change	Small
Increase in the concentration of suspended solids in water	Skip	Skip
Deposition of agitated sediment	Skip	Skip

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Changing the conditions for implementation and operation of the Project does not affect the nature, magnitude and significance of impacts in relation to the Project in the parameters approved by the Environmental Decision.

10. Impacts related

The nature of the benthos, i.e. its taxonomic composition, abundance and biomass, is shaped by the physical and chemical factors of the water above the bottom: salinity, oxygen saturation and the type of bottom sediment. The impact of OWF BIII on marine benthos will result from the disturbance and change in the nature of sediments. If the predominant area of the BIII OWF is dominated by sandy sediments, sands on clays and differentiated sediments (Dembska et al., 2015 - Volume III Section 5 of the report), then during the construction and decommissioning of the farm there will be an increased exposure of the benthos to unfavorable suspended solids flow. The benthos will be destroyed in areas where the sediment has been excavated to prepare the bottom for the foundation and leaching protection layer, as well as the cables connecting the wind turbines, in areas of deposition of the excavated spoil, and in areas of foundation placement. It is estimated that the total area of the bottom area degraded as a result of construction in the variant approved by the Environmental Decision will be less than 1% of the area of OWF BIII, and in the case of proposed changes in the parameters of the Project, this figure will be reduced to about 0.4% of the area of OWF BIII. The depletion of the benthic food base for seabirds and fish will not be permanent. The high reproductive potential of benthic species will cause the taxonomic structure to recover after the first growing season, and the return to full recovery of the quantitative state (abundance and biomass) will occur no later than the fifth growing season after degradation, when the longest-lived bivalve species will reach maximum size.

In the area of OWF BIII, two macrozoobenthos communities were found - the *Mytilus trossulus* assemblage, which lives on hard bottom, where gravels and pebbles predominate, and the *Pygospio elegans* assemblage, which occurs on sandy bottom fragments. The construction of an offshore wind farm will cause the greatest changes in the benthic assemblages of the sandy bottom. The introduction of hard substrate (foundations, foundation stabilizing aggregate) into the environment will produce an

"artificial reef" effect. In a short time, the hard surface will be colonized by epiphytic organisms: mussels, barnacles and bryozoans, and in the overexposed zone also by phytobenthic species. Herbivorous crustaceans and snails will appear in large numbers. With the exception of phytobenthic species, the taxonomic composition and quantitative structure of the benthos will be similar to those found in the *Mytilus trossulus* community. Increased biological productivity of benthic species will make the region around the foundations a place for concentration and feeding of many fish species. In addition, inside the BIII farm, hydrological and hydrochemical changes will occur during the operation stage (Chalcinska et al. 2014), which conditions affect the physiology of benthic organisms.

The results and conclusions in this chapter are important for a comprehensive environmental impact assessment. The structure and functioning of the benthos depends on the abiotic conditions (bottom sediments, hydrological and hydrochemical conditions of the headwaters), hence the assessment in the report is related to the results contained in the reports "Studies of physical and chemical conditions of sediments in the area of the OWF "Baltic Central III"(Dembska et al, 2015 - Volume III Section 5 of the report), "Investigations of hydrological and hydrochemical conditions in the area of the OWF "Baltic Central III"(Chalacińska et al., 2015 - Volume III Section 2 of the report) and the report on modeling, among others, of hydrographic conditions and suspended solids spreading at the stage of construction of the offshore farm (Volume II Section 11 of the report. In addition, the conclusions of this report are the basis for the assessment of associated impacts in the reports on the assessment of the impact of OWF BIII on ichthyofauna (Volume IV Section 4 of the report), fisheries (Volume IV Section 10 of the report) and birds (Volume IV Section 5 of the report).

11. Impacts unplanned

Unplanned impacts are the result of sudden events or failures that are not related to activities included in the project schedule (e.g., leakage of toxic substances into the water due to a collision between two vessels).

A full description of potential unplanned events can be found in Section 12 of Volume II of the report. The assessment of the significance of unplanned impacts on benthos took into account the probability of the event that will be the source of the impact and its potential consequences.

Based on data from other OWF projects and similar projects, as well as the 2015 Report, the following potential unplanned impacts were selected:

1) leakage of petroleum substances as a result of a collision, accident or construction disaster (during normal operation or in an emergency);
2) accidental release of municipal waste or domestic sewage;
3) accidental release of construction materials or chemicals;
4) contamination of the water tone and bottom sediments with antifouling agents;
5) disruption of sediment structure, agitation and sedimentation on the bottom associated with unexploded conventional weapons (UXO) explosions.

It should be noted that as a result of unplanned events , the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. On the other hand, indirectly, these events can also affect living organisms that inhabit or otherwise use the seabed, the water table and the sea surface.

A full description of potential unplanned events can be found in Section 12 of Volume II of the report. In contrast, **indirect impacts of unplanned events on benthos** are **assessed** below, based on this description.

11.1. Spill of petroleum substances (during normal operation of the vessels)

During normal ship operation, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) can occur.

Under favorable conditions, leaks can disappear spontaneously due to evaporation and dissipation in water. The size of these spills will be practically limited to the OWF area.

They may contribute slightly to the deterioration of water quality. Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. There they can be bound by bottom sediments. However, due to the nature of the sediments in the BIII offshore wind farm area (small amount of organic matter and low content of fine fractions), they will not cause any noticeable deterioration in their quality. It should be assumed that these spills will be small (stage I), up to 20^{m3}. Visible traces of such contamination under favorable conditions can disappear spontaneously due to evaporation and dispersion in the water. The size of these spills will be practically limited to the OWF area. The contamination of sediments with petroleum substances is independent of the type of foundation used. It will be more noticeable in areas with fine-grained sediments, which have a greater capacity to absorb petroleum substances.

As a primary minimization measure, it is recommended that vessels be supplied with means to deal with minor oil spills. Mitigation activities are described in more detail in Section 12 of Volume II of the EIA.

The impact on the benthos of a small amount of petroleum substances released into the sea during normal ship operations is assessed as **an indirect, negative, local in scope, temporary or short-term, reversible, repetitive, low-intensity** impact.

An assessment of the significance of this impact on benthos regardless of the stage of implementation of OWF BIII and the project variant is presented in the table below. Changing the parameters of **the Project to those specified in the Environmental Decision will not affect either the risk or the magnitude of the impact caused by an oil spill into the sea.** The significance of the unplanned impact - oil spills on the benthos of OWF BIII, will be negligible or small.

Table 32. Assessment of the impact on the benthos of oil substances released into the sea during normal ship explorations regardless of the stage of implementation of OWF BIII and the project variant

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Average	In emergency situations, contamination of water depths and bottom sediments with oil-based substances may occur	Insignificant (scale of exposure - local, duration - temporary or short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	Average		Insignificant (scale of exposure - local, duration -	Negligible (magnitude of impact - insignificant,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
				temporary or short-term, intensity - low)	importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

11.2. Spill of petroleum substances (in an emergency situation emergency)

During the construction, operation or decommissioning of the farm, leakage of petroleum substances may occur, resulting in pollution of the water table and bottom sediments. A spill can occur as a result of a shipwreck or collision, a construction disaster at one of the farm's facilities, or during maintenance work. In the event of a collision or collision between ships, a Grade III spill, i.e. over 50^{m3}, can be expected.

It has been calculated that the probability of serious accidents is very low, on the order of $^{10-5}$ - $^{10-4}$. For the Southeast Baltic, which may include the BIII offshore wind farm area, the risk of collision was estimated at 1 case per 1060 years. The significance of this impact can be considered negligible, as the unplanned impacts described are extremely rare and practically impossible. In this case, there are organizational structures, plans of conduct in carrying out actions to combat hazards and pollution, and effective methods of cleaning up pollution.

However, if an oil spill were to occur in the area of OWF BIII during its construction, 24 hours after the accident at a probable wind direction distribution for the Southern Baltic of 3°B, its extent would cover the eastern slope of Slupsk Shoal (Pawelec et al. 2014), threatening not only the benthic organisms of the farm area, but the Slupsk Shoal Natura 2000 area, which protects, among other things, the habitat of marine clam beds and many species of macroalgae. In the best-case scenario (calm sea), oil splashes will not threaten the benthos, but only groups of organisms living in the water's depths. During a storm, the dispersion of the oil spill will contaminate the food chain in the area of the failure (Malaczynski and Czarnecki 2010). If petroleum products reach the bottom sediments where they accumulate, they will simultaneously be a major toxic and carcinogenic threat to benthic organisms, reducing their physiological condition. In addition, the effects of spills can be catastrophic for the benthos for several months after an accident due to a decrease in the amount of oxygen reaching the bottom zone (Rogowska 2011).

The impact on the benthos of more petroleum substances released into the sea during an accident or collision is assessed as **indirect, negative, regional in scope, short-term, reversible, repetitive, high-intensity** impact.

An assessment of the significance of this impact **for the most far-reaching scenario, the 2015 NIS,** is presented in the table below.

Table 33 Assessment of the impact on benthos of more petroleum substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Average	In emergency situations, contamination of water depths and bottom sediments with oil-based substances may occur	Small (scale of exposure - regional, duration - short-term, intensity - high)	Negligible (magnitude of impact - low, importance of the resource - low)
Macrozoobenthos	Medium	Average		Small (scale of exposure - regional, duration - short-term, intensity - high)	Small (magnitude of impact - negligible, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Changing the parameters of **the Project to those specified in the Environmental Decision will not affect either the risk or the magnitude of the impact caused by an oil spill into the sea.** The significance of the unplanned impact - oil spills on the benthos of OWF BIII, will be negligible or small.

11.3. Accidental release of municipal waste or wastewater domestic

During the construction of the wind farm, waste, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage, will be generated on vessels as well as at the construction facilities located on land (at the port serving the project). Their expected types of quantities, as well as how they will be handled, are presented in Section 10 of Volume II of the EIA. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident, causing a local increase in nutrient concentrations and deterioration of water and sediment quality, and indirectly negatively affecting the benthos. However, the pollutants should quickly disperse, so they will not contribute to permanent deterioration of the environment in the project area.

As a minimizing measure, it is recommended to create procedures related to waste and wastewater handling.

The impact on the benthos of a small amount of municipal waste or domestic sewage accidentally released into the sea is assessed as an indirect, negative, local in scope, short-term, reversible, repetitive, low-intensity impact.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario, the 2015 NIS, is presented in the table below.

Changing the parameters of the Project will not result in either an increase in the amount of waste and domestic sewage, or in the amount of maintenance operations, and it is expected that due to the smaller number of power plants in relation to the parameters of the Project approved by the

Environmental Decision, the amount of impact generated by the Project under the modified parameters will be less.

The significance of the unplanned impact - contamination with construction and operational materials of the OWF BIII benthos, will be negligible.

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Average	During the construction, operation or decommissioning of the farm, a small amount of municipal waste or domestic sewage may be accidentally released into the sea	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	Average		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

11.4. Accidental release of chemicals and waste from construction, operation or decommissioning of the farm

During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that about $5^{m3\ of}$ product could sink during handling. Grouts, mortars and other binders often contain hazardous substances. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 $^{g\text{-}cm\text{-}1}$, they sink and are deposited on the bottom. These substances are considered a serious threat because they cannot be easily removed from the bottom and are toxic to marine organisms.

During the operation of the farm, maintenance of its facilities will be carried out. Accidental discharge of waste or operating fluids into the sea cannot be ruled out, which may end up deposited on the bottom.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out this work (cf. description of the decommissioning stage), and the greatest contamination may occur if gravity foundations have to be crushed.

The anticipated types and quantities of waste are presented in Section 10 of Volume II of the EIA.

For this type of investment like the OWF, a detailed plan is being developed to counteract the risks and pollution arising during the construction, operation and decommissioning of the OWF, which includes a description of minimization measures and how to deal with such events. It is recommended that such procedures be created as a minimization measure.

The impact on the benthos of construction and operation materials that may accidentally enter the sea during the construction, operation or decommissioning of the farm is assessed as a direct or indirect, negative, local in scope, short-term, reversible, repetitive, medium intensity impact.

The assessment of the significance of this impact on benthos regardless of the stage of implementation of the BIII OWF carried out in the 2015 Report is presented in Table 34 below. **Changing the parameters of the Project will not result in either an increase in waste or maintenance operations, and it is expected that due to the smaller number of power plants relative to the parameters of the Project approved by the Environmental Decision, the magnitude of impact generated by the Project under the modified parameters will be less.** The significance of the unplanned impact - contamination with construction and operational materials of the OWF BIII benthos, will be negligible or small.

Table 34. Assessment of the impact on benthos through contamination of the seabed by construction and operational materials regardless of the stage of implementation of OWF BIII and the variant of the project

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Average	During the construction, operation or decommissioning of the farm, there may be accidental release of waste associated with the process into the sea, and at any stage of the project there may be accidental release of various types of chemicals	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	Average		Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

11.5. Contamination of water depths and bottom sediments with agents antifouling

To protect the hulls of ships from overgrowth, biocides are used, which may include, for example, copper compounds, mercury compounds, organotin compounds (such as tributyltin - TBT). These substances can pass into the water's depths and eventually be retained in the sediment. It should be assumed that the emission of these compounds will be limited by dilution in the water depths. Of the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. TBT (the most harmful substance) is currently banned in antifouling paints, but the presence of these compounds in older units cannot be ruled out.

As a minimizing measure, it is recommended that vessels whose hulls have not been coated with TBT-containing antifouling paint be used at any stage of the project. This will eliminate this most harmful impact on aquatic organisms.

The impact on the benthos of antifouling agents is assessed as **indirect, negative, local in scope, temporary or short-term, reversible or irreversible, repetitive, low intensity**.

The assessment of the significance of this impact on the benthos regardless of the stage of implementation of OWF BIII carried out in the 2015 Report is shown in Table 35 below

Changing the parameters of **the Project to those specified in the Environmental Decision will not affect both the risk and magnitude of the impact through contamination of the water depth and bottom sediments with antifouling agents. Due to the smaller number of power plants in relation to the parameters of the Project approved by the Environmental Decision and, consequently, the smaller number of maintenance operations, the magnitude of the impact generated by the Project under the modified parameters will be lower**

Table 35 Assessment of impacts on benthos of antifouling agents released into the sea (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Average	During the normal operation of ships, the release of antifouling substances from their hulls may occur	Negligible (scale of exposure - local, duration - temporary or short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	Average		Negligible (scale of exposure - local, duration - temporary or short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

11.6. Disruption of sediment structure, secondary sedimentation on the bottom, and increased suspended solids associated with UXO explosions

If UXO detonation is carried out, it is possible to disrupt the structure of bottom sediments, agitate and redeposit them, and increase suspended solids in the water.

In the case analyzed, impacts are expected to be analogous to those of physical interference with the bottom during the construction phase (see Section 9.1 of this Section).

As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and dissipate (resuspension) in the water depths, potentially releasing pollutants and nutrients into the water, re-depositing on the bottom. Some heavy metals, pollutants and nutrients may be released from the bottom sediments as a result of the agitation, analogous to the construction phase. In this case, there may be a deterioration of water quality due to an increase in the concentration of harmful and biogenic substances (due to the passage from the sediment to the water body as a result of sediment uplift processes). These sediments will also promote the formation of more suspended solids, which will persist in the water depths for a long time. Intense resuspension can cause the release of nutrients

immobilized in the sediment and contribute to eutrophication. In the case of sandy sediments with low organic matter content (e.g., coarse-grained sandy sediments), the processes described will be less intense. These sludges are generally characterized by small amounts of fine fractions and low concentrations of metals and persistent organic pollutants.

It is also assumed that there may be temporary turbidity in the water due to an increase in suspended solids in the water. Aggradation of bottom sediments can also affect potential mineral accumulations.

The scale of anticipated impacts will vary depending on the size of the detonated cargo, but nevertheless they are not expected to extend beyond the local range. All potential impacts on the benthos associated with the decommissioning of UXO, with the exception of physical destruction of the benthos due to disturbance of the sediment structure, were assessed as insignificant. Since phytobenthos was only recorded in the buffer zone of the farm during the environmental studies, it is not expected that the detonation of UXO could cause its physical destruction. In the case of macrozoobenthos, the significance of the impact involving its physical destruction, due to the long-term nature of the effects (recovery of the population to its original state occurs after about 5 years) and its high intensity, was considered low. An assessment of the significance of the impacts in question is presented in the tables below.

Table 36 Impact assessment of physical destruction of benthos resulting from disruption of bottom sediment structure due to UXO explosion (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	Due to the detonation of UXO, the structure of the bottom sediments will be disturbed, leading to the physical destruction of the benthos	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)
Macrozoobenthos	Medium			Moderate (scale of exposure - local, duration - long-term, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)

Table 37. Assessment of the impact on benthos of an increase in suspended solids concentration in water due to UXO explosion (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	Due to the detonation of UXO, the structure of the bottom sediments will be	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			disturbed, leading to an increase in the concentration of suspended solids in the water		the resource - low)
Macrozoobenthos	Medium	None, very low or low		Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Table 38. Assessment of the impact on benthos of the deposition of suspended solids on the seabed in the growth of the result of UXO explosion (any stage)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Phytobenthos	Small	Low or medium	Due to the detonation of UXO, the structure of bottom sediments will be disturbed, leading to an increase in the concentration of suspended solids in the water and their subsequent redeposition on the seabed	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Macrozoobenthos	Medium	None, low or medium		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

The 2015 report did not include an assessment of unplanned impacts associated with UXO detonation. The assessment conducted in this report indicates that the magnitude and significance of the impact is insignificant. At the same time, it should be emphasized that the Project update does not affect the Project's impacts in relation to the Project in the parameters approved by the Environmental Decision. The possibility of such an impact is related to the area of the seabed covered by the works during the course of the project, and this will not change even after the implementation of the proposed changes to the conditions of the Environmental Decision.

11.7. Impacts cumulative

In the event of simultaneous construction, operation or decommissioning of several projects, vessel traffic in adjacent areas increases, with an increased risk of collisions and emergency oil spills and simultaneous accidental discharge of construction and operational materials into the sea.

In the case of simultaneous implementation or operation of several projects, vessel traffic in neighboring areas also increases, with an increased risk of such an event. To the north of the farm is a heavily used shipping route, in the area of which there is an increased risk of oil spills.

The cumulative impact of all unplanned impacts on the benthos will be the same as for the individual impacts described in sections 11.1. - 11.6.

12. Assessment of the impact of the project integrity, coherence and object of protection of Natura 2000 areas

This chapter analyzes the potential for impacts of the BIII OWF, individually and in cumulation with other projects, on the integrity, coherence and objects of protection of Natura 2000 areas in the context of benthos. The assessment was performed in accordance with the methodology described in Section 5 of Volume I, paragraph 4.3.13.

12.1. Initial assessment - screening

Pre-assessment is the process by which the project's likely impacts on Natura 2000 sites are identified (either singly or in conjunction with other projects or plans). An analysis is made of whether the projected impacts could have a significant impact undermining the conservation objectives of these areas (EU Guidance on wind energy, 2011).

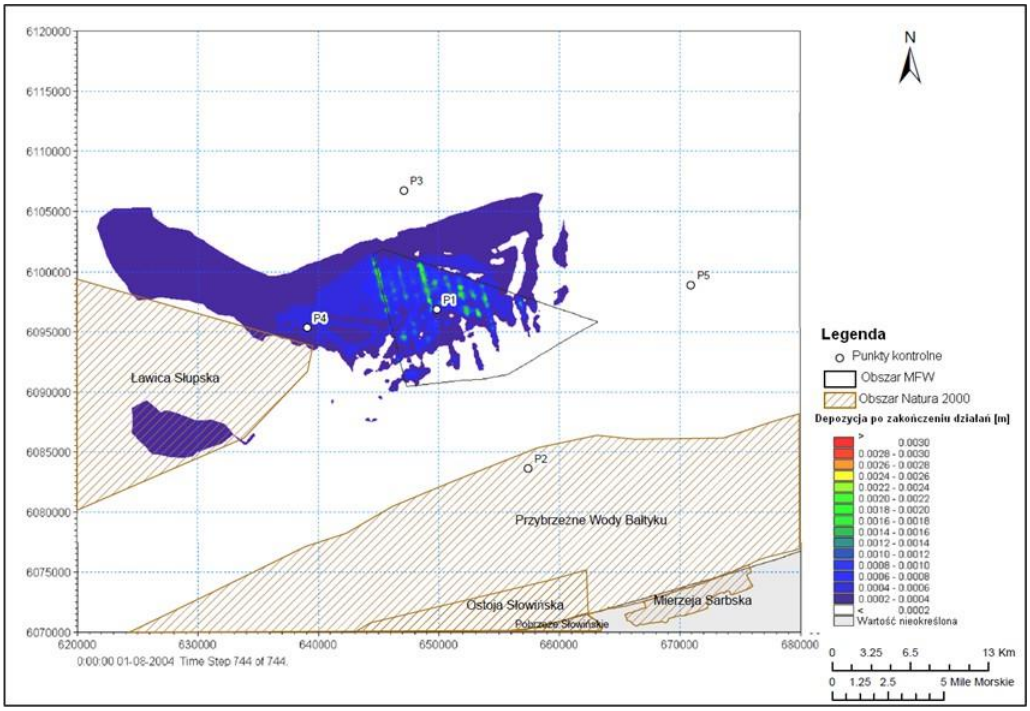
12.1.1. Zone of potential impacts of the OWF BIII

After analyzing the impacts of OWF BIII, as described in this document, it was found that the project's impacts on benthos will be overwhelmingly limited to the area of the farm.

However, the following secondary impacts may extend beyond the farm area:

- resulting from the rise and spread of suspended solids in the water depths and their redeposition to the bottom, thereby covering benthic habitats and protected habitats in the Slupsk Bank PLC990001 Natura 2000 area. This indirect impact will be a direct result of the disturbance of the bottom sediment structure during construction activities (and to a lesser extent during operation and decommissioning of the farm). Its range, in the farthest-reaching scenario, up to a dozen kilometers, is shown in the figures below.
- resulting from the effect of changes in benthic habitats that are a source of food for seabirds that are protected in Natura 2000 areas. Its range will be up to several kilometers.

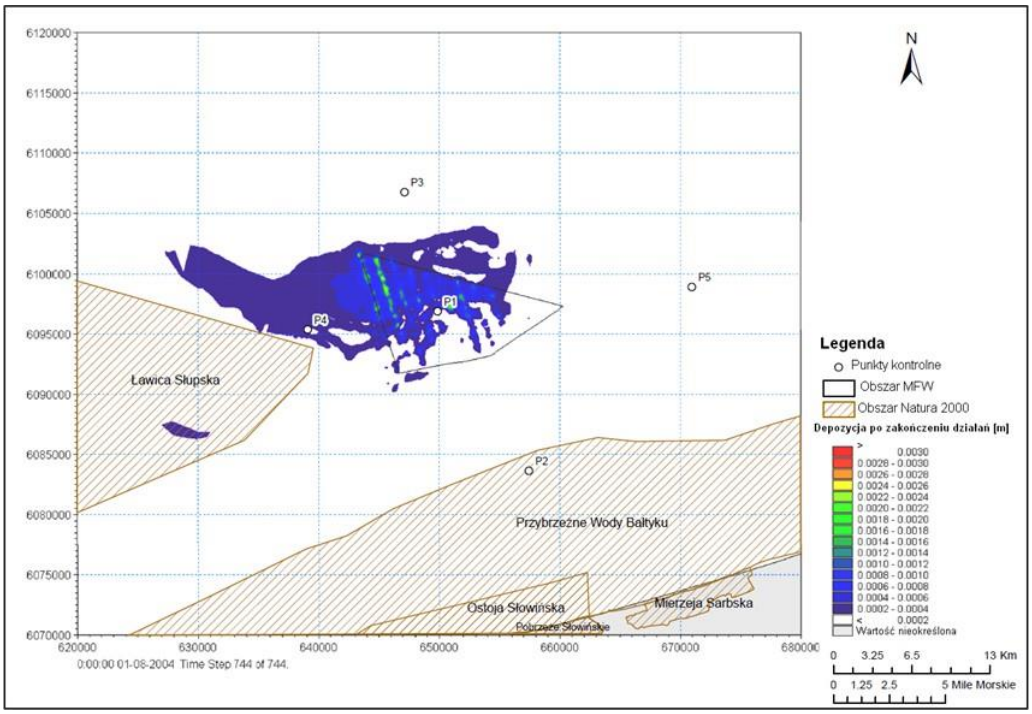
Figure 7 The area to which sediment will fall after construction work is completed (NIS 2015)



Ławica Słupska	Slupsk Shoal
Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Ostoja Słowińska	Ostoja Słowińska
Mierzeja Sarbska	Sarbska Spit
Pobrzeże Słowińskie	Pobrzeże Słowińskie
Legenda	Legend
Punkty Kontrolne	Checkpoints
Obszar MFW	IMF area
Obszar Natura 2000	Natura 2000 area
Dyspozycja po zakończeniu działań	Disposition after action
Wartość nieokreślona	Value not specified
Mile Morskie	Sea Miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Figure 8 Area to which sediment will fall upon completion of construction work (for the Project in the parameters approved by the Environmental Decision)



Ławica Słupska	Slupsk Shoal
Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Ostoja Słowińska	Ostoja Słowińska
Mierzeja Sarbska	Sarbska Spit
Pobrzeże Słowińskie	Pobrzeże Słowińskie
Legenda	Legend
Punkty Kontrolne	Checkpoints
Obszar MFW	IMF area
Obszar Natura 2000	Natura 2000 area
Dyspozycja po zakończeniu działań	Disposition after action
Wartość nieokreślona	Value not specified
Mile Morskie	Sea Miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

The variant that is the subject of this Report will build about. 70% fewer foundations than envisaged for the furthest-reaching scenario - NIS 2015 - forming the basis of the assessment in the 2015 Report, and twice as few as specified in the Environmental Decision, and the use of the most invasive gravity foundations under the power plants has been excluded, limiting the permissible foundation types to monopile and jacket type only, and only in the case of additional infrastructure has the possibility of using gravity foundations been retained, but their number has been limited to one (out of 6 permitted under the terms of the Environmental Decision). It is associated with a significantly lower extent of all impacts on benthos during the construction, operation and decommissioning phases. Thus, it is considered that if the proposed modifications are implemented, the disturbance that is a source of suspended solids uplift and dissipation in the water body, as well as secondary sedimentation, will also be significantly reduced, thus further reducing the potential for impacts on Natura 2000 sites compared to the Project in the parameters constituting the 2015 NIS, as well as the variant approved in the Environmental Decision.

12.1.2. Natura 2000 areas in the zone of influence of the BIII OWF

The zone of potential impacts of OWF BIII on benthos may include 2 areas.

- Slupsk Shoal PLC990001 - about 5.5 km westward from OWF BIII.
- Coastal waters of the Baltic PLB990002 - about 8 km in a southerly direction from OWF BIII;

These areas are described below.

Slupsk Shoal" Natura 2000 area PLC990001

Slupsk Shoal Natura 2000 site PLC990001, which is also an IBA PLM1 sanctuary, is located to the west, at a distance of about 5.5 km from OWF BIII. It is a bird sanctuary of European rank E 79.

Slupsk Shoal is a body of water in the southern Baltic Sea, encompassing an area with a highly varied bottom with numerous hills and depressions with depths ranging from about 8.0 to about 35.0 meters. The shallowest parts of the bottom include elevations within the so-called "boulder pit" in the northern and western parts of the area (minimum depth of about 8.0 m) and parts of the sandy bottom of the central part of the area (minimum depth of about 12.0 m). The deepest parts of the bottom (up to 35 m) are located in the southeastern part of the area. The dominant plants are macroalgae, with many species already disappearing in the Gulf of Gdansk. There are no bird species from Annex I of Council Directive 79/409/EEC. During the winter there is at least 1% of the long-tailed duck (C3) migratory path population of the following species: long-tailed duck, guillemot, uha. Wetland birds occur in concentrations of more than 20000 individuals (C4). Isolated are the sites - habitat 1170 (marine bivalve shoals) in Polish marine waters. The shallows are inhabited by numerous invertebrates, providing a rich food base for the flocks of wetland birds that stop in autumn and winter here. It is the site of the crayfish Delesseria sanguinea, which is considered lost in the Baltic Proper.

Natura 2000 area "Baltic coastal waters" PLB990002

The Przybrzeżne wody Bałtyckie PLB990002 Natura 2000 site, which is also an IBA PLM2 site and a bird sanctuary of European rank E 80, is located to the south, at a distance of about 8 km from OWF BIII. It covers the coastal waters of the Baltic Sea with a depth of 0 to 20 meters. Its boundaries stretch for 200 kilometers, starting from the base of the Hel Peninsula and ending at the Pomeranian Bay. The seabed is uneven, with denivelations reaching 3 meters. The area is wintered in significant numbers by 2 species of birds from Annex I of Council Directive 79/409/EEC: black-throated diver and red-throated diver (C7). During the winter there is more than 1% of the long-tailed duck's migratory path (C3) population, at least 1% of the guillemot and uhla. The benthic fauna is dominated by small crustaceans. Large marine mammals - gray seals *Halichoerus grypus* and ringed seals *Phoca hispida* and porpoises Phocaena *phocaena*- are rarely observed.

12.1.3. The object of protection of Natura 2000 areas in the zone impacts

The object of protection of Natura 2000 areas in the zone of impacts of OWF BIII on benthos is presented in the following tables.

Table 39 Slupsk Shoal PLC990001 - types of natural habitats found in the area and assessment of the importance of the area for these habitats:

Code	Name of habitat	Coverage [ha]	The degree of reprezen.	Relative area.	Preservation status.	Overall assessment
1110	submarine sandbanks	30926.65	A	A	A	A
1170	reefs	14331.60	A	A	A	A

Source: Standard Data Form

Table 40 Slupsk Shoal PLC990001 - species covered by Article 4 of Directive 2009/147/EC and assessment of the importance of the area for these species

Code	Scientific name	Species	Population				Assessment of the importance of the area			
			Settled	Migrating			Population	Western condition.	Insulation	Overall
				Reproductive	Overwintering	Transient				
BIRDS										
A202	Cepphus grylle	Diver			98-556		C	A	C	C
A202	Cepphus grylle	Nurinik				72-461	C	A	C	C
A064	Clangula hyemalis	Long-tailed duck			101148-231180		B	A	C	B
A064	Clangula hyemalis	Long-tailed duck				76440-214374	B	A	C	B
A066	Melanita fusca	Uhla			5365-23611		B	A	C	B
A066	Melaniata fusca	Uhla				910-1786	C	A	C	C

Source: Standard Data Form

Table 41 Baltic coastal waters PLB990002 - species covered by Article 4 of Directive 2009/147/EC and assessment of the significance of the area for these species

Code	Scientific name	Species	Population				Assessment of the importance of the area			
			Settled	Migrating			Population	Western condition.	Insulation	Overall
				Reproductive	Overwintering	Transient				
BIRDS										
A200	*Alca torda*	alka			500-1000		C	C	C	C
A202	*Cepphus grylle*	plunger			1500		B	B	C	B
A064	*Clangula hyemalis*	long-tailed duck			90		B	C	C	B

Code	Scientific name	Species	Population				Assessment of the importance of the area			
			Settled	Migrating			Population	Western condition.	Insulation	Overall
				Reproductive	Overwintering	Transient				
A184	*Larus argentatus*	silvery gull			8000-15000		C	C	C	C
A066	*Melanitta fusca*	uhla			14		C	C	C	C
A065	*Melanitta nigra*	scotch				3000	C	B	C	C
A655	*Melanitta nigra*	scotch			5000-8000		C	B	C	C

The conservation objective of none of the above areas is benthic species. However, benthic species are taken into account in the assessment of the status of the two habitats protected in the Natura 2000 area Slupsk Shoal PLC990001 as indicators of their specific structure and function. They are also the basis for the preservation of the proper conservation status of the benthophagus wintering in the area. Habitat 1110 assesses the presence of *habitat-typical* macrozoobenthos species (i.e. *Bathyporeia pilosa, Mya arenaria, Pygospio elegans* and *Cerastoderma glaucum*), while Habitat 1170 assesses the presence of *habitat-typical* macroalgal taxa (i.e. *Furcellaria lumbricalis, Ceramium spp*. And *Vertebrata fucoides*) and taxa of phytophilic epiphytic fauna (i.e., *Amphibalanus improvisus, Einhornia crustulenta, Mytilus trossulus,* and gudgeons of the genus *Gammarus sp.*) (Michalek et al. 2019[2]) (Baranska et al. 2019[3]).

The following is a brief description of the natural habitats protected in the area.

Natural habitat 1110 consists of sandbanks in the sublittoral, permanently submerged under water, the depth of which rarely exceeds 20 meters. Within the habitat, bottom vegetation is mostly absent, except for algae overgrowing individual stones lying on the sand. However, groupings of benthic invertebrates with high species diversity are characteristic of habitat 1110. The criteria in question are met by the predominantly sandy sedimentary part of the Slupsk Shoal. In terms of ecological and biological importance, sandbanks in the southern Baltic Sea are, above all, an important wintering site for many species of seabirds (Warzocha 2004a).

Natural habitat 1170 consists of submerged underwater and elevated above the surrounding seabed rocky substrate in the sublittoral zone. Reefs promote zonal distribution of plants and animals and high biodiversity. The habitat area includes the northwestern part of Slupsk Shoal, with a bottom composed of boulders and stones, with rich plant communities and shoals of mussels. The water depth is about 8-17 m. The hard bottom and the relatively high transparency of the water create favorable conditions for the development of benthic macroalgal communities. This is the only place in the Polish Maritime Areas that is so far from the shore where mass occurrences of benthic vegetation communities can be found (Warzocha 2004b).

An assessment of the conservation status of habitats 1110 and 1170 at sites located in the Slupsk Shoal Natura 2000 area PLC990001 was carried out within the framework of the project entitled: *"Pilot implementation of monitoring of marine species and habitats in 2015-2018"* (implemented as part of the State Environmental Monitoring).

As a result of the 2016-2018 monitoring studies:

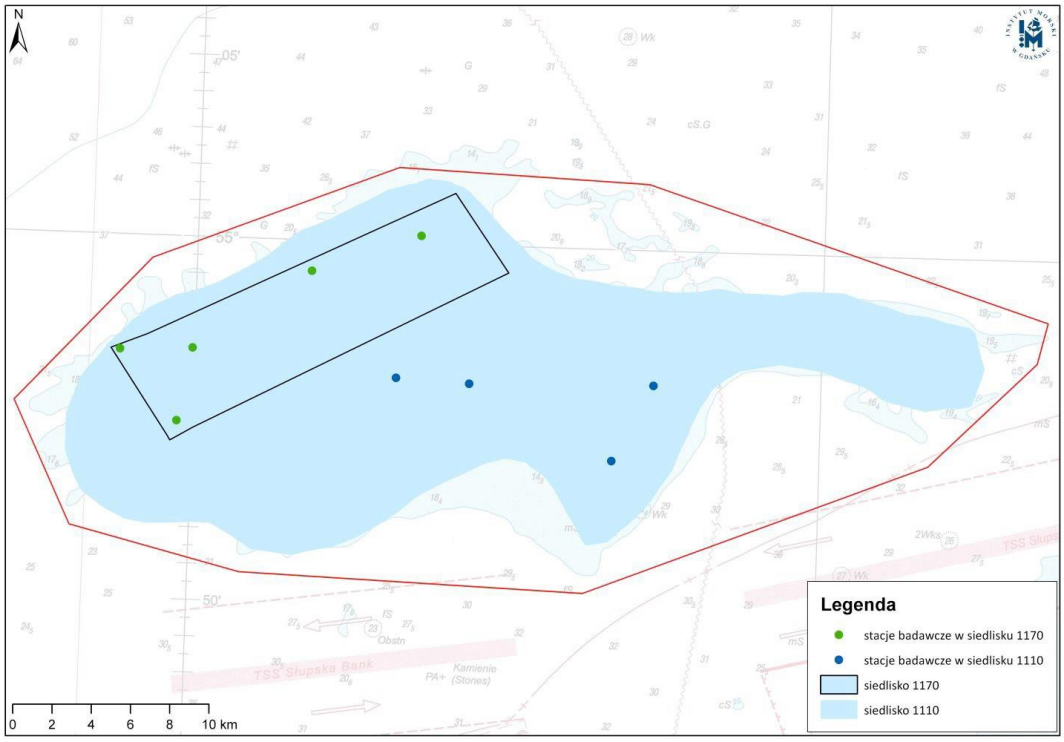
[2] As the methodology does not specify the date of its development/publication, the date of access is given.
[3] As the methodology does not specify the date of its development/publication, the date of access is given.

all three parameters of habitat 1110: Area, Specific structure and functions (including both indicators, viz: *Macrozoobenthos Typical Species and Bottom Sediment Status*) and Conservation Prospects were rated at FV (fair condition);

all three parameters of habitat 1170: Area, Specific structure and functions (including both indicators, i.e.. *Typical Taxa of Macroalgae and Typical Taxa of Sporophilous and Phytophilous Fauna*) and Conservation Prospects were assessed at FV (proper condition).

Thus, the conservation status of both habitat types on Slupsk Shoal was assessed as adequate (Baranska et al. 2018).

Figure 9 Previous habitat survey stations in the Slupsk Shoal PLC990001 Natura 2000 area (source: Presentation from the information meeting within the Project entitled. "Development of a draft conservation plan together with public consultations for the marine Natura 2000 area Slupsk Shoal (PLC 990001)" Slupsk 2019)



Legenda	Legend
Stacje badawcze w siedlisku 1170	Research stations in habitat 1170
Stacje badawcze w siedlisku 1110	Research stations in habitat 1110
Siedlisko 1170	Habitat 1170
Siedlisko 1110	Habitat 1110

12.1.4. Impacts of OWF BIII on the object of protection, integrity, coherence of Natura 2000 areas

As can be seen from the analyses performed, the results of which are presented in section 9.1.3. above, the sediment stirred up during the construction works of the farm, falling down, depending on the variant of the project, will cover the bottom to an average thickness of 0.2 - to 0.4 mm, which is shown on the above maps (Figures 7 and 8) in dark blue, also within the boundaries of the Slupsk Shoal Natura 2000 area. The amount of suspended solids carried is so small that it can be compared with the rate of sedimentation in Baltic waters, which ranges from 0.005 to about 0.2 mm/year per year (Gradzinski et al., 1986). The amounts of suspended solids transferred to Natura 2000 areas are, from a practical point of view, unmeasurable. Impacts on the benthic habitats of both areas from OWF BIII should be considered negligible.

Some heavy metals, pollutants and nutrients will be released from the bottom sediments as a result of the agitation, as discussed in detail in Section 9.1.4. There will also be a temporary turbidity of the water. However, these impacts will not result in significant associated impacts on benthic habitats, as well as birds that are the subject of protection of the above Natura 2000 areas, as further described and evidenced in Section 5 of Volume IV.

The impact of changes in benthic habitats in the BIII OWF area (destruction of habitats during the construction phase, followed by their recolonization and the so-called "artificial reef" effect) was considered insignificant, due to the crowding effect that the BIII OWF will have on seabirds, including bentophagous birds that could benefit from the feeding base in the farm area. This issue is described and evaluated more extensively in Section 9.2.5. Section 5 of Volume IV Seabird Impact Assessment.

12.1.5. Zone of potential impacts cumulative

The assessment in the 2015 Report, cited in Section 9.1.5, pointed to the results of the cumulative impacts assessment, stating that the cumulative impacts on benthos increased by about 16.5% above the level analyzed in the 2015 Report for the set of parameters of the Project representing the most far-reaching scenario of the 2015 NIS, which was assessed as having a negligible impact on the increase in the zone of potential impacts.

The potential cumulation of impacts can be spoken of primarily in the case of the spreading of suspended solids caused by the disturbance of the structure of bottom sediments, since, as can be seen from Figures 5 -6 in Section 9.1.2 and Figures 7 - 8 in Section 9.1.3, they can sink to the bottom even at a distance of several kilometers from the site of construction activities. Also associated with the dissolution of suspended solids is the release of a certain pool of pollutants and nutrients from the sediment into the water body and the turbidity of the water. However, an analysis of the aforementioned drawings also allows us to conclude that the level of this accumulation will be minimal - in the course of the works, the raised suspended solids will only marginally exceed the boundaries of the farm and the thickness of the layer of suspended solids that will sink to the bottom is only 0.2 - 0.6 mm in most of the area, which does not cause a significant impact on benthic habitats. The 16.5% increase in the listed impacts is insignificant.

The range of impacts of the BIII OWF will be further increased by the cumulative impacts caused during the laying of the export cable, which will run through both of the above Natura 2000 areas.

The BIII OWF in its planned modified parameters assumes the construction of 60 wind turbines, which represents 30% of the wind turbines evaluated in the 2015 NIS, which is the basis for the BIII OWF benthic impact assessment. In addition, the modified parameters of the Project assume the abandonment of the possibility of gravity and tripod foundations, i.e. the solutions with the greatest significance from the point of view of the impacts of potential impacts on benthos.

In the case of implementation of the Project in the proposed revised parameters, there will be no impacts beyond those assessed in the proceedings during which the Environmental Decision was issued, even after taking into account the Baltic Power SHPP project, for which an environmental decision has since been issued.

12.1.6. Natura 2000 areas in the cumulative zone impacts

There are no other areas in the zone of cumulative impacts of the BIII OWF, apart from the areas of Slupsk Shoal and Baltic Coastal Waters described above.

12.1.7. Object of protection of Natura 2000 areas in the zone of cumulation impacts

In the zone of cumulative impacts of the BIII OWF, there are no Natura 2000 sites other than those described above.

12.1.8. Cumulative impacts of OWF BIII on the object of protection, integrity, coherence of Natura 2000 areas

At the stage of construction and decommissioning of the BIII OWF, the impacts of the planned farm on the natural habitats under protection in the Slupsk Shoal Natura 2000 area, as well as the benthic resources constituting the food base in the Natura 2000 areas, associated with the agitation of bottom sediments and their subsequent sedimentation, may potentially cumulate with analogous impacts caused by the implementation of works in the Baltica 3 Area under the Baltica OWF project (Baltica 3) and the BIII MIP. Since the impacts associated with the planned BIII OWF on the natural habitats under protection in the Slupsk Shoal Natura 2000 area, as well as on the benthic resources found in Natura 2000 areas, will be negligible, they will not result in amplification of the impacts of other projects due to cumulative effects.

In the report on the environmental impact of the Baltic offshore wind farm (IMG Consortium and MEWO et al. 2017), the following assumptions were made in determining the extent of the impact of the increase in suspended solids concentration in the water tone and the resulting sedimentation:

- the maximum range of suspended solids with a concentration of 4 mg/L is 5 km from the site;
- the maximum extent of the sedimentation area of suspended solids with a thickness of 1.5 mm is 2 km.

Taking into account the distance separating the OWF Baltica 3 from the Slupsk Shoal Natura 2000 area, which is more than 11 km from its development area, it can be concluded that the Natura 2000 area in question is outside the above-mentioned range of influence of the suspension. Therefore, the impacts of OWF BIII and OWF Baltica 3 on the natural habitats under protection in the Slupsk Shoal Natura 2000 area, as well as the benthic resources in the said area, resulting from the agitation of bottom sediments will not be cumulative.

It is expected that due to the construction of the BIII OWF in the eastern part of the Slupsk Shoal Natura 2000 area, there may be a slight increase in the concentration of suspended solids at the bottom below 2 mg/L (see Figure 4). Regarding the anticipated extent of suspended solids impact from the construction of MIP BIII, the authors of the environmental impact report for the project in question (BDEI 2016), cite the results of studies conducted during the laying of the SwePol Link cable, which indicate that the turbidity of the water was short-lived and occurred locally only in a small area, and that the greatest turbidity was limited to the area of close proximity under and around the dredge, with a gradual decrease to completely clear water a few tens of meters away. Therefore, the possible cumulative impact of increased suspended solids concentrations due to the implementation of OWF BIII and MIP BIII within the Slupsk Shoal Natura 2000 area will be insignificant.

As indicated in the report on the environmental impact of the BIII MIP (BDEI 2016), as a result of its implementation, a fragment of habitat will be lost in the Slupsk Shoal area, while the increase in suspended solids and its sedimentation process resulting from the foundation of the MIP cables may cover the southern part (the place of bifurcation of the MIP corridor into the section connecting with OWF BII and OWF BIII) and the northern part of the Slupsk Shoal, and in these places the additional thickness of sediments after the execution of works along the entire route will not exceed 15 mm. Thus, it can be concluded that even if suspended sedimentation were to occur in the same part of the Slupsk Shoal area due to both MIP BIII and OWF BIII, the expected maximum thickness of the additional

sediment layer deposited due to the construction of the planned farm (up to 0.04 mm) would in no way affect the scale of the disturbance in question.

In the case of the Natura 2000 area Przybrzeżne wody Bałtyku PLB990002, there are no objects of protection in the form of natural habitats, while the even greater distance of OWF BIII from the borders of the Natura 2000 area means that there is no risk of impacts that could lead to the effect of changes in benthic habitats that are a source of food for seabirds that are the subject of protection in the Natura 2000 area.

In conclusion, the BIII OWF will not cause significant impacts on habitats under protection in the Slupsk Shoal Natura 2000 area, as well as benthic resources occurring about Natura 2000 areas, and related to the agitation of bottom sediments in cumulation with the above-mentioned projects.

12.1.9. The result of the assessment preliminary

Taking into account the type and scale of impacts of OWF BIII, it is not expected that the planned farm could, alone or in accumulation with other projects, have a significantly negative impact on the natural habitats that are the objects of protection in Natura 2000 areas, as well as benthic resources in it, conditioning the integrity of the areas in question. Thus, there is no basis for a proper assessment on Natura 2000 sites.

13. Impacts transboundary

The BIII OWF is not expected to cause transboundary impacts, i.e. to affect benthos within the borders of other countries (including their exclusive economic zones), either alone or in cumulation.

According to the assessment, the impact of OWF BIII has an overall low impact on the status and habitat of the benthos. The impact is only local, limited to the area of the farm. Based on EEZ boundary data in the Baltic Sea (http://maps.helcom.fi/website/mapservice/index.html) the minimum distances of OWF BIII from EEZs of other countries were calculated. The minimum distance of the BIII OWF to the EEZ border of Sweden will be about 52 km, to Denmark - 57 km, to Russia - 104 km and to Germany - 170 km. In addition, with limited cumulative impacts, the planned project will not generate transboundary impacts.

14. Proposal monitoring

The Project update does not affect the conditions for monitoring specified in the Environmental Decision. The conditions and rules for conducting benthic monitoring are specified in the Environmental Decision in section 2.2.a at the stage of construction of OWF BIII and 2.2.c at the stage of operation of OWF BIII and 2.2.b at the stage of decommissioning of OWF BIII. Nor is it the subject of this Report to change these conditions.

15. Summary and conclusions

According to the results of the assessment of the impact of OWF BIII on benthos, modification of the parameters of the Project in relation to those approved by the Decision on environmental conditions will not change the nature, scope or magnitude of the impacts caused. Consequently, based on the results of the assessment presented for the Project in the parameters approved by the Environmental Decision, it should be concluded that OWF BIII in the updated parameters will not have a significant negative impact on these benthic organisms.

The different types of potential impacts of offshore wind farms on the benthos that occur at successive stages of the project are presented mainly based on literature data in Chapter 7.

The most important impact on benthos during the construction phase is its physical destruction associated with the installation of wind turbine foundations and internal connection infrastructure. At the operational stage, an important factor that changes the nature of the habitat in the farm area is the "artificial reef" effect, i.e., the overgrowth of underwater structures of wind turbines by the epiphytic flora and fauna. At the decommissioning stage of the farm, the dismantling of these structures will result in the loss of this habitat.

The impact assessment included in the 2015 Report considered two project alternatives. In the case of the set of parameters of the Project constituting the most far-reaching NIS 2015 scenario, the maximum number of foundations possible in the BIII offshore wind farm area was taken into account, as well as the technical parameters of gravity foundations, whose footprint is much larger than that of the other types of foundations and can therefore have the most negative impact on the benthos. Thanks to such assumptions, the most far-reaching scenario of the project, the 2015 NIS, i.e. the one with the highest negative impact on the benthos, was evaluated. The variant of the Project in the parameters approved by the Environmental Decision will be more favorable to the benthos due to the fact of preserving a larger area of intact bottom structure and the habitats they inhabit. However, the values of physical destruction of benthos and loss of habitat in this variant compared to the alternative variant are only marginally lower, which does not change the significance of individual impacts. In the case of the proposed modification of the parameters of the Project, they are further reduced.

If the parameters of the project are modified, there will be a further reduction in the number of power plants, but also in the area occupied by foundations as a result of the exclusion of the possibility of using gravity-type and tripod foundations for the foundation of power plants and the limitation of the number of foundations for substations to 1 unit, and thus the changes in the ecosystem in the area of OWF BIII related to the creation of an "artificial reef" will cover an area even smaller than in the case of the Project in the parameters approved by the Environmental Decision. Any environmental interference that destroys the naturalness of the environment makes such an impact take on a negative character with unknown effects on the ecosystem in the long term.

The impact assessment was based on a sensitivity analysis of all 4 phytobenthic taxa found in the buffer zone of the BIII OWF, as well as 12 of the most common macrozoobenthic species that are part of two different communities: Mytilus trossulus and Pygospio elegans of the actual farm area including the buffer zone. Among the benthos, only one strictly protected species was found - the pitchfork Furcellaria lumbricalis - formerly F. fastigiata (in accordance with the Regulation of the Minister of Environment of October 9, 2014 on the protection of plant species (Journal of Laws 2014, item 1409). This kelp was attached to a colony of mussels on the sandy bottom. It can be assumed that it came from other areas than the IMF study area, as small aggregations of mussels can be carried by currents from place to place. The sensitivity of most benthic species was low or medium depending on the type of impact.

The most important cumulative impacts on benthos that may occur during the various stages of the project are the spreading of suspended solids due to the disturbance of the bottom sediment structure, which may then sink to the bottom even up to 20 km from the site of the construction works (and thus at the locations of other proposed farms), and the formation of an "artificial reef" on the underwater elements of several neighboring farms. Cumulative impacts are assessed as negligible or small.

On the basis of the screening conducted regarding the assessment of the project's impact on the integrity, coherence and subject of protection of Natura 2000 areas, it was concluded that no direct, indirect, secondary or cumulative impacts of the project on the benthos of the nearest areas are expected: Slupsk Shoal (PLC990001) and Baltic Coastal Waters (LB990002), located in the Natura 2000 network.

The analysis of associated impacts concluded that the loss of habitat as a result of the construction of the farm will be very small, and the depletion of the food base, which is benthos for seabirds and fish, will not be permanent. The introduction of hard substrate into the environment will produce an "artificial reef" effect, and the region around the foundations will become a place for concentration and feeding of many fish species.

Due to the distances to the EEZs of other countries (the closest one, the EEZ of Sweden, is about 50 km away) and the mostly local scale of impacts, the BIII OWF is not expected to cause transboundary impacts, i.e. to affect the benthos within the borders of other countries (including their exclusive economic zones), either alone or in cumulation.

Potentially, the most significant unplanned impact could be a larger oil spill resulting from an accident or collision. However, even in this case, its importance to the benthos is assessed as negligible or small.

A summary of the assessment of the impact of the project at the stage of construction, operation and decommissioning in the BIII OWF area, as well as the impact of the proposed changes in the parameters of the Project on the significance of the impact are presented in the tables below.

In all cases, the nature of the impacts, including cumulative impacts, is local. Taking into account that the magnitude of impacts is moderate to the highest degree, with low importance of phytobenthos and medium importance of both macrozoobenthos assemblages in the area of OWF BIII - the importance of all impacts at different stages of the project is negligible or low. In this case, minimization measures are not required.

Despite the low significance of the impact of OWF BIII on the benthos, monitoring is advisable due to the fact that this will be the first study of its kind in the Southern Baltic, verifying actual changes in the state of one of the components of the ecosystem. The results obtained during post-investment monitoring will ultimately determine the actual nature of the project's impact (positive or negative) during its operation phase.

15.1. Phytobenthos

Table 42 Assessment of the impact of the Project update on the results of the phytobenthos impact assessment in the most far-reaching scenario (NIS 2015) - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Disruption of sediment structure	Small	No	No change	No change	Significantly reducing the impacts of
Increase in the concentration of suspended solids in water			Insignificant	Skip	Reducing impacts
Deposition of agitated sediment			Insignificant	Skip	Reducing impacts

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Release of pollutants and nutrients from the sludge into the water body			Insignificant	Skip	Reducing impacts

Table 43 Assessment of the impact of the Project update on the results of the phytobenthos impact assessment in the most far-reaching scenario (NIS 2015) - operational phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Occupation of the seabed area	Small	No	No change	No change	Significant reduction in impacts
The creation of an "artificial reef"			Moderate	Small	Reducing impacts
Contamination of the water tone and bottom sediments with compounds from corrosion protection agents			No change	No change	No change
Change in water and sediment temperature			No change	No change	No change
Changes in the regime of sea currents			No change	No change	No change
Ripple suppression			No change	No change	No change

Table 44 Assessment of the impact of the Project update on the results of the phytobenthos impact assessment in the most far-reaching scenario (NIS 2015) - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Elimination of the "artificial reef"	Small	No	Moderate	Small	Reducing impacts
Disruption of sediment structure			No change	No change	No change
Increase in the concentration of suspended solids in water			Insignificant	Skip	No change
Deposition of agitated sediment			Insignificant	Skip	No change
Release of pollutants and nutrients from the sludge into the water body			Insignificant	Skip	Reducing impacts

15.2. Macrozoobenthos

Table 45 Assessment of the impact of the Project update on the results of the macrozoobenthos impact assessment in the most far-reaching scenario (NIS 2015) - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Disruption of sediment structure	Medium	No	Moderate	Small	Significant reduction in impacts
Increase in the concentration of suspended solids in water			Insignificant	Skip	Reducing impacts
Deposition of agitated sediment			Insignificant	Skip	Reducing impacts
Release of pollutants and			Insignificant	Skip	Reducing impacts

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
nutrients from the sludge into the water body					

Table 46 Evaluation of the impact of the Project update on the results of the macrozoobenthos impact assessment in the most far-reaching scenario (NIS 2015) - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Occupation of the seabed area	Medium	No	Moderate	Small	Significant reduction in impacts
The creation of an "artificial reef"			Moderate	Small	Reducing impacts
Contamination of the water tone and bottom sediments with compounds from corrosion protection agents			No change	No change	No change
Change in water and sediment temperature			No change	No change	No change
Changes in the regime of sea currents			Small	Small	No change
Ripple suppression			Small	Small	No change

Table 47 Assessment of the impact of the Project update on the results of the macrozoobenthos impact assessment in the most far-reaching scenario (NIS 2015) - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Elimination of the "artificial reef"	Medium	No	Moderate	Small	Reducing impacts

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Disruption of sediment structure			Moderate	Small	No change
Increase in the concentration of suspended solids in water			Insignificant	Skip	No change
Deposition of agitated sediment			Insignificant	Skip	No change
Release of pollutants and nutrients from the sludge into the water body			Insignificant	Skip	Reducing impacts

16. Shortcomings in technology and gaps in modern knowledge

No wind farm construction, operation or dismantling work has been carried out in the southern Baltic Sea to date. There are no results of studies on the impact of submerged elements of wind turbines on benthic assemblages (succession of overgrowth of newly introduced hard substrate, appearance of phytobenthic and zoobenthic growth species, local change in the qualitative and quantitative structure of the benthos). In part, the answer to the above problems can be found in the scientific literature documenting the results of research in the above-mentioned area conducted in other areas of the Baltic Sea. However, full information taking into account the specifics of the benthos of the eastern part of Slupsk Shoal will be provided by post-investment studies. Lack of data or limited knowledge about the impact of noise on benthos does not make it possible to confidently and unequivocally assess the impact of this factor. The effects of heat emission and electric field and radiation on benthos are very poorly documented in the literature to date.

17. Literature and other sources

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 4

Fish

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Abbreviations and definitions

DSU	Decision on environmental conditions
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
Dispersion	Dispersion, spreading of suspended sediment in the water depths
HCB	Hexachlorobenzene
ICES	International Council for the Exploration of the Sea
EEZ	Exclusive Economic Zone (Exclusive Economic Zone)
EW	Wind power plant
HCB	Hexachlorobenzene
Ichthyofauna	Fish
HVDC cable	AC high voltage cable
l.t.	Total length of the fish (longitudo totalis)
Heavy metals	A group of metals characterized by high density and often toxicity
IMF	Offshore wind farm
IMF Baltica 2	Baltica 2 offshore wind farm
IMF Baltica 3	Offshore wind farm Baltica 3
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
IMF BSII	Offshore wind farm Baltic Central II/ Offshore wind farm Baltic II
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
EIA	Environmental impact assessment
PCB	Polychlorinated biphenyls
PGE	Polish Energy Group
POM	Polish maritime areas
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas dated 30/03/2012 No. MFW/2/2012 ("PSZW") with a maximum capacity of 1200 MW and a maximum number of 200 power plants
PTS	Permanent shift in hearing/hearing threshold (=TPPS)
Report/EIA Report	Environmental impact report
Resuspension	Re-precipitation, disturbance of sediments deposited on the bottom of the reservoir, caused, for example, by wave action, net dragging. It can be an internal source of enrichment of the water tone with nutrients (biogenic) accumulated in sediments.
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for

	Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
ROV	Remotely Operated Vehicle (Remotely Operated Vehicle)
SL	Standard length of fish (standard length)
SPL	Sound pressure level
ΣDDT	The sum of DDT (dichlorodiphenyltrichloroethane) and its derivatives; most often the sum includes 3 compounds: • pp'-DDT - 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane, • pp'-DDD - 1,1-dichloro-2,2-bis(4-chlorophenyl)ethane • pp'-DDE - 1,1-trichloro-2,2-bis(4-chlorophenyl)ethylene
PCDD/F	A group of compounds (often referred to as dioxins) that consist of: • PCDD -polychlorinated dibenzodioxins • PCDF - polychlorinated dibenzofurans
TBT	Tributyltin
TSS	Traffic Separation Scheme
TTS	Temporal shift of hearing/hearing threshold (=CPPS)
WWA	Polycyclic aromatic hydrocarbons

1. Non-specialist summary

A non-specialist summary of the results of the assessment of the impact on ichthyofauna of the changes proposed to be made to OWF BIII, for which the Environmental Decision was issued, is included in Section 5.2 of Volume VI of the Report.

2. Introduction

This section analyzes the potential impacts of changing and updating the Project's implementation and operation conditions on fish (ichthyofauna). The EIA Report includes an analysis of whether the requested changes made against the provisions of the RDOŚ decision of July 7, 2016, marked RDOŚ-Gd-WOO.4211.12.2015.KP.22 (zpo) result firstly in a change in the potential impacts determined for OWF BIII on fish (ichthyofauna), as well as secondly whether there is a need to adjust other conditions of the project behind the introduced changes.

This section is based on the research and analysis and findings made for the impact assessment made in the 2015 Report taking into account changes in the legal status and available environmental information that emerged after the date of the 2015 Report. At the same time, it should be noted that the data on which the 2015 Report is based remains valid for the variant indicated for implementation under the Environmental Decision. In the case of the modified parameters proposed for implementation on the basis of an amendment to the Environmental Decision, they should also be considered adequate, which is due to the fact that the scale of the planned Project changes, where its parameters related to the number of wind power plants are reduced by 50% in relation to the Environmental Decision, a decisive part of the parameters remain the same, and some of the parameters specified as possible in the Environmental Decision are clarified, such as the method of foundation of the power plant foundations. On the other hand, the parameters that increase, such as the maximum height of the power plant and the maximum diameter of the rotor, are not parameters whose change can generate a change in terms of impacts on ichthyofauna.

Analyses made in this EIA Report are based on research conducted by the Maritime Institute of Fisheries - National Research Institute on behalf of the Maritime Institute in Gdansk, in the area of OWF BIII and in the buffer around its borders, which formed the basis for obtaining a decision on environmental conditions. The results of the research were reviewed and evaluated in the context of the scope of the changes planned to be made in the RDEP's decision dated July 7, 2016, marked RDOŚ-Gd-WOO.4211.12.2015.KP.22.

3. Description of the planned project

The parameters of the BIII OWF that are relevant to the assessment of the project's impact on ichthyofauna are:

- farm location;
- area of the farm - total and buildable;
- foundations - types, number, dimensions, method of foundation and the seabed area occupied by them;
- power cables - their length and the surface of the bottom disturbed during their laying.

The characteristics of the Project, including information relating to its construction, operation and decommissioning phases, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.1. Basic parameters of the project

Currently, the project planned for implementation is defined by the decision of the RDOŚ dated July 7, 2016, marked RDOŚ-Gd-WOO.4211.12.2015.KP.22. With regard to the conditions of implementation of the Project specified in the EIA, the key parameters of the Project, which were the source of impacts on ichthyofauna, were significantly reduced. The plant's foundation technology has also been concretized.

Table 1. Technical parameters of the BIII OWF relevant to the assessment of the impact on fish

Parameter	Parameters of the Project approved by the Environmental Decision	Parameters of the Project after the proposed modifications
Maximum number of power plants [pcs.]	120	60
Maximum number of substations [units]	6	1
Maximum length of power cable sections [km]	200 km	200 km
Maximum cable trench width [m]	1,5 m	1,5 m
Maximum/average cable trench depth [m]	3 m / 1.5 m	3 m / 1.5 m
Types of power plant foundations considered	monopile, tripod type, jacket type (truss) and gravity	monopile and jacket (truss) type
Considered types of supporting infrastructure foundations	monopile, tripod type, jacket type (truss) and gravity	monopile, tripod type, jacket type (truss) and gravity
Gravity foundation: 1. Base diameter (max) 2. The diameter to which the bottom is dredged (max) 3. Depth to which the bottom is dredged (max) 4. Width of leaching protection layer from the foundation perimeter (¶) 5. Depth of the protective layer against leaching (¶) Foundation column diameter (max)	1. 50 m 2. 70 m 3. 3 m 4. 15 m 5. 1,5 m 6. 6. 7,5 m	1. 50 m 2. 70 m 3. 3 m 4. 15 m 5. 1,5 m 6. 6. 7,5 m

Parameter	Parameters of the Project approved by the Environmental Decision	Parameters of the Project after the proposed modifications
Steel monopile foundation: 1. Diameter (max) 2. Length (max) 3. Width of leaching protection layer calculated from the foundation perimeter (¶) 4. Depth of the protective layer against leaching (¶) 5. Air hammer energy (max)	1. 12,5 m 2. 120 m 3. 20 m 4. 1,5 m 5. 3000 kJ	1. 10 m 2. 120 m 3. 25 m 4. 1,5 m 5. 4500 kJ
Jacket type foundation: 1. Distance between foundation legs (max) 2. Number of foundation legs (max) 3. Diameter of foundation legs (max) 4. Pile diameter (max) 5. Pile length (max) 6. Width of leaching protection layer calculated from the edge of a single pile (max) 7. Depth of the protective layer against leaching (¶) 8. Air hammer energy (max)	1. 40 m 2. 4 pcs. 3. 3 m 4. 3 m 5. 70 m 6. 10 m 7. 1,5 m 8. 2300 kJ	1. 40 m 2. 4 pcs. 3. 3 m 4. 3 m 5. 70 m 6. 10 m 7. 1,5 m 8. 2300 kJ
Tripod type foundation: 1. Distance between foundation legs (max) 2. Number of foundation legs (max) 3. Diameter of the main foundation column (max) 4. Diameter of side pipes (max) 5. Pile diameter (max) 6. Pile length (max) 7. Width of leaching protection layer	1. 40 m 2. 3 pcs. 3. 7 m 4. 5 m 5. 2,5 m 6. 60 m 7. 10 m 8. 1,5 m 9. 2800 kJ	1. 40 m 2. 3 pcs. 3. 7 m 4. 5 m 5. 2,5 m 6. 60 m 7. 10 m 8. 1,5 m 9. 2300 kJ

Parameter	Parameters of the Project approved by the Environmental Decision	Parameters of the Project after the proposed modifications
calculated from the edge of a single pile (¶) 8. Depth of the protective layer against leaching (¶) 9. Air hammer energy (max)		

Source: Own elaboration based on Offshore wind farm Baltic Central III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

With regard to the above information, it should be noted that for wind power plants only monopile and jacket (truss) type foundations are currently considered, the implementation of which is assumed as possible and, in principle, applicable in the absence of technical feasibility of monopile foundations, while the possibility of founding power plants on gravity and tripod type foundations has been excluded. In the case of a substation, monopile, tripod, jacket (truss) and gravity type foundations are considered for its foundation, while the number of substations has been reduced from 6 to 1 unit.

3.2. Projects whose impacts may cumulate with the impacts of the OWF BIII on fish

There are other projects planned in the project area that could potentially, along with the BIII OWF, cause cumulative environmental impacts. At the outset, however, it should be noted that key to their evaluation is the fact that the scope of the Project has been reduced by reducing the number of wind turbines planned to be built under it by 50%.

At the beginning of this chapter, it is necessary to clarify how cumulative impacts are understood in the report. Three types of it can be distinguished:

1) the cumulation of the same impacts within the BIII OWF,

2) accumulation of various impacts within the BIII OWF,

3) the cumulation of the same or different impacts of the BIII OWF and other projects.

An example of the cumulation of the same impacts within a project could be the simultaneous disturbance of the bottom sediment structure by a dredge that may be working to prepare the bottom for a gravity foundation. However, as a result of the modification of the parameters of the Project, such a situation has been eliminated due to the limitation of the possibility of using gravity foundations for substations of 1 unit.

Nevertheless, the above assumption was adopted as the maximum in the suspended solids spread model for the project alternatives under consideration (Volume II Section 11 of the 2015 Report), and thus - used in all assessments where suspended solids spread is relevant, both abiotic and biotic. At this point, it should be noted that the fact of abandoning gravity foundations for wind turbines will significantly reduce this type of impact and the possibility of its cumulation with other projects.

As an example of the accumulation of various impacts within the BIII OWF, implemented with the proposed changes in mind, the laying of power cables by a cable carrier can still be cited. This is an unlikely scenario, but was included as part of the evaluation for the option selected for implementation.

Meanwhile, the third type of accumulation is devoted to this chapter and the "assessment" chapters - 9.1.6 (construction phase), 9.2.6 (operation phase), 9.3.5 (decommissioning phase) and 11.6

(unplanned impacts). These chapters assess the potential cumulative impacts on the fish of the BIII OWF and other projects located or planned in the vicinity of the planned farm and listed in this chapter. These included offshore wind farms and transmission infrastructure.

It should be noted that these projects are concentrated to the east of Slupsk Shoal for other wind power plants and to the south for and north for transmission infrastructure.

For the purposes of this report, projects that have the potential to generate cumulative impacts on fish have been identified. The potential impacts of these investments are mainly the possibility of cumulative growth of suspended solids in the water body, release of toxic substances and noise emissions (construction of the OWF and foundation of transmission cables), emission of electromagnetic fields (existing and planned power cables) in case the above-mentioned investments are implemented at the same time.

A list of projects whose environmental impacts may cumulate with those of OWF BIII, along with the rationale for their selection, is presented in Section 13 of Volume II of the Report. For the purposes of this study, they are presented in the tables below. As indicated in the aforementioned section of this report, offshore wind farms located in Zone 1, i.e. located between 1 and 150 km from the Project, were considered for cumulative impacts.

Table 2. List of offshore wind farms with which the impacts of the BS III OWF on fish may cumulate

Lp.	Type and name of the project	Distance from IMF BIII	Basic parameters, relevant to the assessment of cumulative impacts	Status
1	IMF BSII	a minimum of about 17 km, in a northwest direction	60 wind power plants, expected completion date 2025-28	The project has a DSU (with its amendment), connection conditions and connection agreement
2	IMF Baltica (Baltica 2 and Baltica 3)	in the immediate vicinity of Baltica 3 to the north, Baltica 2 to the northwest	90 Baltica 3 wind turbines, 119 Baltica 2 wind turbines, expected completion date Baltica 3 2025-28	Projected investment - PSZW issued and paid for; Project has DSU: The project has connection conditions and a connection agreement for up to 1.045 GW (1,045 MW) of power in the Baltica 3 range
3	FEW Baltic II	a minimum of about 30 km, in the northwest direction	44 wind power plants, expected completion date 2028-30	Projected development - PSZW issued and paid for; Project has DSUs
4	Baltic Power	approx. 3 km, in an easterly direction	126 wind power plants, expected completion date 2028-30	Projected investment - PSZW issued and paid for; Investment at the stage of obtaining DSUs

Lp.	Type and name of the project	Distance from IMF BIII	Basic parameters, relevant to the assessment of cumulative impacts	Status
5.	C-Wind	Approximately 20 km in an easterly direction	41 wind power plants, expected completion date 2028-30	Projected investment - PSZW issued and paid for; Investment at the stage of obtaining DSUs

Source: documentation of the aforementioned projects, made available as public information or environmental information

Table 3. List of projects other than offshore wind farms with which the impacts of BIIII OWF on fish may cumulate

Lp.	Type and name of the project	Distance from IMF BII	Basic parameters, relevant to the assessment of cumulative impacts	Status
1.	Shipping routes	approximately 0.8 km to the south (existing TTS) and 10 km northeast (planned Route D)	Increased risk of oil spills	Navigation routes: • TSS - existing shipping route • Planned deep water route D - initiative of the Maritime Office in Gdynia (need to agree with Swedish and Danish side)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

With regard to the information contained in the 2015 Report, it should be noted that a significant reduction in the risk and possible scale of cumulative impacts, in addition to the reduction in the number of wind power plants implemented as part of the Project, is influenced by the issue of expiration of licenses for oil or gas exploration and prospecting. Following the information published on the website of the Ministry of Climate[1], it is to be assumed that no concessions are currently in force in the area in question.

4. Existing anthropogenic pressures

Fishing has been identified as the main anthropogenic pressure affecting ichthyofauna in the area of the proposed OWF BIII .

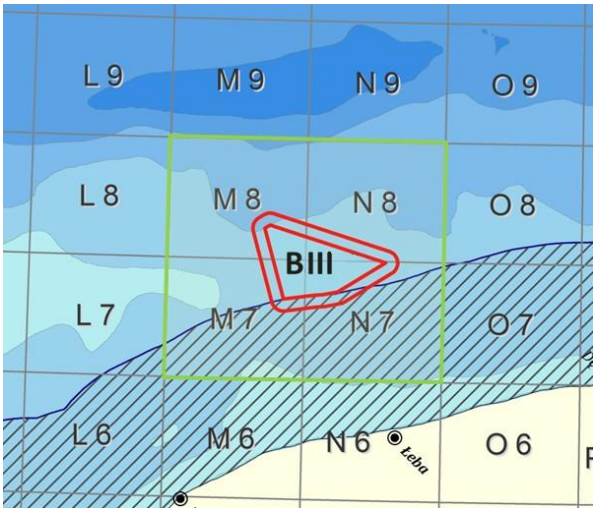
In order to determine with as much accuracy as possible the impact of the investment on fisheries (to determine potential losses of fisheries) in the area occupied by the BIII OWF (in the case of the most far-reaching scenario of complete exclusion of the farm area from the possibility of fishing), the relative share of the area that the farm will occupy in relation to the total area of fishing squares was taken into

[1]https://bip.mos.gov.pl/koncesje-geologiczne/raporty-i-zestawienia-dotyczace-udzielonych-koncesji-w-tym-zestawienia-otworow-wiertniczych/raporty-i-zestawienia-rok-2022/raporty-i-zestawienia-marzec-2022-r/

account. The area of OWF BIII is about 119 square kilometers, while the area of fishing squares M7, M8, N7, N8, on parts of which the farm will be located, is 1.58 thousand square kilometers. Thus, IMF BIII occupies about 7% of the total area of the four quadrants.

A detailed description of fisheries is presented in the study "Monitoring of fisheries in the area of the offshore wind farm Central Baltic III. Final Report with Study Results" (Volume III Section 13 of the EIA).

Figure 1. The area of the planned OWF BIII on the background of fishing squares



Łeba	Łeba

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Other existing anthropogenic pressures have a very low impact on ichthyofauna (sea angling, underwater tourism, noise and vibration from ship traffic, climate change).

Current data on the distribution of the fishing fleet shows that the study area is unlikely to be a place of particular interest to anglers because of the economic calculus, which generally allows for fishing in a zone up to 10 Mm from shore.

Humans are influencing global warming with their impact on the environment. The effects of this phenomenon will also be felt in the future on the water body in question. They will most likely be reflected in the salinity and temperature of the seawater. Mathematical models are used to predict the extent of these changes (Meier et al., 2012; Neumann, 2010). Such predictions were published by HELCOM in "Climate change in the Baltic Sea Area HELCOM thematic assessment in 2013." The cited models and discussions forecast changes through the end of the 21st century. Analyzing the results and maps there, it can be assumed that the surface water temperature in the basin in question will increase by about 2 °C by the end of the century. Salinity, on the other hand, will drop by about 1.5 to 2 PSU during the period. However, it is important to remember that it is difficult to predict all possible scenarios. This is especially true for salinity, the changes of which will depend on the difference in freshwater supply to the sea (from rivers and precipitation) and evaporation. However, assuming the extent of the changes that are predicted by the end of this century, it can be assumed that they will not drastically affect fish stocks over the expected lifetime of the wind turbines.

These findings are consistent with those made at the stage of issuing the Environmental Decision. This is due to the fact that the pressure on ichthyofauna has not changed, and in addition, the proposed changes to the Project significantly reduce the number of power plants to be built.

5. Description of the anticipated effects on the environment if the project is not undertaken

This chapter analyzes the effects on ichthyofauna in the case of not undertaking the project, which would entail the decision to abandon the Project in the shape and scope specified both in the Environmental Decision), as well as in the scope covered by the application to amend the above-mentioned decision.

In doing so, three scenarios were considered

- offshore wind energy will not be developed in the Polish maritime areas, and therefore the evaluated BIII OWF project, or similar ones, will not be implemented,
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind power are not being made, but the mining industry is developing.

The results of the analysis are shown in the table below.

Table 4. Effects on ichthyofauna if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy will not be developed	No action related to the construction, operation or decommissioning of offshore wind farms would mean no impact on fish. So, on a short-term scale, the ichthyofauna will remain in its current ecological state. The area designated for OWF BIII will remain unchanged and will continue to be used as before (no change in the structure of the bottom surface, no navigational impediments, a larger fishing area). However, changes in the amount of fishing pressure on the area, caused by the dynamics of the size of Baltic fish stocks, are possible. In the analyzed area, as a result of the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality and sediments, and indirectly - fish living conditions. An indirect considered impact of placing power plant foundations on the bottom is the creation of new habitats (the "artificial reef" effect). This effect will increase the abundance and biomass of fish living within the structures, as a result of a kind of "diversification" of the homogeneous underwater environment of the southern Baltic. If the investment is abandoned, this effect will not occur. A detailed description of the status quo can be found in the study "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Study Results" (Volume III Section 7 of the EIA).
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	In the event that the BIII OWF is not built, but other wind farms are built in neighboring locations as a result of offshore wind energy development, no significant impact on fish is expected in the BIII OWF area. Only the suspended solids that will rise during the construction of these farms may settle in a small layer on the

Lp.	Script	Environmental implications
		seabed. In addition, noise impacts may be important if foundation piles are driven. However, it should be assumed that mitigation measures will be applied, for example, in the form of bubble curtains, which will significantly reduce the scale of noise. From the point of view of impacts on fish, the type of sediment present at the planned OWF site will be important. A greater impact involving the redistribution of pollutants deposited in the sediments into the water body and the formation of greater long-lived suspended solids will be observed for clay sediments (with a high content of organic matter and fine fractions), which are generally characterized by higher contents of metals, nutrients and organic pollutants. There will be less impact when offshore wind farms are located in the area of coarse sands (with low organic matter and fine fractions), which are characterized by a low content of metals, nutrients and organic pollutants. The area allocated for OWF BIII will remain unchanged and continue to be used as before.
3.	Offshore wind power will not develop, but mining industry will grow	Potential impacts on the ichthyofauna of the BIII offshore wind farm area may also result from other uses of marine resources in its immediate vicinity, such as aggregate extraction from the seabed or oil/gas extraction. Impacts will be similar to those of wind farm construction.

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

6. Impact assessment methodology

The project's impact assessment was carried out in accordance with the project's framework methodology, as described in Section 5 of Volume I of the report, with some modifications or refinements, as discussed below.

6.1. Modifications or refinements to the evaluation framework methodology

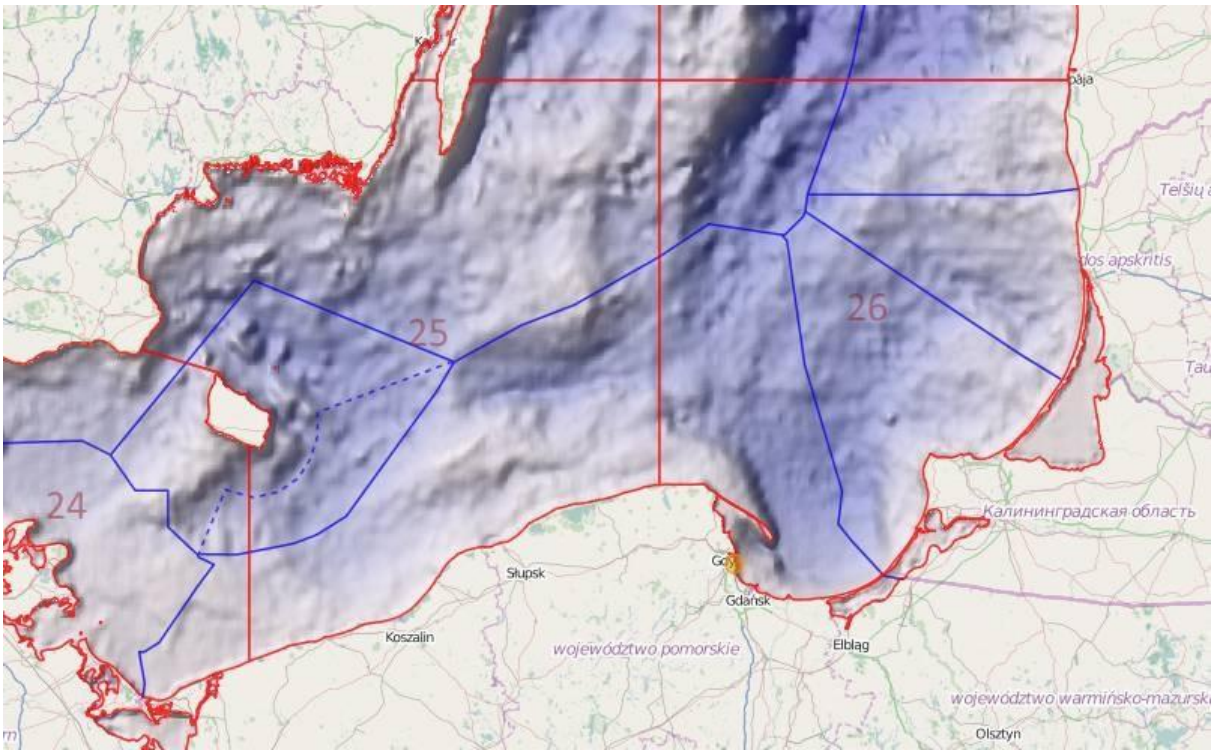
The study makes the following modifications or refinements to the evaluation framework methodology. Chapter 8 defines the degrees of vulnerability (sensitivity) of selected species to the potential impacts of the wind farm. The assessment of species sensitivity was then used to categorize impact intensity in the "Impact Magnitude Assessment Matrix."

For the exposure scale classification, the generally accepted rules for Baltic fish stock classification and the zonality of the POM were followed (Figure 4 below):

- local - impact on populations in the area of OWF BIII,
- regional - impact on populations in the area of ICES zone 25 of the Polish Maritime Areas,
- national - impact on populations in the POM region,
- international - impact on populations/stocks in the Baltic Sea.

Figure 2 shows the boundaries of the marine area zones. The blue line marks the boundaries of the countries' economic zones, while the red line marks the boundaries of ICES sub-areas.

Figure 2. Borders of the economic zones of the southern Baltic States and the boundaries of the ICES sub-areas



Koszalin	Koszalin
Słupsk	Slupsk
Gdynia	Gdynia
Gdańsk	Gdansk
Elbląg	Elbląg
Województwo pomorskie	Pomeranian Voivodeship
Województwo warmińsko-mazurskie	Warmian-Masurian Voivodeship
Olsztyn	Olsztyn

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

The aspect of the scale of exposure has the greatest impact on the result of the "Impact Magnitude Assessment Matrix."

For fish stocks, stocks are classified by definition as a collection of fish of a given species with a temporally and spatially unique migratory cycle. The herd is homogeneous internally through excellent mixing of the gene pool. ICES currently classifies stocks in the Baltic Sea as follows:

- cod - two stocks (22-24 and 25-32),
- herring - four stocks (22-24, 25-29, herring of the Gulf of Riga and the Gulf of Bothnia),
- sprat - one stock,
- flounder - one flock (22-32),
- salmon - two stocks (22-31 and 32),

- the remaining species belong to a single stock.

The above classification is crucial in determining the scale of impact, and a large territorial range of fish stocks is implied.

6.2. The most far-reaching scenario of the venture - NIS 2015

The initial EIA, which formed the basis for the issuance of the Environmental Decision, was conducted on the basis of indicating the assumptions for the Project, as well as by identifying the investment scenario that could potentially have the greatest impact on fish, among others. Thus, the assessment was carried out based on the concept of the envelope, i.e., determining the set of parameters of the Project that generate the most far-reaching impacts called the furthest-reaching scenario - NIS 2015, and subjecting such theoretical shape of the Project to an impact assessment. The furthest-reaching scenario - the 2015 NIS - then provided a benchmark for assessing whether the planned Project as proposed and submitted for implementation based on the 2015 Report is acceptable, or, alternatively, what conditions must be introduced for the furthest-reaching NIS 2015 scenario so that the impacts generated by the Project are not significantly negative impacts. These verified and limited to the thresholds of safe and environmentally acceptable conditions for the implementation of the Project were specified by the authority in the Environmental Decision. Thus, at this stage, the conditions set forth in the Environmental Decision have become the most far-reaching scenario of acceptable impacts of the Project. In each case, it is the conditions set forth in the Environmental Decision that are the benchmark for evaluating the changes proposed in this proceeding. It should be noted that the purpose of the current impact assessment is to verify and characterize the current impacts of the Project in connection with the further development of the project, as well as to carry out amendments to the Environmental Decision resulting from the progress of work and the reduction of the scope of the Project and the introduction of additional measures to reduce its impact in relation to those envisaged at the stage of issuing the Environmental Decision. However, since the impact assessment contained in the 2015 Report is based on an assessment of the impact of parameters that may cause the most far-reaching impact scenarios, in conducting this impact assessment of the proposed amendments to the Environmental Decision and the concretization of the parameters of the Project, it is necessary not only to refer to the conditions set forth in the Environmental Decision itself, which currently set the rules for the implementation of the Project and constitute its alternative to the Project to be implemented after the amendment of the Environmental Decision, but also to the most far-reaching scenario adopted in the 2015 Report (NIS 2015), as this one set the most far-reaching limiting parameters of the Project, the implementation of which did not cause significant negative environmental impacts.

With the above in mind, it should be pointed out that at the stage of the 2015 Report, it was considered that the set of parameters of the Project - NIS 2015 would occur in the variant, which was to consist in the construction of 200 wind power plants with accompanying infrastructure (including 7 offshore substations and 1 add-on foundation) on gravity or monopile foundations, i.e. the maximum number of power plants allowed to be installed in the area of OWF BIII according to the location decision (PSZW).

At the stage of the 2015 Report, gravity foundations were considered for the foundation of both the wind turbines themselves and the associated infrastructure elements. This solution has the largest base diameter and area of all those considered at the time. Gravity foundations also require bottom preparation, and thus their foundation causes the greatest impacts related to habitat alteration, suspended solids spreading or release of toxic substances from sediments. Currently, the use of this type of foundation has been ruled out against wind power plants. On the other hand, it should be pointed out that a gravity-type foundation has not been ruled out as possible for the foundation of a substation. The very fact that gravity foundations are excluded from use for wind power plants, with this type of foundation allowed only for the substation, is to be confirmed by the change in the conditions for implementation of the Project by specifying in the decision amending the Environmental

Decision that monopile and jacket type foundations will be used for the Project, and for the substation all types of foundations considered so far, including gravity foundations, may be used.

In contrast, potentially the greatest noise occurred when monopile foundations were driven into the seabed.

The variant selected for implementation and indicated in the Environmental Decision consists of up to 120 power plants, i.e. about 40% less than in the 2015 NIS. The above indicates that the option selected for implementation and determined by the Environmental Decision will cause environmental impacts equal to or less than the one considered in the 2015 NIS.

Referring to the above conclusions, therefore, it should be pointed out that the currently proposed change leads to a reduction in the number of power plants to 60, which is about 70% (70.68%) less than in the 2015 Report's analysis of the Project's parameters constituting the 2015 NIS, and 50% less than in the variant indicated for implementation in the current Environmental Decision.

These circumstances indicate that the impact of the Project in the shape and scope to be determined by the requested amendment decision will be significantly less than that which was subjected to the original environmental impact assessment

7. Potential impacts of offshore wind farms

Knowledge of the IMF's impact on ichthyofauna is limited. Planning and building OWFs is a relatively new industry, so only a few studies have been conducted directly on OWFs so far. Earlier studies focus on examining the impact of individual turbines that were much smaller than those currently planned and constructed (Smith and Westerberg, 2003). Moreover, they can only be partially applied to the planned project due to the fact that they concerned bodies of water with different characteristics than the South Baltic (differences in biodiversity, substrate structure, lack of tidal incidence, etc.).

Studies conducted at the Horns Rev wind farm (Denmark) have shown no or negligible impact (depending on the factor studied) of the investment on fish, no significant differences in benthic assemblages, and the emergence of epiphytic assemblages - the basis of the "artificial reef" ecosystem (Elsam Engineering A/S, 2005; Leonhard et al., 2011). Similarly, studies at the Burbo Offshore (England) have shown no or low impact on birds and negligible impact on the other environmental elements studied (SeaScape Enerdy Ltd., 2002). The types of impacts are shown in the table below.

Table 5. The main sources of impacts at different stages of the OWF's existence

Type of impacts	Phase		
	Construction	Operations	Liquidation
Noise and vibration	x	x	x
Sediment suspension	x		x
Electromagnetic field		x	
Water pollution	x		x
Habitat changes	x	x	x
Mechanical barrier	x	x	x

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015, based on Spanggaard G. 2006, modified

In addition, unplanned emissions may occur at any stage of the project, such as explosions associated with bottom clearing of UXO, contamination of the water tone and bottom sediments with petroleum substances (during normal operation and in an emergency), antifouling agents, accidentally released municipal waste or domestic sewage, chemicals, and waste from the construction, operation or decommissioning of the farm. They will indirectly affect living organisms, including fish. An assessment of the impacts of unplanned events on ichthyofauna is presented in Chapter 11 of this document.

7.1. Construction phase

7.1.1. Increase in the concentration of suspended solids in water

During preparatory work and during the construction of offshore wind farms, the sediment layer is disturbed, which is associated with the floating of sediment particles into the water depths. Wind farms, for technological reasons, are most often planned in bottom areas covered with sandy and gravelly sediments. The relatively high specific gravity of sediment particles causes them to sink to the bottom relatively quickly after they have risen in the water's depths. This indicates a rather local and short-lived (largely limited to the duration of the works) increase in suspended solids in the water tone.

The significance of a suspension's effect on ichthyofauna depends on a number of factors related to the characteristics of the suspension's particles, including density, size distribution and particle shape, the particles' ability to adsorb and absorb, and their mineral composition. Environmental conditions, such as temperature or oxygen concentration in the overdraft water, can also play an important role (Hygum, 1993, after Engell-Sorensen and Skyt, 2001). At the same time, the higher the concentration of suspended sediment and the longer the exposure time, the greater the negative impact on marine organisms (Newcombe and MacDonald, 1991).

A very important factor determining the intensity of the impact of the suspension on ichthyofauna is what developmental stage the analyzed individuals are in. The most sensitive stage of fish development is the larval period. Unlike adults, larvae are characterized by a limited ability to move and, consequently, to escape adverse environmental conditions (Knudsen et al., 1992; Wahlberg and Westerberg, 2005). While for juvenile and adult fish the lethal effects of suspension can be expected at concentrations on the order of grams/liter, for earlier life stages (eggs and larvae) concentrations on the order of milligrams/liter can already be dangerous (Engell-Sørensen and Skyt, 2001).

The level of impact of the suspension on larvae and eggs depends on both the characteristics of the suspension and the age, morphological characteristics and species of larvae and eggs.

The larvae have high oxygen requirements associated with rapid metabolism and higher oxygen consumption relative to body weight (Auld and Schubel, 1978; Partridge and Michael, 2010), making them particularly vulnerable to respiratory obstruction. The adherence of suspended particles to the gills of larvae can therefore cause increased mortality (Groot, 1980).

Another mechanism for the suspension's effect on larvae is to reduce visibility. Most larvae use their eyesight to search for food, with herring (Batty, 1987; Boehlert and Morgan, 1985), flatfish and cod larvae seeing from a distance of only a few millimeters, which is less than their body length (Bone et al., 1987). Since larvae are unable to survive prolonged periods of starvation, difficulties in acquiring food quickly result in increased mortality. The effect of the suspension on the ability to see food particles depends on both the concentration of the suspension and the developmental stage/age of the larvae.

There is evidence that moderate water turbidity (35 JTU- *Jackson Turbidity Unit*) may benefit the ability of smaller (20 mm) Atlantic herring larvae to acquire food (Utne- Palm, 2004; Boehlrt and Morgan, 1985). A possible explanation for this phenomenon is that the increased amount of suspended matter

in the water tone improves the contrast between food and background (Hinshaw, 1985). Particles of suspended matter scatter light, making food less transparent and easier to see (Boehlert and Morgan, 1985).

High turbidity (80 IUU), on the other hand, negatively affects the ability of herring larvae across the size spectrum to acquire food (Utne-Palm, 2004; Chesney, 1989; Boehlrt and Morgan, 1985). Also, a study by Johnston and Wildish (1982) showed that a significant effect of reduced visibility on the decrease in the amount of food eaten by herring larvae was observed at a suspended solids concentration of 20 mg dry sediment/l, with smaller larvae being most affected. A similar effect was observed by Boehlert and Morgan (1985) for Pacific herring*(Clupea harengus pallasi*) larvae at a dose of 2,000 mg/l for 24 hours. Increased water turbidity also reduces the ability of flat fish larvae to see food (Boehlrt and Morgan, 1985 after Moore & Moore, 1976). Less food intake can translate into slower growth rates.

Increased turbidity due to increased suspended solids may also indirectly positively affect larval survival by reducing predation pressure associated with reduced visibility (Gregory and Northcote, 1993). At the same time, reducing this pressure makes the larvae more active - they swim longer and more often (Utne-Palm and Stiansen, 2002).

The susceptibility of larvae to the effects of suspension depends on the developmental stage/age of the larvae, with most data available in the literature indicating that younger individuals are more sensitive. Studies of cod larvae have shown, at a suspension concentration of 10 mg/l, higher mortality of larvae with yolk sacs than for larvae after sac resorption (Rönnbäck & Westerberg, 1996).

Also according to Johnston & Wildish (1982), the adverse effect of suspension on the amount of food eaten is greater for small larvae.

As already mentioned, the effect of the suspension's effect on larvae is largely dependent on its concentration.

At concentrations of 3 mg/l, this effect for herring and cod larvae amounted to an avoidance response, while concentrations of 10 mg/l resulted in a noticeable increase in mortality of cod larvae at the gall stage (Westerberg et al., 1996). Also, the study by Messieh et al. (1981) showed variation in the response of herring larvae depending on the content of suspended solids in the water tone. At a concentration of 540 mg/l, smaller sizes of reared larvae were found (Messieh et al., 1981), while the effect of a suspension at a concentration of 2000 mg/l for a period of 24 hours resulted in a decrease in food consumption (Boehlert and Morgan, 1985). Exposure of larvae to the suspension at a concentration of 19,000 mg/l for 48 hours resulted in 100% mortality (Messieh et al., 1981). A slight increase in mortality (6%) already at concentrations of 25 mg/l was also observed for Siberian grayling (Thymallus arcticus), while at suspension contents exceeding 230 mg/l the mortality of larvae of this species after 4 days of exposure was 47% (Newcombe & MacDonald, 1991). A compilation of findings by Hanson (1995) indicates that increased mortality typically occurs at suspended solids concentrations exceeding 100 mg/L.

Increased suspended solids can have a direct negative impact on egg development and survival. The adherence of suspended particles to the egg shell results in obstruction of gas exchange and inability to get rid of harmful metabolites (Chapman, 1988; Argent and Flebbe, 1999; Kiorboe et al., 1981). A study by Rönnbäck and Westerberg (1996) showed a significant increase in mortality of cod larvae at suspended solids concentrations exceeding 10 mg/L.

The suspension also indirectly affects the survival and condition of pelagic eggs by reducing their buoyancy. This causes the eggs to sink to deeper water layers or to the bottom, where they are exposed to less favorable conditions (benthic predation, mechanical or physiological stress, deterioration of oxygen conditions). It has been found that, sinking of pelagic cod eggs, can already occur at a suspension concentration of 5 mg/l and an exposure time of 11 hours, and an increase in this concentration and

exposure time increase the rate of the sinking process (Rönnbäck and Westerberg, 1996). Demersal eggs are also adversely affected by increased concentrations of suspended solids. The results showed that covering Atlantic herring (Culepea harengus) eggs with a thin layer of sediment increases mortality, but there is no evidence of a direct negative effect of a suspension with a concentration of up to 7,000 mg/L (Messieh et al., 1981). There was also no negative effect on the development of herring eggs of a suspension at a concentration of 300-500 mg/L acting for one day. Also, suspended solids concentrations of 5- 300 mg/l sustained for 10 days did not adversely affect the development of Atlantic herring eggs (Kiorboe et al., 1981). However, according to the authors of this study, the sensitivity of eggs to increased suspended solids in the water depths may be higher when oxygen conditions deteriorate.

Studies on the effects of increased concentrations of suspension on demersal eggs of freshwater and estuarine fish conducted in the Chesapeake Bay region (USA) have shown a wide variability of responses in different species. For some taxa, a reaction was observed as low as 100mg/l (exposure time of 96 hours), while for other species no significant effect of the suspension on egg development was found even at concentrations exceeding 1000 mg/l (Auld & Schubel, 1978).

Long-term increased suspended solids in the water depths can have particularly adverse effects on demersal eggs of fish characterized by long embryonic development. In the case of salmonids, long exposure (72 days) to relatively low concentrations of suspended solids (157 mg/l) results in 100% egg mortality. Equally high mortality of rainbow trout eggs was observed as a result of six days of exposure of eggs to suspended solids concentrations in the range of 1000-2500 mg/l (Newcombe & MacDonald, 1991). Changing the structure of herring spawning substrate can affect the subsequent stock structure, as fish spawn in poorer environmental conditions due to the inability to find a suitable spawning site (Groot, 1980; Marschal and Crowder, 1996).

Studies of the effects of high concentrations of suspended matter on older stages of ichthyofauna reveal a number of potentially harmful impacts. Adverse effects have been found on the locomotor abilities of fish (Robertson et al., 2006), reduced fish growth (Robertson et al., 2006), and increased mortality, e.g. due to gill plugging (Bruton, 1985). The latter effect, in particular, can have a significant negative impact. Clogging the gills with suspended solids impedes gas exchange; larger particles become trapped in the gill lamellae impeding water flow, resulting in oxygen deficiency (DOER, 2000). This phenomenon is more severe for smaller fish both because of their greater oxygen requirements due to their faster metabolism and the smaller gill openings through which water flows (Moore, 1991). The magnitude of the impact of increased suspended solids concentration may also be the result of differences in lifestyle and gill morphology. For plankton-eating fish, such as herring, gills are much more likely to be clogged than in predatory fish.

The reduction in visibility caused by an increase in suspended solids concentration to 2000-3000 mg/l can also affect the ability of predatory fish to obtain food (McLeay et al, 1984, 1987; Redding et al, 1987; Reynolds et al, 1989) and limit their growth (Sigler et al, 1984). Abrasion of the body shell, abrasion of the protective mucus, increased susceptibility to parasites (Everhart and Durchow, 1970; Johnston and Wildish, 1981), and reduced resistance to disease in fish have also been found (Herbert and Merkens, 1961; Redding et al., 1987; Robertson et al., 2006).

Instances of physiological sublethal responses of fish to suspended matter have also been reported, such as elevated blood sugar and cortisol levels (Sigler et al, 1984; Servizi and Martens, 1987, 1992; Redding et al, 1987; Lake and Hinch, 1999); increased cardiac minute capacity (with suspended matter around 3300 mg/L, Bunt et al, 2004); increased ventilation rate (Horkel and Pearson, 1976; Berg and Northcote, 1985; Servizi and Martens, 1987); gill damage (Sigler et al, 1984; Servizi and Martens, 1987; Bergstedt and Bergersen, 1997; Lake and Hinch, 1999).

Threshold concentrations of suspended solids, which have the effect of avoiding polluted regions, vary depending on the species and life stage of the fish. In the case of juvenile forms of herring, the avoidance

effect was induced by a suspended solids concentration of 12 mg/l (Messieh et al., 1981), and in the case of adult fish 10 mg/l (Johnston and Wildish, 1981), 22 mg/l in adult smelt (Wildish and Power, 1985). Experimental studies have shown that concentrations of about 3 mg/l of lime and clay cause partial avoidance of the area by herring and cod, and 6-8 mg/l cause complete avoidance (Westerberg et al., 1996). Exposure of plaice to a suspended solids concentration of 3,000 mg/l for 14 days is lethal (Newton, 1973).

The study by Hammar et al. (2008, after Engell-Sørensen and Skyt, 2001) showed that the construction of wind farm foundations in the Öresund area at a suspended solids concentration of 10 mg/l did not significantly affect fish distribution either after 1 day or 1 month (Hammar et al., 2008, after Engell-Sørensen and Skyt, 2001).

The following table summarizes the available data for species found in the Baltic Sea. In general, one can find increased sensitivity of pelagic eggs already from low concentrations of suspension (from 5 mg/l) and increased mortality of larvae in the yolk sac stage (from 10 mg/l). Apart from these cases (not counting extreme concentrations), fish are able to avoid polluted areas.

Table 6. Values of suspended solids concentrations and their effect on different stages of fish found in the Baltic Sea according to available literature

Species	Stadium	Concentration of suspended solids	Effect	Data source
Gadus morhua	roe	5 mg/l	egg drop	Rönnbäck and Westerberg, 1996
Clupea harengus	roe	7,000 mg/l	no	Messieh et al, 1981
Clupea harengus	roe	5-300 mg/l	no	Kiorboe et al, 1981
Clupea harengus	larva	20 mg/l	disruption of food intake	Wildish, 1982
Clupea harengus	larva	2000 mg/l	disruption of food intake	Boehlert and Morgan, 1985
Clupea harengus	larva	3 mg/l	evasion	Westerberg et al., 1996
Clupea harengus	larva	10 mg/l	mortality of larvae in the yolk sac stage	Westerberg et al., 1996
Clupea harengus	larva	540 mg/l	decline in growth rate	Messieh et al., 1981
Clupea harengus	larva	19000 mg/l	100% mortality rate	Messieh et al., 1981
Gadus morhua	larva	10 mg/l	mortality of larvae in the yolk sac stage	Rönnbäck & Westerberg, 1996
Gadus morhua	larva	3 mg/l	avoidance response	Westerberg et al., 1996
Gadus morhua	larva	10 mg/l	mortality of larvae in the yolk sac stage	Westerberg et al., 1996
Clupea harengus	fry	12 mg/l	avoidance response	Messieh et al, 1981

Species	Stadium	Concentration of suspended solids	Effect	Data source
Clupea harengus	adult	10 mg/l	avoidance response	Johnston and Wildish, 1981
Osmerus eperlanus	adult	22 mg/l	avoidance response	Wildish and Power, 1985
Gadus morhua Clupea harengus	adult	6-8 mg/l	avoidance response	Westerberg et al, 1996
Pleuronectes platessa	adult	3000 mg/l	mortality	Newton, 1973

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In a publication on the classification of the impacts of individual factors associated with the construction, operation and decommissioning of OWFs on the living environment of the Baltic Sea (Bergstrom et al., 2014), the negative impact of an increase in suspended solids concentration on fish was classified as medium. Such an assessment consisted of a moderate impact of this factor in terms of spatial extent, low - in terms of duration of impact and moderate in terms of sensitivity of the receptor, which is fish. A slightly different assessment of the impact of increasing suspended solids concentration on fish is presented in a publication by Wilhelmsson et al. (2010), where the harmfulness of this impact was determined to be low (the spatial scale of the impact was classified as extensive, and the temporal scale as short-term).

7.1.2. Release of pollutants and nutrients from the sludge into the water body

The appearance of negative impacts of toxic chemicals at the stage of OWF construction may have different origins, such as through possible leakage from ships or equipment involved in laying cables (as discussed in the chapter on unplanned impacts) and as a result of harmful substances entering the water along with suspended matter lifted from the bottom as a result of foundation or cable laying work on the seabed.

The most sensitive stages of fish to exposure are maturing females, young embryos, larvae just after yolk sac resorption and early larval stages. A number of studies show that staying with maturing females even in low concentrations of substances that accumulate in tissues can negatively affect their reproductive organs. The effects are usually not seen until the next generation. Common morphological deformities are deformities of the lower jaw, eyes, spinal anomalies and reduced larval size at hatching. The physiological changes that occur as a result of exposure to toxic substances are most often a lowered heart rate and hormonal disturbances (effects on ovulation and spawning). As a result, motor skills like swimming ability and balance disorders deteriorate. Being in a polluted environment can also affect the effectiveness of fish nutrition (Rosenthal et al, 1986; Dethlefsen et al, 1988; von Westernhagen, 1988 after Sindermann, 1994; Struhsaker, 1977; Wedemeyer et al, 1984).

Species in which numerous deformities have been observed due to high concentrations of harmful substances in the North Sea include dab (Limanda limanda) (Dethlefsen et al., 1986), flounder (Dethlefsen et al, 1986), whiting (Dethlefsen et al., 1986), Atlantic cod (Gadus morhua) (Dethlefsen et al., 1986), plaice (Pleuronectes platessa) (Dethlefsen et al., 1986) and herring (Clupea harengus membras) (Linden, 1976).

High concentrations of PCBs in the reproductive organs of North Sea friction fish, such as flounder, herring, rockfish and whiting, can cause high embryonic mortality. The threshold value above which normal development of eggs and larvae is threatened is 0.12 ppm PCBs (von Westernhagen et al, 1981, 1988; Hansen et al, 1985; Westin et al, 1985; Cameron et al, 1986).

The Helsinki Commission (HELCOM) has proposed a list of chemicals whose presence in the sediment should be monitored if dredging is planned in the area. These are mainly heavy metals (cadmium, chromium, copper, lead, mercury, nickel, zinc, arsenic), chlorinated biphenyls, organochlorine and organophosphate pesticides, tributyltin (TBT) and its breakdown products, total petroleum hydrocarbons (TPH), polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), PCBs (congeners according to IUPAC 28, 52, 101, 118, 138, 153, 180), sum of PAH9 (anthracene, benzo[a]anthracene, benzo[ghi]perylene, benzo[a]pyrene).

The risk of releasing larger amounts of these substances from sediments during construction activities is low due to the low concentrations found in sediments in the southern Baltic region. Based on available data, it is known that mercury concentrations in the surficial sediment layer in the area of the planned project, and cadmium concentrations at elevated levels (Korpinen and Laamanen, 2010).

In 2010, studies were conducted on the content of polychlorinated biphenyls, organochlorine pesticides and heavy metals (copper, zinc, cadmium, lead, mercury) in sediments from various locations of the Polish Marine Areas, including an area close to the area of the planned project. Based on the results of this work, the region was considered a reference, that is, relatively free of pollution. The results of the study indicate the validity of this assumption, as the aforementioned substances were not found in the sludge in concentrations that could cause a negative biological effect (Dabrowska et al., 2013).

Studies of the concentration of heavy metals (copper, zinc, cadmium, lead, mercury) in the sediments and tissues of flounder*(Platichthys flesus*) from the area under consideration, carried out in 2011, indicate a low level of accumulation of harmful substances in fish tissues (Polak - Juszczak, 2013).

Also, during studies of the content of ∑DDT, HCB, PCDD/F in sediments in the area close to the planned OWF project, the concentrations of these pollutants were not found to have toxic effects on marine organisms (Szlinder-Richert et al., 2012).

Wilhelmsson et al. (2010) assess the risk of significant negative impacts from toxic chemicals as low and occurring within a limited spatial range.

7.1.3. Noise and vibration emissions

Acoustic disturbance is among the most important environmental impacts from offshore wind farm construction activities. Their sources are mainly work on the construction of foundations for the turbines and increased traffic of vessels.

Noise levels associated with foundation construction can reach 260 dB re: 1 $^{\mu Pa2s}$and cable laying work can generate noise as high as 178 dB re: 1 µPa2s (Wilhelmsson et al., 2010).

These values are largely dependent on the type of foundation construction. The highest sound intensity is associated with the construction of truss foundations and monopiles. Significantly less risk is generated in the case of gravity foundation structures, the construction of which does not involve piling (Hammar et al., 2008, after Bergstrom et al., 2014).

Previous studies show that noise can significantly negatively affect the development and life of fish (Popper, Hastings, 2009). Among the effects of anthropogenic sounds are: damage to body tissues (Hastings, Popper, 2005), permanent and temporary loss of hearing capabilities (Smith et al, 2004; Hastings et al, 1996; McCauley et al, 2003), as well as changes in fish behavior (Mitson et al, 2003). It

has also been shown that noise-related environmental stress can induce endocrine and physiological responses in fish (Wysocki et al., 2006; Smith et al., 2004, Santulli, 1999). Ambient sounds can also affect the fish's communication abilities (Amoser et al., 2004), ability to locate prey through acoustic masking (Fay and Simmons, 1999), and their spatial orientation (Lagardère et al., 1994). In addition, human-generated sounds and vibrations can induce fish to leave feeding grounds, hiding places and change spawning territories (Slotte et al., 2004), thus affecting the survival rate of individuals and their reproductive success.

The risk of death or serious injury from noise associated with foundation construction applies to a zone tens to hundreds of meters from the sound source. Some authors (e.g., Caltrans, 2001) emphasize that the high levels of sound pressure generated when piles are driven into the seabed can permanently damage the swim bladder and hearing organs of fish.

A direct effect resulting in death has been observed during piling (bridge construction) within a 50-meter radius of the noise source (Wilhelmsson et al., 2010) while damage to hearing organs or tissues can occur within several hundred meters (Nedwell and Howell, 2003).

In the case of fish, the level of noise that comes from piling work and can cause adverse effects in the form of mortality or damage, the level of which can vary and be reversible or irreversible. In the case of fish that have a swim bladder, it should be recognized that they are more susceptible to acoustic impact, in addition, the use of the swim bladder for hearing processes is of importance. For fish without a swim bladder, the peak noise level that can cause mortality or permanent damage was determined to be 213 dB (219 dB SELcum), and for fish with a swim bladder involved in hearing processes, 207 dB (207 dB SELcum) (Popper, Hawkins et al.,2014). The current data in this area was taken into account when analyzing acoustic impacts and determining minimization measures.

Sublethal impacts mainly boil down to avoidance responses and occur over a much larger radius, usually reaching several thousand meters, from the noise source. Studies by Nedwell and Howell (2003) have shown that when monopal foundations are built, the radius of the avoidance zone is up to 2,000 m for salmonids and up to 10,000 m for cod.

The avoidance response can negatively affect spawning processes in the vicinity of ongoing construction work. This effect is a much greater threat to the population when the avoidance involves an area where environmental conditions are particularly favorable for spawning and there are no areas of similar character nearby. According to Wilhelmsson et al. (2010) sublethal effects of noise impacts can be classified as short-term but having a wide spatial extent. The harmfulness of this factor to local ichthyofauna assemblages was determined to be low. However, these authors emphasize the potential increase in the harmfulness of this factor in relation to cumulative impacts, when the construction of further OWFs or other projects with similar impacts, may cause avoidance of a particular area for a longer period of time (long-term impact).

A report on the assessment of the impact of underwater noise generated by 2 MW wind turbines located in the UK indicates that during piling, fish reaction is possible up to several kilometers away, while permanent damage to fish bodies is possible within a radius of several hundred meters (Nedwell et al., 2003).

Studies in the Baltic prove that cod and herring are capable of picking up sounds emitted during piling from a distance of 80 kilometers, while flounder are capable of picking up sounds from several kilometers away from the sound source (Thomsen et al., 2006). Due to the characteristics of the noise generated and the phenomena of sound propagation, the intensity level presented in the model at a distance of 80 km was higher than the background noise for waves with frequencies from 63 Hz to 2.5 kHz. This range largely overlaps with the auditory capabilities of cod and herring. Measurements made at a distance of 10 km and at closer sites showed that the noise level was higher than the background

noise for the entire spectrum studied (30 Hz - 4 kHz), which includes sounds heard by flounder (Thomsen et al., 2006). The presence of the listed species was noted in the area designated for the planned project.

During the construction phase of the wind farms, there is also a potential threat to fish from increased noise levels generated by increased ship traffic in the area. The type and intensity of the sounds emitted depends mainly on the size of the ships and the propulsion systems used on them (Thomson, 1995).

Noise generated by moving ships and motor boats can also affect the spatial distribution of fish, avoiding acoustic stress (Soria, 1996). Responses involving avoidance of passing vessels have been reported in studies conducted on Baltic populations of cod, herring and sprat, which exhibit the best sound-receiving abilities of the major species exploited by fisheries (Mitson, 1995).

In addition, an *in situ* experimental study conducted in the WWF Natural Miramare Marine Reserve protected area showed a change in the behavior of the red-footed goby (Gobius cruentatus) and chestnut chromis*(Chromis chromis*) in the presence of motor boat sounds (Picciulin et al., 2010). Laboratory studies of these species and the black curlew*(Sciaena umbra*), on the other hand, showed significant negative effects on their communication through acoustic masking effects (Codarin et al., 2009). In contrast, other authors (Wysocki et al., 2006) emphasize that noise can cause physiological responses in fish, such as increased cortisol secretion.

It should be emphasized that the noise generated during the OWF construction work affects not only adult fish, but also their early developmental stages - embryonic (egg), larval and juvenile stages. Significantly, adult fish, thanks to their ability to move considerable distances, often exhibit a response of avoiding harmful sound (Mitson et al., 2003). However, larvae and other early life stages of fish, with significantly less swimming ability, are more vulnerable than adult fish to the negative effects of noise (Wahlberg and Westerberg, 2005). Unfortunately, there is much less knowledge about the effects of noise on eggs, larvae and juvenile marine fish than for adult fish.

Most studies on the effects of sound on early stages of fish are based on the seismic method, which uses air gun devices as the sound source (Piper et al., 1982; Dalen & Knutsen, 1987). It involves creating a strong pulse of low-frequency sound by violently releasing compressed air from a several-liter metal chamber, resulting in a brief shock and vibration of the air bubbles. The sound parameters depend on the volume and pressure of the chamber, which refills, several times a minute (Wille, 2005). Other stimuli used in the experiments are loud pulses of low-frequency sound (Popper, 2009) and mechanical shocks (np. Jensen and Alderice, 1983, 1989; Dweyer et al., 1993).

Placing cod eggs in close proximity to the firing of an *air gun* type device did not significantly affect their survival rate (Dalen and Knutsen, 1987). On the other hand, Kostyuchenko's (1973) results show damage to Black Sea fish eggs at a distance of 20 meters from the sound source, induced by seismic methods. These discrepancies in results may be due to the fact that noise impacts on early life stages of fish depend on a number of factors: species, life stage, distance of the organisms from the sound source, and exposure time. The occurrence of both species differences, as well as differences due to distance from the sound source and developmental stage, was demonstrated by Booman's (1996) *air gun* experiments on three species: herring*(Culpea harengus*), cod (*Gadus morhua*) and plaice*(Pleuronectes platessa*). They made it possible to find a small effect of sound (in the range of 220 to 242 dB re $^{1\mu Pa2}$) on the mortality of yolk sac cod larvae. In the case of yolk sac herring larvae, the impact proved to be insignificant due to the high overall mortality rate. Significant effects on cod larvae at the stage after yolk sac resorption were recorded at noise ≥223 dB. A similar effect was noted for cod at the juvenile stage at 242 dB, while for herring and plaice at the same stage of development, a small, non-significant effect appeared above 242 dB. The observed effect was dependent on the distance from the source of the sound; significant mortality of cod and herring was recorded as early as 5 m, although the greatest effect of the sound occurred at a distance of 1.4 m from the source.

Experiments on the effects of sound on common sole larvae (Solea solea) used frequencies from 50 to 1000Hz with sound levels ranging from 0 to 210db re $^{1\mu Pa2}$, with a single signal measuring up to 186 dB re $^{1\mu Pa2s}$(Bolle, 2012). The results of these experiments showed that there were no statistically significant differences in mortality of larvae treated with sound compared to the control group (Bolle, 2012).

The information presented above proves that even if the impact of noise on eggs and larvae is significant, sometimes even fatal, it is a local impact occurring at a short distance from the source of the sound - on the order of a few, several meters. Of course, it cannot be ruled out that noise with a source even much farther away, although it does not cause increased mortality, can affect the reduced growth rate of larvae. However, there is a lack of literature information on the subject.

In a paper summarizing the state of knowledge on the environmental impact of OWF construction and operation, Wilhelmsson et al. (2010) estimate that the risk of death or serious injury from construction-generated noise occurs only to the local extent and, given the potential for fish escape and the use of mitigation measures, is low.

In contrast, the sublethal effects of noise exposure (primarily related to the avoidance response discussed earlier) can, according to Wilhelmsson et al. (2010) classify as short-term, but with a broad spatial scope. The harmfulness of this factor to local ichthyofauna assemblages was determined to be low. However, these authors emphasize the potential increase in the harmfulness of this factor in relation to cumulative impacts, when the construction of further OWFs or other projects with similar impacts, may cause avoidance of a particular area for a longer period of time (long-term impact).

Bergstrom et al. (2014) assess the potential impact of noise on fish in the Baltic proper as moderate. This assessment consists of a medium to high spatial extent of the impact with its short-lived nature and low to medium sensitivity of the receptor (ichthyofauna).

7.1.4. The formation of a mechanical barrier

Migration routes of spawning and feeding fish species of economic importance, including cod, herring and salmon (Netzel and Janusz, 2005 in Zaucha et al., 2009), run through the site of the planned projects. Work on the construction of the OWF involves, among other things, an increase in the intensity of ship traffic in the area as well as the emergence of underwater structures. Such an accumulation of large-scale objects can create an underwater physical barrier to fish migration during the construction period. However, this is a relatively short-lived stage, and fish have the ability to actively move to avoid these barriers. Danish studies have shown that the existence of the OWF has no negative impact on fish migration routes (Leonhard et al., 2011).

7.1.5. Habitat changes

Habitat changes caused by the construction of the wind farm may affect ichthyofauna through changes in the morphology of the bottom and the nature of the sediment that may directly affect the living and reproductive conditions of ichthyofauna, and indirectly, through the impact of habitat changes on benthic organisms that are the food source of fish.

Changing sediment structure can, among other things, negatively affect the reproductive success of fish (ICES, 1992; ICES, 2001; Phau et al, 2004; Posford Duvivier Envirnment and Hill, 2001; Birklund and Wijsman, 2005). This is particularly important for herring, which prefer specific habitats characterized by shallow depths and suitable substrate that provides for egg attachment (Kiorboe et al., 1981; Posford Duvivier Environment and Hill, 2001). Numerous studies have shown that changes in the structure of sediments that serve as spawning grounds result in a lack of spawning or create unfavorable conditions for egg and fry development (de Groot, 1979; Phua et al., 2004). Changes in sediment structure and chemicals released from the sediment (Spanggaard, 2006) also affect benthic biocoenoses

(phytobenthos, plants, invertebrates), which can be removed or destroyed. This can result in a deterioration of the food base for benthic fish, for which benthic organisms are an important food base (Daan et al, 1990; Cohen et al, 1980; Sissenwine et al, 1984; Jones, 1984 for: ICES, 2001).

It should be pointed out that the works carried out will cause the suspension of fine sediment fractions in the water depths, which will then fall to the bottom covering them with a layer of fine sediment.

The results of sediment dispersion and sedimentation modeling showed that the extent of this process will cover the entire area of the planned project, and the maximum thickness of the additional sediment layer will not exceed 3.5 mm (Report 2015). However, such a relatively small change in habitat can disrupt the development of benthic eggs (herring, bottomfish, gobies) by covering already deposited grains or hindering their deposition on the altered sediments. In the case of the former, such an impact has been confirmed by literature data (Report 2015).

Habitat change during construction will lead to the complete destruction of the benthos in the areas of excavation for foundations and trenches where cables will be run. This will deplete food resources for benthic fish. However, the area where the habitat change will completely eliminate benthic organisms will be relatively small. Given the active movement of fish in search of food, such a loss of organisms included in the diet of bentophagous fish can be considered insignificant.

Also, the reduction in the food base of fish caused by the negative impact of covering the bottom with a layer of fine sediment settling from the water depths should not be significant.

The results of the zoobenthic structure and its susceptibility analyses presented in Appendix E of the Report and in Section 2 of Volume IV of the Report indicate that the only benthic species significantly exposed for this reason, which at the same time constitutes a relatively important component of the diet of fish (mainly flounder), is the bivalve Cerastoderma glaucum (heartfish). However, its contribution to the zoobenthic biomass of the area in question is very small (<7% of the total zoobenthic biomass). The effect of covering the bottom with an additional layer of sediment on the benthos is considered negligible. Therefore, there is no reason to assume that the associated reduction in the food base of benthic fish can negatively affect ichthyofauna during construction activities.

Given that even in the most far-reaching scenario the significance of this impact on fish is negligible or small, minimization measures are not required.

Habitat alteration due to seabed work during construction is a direct, negative impact on fish (especially benthivores and bottom spawners) of local extent, short-term, reversible, repeatable during the construction period, of medium intensity.

The results of the impact assessment in terms of the increase in suspended solids in water, caused by the implementation of the Project in the variant constituting the NIS 2015, for fish species such as goby, demersal, cod, plaice, turbot, flounder, sprat and herring show insignificant impacts of local and short-term nature with low intensity. The assumed parameters of the currently anticipated Project are 70% less than the 2015 NIS, which means that the nature and magnitude of these impacts will be less than those identified for both the variant assessed as the 2015 NIS, as well as those identified in the Environmental Decision.

7.1.6. Summary

Table 7. Potential impacts of OWF on fish - construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Increase in the concentration of suspended solids in water	As a direct result of disturbing the structure of bottom sediments during construction activities, suspended solids will rise and spread in the water depths. The most important parameters affecting the level of impact are: • the type, dimensions and number of foundations to be built and the length of cables to be laid; • a type of rock material that forms the seabed.
Release of pollutants and nutrients from the sludge into the water body	Violation of the structure of bottom sediments will result in the passage of pollutants and nutrients contained in them. These substances can negatively affect ichthyofauna. The most important parameters affecting the level of impact are: • the type and amount of toxic chemicals released; • weather conditions; • a type of rock material that forms the seabed.
Noise and vibration emissions	Fish will be exposed to underwater noise and vibration emissions during the installation of monopal, jacket and tripod foundations. The most important parameters affecting the level of impact are: • number of foundations; • diameter of the pile(s); • power of the jackhammer; • piling time. Explosions of unexploded conventional weapons deposited on the seabed (unplanned activity) can also be a source of noise.
The formation of a mechanical barrier	Foundation structures gradually appearing during the construction phase may provide an underwater physical barrier to fish migration during the construction period. The most important parameters affecting the level of impact are the number, diameter and spacing of foundations.
Habitat changes	Habitat changes caused by the construction of the wind farm, in particular the change in bottom morphology, sediment substrate composition and structure, may directly affect the living and reproductive conditions of ichthyofauna and indirectly, through the impact of habitat changes on benthic organisms that are the food source of fish. The most important parameters affecting the level of impact are: • the type, dimensions and number of foundations to be built and the length of cables to be laid; • a type of rock material that forms the seabed.

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Oil spill	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. From this source, about 33% of the oil entering the environment enters the waterways (mainly due to increased ship traffic in the Baltic Sea region (Kaptur, 1999). In comparison, about 37% of the oil that enters the sea comes from river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster). Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. Pollution of water and bottom sediments can negatively affect ichthyofauna. The most important parameters affecting the level of impact are: • the type and amount of oil substances released; • weather conditions; • a type of rock material that forms the seabed.
Contamination of water depths and bottom sediments with antifouling agents	At each stage of the project, vessels (ships, barges, etc.) will be used, from whose hulls some amounts of antifouling substances may be released into the water depths during normal operation. Pollution of water and bottom sediments can negatively affect ichthyofauna. The most important parameters affecting the level of impact are: • the type and amount of antifouling substances released; • a type of rock material that forms the seabed.
Accidental release of municipal waste or domestic sewage	At each stage of the project, on the vessels as well as at the construction facilities located on land (at the port serving the implementation of the project), waste will be generated, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident. Pollution of water and bottom sediments can negatively affect ichthyofauna. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released;

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	• weather conditions; • a type of rock material that forms the seabed.
Accidental release of chemicals and waste from farm construction	During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea. Pollution of water and bottom sediments can negatively affect ichthyofauna. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released; • weather conditions; • a type of rock material that forms the seabed.

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

7.2. Operation stage

7.2.1. Emissions of compounds from corrosion protection agents

During the operation of the farm, contamination of the water table and bottom sediments with compounds from corrosion protection agents for steel foundation structures may occur.

The most common anti-corrosion method used in the marine environment is cathodic protection. It can be implemented as galvanic or electrolytic protection. Galvanic cathodic protection involves installing aluminum or zinc anodes on the foundations. Anodes are gradually consumed and Al or Zn passes into the water depths and accumulates in bottom sediments.

In electrolytic cathodic protection, the protected object becomes the cathode of an electrolytic cell supplied with DC current from an external source. The anode used in this circuit is mostly insoluble. Among the most durable anode materials used in this method are platinum and titanium electrodes coated with a 2-3 µm layer of platinum. With electrolytic cathodic protection, no impact on water quality or sediment is observed.

While aluminum (Al) is widely distributed and found in the biosphere, its toxic effects have mainly been observed in sudden acidification of inland water environments (Poleo, 1997). Zinc (Zn), on the other hand, is an essential element in most organisms, but in high concentrations it poses a threat to the health of living organisms, including fish (Eisler, 1998; Amundsen et al., 1997). The bioavailability and toxicity of zinc in aquatic organisms has been shown to depend on the concentration of the metal in water (Chen et al., 2000; Rashed, 2001). Current studies of zinc concentrations in fish do not show that the standard (see table below), which is 50 $^{mg/kg^{-1}}$, is exceeded.

Table 8. Content of individual elements in tissues of fish from the Baltic Sea

Genre		N	Cu [mg $^{kg-1}$]	Zn [mg $^{kg-1}$]	Cd [µg $^{kg-1}$]	Pb [µg $^{kg-1}$]
P. flesus	muscles	74	0,20 ± 0,10	3,82 ± 1,22	1,1 ± 0,7	10 ± 6
			0,08 - 0,60	1,83 - 10,74	1 - 4	0,0 - 35
P. platessa		51	0,11 ± 0,03	3,41 ± 1,03	1 ± 0,7	10 ± 5
			0,05 - 0,19	2,02 - 7,30	1 - 5	0,0 - 25
S. maximus		50	0,10 ± 0,05	3,81 ± 1,14	0,7 ± 0,1	14 ± 14
			0,10 - 0,40	1,86 - 7,47	0,0 - 7	0,0 - 90
P. flesus	livers	74	11,50 ± ,54	34,83 ± 7,65	206 ± 130	22,4 ± 19
			1,54 - 24,55	19,24 - 57,2	35 - 664	0,0 - 149
P. platessa		51	4,97 ± 3,76	20,44 ± 5,44	225 ± 153	36 ± 32
			0,99 - 18,09	11,0 - 33,65	32 - 725	0,0 - 157
S. maximus		50	2,28 ± 1,14	15,77 ± 2,88	41 ± 28	32 ± 29
			0,71 - 7,97	2,30 - 21,83	13 - 136	0,0 - 189
S. sprattus	whole specimens	20	0,57 ±0,10	21,5 ± 2,2	13,2 ± 5	8 ± 5
			0,35 - 0,95	15,6 - 28,4	8 - 23	10-14

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

With regard to aluminum, it should be pointed out that it is an element that is widely distributed on Earth. It is found in soil, water and air. It is found in all natural waters, where it can occur in soluble and insoluble forms in inorganic as well as organic compounds. Aluminum compounds in the aquatic environment show varying degrees of toxicity, which depends on the reaction of the water. The pH range of 5.1-5.5 is dominated by monomeric toxic hydroxocomplexes $Al(OH)^{2+}$, $Al(OH)^{2+}$, which pose a threat to aquatic organisms: phytoplankton, crayfish, snails and fish. The effect of toxic forms of aluminum is to penetrate organisms, accumulate and disrupt the osmoregulatory balance of fish. With an increase in pH above 6 and a high concentration of aluminum, the die-off effect is due to clogging of the fish's gills (Widlak, 2011 for: Playe, Wood, 1990; Bezak-Mazur, 2004; Herbs et al. 2008). Both high and low concentrations of aluminum are a factor in fish felling.

Due to the natural conditions of seawater (pH=8.1), the predominant form of aluminum is the hydroxide hydroxocomplexes $Al(OH)_4$, $Al(OH)^{30}$, but it can also bind to fluorine, fossilized organic matter or be organically chelated.

Based on analyses of the inhibitory or phective concentrations of aluminum causing 10% inhibition of growth or physiological process (IC10 or EC10) and the no effect concentrations determined for 11 marine species from different toxicity levels (including temperate and tropical species), a guideline for aluminum content in marine waters of 24 µg total Al/l was developed (Golding et al.) It has been shown that aluminum in dissolved and/or particulate form can contribute to the occurrence of chronic (chronic) toxicity depending on the species studied. Among the most sensitive of the species analyzed are: *ceratoneis closterium* diatom, *Mytilus edulis clam* and *Saccostrea echtinata* oyster. Toxicity to these species was due to the presence of soluble forms of aluminum ($Al(_{OH4}$) and aluminum hydroxide ($Al.(OH)^{300}$; however, both dissolved and particulate forms of aluminum contributed to toxicity to the diatom and green alga *Dunaliella teriolecta*. In contrast, aluminum toxicity to the green algae

Tetraselmis sp. was caused exclusively by aluminum in molecular form. Four species, the brown macroalga Hormosira banksi, the sea urchin embryo *Heliocidaris tuberculata*, and the juvenile individuals of two fish species Lates calacalifer and Acanthochromis polyacanthus, were not adversely affected at the highest concentration used.

Regarding the impact of corrosion protection systems, the effects of Al emissions from galvanic anodes have been analyzed in several studies, mainly in port environments or laboratory experiments (Kirchgeorg et al., 2018). Gabelle et al. (2012) showed a significant increase in Al concentrations in sediments near the anodes in the harbor basin (Le Havere), while Al concentrations in the water did not increase due to dilution. Experiments with tanks filled with sediment-free seawater conducted by Deborde et al. (2015) showed high concentrations in embedded and suspended particulate matter. They assumed that this enrichment of Al suspended matter could be of importance to the filtrators. Deborde et al. (2015) also suspected that the dissolved fraction in seawater is irrelevant in the environmental conditions of these waters due to the dilution effect. Mao et al. (2011) investigated Al accumulation in the mussel Mytilus edulis in a harbor environment and showed that the digestive glands are short- and medium-term sites of Al accumulation.

Caplat et al. (2010) investigated dissolved Al and Zn from galvanic anodes and the corresponding sulfate salts using sea urchin bioassays. And they indicate a lower influence of Al and Zn coming from galvanic anodes (Kirchgeorg et. al., 2018).

The effect of dissolved and precipitated Al on various diatoms was studied by Gillmore' et al. (2016). They showed that toxicity can be caused by dissolved or precipitated Al depending on the diatom species. These studies also show that Al concentrations causing chronic toxicity in different species of marine diatoms vary significantly.

7.2.2. Noise and vibration emissions

Among the changes in long-term habitats associated with OWFs is the change in the acoustic environment, caused by noise and vibration from turbine operations, among other things (Spanggaard, 2006). The level of noise intensity generated by these devices depends on the type of turbine, wind speed, the number of power plants in operation and their mutual distances as well as local hydrological, geological and depth conditions. The frequency of sound generated in the water by an operating turbine ranges from 1-400 Hz and the level from 80-100 dB $^{1\mu Pa2s}$and increases with the number of turbines (Nedwell and Howell, 2003). Due to the low frequency and intensity of the noise, there is no risk of permanent damage to hearing organs or fish tissues from the noise generated by operating wind turbines (Wahlberg and Westerberg, 2005).

On the other hand, the avoidance effect of regions in the immediate vicinity of the turbine is likely, but the extent of this impact should not exceed a few meters. The avoidance response to the increased pressure associated with the generated sound occurs in a zone up to 4 m from the turbine (Wahlberg and Westerberg, 2005). The effect associated with the response to particle acceleration caused by turbine operation has an even smaller range of up to 1 meter. No detection of this anomaly by cod, flatfish or salmonids was found within 10 meters of the turbine (Sigray et al., 2009 after Wilhelmsson et al., 2010).

On the other hand, experimental studies conducted in aquaria (Muller, 2007 after Wilhelmsson et al., 2010) have shown the response of plaice and cod to noise generated by turbines. However, it was not strong enough to result in the permanent abandonment of the habitat.

According to a report on the impact of turbine noise in the area of the Vindeby offshore wind farm (Engell-Sorensen, 2002), a response of avoidance by flat fish of areas directly approaching (up to several meters from the foundation) to the turbines can be expected with little probability.

Other studies show that the possible negative stimuli generated by noise and vibration emitted in the immediate vicinity of the turbine are not significant enough to prevent fish from accumulating near the turbine foundations covered with encrusting organisms (the "artificial reef" effect). Acoustic cruises in the Horns Rev offshore wind farm area showed that most, and mainly large fish, were located directly around the turbine foundations (Elsam Engineering A/S, 2005).

At the same time, during the operation phase of the offshore wind farm in the described area, there may be a slight reduction in noise from shipping and fishing due to restrictions on vessel traffic and a possible ban on fishing in the area of the OWF. However, it is difficult to determine to what extent it will be offset by increased traffic of service units.

Noise impacts at the operational stage can be made according to Wilhelmsson et al. (2010) classify as long-lasting but with very limited spatial coverage. The harmfulness of this factor to local ichthyofauna assemblages was determined to be low.

Bergstrom et al. (2014) assess the potential impact of mining noise on fish in the Baltic proper as moderate. This assessment consists of the medium spatial extent of the impact with its long-term nature and low sensitivity of the receptor (ichthyofauna).

At the operation stage, there may also be noise emissions from operating vessels, which may appear at the OWF site in connection with maintenance work. Responses involving avoidance of passing vessels have been reported in studies conducted on Baltic populations of cod, herring and sprat, which exhibit the best sound-receiving abilities of the major species exploited by fisheries (Mitson 1995). The response of fish to noise also depends on their physiological state. Herring, which have very good hearing, are observed to avoid sound sources associated with ship traffic and fishing gear usually outside the spawning season (Olsen et al. 1983; Vabo et al., 2002), and this behavior changes when herring spawn (Nøttestad et al. 1996; Axelsen et al. 2000).

On the other hand, the avoidance effect of regions in the immediate vicinity of the turbine is likely, but the extent of this impact should not exceed a few meters. The avoidance response to the increased pressure associated with the generated sound occurs in a zone up to 4 meters from the turbine (Wahlberg and Westerberg, 2005). The effect associated with the response to the acceleration of particles caused by the operation of turbines has an even smaller range, reaching a distance of 1 meter.

7.2.3. The formation of a mechanical barrier

The presence of wind turbine structures may to a small extent constitute an underwater physical barrier to fish migration. However, far more important are the positive consequences of the IMF's existence in the form of the creation of a new "artificial reef" habitat (allowing shelter, potential breeding and foraging sites). Danish studies have shown that the existence of the OWF has no negative impact on fish migration routes (Leonhard et al., 2011).

7.2.4. The creation of an "artificial reef"

The appearance of new elements in the environment, such as structural elements of turbines, mainly their foundations and erosion control structures, is associated with the creation of a new habitat characterized by hard ground. The term "artificial reef" is used to refer to these types of structures (wind turbines, drilling towers, or artificial structures placed in the environment to create hard ground).

Time of colonization

The process of colonization of artificial reefs often begins immediately (a few hours or days) after the structure in question is installed (Norsker, 1997). The presence of invertebrates and fish was observed on artificial reefs shortly after their creation (Stone, 1978; Grove et al, 1983; Bohnsack and Sutherland,

1985; Ambrowe and Swarbrick, 1989). Often, fish populations become very abundant at such sites within a few months (Turner, 1969; Stone et al., 1979; Bohnsack and Tolbot, 1980). However, it usually takes 1-5 years for a stable artificial reef system to develop (Bohnsack and Sutherland, 1985). Hard substrate (also in the form of IMF structures) is characterized by a rapid rate of colonization by epiphytic organisms, macrophytes, invertebrates (Newell et al., 1998; Feger, 1971). Such a phenomenon has been observed, for example, in the case of the Nordsee research platform (Garcia, 1991) or the IMF Horns Rev (Leonard, 2000). Studies show that colonization of wind farm structures by epifauna occurs as early as 5 months after commissioning (Leonhard, 2000).

After the construction phase is completed, representatives of numerous fish species return to their previous habitats. There are also emerging opportunities to settle new habitats. In the area of artificial reefs, fish populations similar to those observed in the wild have been reported (Relini et al., 1994), although there may also be an increase in biodiversity.

Causes of colonization and increase in density

Usually, the appearance of new structures that provide hard substrate results in an increase in the abundance of certain fish species. This is a result of the creation of a new habitat, providing shelter for ichthyofauna, as well as an increase in food resources as a result of the emergence of encrusting organisms. An increase in the abundance of certain ichthyofauna taxa may be an additional factor in attracting predatory fish. Some authors have also argued that structural elements attract fish by providing them with points to help them orient themselves in space (e.g. Bohnsack and Sutherland, 1985; Bohnsack, 1989).

Underwater observations in the offshore areas of wind farms in the North Sea have shown that wind farm foundations, which consist of, among other things, stones and boulders with many holes and crevices, provide an attractive hiding place for cod aged 2-3 years (Reubens et al., 2011). Atlantic cod find refuge here from ocean currents and pressure from both predators (Bohnsack and Sutherland, 1985; Wilhelmsson et al., 2006) and fisheries. Thus, offshore wind farm areas in the North Sea are seen as an opportunity to enhance the health of Atlantic cod populations (Reubens, 2014). A similar ecologically important function as a habitat for fish has been attributed to the establishment of oil rigs in the Southern California area (Helvey, 2002).

The creation of new habitats may result in spawning conditions for herring*(Clupea harengus*), foxfish*(Agonus cataphractus*), beluga*(Belone bel*one), cleavers (*Cyclopterus lumpus*), horse mackerel (*Pholis gunnellus*) in the IMF area under consideration (Zocco et al., 2006). Structures of wind turbine structures can be both places of refuge and places of reproduction or development of the early stages of many fish species. A pelagic species - herring*(Clupea harengus*), which is found in the OWF area, spawns near the bottom. The presence of stable substrate in the form of OWF structures will create favorable spawning conditions for this species (Spanggaard, 2006).

Representatives of gobies (Pomatoschistus spp) are demersal spawning fish that spawn on hard substrates (such as clam shells). The colonization of OWF structures by sedentary organisms (such as clams) can therefore create conditions favorable for the reproduction of this group of fish (Spanggaard, 2006). Also, the study by Wilhelmsson et al. (2006) confirm the increased abundance of goby fish in the immediate vicinity of the turbines. The appearance of macrophytes overgrowing the hard substrate created by OWF structural elements can create a favorable environment for the reproduction and development of the early stages of many ichthyofauna taxa (Gregg, 1995; Nelson, 1985; Norsker, 1997). Algae may also be preferred as refuge sites for juvenile stages (Spanier et al., 1990; Ambrowe and Swarbrick, 1989). The presence of algae can also increase food availability for many species (Hueckel and Buckley, 1987).

If restrictions are placed on fishing in the offshore wind farm area and the area is excluded from shipping (or restrictions are placed on these activities), pressure from both these sectors will decrease and the

farm area can provide a refuge for fish, both adults and their early life stages - larvae and fry - these areas can be considered protected areas (Degraer and Brabant, 2009). The eventual cessation of fishing in the area may result in a rapid increase in biomass, incidence as well as larger sizes of representatives of fish species that were previously exploited. An increase in species richness is also likely (Halpern, 2003). Evaluation of the positive effect depends on the size of the area, if any, excluded from fishing, the number of artificial reefs in the area, and how long it has been since fishing in the area stopped (Roberts et al., 2001).

Although the amount of productivity growth of individual regions will largely depend on the specific conditions in the area (Bohnsack, 1989), the direction of the predicted changes (i.e., productivity growth rather than decline) is clearly positive.

However, it should be remembered that the increase in abundance, and in some cases diversity of ichthyofauna, in the area of artificial reefs is not necessarily due to increased production in these areas. It can only be the effect of "attracting" fish from nearby areas by creating more favorable conditions for feeding or avoiding predator pressure. The debate over this issue has remained an important part of research on the impact of artificial reefs on fish stocks and fisheries efficiency for years (Pickering and Witmarsh, 1997).

When the cessation of fishing results in an increase in the abundance/productivity of ichthyofauna in an area, there may be migration of fish from these areas to adjacent areas. In some cases, this leads to an increase in the fishing productivity of water bodies adjacent to areas closed to fishing (Murawski et al., 2000).

It is worth mentioning, however, that not all studies carried out in OWF areas unequivocally point to their role as a factor in increasing the abundance and diversity of ichthyofauna in these areas.

Hydroacoustic surveys conducted in the Nysted (Baltic) and Horns Reef (North Sea) offshore areas did not show a statistically significant impact of new habitat elements on fish distribution at both local and regional scales. In the case of the Nysted farm, this may have been due to the very homogeneous taxonomic structure of the benthic fauna that populated the turbine components. The newly formed hard substrate was completely dominated by mussels (M. edulis), which are not an important food component of ichthyofauna in the area, hence no fish were observed to congregate near the turbines. On the other hand, the lack of change in fish distribution and abundance due to the construction of the Horns Reef farm is explained by the authors of the study as a result of the time that elapsed between the construction of the OWF and the time of the study, which was too short and insufficient to form new biocoenoses (Hvidt et al., 2004; Hvidt et al., 2005a; Hvidt et al., 2005b).

The effect of the IMF as a structure that creates an artificial reef can, according to Wilhelmsson et al. (2010) classify it as a positive impact of long-term nature and local scope and its level should be assessed as medium. The elimination of fishing pressure in the area of the OWF was assessed by these authors as a largely positive factor on ichthyofauna having a long-term and broad spatial impact.

Bergstrom et al. (2014) assess the potential impact of new habitat creation on fish in the Baltic as moderate. This assessment consists of the medium spatial extent of the impact with its long-term nature and the medium sensitivity of the receptor (ichthyofauna).

7.2.5. Emission of electromagnetic fields and radiation

During the operational phase of the wind farm, electromagnetic interactions observed around cables transmitting electricity could be a potential threat to fish. The effects of electromagnetic fields on ichthyofauna remain poorly documented to date (Gill, 2001; Gill, 2005; Öhman et al., 2007). Effects of electric and magnetic fields have been observed on some fish species considered sensitive ("electro-sensitive fish") (Rodmell and Johnson, 2005; Gill and Taylor, 2001; Westerberg, 2000). Also, it is known

from experience with fishing done using electricity in freshwater that many fish species (both adults and eggs and larvae) are sensitive to electric fields. This applies to adults as well as larvae and eggs (Fricke, 2000).

The threshold of fish sensitivity to the presence of electromagnetic fields is not well understood. During an experiment on the field-sensitive dogfish shark (Cyliorhinus caniculus), electromagnetic field avoidance of $^{10uV/cm2}$ was observed (Rodmell and Johnson, 2005), which is the maximum expected field strength when using an unburied 150kV/600A 3-core power cable (Gill and Taylor, 2001).

According to the Danish Offshore Wind-Key Environment Issue Report (2006), it is possible to change the behavior of fish subjected to electromagnetic forces around cables by avoiding the zone of influence or attracting fish toward them, depending on the species. In the case of flounder, a significant correlation was observed between these phenomena and electromagnetic field strength. Behavioral changes in fish have been observed in the form of electromagnetic field avoidance (Rodmell and Johnson, 2005) and changes in swimming direction (Westerberg, 2000).

Species of the herring family (Clupeidae) and flat fish (Pleuronectidae) may be exposed to electric fields in the Baltic Sea (Fricke, 2000). Of the species found in the study area, the plaice*(Pleuronectes platessa*) is an example of a species that uses Earth's magnetic interactions and those generated by seawater movement for orientation/navigation (Metcalfe, 1993). The results of an experiment testing the long-term (7 weeks) effects of a static magnetic field (3.7 mT) on juvenile flounder*(Platichthys flesus*) showed no differences in fish survival compared to a control sample (Bochert and Zettler, 2004).

Observations of the sensitivity of hatchlings of sea*trout (Salmo trutta*) larvae to magnetic fields allowed us to conclude that at this stage of ontogenesis, the larvae use exteroreceptors that receive magnetic stimuli from the environment. Such ability gives them the ability to orient themselves in the water's depths and move in a certain direction (Formicki et al., 2004; Sadowski et al., 2003).

The potential impact of the additional magnetic field may also occur in herring*(Culpea harengus*) and sprat*(Sprattus sprattus*) (Fricke, 2000).

It is believed that the electromagnetic field observed around the connection cables may also affect the migratory abilities of the fish. Species that use geomagnetic forces for spatial orientation, such as the European eel (Öhman et al., 2007) or salmonids, are particularly vulnerable to this impact (in the work of Yano, 1997, a reduction in swimming speed was observed in keta individuals subjected to electromagnetic forces). However, other studies have found no significant effect of the presence of high-voltage cables on the migration of silver eel*(Anguilla anguilla*) (Westerberg and Begout-Anras, 1999). Observations involving tracking eel migration routes showed that electromagnetic fields generated by cables associated with the operation of the OWF caused only minor (up to 50 minutes) delays in migration or insignificant changes in the route, without causing interference that could significantly affect migration efficiency (Westerberg et al., 2007 after Wilhelmsson et al., 2010). Similarly, studies conducted on the impact of the power cable connecting Poland and Sweden (SwePol Link) did not show a significant effect of this factor on salmonids (Westerberg et al., 2007 after Wilhelmsson et al., 2010). Also, studies conducted in 1999-2002 by the Maritime Institute of Fisheries on the impact of the construction and operation of this undersea power transmission system between Poland and Sweden (SwePol Link) on the marine environment did not reveal disturbances in the movement of flatfish and juvenile cod. This could be due to the small range of the field's influence: its changes were significant only at a short distance from the cable (up to a dozen meters), while at a distance of several tens of meters from the cable, the changes were within the range of natural changes (Andrulewicz et al., 2003).

In addition to studying the effects of transmission line laying on macroscopic organisms, the scale of disturbance of the earth's magnetic field by current flowing in cables has been studied (Andrulewicz et al., 2003). Changes in the magnetic field were significant only at a short distance from the cable (up to

a dozen meters), while at a distance of several tens of meters from the cable, the changes were within the range of natural variations. During measurements on the seabed above the cable line, no disturbance of flatfish and juvenile cod was observed.

The concentration of cod in the vicinity of the magnetic field, which was observed in the Nysted offshore wind farm area in 2003, is related to the concentration of food in the area rather than to the fish's preference for electromagnetic field locations (Bio/consult as, 2006).

The impact of electromagnetic field changes caused by the construction of the OWF on ichthyofauna can, according to Wilhelmsson et al. (2010) classify it as a small one with a long-term nature and local scope. However, these authors point out the uncertainty of this assessment due to limited knowledge of the impact of this factor on fish, especially with regard to possible disruptions in fish migrations (the barrier effect created by the OWF) and changes in the foraging behavior of cartilaginous fish as a result of long-term impacts.

7.2.6. Summary

A summary of the potential impacts of the OWF operation stage on ichthyofauna is provided in the table below. The table also includes a description of potential unplanned impacts.

Table 9. Potential impacts of OWF on fish - operation stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Emissions of compounds from corrosion protection agents	The impacts of toxic substances during the operation stage are related to the protection of steel foundation structures from corrosion. The most common anti-corrosion method used in the marine environment is cathodic protection. It can be implemented as galvanic or electrolytic protection. With cathodic protection, there will be a gradual release of Al or Zn into the water table. The most important parameters affecting the level of impact are: • the type and amount of substances released, • water quality in the project area, • a type of rock material that forms the seabed.
Noise and vibration emissions	At the stage of operation of the OWF, there are noise and vibrations caused by the operation of the turbines, as well as, to a small extent, the movement of service vessels. At the same time, in the described area, there may be a slight reduction in noise from shipping and fishing due to restrictions on vessel traffic and the possible prohibition or restriction of fishing in the area of the OWF. The most important parameters affecting the level of impact are the number and spacing of power plants.
The formation of a mechanical barrier	The foundations of wind turbines and supporting infrastructure can create an underwater physical barrier to fish migration during the operational period. The most important parameters affecting the level of impact are the number, diameter and spacing of foundations.

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Habitat changes - the emergence of "artificial reef"	Habitat changes brought about by the creation of an "artificial reef" can have a positive impact on ichthyofauna, thanks to the creation of new hiding places, an increase in the food base, the creation of favorable conditions for the spawning of some species and the development of juvenile forms. The most important parameters affecting the level of impact are the shape, base diameter and number of foundations.
Emission of electromagnetic fields and radiation	Electricity transmission cables transmit an electromagnetic field that can have a slight effect on some fish species. The most important parameters affecting the scale of the impact are the length and type of power cable.
Oil spill	See description for construction phase
Accidental release of municipal waste or domestic sewage	See description for construction phase
Accidental release of chemicals and waste from farm operations	During the operation of the wind farm, waste directly related to the operation of the wind farm will be generated on the vessels, at the facilities located onshore (at the port servicing the project) and at the project site. These may include damaged parts of farm components, cement, grout, mortar, operating fluids and other chemicals used or replaced during maintenance work. They can be accidentally released into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Contamination of water depths and bottom sediments with antifouling agents	See description for construction phase

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

7.3. Decommissioning stage

The lifespan of the OWF infrastructure is assumed to be about 25 years (Wilhelmsson et al., 2010). After this period, three options are possible: decommissioning the structures that make up the OWF, leaving the turbine structures stripped of their moving parts (along with the consequences of their continued existence, i.e., the presence of disturbances caused by their presence, but also the preservation of the habitats created on their elements), and continued operation requiring continued maintenance of the efficiency and modernization of the infrastructure (Wilhelmsson et al., 2010). However, in the current state of the law, the latter is unacceptable, as wind farm structures should be properly dismantled ensuring the safety of navigation, fishing or other future uses of the area. The need to decommission offshore wind farms at the end of their operation stems from, among other things, the UNCLOS (1982) international maritime law. Guidelines and standards for how to carry it out are also included in the Helsinki Convention (HELCOM) and recommendations, such as IMO Guidelines and Standards for the

Removal of Offshore Installations and Structures on the Continental Shelf in the Exclusive Economic Zone (1989). According to international maritime law (UNCLOS, 1982), information on the location of structural elements that have not been fully removed must be made public. This may include parts of turbine foundations below the bottom level, erosion protection and power cables.

During demolition, methods and technologies should be used to minimize harmful effects on the environment.

Analysis of this impact is hampered by the lack of experience in this type of project due to the early stage of offshore wind development, as well as the inability to predict what technologies will be available twenty or more years down the road when the dismantling of the farms is carried out (OSPAR, 2008). It is assumed that the primary factors likely to adversely affect the environment will be, as in the case of the construction phase, an increase in the concentration of suspended solids, noise, the threat of contamination by toxic substances, and habitat alteration. The environmental impact of the aforementioned factors is largely dependent on the demolition and removal technology used and the turbine foundation solutions adopted during construction.

7.3.1. Increase in the concentration of suspended solids in water

During the decommissioning phase, operations to remove turbines, foundations and cables may increase the amount of suspended solids in the water table. Liquidation of monopile and jacket-type foundations involves partial removal of piles from the bottom. This will disturb the sediment and increase the concentration of suspended solids in the water tone. Removal of ballast from gravity foundations can also cause a temporary increase in suspended solids in the water table. A temporary increase in the amount of suspended solids in the water tone can also occur when cables are removed from the bottom.

Thus, it can be assumed that there are similar potential risks associated with an increase in suspended solids concentration to those occurring during the construction phase, such as negative effects on larval and egg development, impediments to food acquisition and clogging of fish gills. Due to the lack of experience with the decommissioning of offshore wind farm components, it is difficult to quantify the amount of suspended solids that will enter the water table during this process, and thus the significance of the impact. However, the impact can be expected to be similar to or less than that occurring during construction, its nature will be moderate or spatially extensive and short-lived.

7.3.2. Release of pollutants and nutrients from the sludge into the water body

The appearance of negative impacts of toxic chemicals at the decommissioning stage of the OWF may arise as a result of harmful substances entering the water along with suspended solids lifted from the bottom as a result of foundation or cable removal work. It can be assumed that the scope and materiality of these risks are, like the construction phase, low.

7.3.3. Noise and vibration emissions

A source of disturbance during the decommissioning process will be noise associated with the increased traffic of vessels involved in the dismantling of infrastructure elements. The noise source will also be the turbine structure removal work itself. Noise generated during this phase of the project may prove to be a threat to species inhabiting new habitats created after the farms are built, with most of the effects described in the section on the construction phase. Wilhelmsson et al. (2010) suggest that, assuming the use of technologies similar to those used in dismantling oil rigs (blasting, cutting), the noise generated during the work could cause death or serious injury to nearby fish.

7.3.4. Elimination of the "artificial reef"

It is assumed that wind turbine generators should be removed in their entirety, and foundations should be removed up to 3 meters below seabed level. The cables can be removed from the bottom or left covered under a layer of sediment. If erosion protection is used, it is not recommended to remove it. The remaining technical infrastructure should be removed.

During the construction phase, there is irreversible destruction of relatively small areas. Removal of the OWF infrastructure will result in the destruction of the habitat created during construction and developing or remaining in equilibrium, created by the hard substrate-providing structural elements (Spanggaard, 2006). Thus, we can expect the disappearance of the artificial reef effect involving a decline in the abundance and diversity of ichthyofauna, as well as a deterioration of conditions favorable for the reproduction and development of early life stages of fish.

The removal of the turbine structures and other infrastructure will also make it possible to restore fishing in the area, which was closed during operation, and lift navigational restrictions. Thus, these areas will no longer be similar in their role to Marine Protected Areas (Inger et al., 2009).

Thus, it can be assumed that habitat changes caused by the decommissioning of the OWF will cause a negative effect by destroying the habitat that provides favorable breeding and living conditions for many species of ichthyofauna. The extent of this impact will be local but long-term.

7.3.5. Summary

A summary of the potential impacts of the OWF decommissioning phase on ichthyofauna is provided in the table below. The table also includes a description of potential unplanned impacts.

Table 10. Potential impacts of OWF on fish - decommissioning stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Increase in the concentration of suspended solids in water	During the decommissioning phase, operations to remove turbines, foundations and cables may increase the amount of suspended solids in the water table. The most important parameters affecting the level of impact are: • the type, dimensions and number of decommissioned foundations and the length of decommissioned cables, • a type of rock material that forms the seabed.
Release of pollutants and nutrients from the sludge into the water body	Violation of the structure of bottom sediments will result in the passage of the pollutants and nutrients they contain into the water body. These substances can negatively affect ichthyofauna. The most important parameters affecting the level of impact are: • dimensions and number of decommissioned foundations and length of decommissioned cables, • the types and amount of pollutants deposited in bottom sediments, • a type of rock material that forms the seabed.
Noise and vibration emissions	During the decommissioning phase of an offshore wind farm, noise and vibration arise from the demolition of wind turbine structural components and are associated with ship operations.

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	The impact of these sounds on the physiological state of the fish is the same as during the construction phase of the farm.
Habitat changes - decommissioning "artificial reef"	A micro-ecosystem of "artificial reefs" on the hard substrate of wind turbine structures will already be formed during the operation of the farm. During the decommissioning stage, elements of the OWF may be removed or left in the seabed. If elements of the farm are left in place, the impact will be no different from that during the construction phase. If the farm's facilities are removed, not only will the habitat of lichen organisms be destroyed, but also the potential habitat, feeding, shelter and breeding grounds of many fish species. The most important parameters affecting the level of impact are the diameter of the base and the number of foundations, as well as the length of the cables.
Oil spill	See description for construction phase
Contamination of water depths and bottom sediments with antifouling agents	See description for construction phase
Accidental release of municipal waste or domestic sewage	See description for construction phase
Accidental release of chemicals and waste from farm decommissioning	During the decommissioning of the wind farm, waste directly related to the decommissioning of the wind farm will be generated on the vessels, at the facilities located onshore (at the port handling the decommissioning of the project) and at the project site. These may include damaged parts of farm components, operating fluids, etc. They can be accidentally released into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

8. Species under evaluation

This chapter briefly characterizes the ichthyofauna found in the area of the proposed OWF BIII. A full characterization is provided in the results of the study, conducted by the Marine Fisheries Institute - National Research Institute, which constitutes Section 7 of Volume III of the EIA. In addition, the chapter defines the sensitivity of selected fish species to the most important impacts of the farm and indicates their importance to the ecosystem.

The results of the study indicate that the site of the proposed farm is of little importance to fish. This is also confirmed by the relatively small commercial fishery conducted in the area of the Project.

During the surveys conducted in 2016-2017, 19 fish taxa were caught in the body of water adjacent to the Project, intended for the Baltic offshore wind farm, of which the permanent fish assemblages of the study area included cod, flatfish, herring, sprats, as well as sparse hen devils, tassels, sandeels and eels. In the ichthyoplankton samples, 12 taxa were identified. During the survey, 27 gobies larvae were recorded, most likely belonging to the small gobies, as well as 16 dennettle larvae. The results of the study are similar and indicate no significant changes in the characteristics of the area.

In the period from the issuance of the DWA to the date of this Report, no projects have been implemented or are being implemented in the BIII OWF area or its vicinity that could change the characteristics of the status of ichthyofauna presented above.

8.1. Basic characteristics of ichthyofauna in the area of the proposed farm

According to the results of ichthyofauna monitoring, 19 fish taxa were present in the area of OWF BIII and its buffer zone. The pelagic trawl and bottom set surveys recorded the presence of 15 fish species, while 10 species of fish larvae and sprat eggs were recorded in ichthyoplankton samples collected with Bongo nets (including 3 species not found in the trawl and bottom set surveys, see Table 10). Due to the difficulty in determining the larvae of sandeel and gobies to the species level, they were designated to the family.

From the point of view of the natural values of the Project area, an important result of the ichthyoplankton surveys was the presence of larvae of two fish species under partial species protection: denfish and goby larvae (most likely belonging to the small goby), found in numbers of 25 pieces and 9 pieces, respectively.

Table 11. List of fish species caught in the area of OWF BIII and the buffer zone in October 2012 - September 2013.

Polish name	Latin name	English name	Ichthyoplankton		Adult fish
			Roe	Larvae	
Belona	*Belone belone L.*	Garfish			x
Stickleback	*Gasterosteus aculeatus L.*	Three-spined stickleback			x
Czarniak	*Pollachius virens L.*	Saithe			x
Dennik	*Liparis liparis liparis L.*	Common seasnail		x	
Dobijak	*Hyperoplus lanceolatus L.*	Greater sand eel			x
Cod	*Gadus morhua L.*	Cod			x
Plaice	*Pleuronectes platessa L.*	Plaice		x	x
Hound of the devil	*Myoxocephalus scorpius L.*	Shorthorn sculpin		x	x
Mackerel	*Scomber scombrus L.*	Atlantic mackerel			x
Motela	*Enchelyopus cimbrius L.*	Fourbeard rockling		x	
Oystercatcher	*Pholis gunnellus L.*	Rock gunnel		x	
Skarp	*Scophthalmus maximus L.*	Turbot			x
Orchid	*Platichthys flesus L.*	Flounder		x	x
Sprat	*Sprattus sprattus L.*	Sprat	x	x	x

Polish name	Latin name	English name	Ichthyoplankton		Adult fish
			Roe	Larvae	
Herring	*Clupea harengus L.*	Herring		x	x
Tasha	*Cyclopterus lumpus L.*	Lumpfish			x
Tobias	*Ammodytes tobianus L.*	Lesser sand eel			x
Eelam	*Zoarces viviparus L.*	Eelpout			x
Dobiidae*	*Ammodytidae*	Sand lances		x	
Cupcakes**	*Gobiidae*	Gobies		x	

*Due to the difficulty in determining the larvae of sandeel fish to the species level, they were determined to the family level. There are two species of this family in the South Baltic: tobias and sandeel (both found in adult form during the survey in the study area) .

**Because of the difficulty in determining gobies fish larvae to the species level, they were determined to the family level. Taking into account the biology and environmental preferences of goby fish species found in the Baltic Sea, it can be assumed with high probability that the larvae caught belonged to the small goby species (Pomatoschistus minutus).

Source: report with results of ichthyofauna surveys - Section 7 Volume III report

The number and weight of each fish species caught in the research catch are shown in the table below.

Table 12. Abundance and weight of individual fish species (in kg) recorded in research fisheries in the area of OWF BIII and the buffer zone (October 2012 - September 2013)

Species	Pelagic fishing		Bottom fishing		Catches together			
	Abundance (pcs.)	Catch weight (kg)	Abundance (pcs.)	Catch weight (kg)	Abundance (pcs.)	Catch weight (kg)	Abundance (%)	Catch weight (%)
Sprat	21927	271.06	5	0.06	21932	271.12	77.93	17.62
Herring	1855	59.19	284	25.8	2139	84.98	7.60	5.52
Cod	6	1.02	2682	864.37	2688	865.39	9.55	56.23
Orchid			1230	287.51	1230	287.51	4.37	18.68
Plaice			41	12.98	41	12.98	0.15	0.84
Skarp			3	3.73	3	3.73	0.01	0.24
Belona	1	0.32			1	0.32	0.00	0.02
Dobijak	43	0.76			43	0.76	0.15	0.05
Tobias	2	0.03			2	0.03	0.01	0.00
Hound of the devil			41	6.77	41	6.77	0.15	0.44
Tasha	3	1.19	2	0.44	5	1.63	0.02	0.11
Eelam			10	2.01	10	2.01	0.04	0.13
Mackerel	3	1.1	1	0.54	4	1.64	0.01	0.11
Stickleback	3	0.01			3	0.01	0.01	0.00

Species	Pelagic fishing		Bottom fishing		Catches together			
	Abundance (pcs.)	Catch weight (kg)	Abundance (pcs.)	Catch weight (kg)	Abundance (pcs.)	Catch weight (kg)	Abundance (%)	Catch weight (%)
Czarniak			1	0.26	1	0.26	0.00	0.02
Total	23843	334.67	4300	1204.43	28143	1539.11	100.00	100.00

Source: report with results of ichthyofauna surveys - Section 7 Volume III report

8.2. Sensitivity of ichthyofauna to potential impacts of the project

The sensitivity of individual species to impacts associated with subsequent phases of the project will differ. The greatest impact is on juvenile forms of the fish, as adults are more resistant to harmful factors that may be present in the environment (Knudsen et al., 1992; Wahlberg and Westerberg, 2005).

An assessment of the degree of vulnerability (sensitivity) of selected species to potential impacts of the wind farm is presented in tabular form, using a three-level scale, based on Bergstrom et al. (2014), using experience from the construction and operation of other wind farms in the Baltic Sea.

The analysis refers to the impact of the BIII OWF, distinguishing at which stage the impact occurs (construction, operation, or dismantling):

- high sensitivity defines the type of impact that affects both the abundance, distribution of fish species and the trophic network,
- medium sensitivity defines the type of impact that affects the abundance and distribution of species, but does not affect the trophic network,
- low sensitivity defines the type of little or no impact on the distribution and abundance of individual species.

An assessment of the degree of sensitivity to the potential impact of an offshore wind farm on selected fish species during the construction, operation and decommissioning stages is presented in the tables below (Tables 14- 16).

8.2.1. Sensitivity to construction stage impacts

During the construction phase of the offshore wind farm, fish may be sensitive to increased suspended solids in the water tone, water pollution, acoustic disturbance, creation of a spatial barrier, and habitat alteration. Increased suspended solids in the water depths can significantly affect early life stages of fish due to the limited possibility of avoiding the adverse effects of this factor. Pelagic eggs may be adversely affected by suspension (sinking to the bottom). In the case of adult forms, there is generally an avoidance effect (with concentrations of suspended solids generated during the construction of the OWF).

Despite the potentially high sensitivity of fish to chemicals, the risk of releasing larger quantities of harmful substances from sediments during construction activities is low due to the low concentrations found in sediments in the South Baltic. Toxic emissions from ships will not noticeably raise chemical levels in South Baltic waters, while the risk of emissions in the event of a collision has been estimated as low.

Acoustic interference is ranked among the most important negative factors affecting ichthyofauna. Noise can significantly adversely affect the development and life of fish. Noise levels associated with

foundation construction can reach 260 dB re: 1 µPa2s and cable laying work can generate noise as high as 178 dB re: 1 µPa2s. However, noise-induced mortality was recorded only within a few meters of the sound source. The sounds and vibrations generated by the construction of the OWF induce fish to leave their feeding grounds, hiding places and change their spawning territory (Slotte et al., 2004), thus affecting the survival rate of individuals and their reproductive success.

The creation of a spatial barrier during the construction phase will be relatively short, and in addition, fish actively move to avoid the barrier.

Habitat changes caused by the construction of the wind farm may affect ichthyofauna through changes in bottom morphology and sediment character, directly affecting the living and reproductive conditions of ichthyofauna and, indirectly, through the impact of habitat changes on benthic organisms that are the food source of fish. Due to the short-term nature of the impact, sensitivity is described as low for all species.

The sensitivity of ichthyofauna to the impacts of the construction phase is shown in the table below.

Table 13. List of selected fish species with assessment of the degree of sensitivity to potential impacts of OWF BIII at the construction stage

STAGE OF CONSTRUCTION					
Impact / Species name	Agitation of sediments*	Water Pollution	Acoustic interference	Creating a spatial blockade	Habitat change
Small grandmother	Average	Low	High	Low	Low
Dennik	Average	Low	High	Low	Low
Cod	Average	Low	High	Low	Low
Plaice	Average	Low	High	Low	Low
Skarp	Average	Low	High	Low	Low
Orchid	Average	Low	High	Low	Low
Sprat	Average	Low	High	Low	Low
Herring	Average	Low	High	Low	Low

* the effect of deposition of suspended solids on the bottom was classified as a habitat change

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

8.2.2. Sensitivity to the impacts of the operation stage

During the operation stage of the OWF, fish may be sensitive to increased suspended solids in the water tone, water pollution, acoustic disturbance, creation of a spatial barrier, habitat alteration, and electromagnetic fields.

At the operation stage, the only sources of **toxic chemicals** that could potentially affect ichthyofauna are spills of harmful substances from ships during the maintenance and servicing of the OWF or potentially spills from the failure of the marine substation (MSE). The risk of pollution and the scale of emissions during the operation of the OWF (based on the literature) mandates that the degree of sensitivity of all species be described as low.

The level of **noise** intensity generated by wind turbines depends on the type of turbine, wind speed, the number of operating turbines and their mutual distances, as well as local hydrological, geological, depth and natural background noise conditions. The frequency of sound generated in the water by an operating turbine ranges from 1-400 Hz and the level from 80-100 dB 1µPa2s and increases with the number of turbines (Nedwell et al., 2003). Due to the low frequency and intensity of the noise, there is no danger of permanent damage to hearing organs or fish tissues as a result of noise generated by operating wind turbines. Experimental studies have shown that the noise is not strong enough to elicit an avoidance response from the fish. Therefore, sensitivity was rated as low.

The presence of windmill structures may provide a small degree of **underwater physical barrier to fish migration. It should be noted that fish actively move to avoid the barrier.**

Usually, the appearance of new structures that provide hard substrate and provide refuge for fish results in an increase in the abundance of some fish species, and biodiversity may also increase. The structures of windmill structures can be both places of refuge and places of reproduction or development of the early stages of many fish species. An additional influence is the shutdown of fishing, but this factor has a local impact. Higher sensitivity of this factor has been attributed to fish to which a **change in habitat** through the creation of an artificial reef will create more favorable conditions for reproduction (bottomfish, gobies), or shelter (cod).

Knowledge about the effects of **electromagnetic fields** on fish is relatively limited. The effects of electric and magnetic fields on some fish species, considered sensitive, have been observed. It is presumed that the electromagnetic field observed around the connection cables may also affect the migratory abilities of fish, although studies conducted on the impact of the power cable connecting Poland and Sweden (SwePol Link) have not shown a significant effect of this factor on salmonids, flatfish and juvenile cod.

The sensitivity of ichthyofauna to the impacts of the operation stage is shown in the table below.

Table 14. List of selected fish species with assessment of the degree of sensitivity to potential impacts of OWF BIII at the stage of operation

OPERATION STAGE					
Impact / Species name	Water pollution	Acoustic interference	Creating a spatial blockade	Habitat change (+)	Electromagnetic interactions
Small grandmother	Low	Low	Low	High	Low
Dennik	Low	Low	Low	High	Low
Cod	Low	Low	Low	High	Low
Plaice	Low	Low	Low	Average	Low
Skarp	Low	Low	Low	Average	Low
Orchid	Low	Low	Low	Average	Low
Sprat	Low	Low	Low	Low	Low
Herring	Low	Low	Low	Average	Low

(+) positive impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

8.2.3. Sensitivity to the impacts of the decommissioning stage

During the decommissioning phase of the offshore wind farm, fish may be sensitive to increased suspended solids in the water tone, water pollution, acoustic disturbance and habitat changes.

It can be assumed that there are similar potential risks associated with an increase in suspended solids concentration to those occurring during the construction phase, such as negative effects on larval and egg development, impediments to food acquisition and clogging of fish gills.

The appearance of negative impacts of toxic chemicals at the decommissioning stage of the OWF may be related to leakage from ships or equipment involved in laying cables, and as a result of harmful substances entering the water along with suspended matter lifted from the bottom as a result of foundation or cable removal work. It can be assumed that the scope and materiality of these risks are, like the construction phase, low.

The source of acoustic disturbance during the decommissioning process will be noise associated with the increased traffic of vessels involved in the dismantling of infrastructure elements. The noise source will also be the turbine structure removal work itself. Noise generated during this phase of the project may prove to be a threat to species inhabiting the new habitats created after the farm's construction, with most of the effects described in the section on the construction phase.

Removal of the OWF infrastructure will result in the destruction of the habitat created during construction and developing or remaining in equilibrium, created by the hard substrate-providing structural elements (Spanggaard, 2006). Thus, we can expect the disappearance of the artificial reef effect involving a decline in the abundance and diversity of ichthyofauna, as well as a deterioration of conditions favorable for the reproduction and development of early life stages of fish.

Table 15. List of selected fish species with assessment of the degree of sensitivity to potential impacts of OWF BIII at the decommissioning stage

DECOMMISSIONING STAGE				
Impact / Species name	Agitation of sediments	Water pollution	Acoustic interference	Habitat change
Small grandmother	Average	Low	High	Average
Dennik	Average	Low	High	Average
Cod	Average	Low	High	Average
Plaice	Average	Low	High	Average
Skarp	Average	Low	High	Average
Orchid	Average	Low	High	Average
Sprat	Average	Low	High	Average
Herring	Average	Low	High	Average

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

8.3. Importance of ichthyofauna

Of the 19 taxa observed during ichthyofauna monitoring, 6 are of particular economic importance, being subject to commercial fishing. These include the sprat Sprattus sprattus, herring Clupea harengus, cod Gadus morhua, flounder Platichthys flesus, plaice Pleuronectes platessa and turbot Scophthalmus maximus. In research catches conducted in the area of the OWF and the buffer zone, the most abundant were sprat, herring, cod and flounder, which are also the basis of commercial fishing (more than 96.2% of total Polish marine catches in 2013).

In 2015-2020, commercial fishing, in the area of Baltic squares M7, M8, N7, N8 falling within the Project area, was dominated by cod (42% of the total weight of fish caught), flounder (23%), sprat (16.0%) and herring (14%).

In addition, during monitoring surveys, the presence of 9 goby larvae was recorded in ichthyoplankton samples, most likely belonging to the protected species of small goby Pomatoschistus minutus, as well as 25 larvae of the denning bird Liparis liparis liparis, which is also partially protected in Poland.

The above-mentioned species, due to their high importance in ecosystem functioning, relevance in commercial fisheries and legal protection status, will be included in the detailed assessment of the impact of the offshore wind farm on ichthyofauna. The remaining species were represented in smaller numbers and will not be considered in the environmental impact assessment of the project.

During the surveys conducted in 2016-2017, 19 fish taxa were caught in the body of water adjacent to the Project, intended for the Baltic offshore wind farm, of which the permanent fish assemblages of the study area included cod, flatfish, herring, sprats, as well as sparse hen devils, tassels, sandeels and eels. In the ichthyoplankton samples, 12 taxa were identified. During the survey, 27 gobies larvae were recorded, most likely belonging to the small gobies, as well as 16 dennettle larvae. The results of the study are similar and indicate no significant changes in the characteristics of the area.

A classification of the importance of the resources of each species selected for evaluation is provided in the table below.

Table 17. Classification of the importance of fish species resources selected for the impact assessment of OWF BIII

Species	Importance of the resource	Justification
Small grandmother	Medium	Protected species, population status unknown, adult forms not very susceptible to impact from the project, in the case of larval forms there may be a negative impact of suspension.
Dennik	Medium	A protected, widely distributed species with a short life cycle (1-3 years). Highly susceptible to water pollution. The denning larvae drift with the current for considerable distances.
Cod	Large	A commercially exploited species of one of the key importance for the functioning of the ecosystem, it is abundant in the Baltic Sea, although heavily subjected to anthropogenic pressure, hence the marked fluctuations in the status of the stock over recent years.
Plaice	Small	A commercially exploited species. Occurring in large numbers, it is not very susceptible to changes in the environment and can adapt quickly to any changes. The results of survey fishing confirm the presence of plaice in the

Species	Importance of the resource	Justification
		study area, but the number of individuals indicates the low importance of the OWF area for this species.
Skarp	Medium	A commercially exploited species. It occurs in lower numbers than flounder. It feeds mainly on small fish, so it is classified as a predator at the top of the ecosystem's trophic pyramid.
Orchid	Medium	A commercially exploited species. An abundant, ecosystem-important key bentophage in the southern Baltic Sea zone.
Sprat	Medium	A commercially exploited species. Abundant, of ecosystem importance. A pelagic, thermophilic species, distinguished by its relatively high mobility, determined mainly by water temperature.
Herring	Medium	A commercially exploited species. Abundant, of ecosystem importance. It is among the species with the greatest migratory tendencies between breeding and feeding sites.

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

9. Assessment of the impact of OWF BIII on fish

Depending on the stage of the project, different aspects of the impact of the OWF on ichthyofauna should be considered. Potentially, the construction phase will have the greatest impact on the environment. The detailed impact of these factors on ichthyofauna is discussed in Chapter 7. Based on the analysis, it is judged that the most significant impacts are those in the form of noise and vibration, as well as the effects of an increase in the concentration of suspended solids in water.

As a result of ichthyofauna surveys conducted in the area of the planned OWF Central Baltic III and in its vicinity as part of the Pre-Investment Survey Program, 19 fish species (total adults, larvae and eggs) were found: beluga, stickleback, coalfish, demersal, sandeel, cod, plaice, devil hen, mackerel, mothership, horse mackerel, turbot, flounder, sprat, herring, tasha, tobias, eelgrass, sandeel, goby (due to difficulties in determining larvae as to species, sandeel and goby were determined as to family). A total of 1,627 fish larvae belonging to 10 species or families were caught, with the vast majority belonging to sprat (1,396 fish) and 1,762 egg grains belonging mainly to sprat.

In the research catch of adult fish, sprats (77.9%) were the most abundant species found in the OWF and buffer zone, followed by cod (9.5%), herring (7.6%) and flounder (4.4%). No adult protected or endangered fish species were found.

From the point of view of the natural values of the Project area, an important result of the ichthyoplankton surveys was the presence of larvae of two fish species under partial species protection: denfish and goby larvae (most likely belonging to the small goby), found in numbers of 25 pieces and 9 pieces, respectively.

The results of the study indicate that the site of the proposed farm is of little importance to fish. This is also confirmed by the relatively small commercial fishery conducted in the area of the Project.

During the surveys conducted in 2016-2017, 19 fish taxa were caught in the body of water adjacent to the Project, intended for the Baltic offshore wind farm, of which the permanent fish assemblages of the study area included cod, flatfish, herring, sprats, as well as sparse hen devils, tassels, sandeels and eels. In the ichthyoplankton samples, 12 taxa were identified. During the survey, 27 gobies larvae were recorded, most likely belonging to the small gobies, as well as 16 dennettle larvae. The results of the study are similar and indicate no significant changes in the characteristics of the area.

In the period from the issuance of the DWA to the date of submission of this application, no projects have been implemented or are being implemented in the area of the OWF Central Baltic III or in its vicinity, which could cause a change in the characteristics of the state of ichthyofauna presented above.

9.1. Construction phase

During the construction of OWF BIII, works will be carried out that have a direct or indirect impact on ichthyofauna. The most significant of these are:

- drilling performed during geotechnical studies,
- preparation of the bottom prior to the installation of the foundation, including dredging of the bottom, removal of the sediment layer with a thickness of about 2 - 3 m and replacing it with rock material with a higher bearing capacity (only in the case of gravity foundations, which can be used in the currently proposed variant of the Project only for supporting infrastructure),
- drilling or driving foundations (only in the case of monopiles, jacket or tripod foundations, while in the currently requested variant of the Project tripod foundations can be used only for supporting infrastructure),
- anchoring jack - up platforms and support units during the assembly of farm components,
- burying cables in the seabed,
- heaping of rock material serving as protection against leaching,
- storage of excavated material from the preparation of the bottom for foundations.

A full description of the construction work can be found in Section 4 of Volume II of the EIA.

The following impacts on ichthyofauna are expected to occur at the construction stage of OWF BIII:

1) an increase in the concentration of suspended solids in water,
2) the release of pollutants and nutrients from the sediment into the water body,
3) noise and vibration emissions,
4) the formation of a mechanical barrier,
5) habitat change.

There may also be unplanned impacts during the construction of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,

4) accidentally released chemicals and waste from the construction of the farm,

5) blow-ups or explosions of unexploded military munitions that may indirectly affect fish.

Unplanned impacts on ichthyofauna also include those associated with the possible detonation of conventional weapons residues deposited in the sea, and which will be found during preparatory or construction work during the implementation of the Project. Decommissioning of UXO will be carried out only in cases where it is necessary.

Unplanned impacts are assessed in Chapter 11.

9.1.1. Increase in the concentration of suspended solids in water

The increase in suspended solids concentration due to the BIII offshore wind farm construction activities may affect both adult fish and juvenile stages. There may be an effect of avoidance of this area by representatives of some fish species, while others are resistant to the increase in suspended solids concentration.

Once the adverse factors have subsided, adult fish can return to previously inhabited sites (Spanggaard, 2006). Thus, the greatest impacts are associated with the early life stages of fish.

As indicated in the 2015 EIA Report, it was assumed that the largest area of the seabed would be disturbed if gravity foundations were used in the project. With the changes planned to be implemented, this type of wind turbine foundation technology has been ruled out. At the stage of issuing the DWA, a variant was analyzed in terms of the area of seabed disturbance, which, assumed the seabed disturbance to a greater extent both in terms of total area and area per wind turbine. This variant was indicated for implementation by the Environmental Decision.

Assuming that the bottom area disturbed by the laying of internal power cables will be the same for the variant indicated for implementation in the Environmental Decision and the variant envisaged for implementation after its amendment, the parameters related to the number and type of foundations envisaged for implementation after the amendment and the bottom area disturbed at the installation area of one foundation will be important for the scale of impacts.

If the requested amendments to the Environmental Decision are made, the parameters related to the foundation of the BIII OWF will be as follows:

Table 17. Parameters of the seabed disturbance area after the amendment of the Environmental Decision

Parameter	The project after the proposed modification	The project in the parameters approved Environmental Decision	The project in the NIS 2015 variant
Number of power plants	60	120	200
Maximum number of foundations (power plants and substations)	61 (including one station)	126 (including 6 stations)	208 (including 7 stations and one additional foundation)
Diameter of the base of the power plant foundation	10 m	40 m	40 m
The width of the leaching protection layer from the	20 m	15 m	15 m

Parameter	The project after the proposed modification	The project in the parameters approved Environmental Decision	The project in the NIS 2015 variant
edge of the power plant foundation			
Diameter of the base of the substation foundation	50 m	50 m	50 m
The width of the leaching protection layer from the edge of the substation foundation	15 m	15 m	15 m
Bottom surface disturbed during the installation of one power plant foundation with a leaching protection layer	1963^{m2}	3848^{m2}	5027^{m2}
Maximum bottom area occupied by 1 foundation of supporting infrastructure including a leaching protection layer	1963^{m2}	3848^{m2}	5027^{m2}
Maximum bottom area occupied by all foundations including leaching protection layers	122 807^{m2}	663 402^{m2}	804 234^{m2}
Total length of sections of internal power cables	200 km	200 km	200 km
Cable trench width	1,5 m	1,5 m	1,5 m
Bottom surface disturbed when laying internal power cables	300 000^{m2}	300 000^{m2}	300 000^{m2}
Total bottom surface area disturbed when installing all foundations including leaching protection layers and when laying internal power cables	419 744^{m2} (0.42 ^{km2})	933 402^{m2} (0.93 ^{km2})	1 092 688^{m2} (1.09 ^{km2})

It should also be pointed out that the total area of the farm is about 117 square ^{kilometers}, of which the development area will be no more than 94 square ^{kilometers}, within which it will be possible to plant wind turbines (power plant development area) on an area of about 88 square ^{kilometers}. Referring to the set of parameters that constitute the most far-reaching scenario - the 2015 NIS - it assumed a breach of 1.09 km2 of bottom. Both the variant indicated for implementation by the Environmental Decision, and even more so the Project in the proposed modified parameters, will generate significantly less impact. This is because it should be pointed out that the area of the bottom disturbed with the installation of all foundations in the variant after the requested changes will be reduced many times, which is due to the limitation of the considered foundation technologies to the installation of monopiles and jacket

foundations. Moreover, the exclusion of gravity foundations, the installation of which requires prior dredging, for wind turbines will significantly reduce the agitation of bottom sediments during the construction phase of the Project.

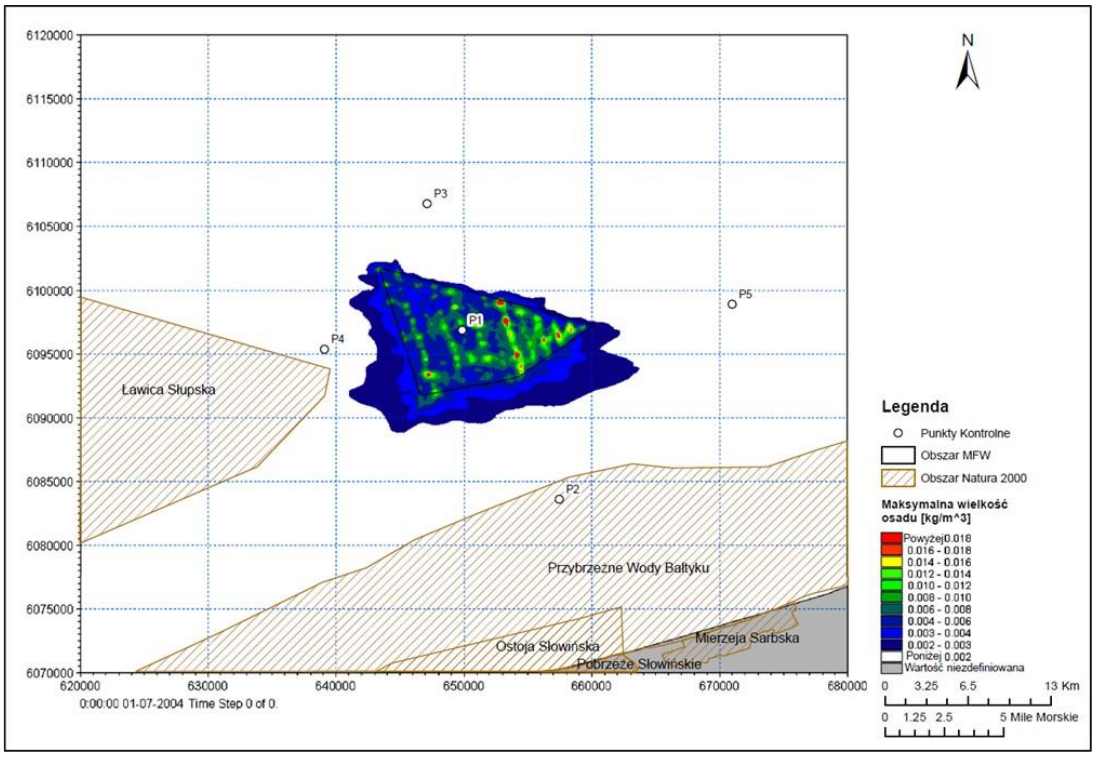
It was already indicated in the 2015 Report that in the case of using other types of foundations than gravity, this area will be even smaller (cf.: technical parameters of foundations, section 3.1. above). Which means that in the case of the changes proposed for implementation, impacts related to foundation placement and seabed disturbance will be significantly less than in the case of the 2015 NIS, as well as the variant envisaged for implementation by the Environmental Decision.

The assessment presented in the 2015 Report used the suspended solids spread model for this stage made by DHI and found in Section 11 of Volume II of the EIA. Modeling was done for both the then selected alternative (subsequently approved by the Environmental Decision) and the then rational alternative (NIS 2015).

The sediment transport model showed that during the construction of the OWF BIII farm, the concentration of suspended matter resulting from the works (without natural background) in the variant to be implemented under the Environmental Decision will not exceed 20 mg/l in most of the farm area and 10 mg/l outside the farm boundaries. It should be noted that in most of the analyzed basin these concentrations will be much lower, as shown in the figures below. Only at points is the concentration of suspended solids higher.

It should also be remembered that the specified concentrations will be very limited in time and space, and will only occur if gravity foundations are used on the farm, which require dredging and leveling of the seabed, and only during dredging operations. With other types of foundations, these impacts will be many times smaller.

Figure 3. Spreading range of suspended solids formed by the agitation of bottom sediments during dredging operations and their maximum concentrations near the bottom in the variant envisaged for implementation in the Environmental Decision



Ławica Słupska	Slupsk Shoal

Przybrzeżne Wody Bałtyku	Baltic Coastal Waters
Ostoja Słowińska	Ostoja Słowińska
Mierzeja Sarbska	Sarbska Spit
Pobrzeże Słowińskie	Pobrzeże Słowińskie
Legenda	Legend
Punkty Kontrolne	Checkpoints
Obszar MFW	IMF area
Obszar Natura 2000	Natura 2000 area
Maksymalna wielkość osadu [kg/m^3]	Maximum sediment size [kg/m^3]
Powyżej 0.018	Above 0.018
Poniżej 0.002	Less than 0.002
Wartość niezdefiniowana	Undefined value
Mile Morskie	Sea Miles

Source: hydrographic modeling results report (Volume II Section 11 of the EIA)

In addition, the relatively high velocity of currents observed during the study, averaging about 0.1-0.2 m/s and a maximum of about 0.5 m/s, will promote the dilution of suspended solids (source: hydrographic modeling results report, Volume II Section 11 of the EIA).

Such concentrations of suspended solids can adversely affect the early juvenile stages of fish. Literature data presented in Chapter 7 indicate that increased mortality of cod and herring larvae can be expected at suspended solids concentrations of about 10 mg/l, which is the concentration predicted for the BIII OWF construction stage (maximum 20 mg/l). A possible effect of the increased suspended solids concentration could therefore be increased mortality of herring larvae, although studies have shown little relevance of this area as a spawning ground for this species. For environmental reasons (too low salinity), cod spawning is not observed in this area (spawning grounds are mainly in the Bornholm Deep).

Due to the spawning of sprats in the study area, the effect of suspension on the pelagic eggs of this species can be significant due to a decrease in the buoyancy of the eggs and their sinking and dying on the bottom. The lowest level for which such a phenomenon was observed for pelagic eggs was 5 mg/L (Rönnbäck and Westerberg, 1996). The region of IMF BIII during the second spawning phase of the sprat (in late spring and early summer) lies directly in the spawning area of this species (Mankowski, 1959, 1972, 1978; Grauman, 1975; Elwertowski, 1976; Aro 1988, 1989). During late spring and summer, intensive surface spawning of sprats takes place throughout the southern Baltic. However, the OWF area is a small body of water, compared to the extensive spawning area of sprat, so its importance for the population of this species is not significant.

In the case of flounder, the offshore winter flounder region lies on the migration route of flounder from feeding grounds located in shallow coastal waters to spawning grounds in the Slupsk Trough, but is not a target spawning ground for the dominant deep-sea spawning flounder in the area due to the prevailing hydrological conditions here - salinity is too low, not exceeding 7.7 PSU.

An important, from the point of view of the natural values of the area of the planned project, the result of ichthyoplankton studies was the finding of the larvae of two protected fish species: denfish and small goby. A total of 13 and 12 demersal larvae and 4 and 5 goby larvae were caught in the farm and buffer zone, respectively, during the survey cycle. The numbers of larvae of both species showed no significant differences in terms of their distribution between the study areas. For some time after hatching, the larvae of both species lead a pelagic lifestyle. The presence of scattered larvae in the water depths may indicate the spawning of these species both in and near the BIII OWF area, or it may be the result of the natural drift of larvae from other areas. Dennik, which prefers a plant substrate for spawning, is most abundant in deeper waters in the eastern part of the Baltic; it is not found in the southwestern part. The larvae of this species spread very widely in the pelagial, and are sometimes encountered near the surface of the water. The little goby prefers shallow waters with a sandy bottom covered with clam shells and rocks. Adjacent to the area of the planned project is the Slupsk Shoal, which provides more

favorable conditions for spawning denfish and goby: adequate depth and the presence of substrate that allows spawning such as stones, macroalgae and empty shells.

According to the project's benthic impact assessment (Volume IV Section 3 of the ROIA), most macrozoobenthic organisms in the Project area have no or very low sensitivity to elevated suspended solids concentrations. Thus, it will not significantly affect the availability of food resources for benthic fish.

Increased concentration of suspended solids in water may cause direct negative impacts on ichthyofauna, local, short-term, reversible, repetitive (during the construction period), with low intensity.

An assessment of the significance of this impact for the set of Project parameters constituting the furthest-reaching NIS 2015 scenario that formed the basis for conducting the impact assessment in the 2015 Report is presented in the table below.

Table 18. Assessment of the impact on fish caused by an increase in suspended solids concentration in water (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Average	legally protected species	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium	Average	legally protected species		
Cod	Large	Average	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small	Average	commercial genre		Negligible (magnitude of impact - insignificant, importance of the resource - low or medium)
Skarp	Medium	Average	commercial genre		
Orchid	Medium	Average	commercial genre		
Sprat	Medium	Average	commercial genre		
Herring	Medium	Average	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In the variant envisaged for implementation after the proposed changes to the Project's implementation and operation conditions, significantly fewer foundations will be built than envisaged not only in the 2015 NIS, but also in the parameters of the Project approved by the Environmental Decision. As the

analyses carried out in this report, and earlier in the 2015 Report, the reduction in the number of foundations is important for the scale of impacts caused, but even more important is the change in the technology of their construction itself, which is now to use monopile or jacket (truss) foundations, with the proviso that the latter will be used only if monopiles are not technically feasible. Key to reducing the impact associated with the Project, in addition to reducing the number of foundations for the power plants, will be the fact that no gravity foundations are planned, the foundation of which involves interference with the bottom, resulting in an increase in the concentration of suspended solids in the water. It should be noted that 60 monopile or jacket (truss) foundations are planned for the Project. Thus, this method of plant foundation will significantly reduce the interference with the bottom and the possibility of sediment agitation, and consequently the level of suspended solids in the water will be lower in relation to that assumed at the stage of the 2015 Report and the variant planned for implementation by the Environmental Decision. With regard to the method of foundation of the associated infrastructure, it should be pointed out that a single foundation will be used to install it, which can be made in monopile, tripod, jacket (truss) or gravity technology. Nevertheless, it should be emphasized that it will be a single structure. Therefore, it should be considered that in the case of updating the Project's parameters, assuming the construction of 50% of the foundations for the power plants in relation to the parameters of the Project approved by the Environmental Decision and only one foundation for infrastructure (the number reduced from 6), as well as a change in the technology to be used for their construction, the Project will cause impacts on ichthyofauna of insignificant magnitude, which will have insignificant significance for the identified fish species, except for cod, for which the significance of the impact should be considered low.

Given that even with the set of parameters of the Project constituting the 2015 NIS, as well as the parameters under which it will be implemented after the amendment of the Environmental Decision, the significance of impacts associated with an increase in the concentration of suspended solids in water is considered negligible or small, **minimization measures are not required**.

Thus, it should be considered that both the nature of the impacts and their scope and magnitude are the same as for the variant approved by the Environmental Decision and the one constituting the 2015 NIS in the 2015 Report, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.2. Release of pollutants and nutrients from the sludge into the water body

The disturbance of the bottom sediment layer during construction activities will also involve the release of a certain pool of pollutants and nutrients from it, which will pass into the water depths.

Research conducted directly in the area planned for the construction of OWF BIII (Research on physical and chemical conditions of sediments in the area of OWF Central Baltic III - final report, Volume III Section 5 of the ROOŚ) confirmed the low concentration of hazardous substances in the sediments (PAHs, PCBs, heavy metals, mineral oils, radionuclides). None of the sediment samples tested from the BIII offshore wind farm area exceeded allowable concentrations of metals, PAHs and PCBs. The estimate of the amount of heavy metals, pollutants and nutrients that may be released in the variant indicated for implementation by the Environmental Decision will not be significant in comparison with the loads contributed annually to the Baltic Sea from rivers and wet precipitation (cf. Abiotic Environmental Impact Assessment, Section 2 Volume IV of the EIA).

Taking into account the above research results, it can be concluded that at the stage of construction of OWF BIII there will be no significant threats to ichthyofauna associated with an increase in the concentrations of toxic chemicals released from the sediments.

The release of a certain pool of pollutants and nutrients from disturbed bottom sediments may cause direct and indirect, negative impacts on ichthyofauna, local, temporary, reversible, repetitive (during the construction period), of low intensity.

An assessment of the significance of this impact of the set of parameters of the Project constituting the 2015 NIS, is presented in the table below.

Table 19. Assessment of the impact on fish of pollutants and nutrients released from sediments into the water body (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	Insignificant (scale of exposure - local, duration - temporary, intensity - low)	Negligible (magnitude of impact -
Dennik	Medium	Low	legally protected species		insignificant, importance of the resource - medium)
Cod	Large	Low	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small	Low	commercial genre		Negligible (magnitude of impact - insignificant, importance of the resource - low or medium)
Skarp	Medium	Low	commercial genre		
Orchid	Medium	Low	commercial genre		
Sprat	Medium	Low	commercial genre		
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In the variant envisaged for implementation after the requested amendments to the Environmental Decision, significantly fewer power plants will be built than envisaged for the set of parameters of the Project constituting the 2015 NIS, which, as can be seen from the table presented in Section 9.1.1, will translate into a smaller area of bottom violations. It should be noted that the reduction in the number of foundations is important for the scale of impacts caused, but even more important is the change in the technology of their construction itself, which is now to use monopile or jacket (truss) foundations. Key to reducing the impact associated with the Project, in addition to reducing the number of foundations for the power plants, will be the fact that no gravity foundations are planned, the foundation of which involves interference with the bottom, resulting in an increase in the concentration of suspended solids in the water. It should be noted that 60 monopile or jacket (truss) foundations are planned for the Project. Thus, this method of plant foundation will significantly reduce the interference

with the bottom and the possibility of releasing nutrients and pollutants from bottom sediments, and thus their levels will be lower relative to the variant constituting the 2015 NIS at the 2015 Report stage and the variant planned for implementation by the Environmental Decision. Regarding the method of foundation of the associated infrastructure, it should be pointed out that, a single foundation will be used to install it, which can be made in monopile, tripod, jacket (truss) or gravity technology. Nevertheless, it should be emphasized that it will be a single structure, which will be located in the central part of the farm.

With the above in mind, it should be assumed that in the case of an update of the parament of the Project assuming the implementation of 50% of the foundations in relation to the parameters of the Project approved by the Environmental Decision, as well as a change in the technology to be used for their construction.

The project will cause impacts on ichthyofauna of insignificant magnitude, which will be of insignificant importance for the identified fish species, except for cod, for which the significance of the impact should be considered low.

Taking into account the above, the Project in the variant indicated for implementation after amendment of the Environmental Decision should be considered that the significance of impacts on fish associated with the release of pollutants and nutrients from the sediment into the water body is negligible or small, and minimization measures are not required.

9.1.3. Noise and vibration emissions

The noise level associated with construction work is largely dependent on the type of foundation used. The technical concept prepared by Royal Haskoning DHV for the BIII offshore wind farm allows 4 types of them: gravity foundations (for which piling is not used) and monopiles, jacket foundations and tripod foundations. Each of these types of foundation would have been taken into account at the stage of the 2015 Report, as well as allowed by the Environmental Decision. At this stage, this environmental impact report has filed the possibilities of implementing wind power plants only on the basis of either monopile or jacket (truss) foundations, and in the case of the foundation for infrastructure: monopile, tripod, jacket (truss) or gravity.

Significant acoustic interference with foundation construction occurs with monopiles and truss (jacket) and tripod-type structures, and averages less than 170 dB, according to the cited report. Thus, they are lower than most of the values reported in the literature, for which negative effects on ichthyoplankton have been observed. However, the DHI acoustic report (Volume II Section 9 of the report) describes in detail the most far-reaching scenario, which assumes maximum sound exposure peaks of as much as 260 dB when sound waves accumulate over a 24-hour period. For the purpose of impact significance analysis, ranges of sound exposure values were adopted to determine impact intensity:

- <140 dB - low impact,
- 140-170 dB - medium impact (avoidance response),
- 170 - 210 dB - high impact (TTS - temporal shift of hearing threshold),
- 210 dB > - very high impact - (PPS - permanent shift in hearing threshold, mortality).

The DHI report prepared for the 2015 Report presented the acoustic impact ranges taken into account for the assessment conducted at the time, which took into account the assumptions in effect at the time regarding the scope and method of implementation of the project, primarily the type of foundations, their parameters and the method of installation work. This report was prepared based on the then prevailing level of knowledge and available literature.

At that stage, the assessment of the significance of this impact for the set of parameters of the Project constituting the 2015 NIS, which was the basis for conducting the assessment in the 2015 Report, **without the application of minimization measures**, is presented in the table below.

Table 20. Assessment of noise and vibration impacts on fish without minimization measures (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	The rationale for impact assessments	Magnitude of impact	The significance of the impact
Cupcakes	Medium	High	legally protected species	Large (scale of exposure- international, duration- medium, intensity- medium)	Moderate (magnitude of impact - high, importance of the resource - medium)
Dennik	Medium	High	legally protected species		
Cod	Large	High	commercial genre		Large (magnitude of impact - high, importance of the resource - high)
Plaice	Small	High	commercial genre		Small (magnitude of impact - high, importance of the resource - low)
Skarp	Medium	High	commercial genre		
Orchid	Medium	High	commercial genre		
Sprat	Medium	High	commercial genre		
Herring	Medium	High	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Due to the finding of high significance of noise impact during monopile driving, which was considered the most far-reaching scenario - NIS 2015 in terms of impact on ichthyofauna, among others, the Environmental Decision imposed an obligation to reduce underwater noise impact. At this stage, the zones of potential noise impact on fish have been verified. These are shown in Table 22 below. Based on these, a reassessment of the significance of the above impact was carried out. It should be recognized in this regard that the findings made at the 2015 Report stage applicable to the NIS remain valid in this regard. After the application of mitigation measures **, the scale of the impact decreased to regional, which significantly affected the assessment of the magnitude and significance of the impact**.

The assessment of noise and vibration impacts on fish for the set of parameters of the Project constituting the 2015 NIS, after the application of mitigation measures in the form of bubble curtains (so-called bubble curtains), is presented in the table below.

Table 21. Assessment of noise and vibration impacts on fish after application of minimization measures (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	High	legally protected species	Small (scale of exposure - regional, duration - medium-term, intensity - medium)	Small (size of impact - small, importance of resource - medium)
Dennik	Medium	High	legally protected species		
Cod	Large	High	commercial genre		Small (magnitude of impact -small, importance of resource - high)
Plaice	Small	High	commercial genre		Negligible (magnitude of impact -small, importance of the resource - small)
Skarp	Medium	High	commercial genre		
Orchid	Medium	High	commercial genre		
Sprat	Medium	High	commercial genre		
Herring	Medium	High	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

It should be noted that the above analyses were conducted in accordance with the assumptions made for the assessment of impacts contained in the 2015 Report. The set of parameters of the Project evaluated there was the scenario for the implementation of the BIII OWF in the variant of the most far-reaching possible impacts - NIS 2015. This scenario has been adjusted to the current assumptions under which the Project is to be implemented, which have changed from those set forth in the Environmental Decision, which at this stage determines the maximum possible scope of the Project.

In view of the intention to amend the Environmental Decision, noise propagation modeling for the BIII offshore wind farm (Sound Simulation Pile Driving for Baltic WF, Equinor 2020) was conducted again in 2020. At this stage, it is assumed that the maximum diameter of monopile foundations that could be installed as part of the Project is up to 10 m (originally assumed to be 12.5 m). Currently, it is also possible to use jackhammers with a higher capacity than originally planned for the installation of foundations, which is related to the rapid development of technologies used for the construction of offshore wind farms. A description of the issues of acoustic impacts is presented in Volume II, Section 9, which presents the methods and input data used to model sound propagation during monopile driving, which is to be carried out under current assumptions. This information is included in the chapter.

For the planned Project, 60 foundations for wind turbines and 1 for associated infrastructure are assumed, with monopole foundations likely to cause the greatest acoustic impacts. The parameters of the Project approved by the Environmental Decision assumed the construction of 120 wind turbines, which could also be sited using this technology. In the case of the set of parameters of the Undertaking

constituting the 2015 NIS, it could be as many as 200 power plants. For both of these OWF implementation alternatives, based on the analyses conducted, it was shown that sound emissions did not cause significant negative impacts.

In order to verify the impact of the changes in question on the predicted ranges of underwater noise impacts on marine organisms, particularly in relation to the closest Natura 2000 area protecting marine mammals, i.e. the Ostoja Słowińska area (PLH220023), a simulation of underwater noise propagation from the piling of a 10 m diameter monopile foundation using a 4,500 kJ pneumatic hammer was carried out. The location of the foundation in the BIII OWF development area for modeling purposes was selected to be as close as possible to the boundary of the aforementioned Natura 2000 area. The modeling was performed for two scenarios - with and without the use of a single bubble curtain, which allows us to determine the predicted effectiveness of this solution in minimizing underwater noise propagation. It should be noted here that the use of a minimization measure in the form of a bubble curtain or other, no less, to reduce the spread of underwater noise, as a mandatory recommendation was included in the conclusions of the EIA Report.

With regard to ichthyofauna, a summary of the results of the conducted modeling is presented in the table below.

Table 22. The ranges of underwater noise impacts emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the offshore wind farm BIII development area - with and without the use of a single bubble curtain, reducing the pressure level

Source	Taxonomic group	Impact [threshold value]	Modeled sound type	Range of influence (m)			
				with minimization		without minimization (for comparison purposes)	
				average	max.	average	max.
Popper et al. 2014	Fish*	PTS [207 SPL]	Single hit	67	84	270	380
		PTS [203 SELcum24]	Multiple strikes	1634	2170	3985	4513
		TTS [186 SELcum24]	Multiple strikes	5441	6301	14394	20532

*Threshold values were adopted for the group of fish with the best-developed hearing (fish in which the swim bladder is connected to the hearing organs).

Source: own study based on the results of modeling performed for the BIII OWF project.

Considering the above, it should be stated that despite the fact that the Project update will result in the construction of significantly fewer foundations that were assumed in the 2015 NIS, as well as for the Project in the parameters approved by the Environmental Decision, the unit sound emissions caused by piling foundations under the current Project implementation assumptions will result in impacts of the same magnitude and significance as those assessed in the 2015 Report. At the same time, it should be noted that the period of exposure to this impact will be shortened, which involves fewer foundations.

9.1.4. The formation of a mechanical barrier

Any structures supporting the foundation stage of the OWF, as well as newly constructed elements of wind installations, may constitute a barrier to fish migration routes. However, they have the ability to bypass these obstacles in order to move to areas with more favorable living conditions. The density of the turbines is low enough that it will not affect the migration opportunities of ichthyofauna.

A mechanical barrier in the form of emerging foundations and other underwater objects can directly negatively affect ichthyofauna. This will be a local, temporary, reversible, repetitive (during the construction period), low-intensity impact.

An assessment of the significance of this impact of the set of parameters of the Project constituting the NIS 2015, is presented in the table below.

Table 23. Assessment of the impact of a wind farm as a mechanical barrier on fish migration routes (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	Insignificant (scale of exposure - local, duration - temporary, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium	Low	legally protected species		
Cod	Large	Low	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small	Low	commercial genre		Negligible (magnitude of impact - insignificant, importance of the resource - low or medium)
Skarp	Medium	Low	commercial genre		
Orchid	Medium	Low	commercial genre		
Sprat	Medium	Low	commercial genre		
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In the case of the Project in the parameters approved by the Environmental Decision, far fewer foundations will be built than envisioned in the set of Project parameters constituting the 2015 NIS, so they will be even less of a barrier to fish. Therefore, it was considered that this option would result in lower impacts on ichthyofauna than the set of parameters of the Project constituting the 2015 NIS.

Considering that even with the set of parameters of the Project constituting the NIS 2015, the impact of the mechanical barrier on fish is negligible or small, **minimization measures are not required**.

In view of the above, it should be considered that updating the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings that resulted in the Environmental Decision.

9.1.5. Habitat changes

Construction work will lead to the complete destruction of the benthos in the areas of excavations for foundations and trenches where cables will be run. This will deplete food resources for benthic fish. However, the area where habitat alteration will completely eliminate benthic organisms will be relatively small (about 1% of the total project area for the set of Project parameters provided in the 2015 NIS). Detailed calculations of the benthic biomass that could potentially be lost due to construction

activities are presented in Chapter 9.2 of the Benthic Impact Assessment (Volume IV Section 3 of the EIA). This will be about 760 Mg, most of which will be the biomass of the mussel overgrowing the stonewort area that makes up 48% of the BIII OWF area - the figure for the 2015 NIS.

Taking into account the above data, the predicted rapid rate of recovery of the benthic population (cf. the chapter "Establishment of the artificial reef" later in this paper), and the fact that fish actively move in search of food, such a loss of organisms included in the diet of benthic fish can be considered insignificant.

Also, the reduction in the food base of fish caused by the negative impact of covering the bottom with a layer of fine sediment settling from the water depths should not be significant. In the variant approved by the Environmental Decision, these values are 1 mm (within the area) and 0.4 mm (outside its borders), respectively. It should also be borne in mind that this sediment will not be stable and, over time, will be further dispersed under the influence of ocean currents (cf. Hydrographic modeling results report, Volume II Section 11 of the EIA). However, such a relatively small change in habitat can disrupt the development of benthic eggs (herring, bottomfish, gobies) by covering already deposited grains or hindering their deposition on the altered sediments. However, the extent of such impact will be local and can be considered insignificant.

The results of the zoobenthos structure and its susceptibility analyses (Volume III Section 6 and Volume IV Section 3 of the ROOŚ) indicate that organisms, which are a component of the diet of benthic fish such as clams and crustaceans, are not sensitive to its impact (cf: Monitoring of ichthyofauna of the area of the OWF Central Baltic III - Final report with research results, Volume III Section 7 of ROOŚ). Thus, there is no basis for assuming that the impact of sedimentation of sediment from the water depths will significantly reduce the food base of benthic fish.

Habitat changes caused by construction activities may directly or indirectly adversely affect ichthyofauna, especially benthic and bottom spawning fish. This will be a local, temporary, reversible, repetitive (during the construction period), medium intensity impact. An assessment of the significance of this impact for the set of Project parameters constituting the 2015 NIS is presented in the table below.

Table 24. Assessment of impact on fish of habitat alteration due to seabed construction activities (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium	Low	legally protected species		
Cod	Large	Low	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small	Low	commercial genre		Negligible (magnitude of

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Skarp	Medium	Low	commercial genre		impact - insignificant, importance of the resource - low or medium)
Orchid	Medium	Low	commercial genre		
Sprat	Medium	Low	commercial genre		
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

For the Project, significantly fewer power plants will be built under the updated parameters. In the variant approved by the Environmental Decision, 120 were envisaged for implementation, and after the changes, the number will be no more than 60, which is far less than envisaged in the 2015 NIS (70%), so the habitat changes will be of a smaller scale. In addition to reducing the number of power plants, a significant reduction in the impact will also be affected by limiting the types of foundations that can be used for power plant foundations (to monopile or jacket foundations). It is therefore considered that the Project after the proposed modifications will cause lesser impacts on ichthyofauna than the Project in the parameters constituting the 2015 NIS and as approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters for the implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Given that even for the set of parameters of the Project constituting the 2015 NIS, the significance of impacts related to habitat alteration is negligible or small, **minimization measures are not required**.

9.1.6. Cumulative impact

Assumptions for analyses of cumulative impacts of OWF BIII and other projects on ichthyofauna are presented in Chapter 3. On the other hand, a broad description regarding this issue can be found in Section 13 of Volume II of the EIA.

At the stage of construction of the BIII offshore wind farm, cumulative impacts may arise if installation work on several offshore wind farms proceeds simultaneously, including foundation placement, as well as as as a result of dredging the bottom for internal and external connection infrastructure cables installed in it. Cumulative impacts involve investments located close to each other.

In the case of the BIII OWF, it will be the vicinity of offshore wind farms: Baltica 2 and Baltica 3, FEW Baltic Power, and MIP BSIII.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for cumulative impacts that may affect ichthyofauna.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for wind farm development in the POM for cumulative impact analyses presented below:

The first assumed between 2019 and 2021, power plants with a total capacity of 900 MW will be built, including 600 MW under the BIII offshore wind farm and 300 MW under the Baltica 3 offshore wind farm. Undersea cables were also assumed for these farms. It was assumed that the average power plant would have a capacity of 6 MW, and their number was estimated at 150. Associated infrastructure (e.g., substations, social platforms, etc.) was also to be built. It was assumed that 158 foundations and about 158 km of internal cables would be installed on the seabed in this connection. This scenario has not been realized.

Subsequently, it was assumed that power plants with a total capacity of 1,350 MW would be built between 2023 and 2026, including 600 MW under OWF BIII and 750 MW under OWF Baltica 2. A total of 225 wind power plants will be built (assuming an average plant capacity of 6 MW). Associated infrastructure (substations, social and survey platforms, etc.) will also be built. It was assumed that 232 foundations and about 232 km of internal cables would be installed on the seabed in this connection.

In addition, there are heavily used shipping routes in the vicinity of the farm (including the Traffic Separation Scheme (TSS)), in the area of which the risk of oil spills increases.

After 2026, if additional connection conditions are obtained, the investor may build more power plants, with a total capacity of 600 MW, under the BIII offshore wind farm. 60 wind turbines will be built. Associated infrastructure will also be built. It was also assumed that an additional 63 foundations and about 62 kilometers of internal cables would be installed on the seabed as a result.

The second scenario that was considered was presented in the Environmental Impact Report prepared in 2015 for the BII offshore wind farm, which assumed that in 2023 - 2026 the above quantities of power plants and infrastructure would be built not in the areas of the BIII and Baltica 3 offshore wind farms, but as the BII and Baltica 2 offshore wind farms. However, such an alternative scenario did not significantly change the level of impacts.

It was then assumed that in the above scenario, the level of cumulative environmental impacts would be only 16.5% higher than the level analyzed in the report as a reasonable alternative (NIS 2015), with the assumption that the 300 MW Baltica 3 offshore wind farm would be built in 2019-2021, i.e. earlier than the stage I construction of the BIII offshore wind farm would occur.

The most significant potential impact may be the cumulative impact of noise from piling. The DHI Technical Report (see Volume II, Section 9 of the ROIA) presents this issue in 2 options: cumulation of emissions inside the project and cumulation with an external project.

In the first case, the total scale of impact of the BIII offshore wind farm is influenced by the intensity of the factor and the timing and scale of the impact. For the most part, the magnitude of the impact was described as insignificant, and the significance of the impact as low or negligible.

In the case of sound exposure, the DHI acoustic report presents a situation of cumulative impacts, in which two structures are simultaneously piled and mitigation measures are applied. In this case, the range (CPPS) will not increase significantly and will be 20-30 km from the sound source, and the avoidance response will be up to 60 km, respectively. **Given this furthest-reaching scenario of the 2015 NIS, according to the methodology, construction can be classified as: negative in nature, direct impact, regional scale, impact frequency constant, medium duration, medium intensity. Considering the Impact Significance Assessment Matrix, the impact of OWF construction will be a low impact for cod and negligible for other species.**

In the second case, assuming that the impact of the other farms is identical to OWF BIII, and that they will be built at the same time, the scale of exposure includes the regional level. Then (also taking into account the Impact Significance Assessment Matrix) the cumulative impact of all investments will be classified as low. This is confirmed by DHI's acoustic report for cumulative impacts, when the hypothetical construction of two wind farms (OWF BIII and Baltica 3) with simultaneous piling of one

structure could cause an avoidance response within a radius of up to about 60 km from the sound source, which includes only POM and ICES Area 25, which according to the accepted methodology is a regional exposure. In order for significant impacts to occur, a factor on a scale larger than regional would be required, impacting long-term with high frequency. Such impacts could occur if negative sound impacts are not mitigated during the construction of offshore wind farms or if wind farm construction is located near cod spawning zones near the Danish border.

Compared to the scenario assumptions adopted in the 2015 Report, the timing of all planned projects has changed, as they have all been delayed.

It is currently anticipated that piling of foundations at the BIII offshore wind farm can be carried out in 2023- 2025. During this period, the Baltica 2 offshore wind farm, which has a signed connection agreement with a completion date similar to the BIII offshore wind farm, may also be implemented.

From the point of view of the potential impact of construction work on fish, without a doubt the most significant impact that can cumulate is noise from piling.

It should also be noted that the assessment of the impact of piling noise on ichthyofauna was made under the assumption that successive foundations are installed one after the other, and the time between the piling process for successive turbines is too long to lead to accumulation of acoustic energy (and thus cumulative CPPS). If the time between the installation of one foundation and the next is less than 72 hours (the period during which porpoise return), cumulative impacts may occur, resulting in a barrier effect or long-term displacement from habitat.

On the other hand, theoretically, a situation could arise when 2 teams driving foundation piles work simultaneously in the BIII OWF area. It can also not be ruled out that foundation piles will be driven simultaneously in the OWF BIII and OWF Baltica projects (2). Such situations are unlikely, due to the limited availability of the specialized equipment required for this type of work, but nevertheless theoretically they could happen. An analysis of such an accumulation scenario, including the BIII offshore wind farm, Baltica offshore wind farm and BII offshore wind farm projects, was conducted as part of the environmental impact assessment of the Baltica offshore wind farm project (IMG/MEWO 2017).

When considering the potential for cumulative impacts of the Project with other projects, it should be borne in mind that the BIII offshore wind farm in its planned modified parameters assumes the construction of 60 wind power plants, which is 50% of the number of plants envisaged by the Environmental Decision and 30% of those assessed in the 2015 NIS. In addition, the modified parameters of the Project assume the abandonment of the possibility of gravity and tripod-type foundations, i.e. the solutions that have the greatest significance from the point of view of potential impacts on ichthyofauna having their source in the increase of suspended matter in the water-depth, release of toxic substances and noise emissions (construction of the OWF and foundation of transmission cables) and emission of electromagnetic fields. By the same token, it should be considered that the impacts caused by the implementation of the projects in the scenarios included in the scenarios forming the basis of the analyses adopted in the 2015 Report will not increase in the event of implementation of the Project in the proposed modified parameters, and the scenarios themselves can be considered valid for making inferences about cumulative impacts.

In addition, it should be added that due to the limited amount of specialized equipment and crews engaged to erect structures for the OWF, it is unlikely that the implementation of more than one farm can be carried out at the same time.

9.2. Operation stage

During the operation of the Project, works affecting the seabed and marine waters will be carried out in the Project area, mainly maintenance works. Among other things, their effect will be a slight disturbance of the sludge structure, causing further release of pollutants and nutrients from the sludge. In addition, small oil spills can be expected to occur during the normal operation of ships or the release of antifouling substances from their hulls. A full description of the work during the operation stage is provided in Section 5 of Volume II of the EIA.

The ichthyofauna will be impacted at the operational stage primarily by foundation structures that will occupy part of the seabed. It should be pointed out that this impact will be significantly reduced in relation to the set of parameters of the Project constituting the 2015 NIS and the variant envisaged for implementation on the basis of the Environmental Decision. This is due to both the reduction in the number of turbines and the fact that during the operation of the OWF they will be populated by benthic organisms and an "artificial reef" will be created, creating favorable conditions for fish feeding and for the development of eggs and fry.

At the stage of operation of OWF BIII, the following emissions and environmental disturbances are expected to occur, which may cause impacts on fish:

1) emissions of compounds from corrosion protection agents,
2) noise and vibration emissions,
3) the formation of a mechanical barrier,
4) the creation of an "artificial reef."
5) electromagnetic field and radiation emissions.

The detailed impact of these factors on ichthyofauna is discussed in Chapter 7 - Potential Impacts of Offshore Wind Farms.

There may also be unplanned impacts during the operation of the farm, particularly pollution of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the operation of the farm, which may indirectly affect fish.

Unplanned impacts are assessed in Chapter 11.

9.2.1. Emissions of compounds from corrosion protection agents

Steel structures or foundation elements of power plants and substations will corrode in the marine environment. Accordingly, appropriate protective measures will be necessary. The most common anti-corrosion method used in the marine environment is cathodic protection. It can be implemented as galvanic or electrolytic protection.

Galvanic cathodic protection involves mounting aluminum (Al) or zinc (Zn) anodes on the foundations. The anodes are gradually consumed, and Al or Zn passes into the water depths and accumulates in the bottom sediments. In the case of electrolytic protection, such interactions do not occur. Thus, the assessment applies only to galvanic cathodic protection.

These emissions are described in detail in Section 9.2.10 of the abiotic impact assessment (Volume IV Section 2 of the EIA).

According to the results of studies of marine waters in the area of the Project, they are characterized by an alkaline reaction: pH in the range of 7.56-8.66 (Volume III, Section II). Thus, releases of aluminum from the project's galvanic cathodic protection are not expected to cause a significant increase in the concentration of toxic dissolved forms of this element (which pose a particular threat to aquatic organisms) in the vicinity of the farm's foundations. Given the hydrodynamic conditions of the body of water in the project area (open marine waters), allowing for rapid dispersion and dilution of the released substances, and the results of the studies described above (in particular, Gabelle et al. (2012)), the concentration of molecular forms in water in the vicinity of corrosion-protected structures is also not expected to increase significantly. Due to the aforementioned conditions, Al concentrations in sediments in the vicinity of the farm's foundations are also not expected to increase significantly. In doing so, it should be noted that the total Al content in bottom marine sediments is high, because since it is derived from clay minerals distinguishing the natural background of Al content in sediments from the influence of galvanic anodes on its concentration can be difficult (Kirchgeorg et al. (2018)). Taking into account the above, it can be assumed that in the water around the foundations of the planned farm there will be no formation of zones with significantly elevated concentrations of aluminum compound.

In the case of monopole foundations, it is assumed that the emission of anodic material (Al and Zn) in the case of an uncoated foundation over 25 years of operation of the farm is about 13 Mg, and 6 mg after the application of a protective coating, assuming that its damage will not be greater than 32% after this operation. In the case of the jacket foundation, these quantities are 22.5 Mg and 7.5 Mg, respectively (Kirchgeorg et al. (2018)). Based on the cited literature data, which presents the most up-to-date information on the topics of anode material releases, an estimate can be made of the amount of aluminum and zinc that will be released at the stage of operation of OWF BIII.

Table 25. Quantities of Al and Zn that may be released during 25 years of operation of OWF BIII in the variant indicated for implementation after amendment of the Environmental Decision

Type of foundation	Additional protective coating	Weight of Al-Zn anode material, including 5% Zn (Mg)	The amount of Al and Zn released		
			1 foundation, the amount of element released over the life of the farm (25 years)	Variant to be implemented after amendment of the Environmental Decision (61 foundations), the amount of element released per year by the entire farm	NIS 2015 (208 foundations), the amount of element released annually by the entire farm
Monopal	not	approx.13.0	approx. 12.35 Mg Al approx. 0.65 Mg Zn	approx. 30.13 Mg Al approx. 1.59 Mg Zn	approx. 102.75 Mg Al approx. 5.41 Mg Zn
	yes	approx. 6,0	approx. 5.70 Mg Al approx. 0.30 Mg Zn	approx. 13.91 Mg Al approx. 0.73 Mg Zn	approx. 47.42 Mg Al approx. 2.49 Mg Zn
Jacket	not	approx. 22,5	approx. 21.38 Mg Al approx. 1.13 Mg Zn	approx. 52.16 Mg Al approx. 2.75 Mg Zn	approx. 177.88 Mg Al approx. 11.06 Mg Zn

Type of foundation	Additional protective coating	Weight of Al-Zn anode material, including 5% Zn (Mg)	The amount of Al and Zn released		
			1 foundation, the amount of element released over the life of the farm (25 years)	Variant to be implemented after amendment of the Environmental Decision (61 foundations), the amount of element released per year by the entire farm	NIS 2015 (208 foundations), the amount of element released annually by the entire farm
	yes	approx. 7,5	approx. 7.13 Mg Al approx. 0.38 Mg Zn	approx. 17.39 Mg Al approx. 0.92 Mg Zn	approx. 59.32 Mg Al approx. 3.16 Mg Zn
Tripod	not	approx. 32,0	approx. 30.40 Mg of Al approx. 1.60 Mg Zn	approx. 74.18 Mg of Al approx. 3.90 Mg Zn	approx. 252.92 Mg of Al approx. 13.31 Mg Zn
	yes	approx. 10,7	approx. 83.76 Mg Al approx. 4.41 Mg Zn	approx. 24.80 Mg Al approx. 1.31 Mg Zn	approx. 696.88 Mg Al approx. 36.69 Mg Zn

As shown in Table 25, approximately 3.9 tons of Zn could be released to the environment annually if the Project is implemented after the proposed modifications in the most far-reaching scenario (tripod foundations, without additional coating). Under similar assumptions, the Project with the parameters envisioned in the 2015 NIS would have estimated Zn emissions of about 13.31 Mg/year. The 2015 Report estimated this value at a slightly lower level of 10 tons per year. However, taking into account that both estimated values of Zn releases for the 2015 NIS are negligible in relation to the load of this element entering the Baltic Sea with rivers each year - in 2006, a total of 3,157.3 Mg of Zn was discharged into the Baltic Sea with waters, of which 256.65 Mg came from Poland (HELCOM, 2011) (cf. Abiotic Environmental Impact Assessment - Volume IV Section 2 of the Report), the update of the calculations in question does not affect the result of the 2015 assessment. At the same time, it should be pointed out that even the above amounts, by releasing into the water body or accumulating in bottom sediments, may affect ichthyofauna. However, this will be an impact at the threshold of detection.

Thus, it should be considered that the nature of the impacts caused by the Project, as well as their scope and magnitude, are at a level that does not cause negative impacts on ichthyofauna. Such conclusions are also supported by the findings of the 2015 Report and the Environmental Decision issued based on it. Updating the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Contamination of the water body and bottom sediments with compounds from antifouling agents will not affect the structure and functioning of ichthyofauna in the project area under any of the project alternatives, as shown in the table below. Minimization measures are not required.

Table 26. Assessment of impact on ichthyofauna involving contamination of water bodies and bottom sediments with compounds from corrosion protection agents (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	No change (no loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)
Dennik	Medium	Low	legally protected species		
Cod	Large	Low	commercial genre		No change (magnitude of impact - no change, importance of the resource - high)
Plaice	Small	Low	commercial genre		No change (magnitude of impact - no change, importance of resource - low) or medium)
Skarp	Medium	Low	commercial genre		
Orchid	Medium	Low	commercial genre		
Sprat	Medium	Low	commercial genre		
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

9.2.2. Noise and vibration emissions

During the operation of the wind turbines, noise and vibration associated with the operation of the installed turbines will be emitted. The assumed noise emissions of the Royal Haskoning DHV technical concept will be only 2 dB(A) above the fish's hearing threshold.

For some fish species, for the development of which solid substrate is attractive, there may be an avoidance effect on the OWF region due to the stress caused by the constant vibration of the wind turbines (Thomsen et al. 2006).

Responses involving avoidance of passing vessels have been reported in studies conducted on Baltic populations of cod, herring and sprat, which exhibit the best sound-receiving abilities of the major species exploited by fisheries (Mitson, 1995). The response of fish to noise also depends on their physiological state. Herring, which have very good hearing, are observed to avoid sources of sound associated with ship traffic and fishing gear usually outside the spawning season (Olsen et al., 1983; Vabo et al., 2002), and this behavior changes when herring spawn (Nøttestad et al., 1996; Axelsen et al., 2000).

On the other hand, the avoidance effect of regions in the immediate vicinity of the turbine is likely, but the extent of this impact should not exceed a few meters. The avoidance response to the increased pressure associated with the generated sound occurs in a zone up to 4 meters from the turbine (Wahlberg and Westerberg, 2005). The effect associated with the response to particle acceleration caused by turbine operation has an even shorter range, reaching a distance of 1 meter.

Noise and vibration generated by operating power plants can have a direct negative impact on ichthyofauna. This will be a local, long-term, reversible, permanent (during the period of operation), low-intensity impact.

An assessment of the significance of this impact for the set of parameters of the Project constituting the 2015 NIS is presented in the table below.

Table 27. Assessment of the impact on fish of noise and vibration associated with the operation of wind power plants (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium	Low	legally protected species		
Cod	Large	Low	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small	Low	commercial genre		Negligible (magnitude of impact - insignificant, importance of the resource - low or medium)
Skarp	Medium	Low	commercial genre		
Orchid	Medium	Low	commercial genre		
Sprat	Medium	Low	commercial genre		
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In the **variant indicated for implementation in the Environmental Decision**, 40% fewer power plants were to be built than envisaged for the set of parameters of the Project constituting the 2015 NIS, and in the variant implemented after the amendment of the Environmental Decision as much as 70%, so the area where noise and vibration associated with their operation will occur will be proportionally smaller. It is therefore considered that the variant to be implemented under the revised Environmental Decision will result in lower impacts on ichthyofauna than assumed in the 2015 NIS. **Thus, it should be considered**

that updating the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings that resulted in the Environmental Decision.

Given that even in the 2015 NIS the significance of impacts related to noise and vibration emissions from operating power plants is negligible or small, **minimization measures are not required**.

9.2.3. The formation of a mechanical barrier

The presence of wind turbine structures may to a small extent constitute an underwater physical barrier to fish migration. Since the distances between the turbines will be large enough (minimum 800 m x 1200 m) that, regardless of the type of foundation used, the **migration opportunities of ichthyofauna will not be affected**.

Danish studies have shown that the existence of the OWF has no negative impact on fish migration routes (Leonhard et al., 2011).

A mechanical barrier in the form of emerging foundations and other underwater objects can directly negatively affect ichthyofauna. This will be a local, temporary, reversible, repetitive (during the construction period), low-intensity impact.

An assessment of the significance of this impact of the set of parameters of the Project constituting the NIS 2015, is presented in the table below.

Table 28. Assessment of the impact of a wind farm as a mechanical barrier on fish migration routes (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)
Dennik	Medium	Low	legally protected species		
Cod	Large	Low	commercial genre		No change (magnitude of impact - no change, importance of the resource - high)
Plaice	Small	Low	commercial genre		No change (magnitude of impact - no change, importance of the resource - low or medium)
Skarp	Medium	Low	commercial genre		
Orchid	Medium	Low	commercial genre		
Sprat	Medium	Low	commercial genre		

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In the case of the Project after the proposed modifications to the implementation and operation conditions, significantly fewer foundations (60) will be built than envisioned for the set of Project parameters constituting the 2015 NIS, so they will be even less of a barrier to fish. Thus, it is considered that the Project in the proposed updated parameters will cause lesser impacts on ichthyofauna than the Project in the parameters approved by the Environmental Decision, as well as the set of Project parameters constituting the 2015 NIS.

Given that even in the 2015 NIS the impact of the mechanical barrier on fish is negligible or small, **minimization measures for the Project** are **not required.**

9.2.4. The creation of an "artificial reef"

Taking into account the large share of mussels in the abundance and biomass of the benthos found in the report "Research of the benthos in the area of the OWF Central Baltic III. Final Report with Study Results" (Section 6 of Volume III of the EIA), it is expected that there will be relatively rapid overgrowth of the turbine foundation structures by this organism and other epiphytic organisms, which will create favorable feeding conditions for some flat fish and some gobies, as well as shelter areas for juvenile fish. The resulting new hard structures, both artificial and those created by the epiphytic organisms, may form a suitable additional substrate for the demersal eggs of the fish found during the survey (herring, gobies, demersal, horse mackerel, devil hens).

The largest feasible gravity foundation considered for the set of parameters of the Project constituting the 2015 NIS has a diameter of 40 m and a footprint of 1257^{m2}. Assuming the application of a 15-meter-wide leaching protection layer around it, its area will be about 3848^{m2}, and for 208 foundations (NIS 2015), it will be a total of 804,234^{m2} (0.8 ^{km2}). For the parameters of the Project approved by the Environmental Decision, the hardened area of the seabed will be a total of 633,402^{m2}, while this area for the Project, taking into account the proposed modifications, will be 122,807^{m2} (and the hardened area of the seabed will be 119,744^{m2}), which is due to the reduction in the number of power plants, the exclusion of the use of gravity foundations for the foundation of power plants, and the reduction in the number of substations to 1 unit.

At the same time, the final report on seabed surveys in the BIII offshore wind farm area (Volume III Section 3 of the report) indicates that the area of stonewalls determined from sonar images amounted to about 42 ^{km2} (the offshore wind farm area and buffer zone combined). However, a comparison of the two areas can be misleading due to the fact that in the case of stonewalls, the actual area of objects that provide hard substrate conducive to the formation of favorable spawning conditions is much smaller than the total area highlighted from sonar images. Thus, it is difficult to quantify the relative increase in the surface area of hard substrate conducive to reproduction for some fish species, such as gobies, herring and bottomfish. However, it is reasonable to assume that this may be an important factor positively influencing the spawning of these fish.

If restrictions are imposed on fishing in the OWF area and the area is excluded from navigation (which is one of the options under consideration), the pressure from both these sectors will decrease, and the

farm area may become a sanctuary for fish, both adults and their early development stages - larvae and fry. Excluding the area from fishing pressure could have a positive effect on ichthyofauna. However, the magnitude of this effect would probably not be large. Fishery monitoring in the BIII offshore wind farm area (Volume III Section 13 of the report), conducted as part of the pre-investment survey, indicates low fishery productivity in the area. At the same time, the area of the area where no fishing activities would be carried out is a fraction of a percentage of the area exploited by fishing for industrial species. Thus, it is difficult to speak of a fundamental decline in fishing pressure on commercial fish at the stock level caused by the cessation of fishing. Also, the possible improvement of conditions for spawning and development of early stages of commercial fish (herring, sprat) will have a local effect at most, given the small area of the area where no fishing activity will take place, compared to the available spawning grounds in the southern Baltic.

A greater positive impact from the cessation of fishing activities can be expected for protected species (gobies, dabbler) that spawn on the bottom. The lack of disturbance associated mainly with bottom trawling could positively affect the spawning processes of these fish. However, given the current very low intensity of fishing with these gears (e.g., in 2013, no bottom trawling was found in the area - source: Monitoring of fisheries in the area of the "Central Baltic II" offshore wind farm Final Report with Research Results - Volume III Section 13 of the report), their discontinuation would not likely have a rapid effect in the form of significantly increased spawning success. On the other hand, it can be assumed that the accumulation of even a small increase in the spawning success of gobies and demersal fish over consecutive years could result in some increase in the abundance of these species. However, it is impossible to quantify the effect of artificial reef formation on the size of fish stocks for which stock estimates exist (cod, herring and sprat). The BIII OWF area is small, while stock fluctuations throughout the Baltic depend on a number of both environmental and anthropogenic factors affecting much more broadly than a potential additional spawning area or an area excluded from fishing, which has lower fishing productivity than the average POM anyway.

The new habitat created by the construction of the OWF, characterized by the presence of hard substrate and a relatively rich food base for benthic fish, may provide a favorable habitat for the bull goby, an invasive species.

Since the first report in 1990 of the introduction of the bull's-eye goby Neogobius melanostomus with ships' ballast water into the Gulf of Gdansk, the presence of this species in the Polish Baltic zone has been reported both in deeper waters (up to 40-60 m) and in the shallow water coastal zone, in the Pomeranian Bay and the Vistula Lagoon and its tributaries.

Bullwhip is also spreading in new habitats due to its tolerance to a wide range of changing environmental conditions: depth, nature of the substrate, salinity, oxygen deficiencies and a diverse food base. Spawning of gobies takes place repeatedly in several portions throughout the season at depths of 0.2 to 1.5 meters on various substrates (Wandzel, 2003). It can live in both marine, brackish and freshwater environments (Carlebois et al., 1997).

Despite its high plasticity and tolerance to a wide range of environmental conditions, the permanent occurrence of bull's-eye gobies in the farm area seems unlikely, due to environmental requirements for the reproduction process. Although the goby's reproductive strategy - caring for eggs developing in the nest and protecting them from predators - is conducive to the species' establishment in a wide variety of conditions (Leather and Stolarski, 1996), it prefers a shallow depth at which to spawn (0.2 to 1.5 meters on various substrates, Wandzel, 2003). Such bathymetric conditions are not provided by the region envisaged for the construction of OWF BIII. It is unlikely that the planned project area will be colonized by fish migration from coastal areas due to the lack of planktonic larval stages and limited movement of adult fish. This species is not one of the good swimmers (Leather and Stolarski, 1996), and the range of migrations undertaken is short and usually does not exceed 100 m. The longest migrations

occur in late autumn and early spring, when the fish move between shallow and deep waters (Berg, 1949).

The above information indicates that successful colonization of the BIII OWF region by this species is not expected.

The creation of an "artificial reef" can directly positively affect ichthyofauna. These will be local, long-term, reversible, permanent (during the period of operation), low-intensity impacts.

An assessment of the significance of this impact for the set of parameters of the Project constituting the 2015 NIS, is presented in the table below.

Table 29. Assessment of impacts related to habitat alteration and creation of "artificial reef" on fish (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	High	legally protected species	Insignificant (scale of impact - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium	High	legally protected species		
Cod	Large	High	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small	Average	commercial genre		Negligible (magnitude of impact - insignificant, importance of the resource - low or medium)
Skarp	Medium	Average	commercial genre		
Orchid	Medium	Average	commercial genre		
Sprat	Medium	Low	commercial genre		
Herring	Medium	Average	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In the variant specified for implementation in the Environmental Decision, it is assumed to perform 60% of the power plant compared to the set of parameters of the Project constituting the NIS 2015 . In the variant to be implemented after the change in the conditions for implementation and operation of the Project specified by the Environmental Decision, as much as 70% fewer foundations will be built compared to the 2015 NIS, which will additionally be implemented using monopile or jacket technology, so the hard surface that may be subject to benthic overgrowth processes will be proportionally smaller.

Thus, it is considered that the significance of this impact for the proposed modification of the Project will be significantly less, while it will continue to have positive impacts on ichthyofauna.

Given that even with the set of parameters of the Project constituting the 2015 NIS, the impact of the artificial reef on fish is negligible or small, **minimization measures are not required**.

Thus, it should be considered that both the nature of the impacts and their extent in the case of the variant proposed in the application to amend the Environmental Decision do not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.5. Emission of electromagnetic fields and radiation

The threshold of fish sensitivity to the presence of electromagnetic fields and radiation is not well understood.

Observations involving tracking eel migration routes showed that electromagnetic fields generated by cables associated with the operation of the OWF caused only minor (up to 50 minutes) delays in migration or insignificant changes in the route, without causing interference that could significantly affect migration efficiency (Westerberg et al., 2007 after Wilhelmsson et al., 2010). Similarly, studies conducted on the impact of the power cable connecting Poland and Sweden (SwePol Link) did not show a significant effect of this factor on salmonids (Westerberg et al., 2007 after Wilhelmsson et al., 2010). Also, studies conducted in 1999-2002 by the Maritime Institute of Fisheries on the impact of the construction and operation of this undersea power transmission system between Poland and Sweden (SwePol Link) on the marine environment did not show any disturbance to the movement of flatfish and juvenile cod. Due to the paucity of information on the impact of this factor, the assessment of the impact of electromagnetic fields is subject to great uncertainty, however, it is not a factor that causes mortality and injury.

Electromagnetic fields can directly negatively affect ichthyofauna. These will be local, long-term, reversible, permanent (during the period of operation), low-intensity impacts.

An assessment of the significance of this impact for the set of parameters of the Project constituting the 2015 NIS, is presented in the table below.

Table 30. Fish impact assessment of electromagnetic fields emitted by submarine cables (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium	Low	legally protected species		
Cod	Large	Low	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Plaice	Small	Low	commercial genre		Negligible (magnitude of impact - insignificant, importance of the resource - low or medium)
Skarp	Medium	Low	commercial genre		
Orchid	Medium	Low	commercial genre		
Sprat	Medium	Low	commercial genre		
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

In the parameters of the Project approved in the Environmental Decision, a similar number of power cables are planned to be laid as for the set of Project parameters constituting the 2015 NIS. Although in this case, the number of power plants is reduced, but the distance between the various elements of the farm increases, resulting in an increase in the length of individual power cables. For analogous reasons, the approximate number of cables will be laid when the parameters of the Project are updated. Therefore, it should be considered that the variant identified for implementation in the Environmental Decision, which is the alternative variant, as well as the variant envisaged for implementation after the amendment of the Environmental Decision, will cause the same impacts on ichthyofauna.

Given that, even in the 2015 NIS, the impact of electromagnetic fields and radiation on fish is negligible or small, **minimization measures are not required, and the requested change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.**

9.2.6. Cumulative impact

Assumptions for analyses of cumulative impacts of the BIII OWF and other projects on fish are presented in Section 3.2. On the other hand, a broad description concerning this issue can be found in Section 13 of Volume II of the report.

The possible cumulative impact at the stage of operation of the BIII OWF is related to the existence of other offshore wind farms in the vicinity of the Project: BSII offshore wind farm, Baltica 2 offshore wind farm, Baltica 3 offshore wind farm, which at the stage of the 2015 Report, a total of 295 power plants with associated infrastructure were assumed to be implemented. The assumptions presented at the time indicated that they could be operated simultaneously between 2026 and 2050. After 2026, the number of total power plants in operation with connection infrastructure was assumed to increase to 355 if additional connection conditions are obtained under the BIII offshore wind farm (BIII OWF).

In the 2015 Report, another scenario was also assumed for the operation stage, which assumed that between 2026 and 2050, a total of 355 power plants and associated infrastructure would be operated under the BII OWF (BII OWF) and BSII OWF, as well as Baltica 3 and Baltica 2 OWF (similar to the scenario described in the paragraph above, but for a different distribution of turbines in the areas included in the OWF). After 2025, if additional connection conditions are obtained, the number of total power

plants and infrastructure in operation under the BIII offshore wind farm was assumed to possibly increase to 415.

Compared to the considerations related to the implementation of other OWF projects considered at the stage of the 2015 Report, a new circumstance is the fact that an environmental decision has been obtained for the FEW Baltic II project, Baltic Power, and proceedings are underway for C-Wind.

Referring to the above, it should also be pointed out that for the BII offshore wind farm in 2021, a decision was issued amending the DSU obtained for it in 2015, as a result of this amendment, 60 wind power plants are envisaged for implementation, and the accompanying infrastructure is to occupy 1 foundation.

It should be borne in mind that the BIII OWF in the planned modified parameters for implementation and operation of the Project assumes the construction of 60 wind power plants, which is 50% of the number of plants envisaged by the Environmental Decision and 30% of those assessed in the 2015 NIS. In addition, the modified parameters of the Project assume the abandonment of the possibility of using gravity and tripod foundations, i.e. the solutions that have the greatest significance from the point of view of the impacts of potential impacts on ichthyofauna due to the possibility of increasing the level of suspended solids in the water. Thus, from the point of view of the possibility of cumulative impacts caused by the BIII OWF, there is a significant reduction in these impacts, which should be taken into account in the course of proceedings on the decision on environmental conditions for the above-mentioned OWF projects.

As in the case of cumulative impacts during the construction phase, the dependence of various impacts associated with the operation of the BIII OWF itself can be assessed. In the impact assessment chapter, the most significant impact on local ichthyofauna will be habitat alteration through colonization of new structures combined with reduced fishing mortality. According to experience from other wind farms and data from the technical concept, colonization will be affected by the effect of avoiding regions in the immediate vicinity of the turbine, but the extent of this impact should not exceed a few meters. Nor are significant scaring effects and disruption of fish migration expected from electromagnetic field emissions.

Thus, the cumulative impact of the OWF can be described as: positive in nature, direct impact, local scale, frequency of impact permanent and long-term. Medium Intensity.

Considering the Impact Significance Assessment Matrix, the impact of OWF construction will be a low impact for cod and negligible for other species.

In the second case, assuming that the impact of the other farms is identical to that of the BIII OWF, and that the power and transmission cables are nonexistent, and that they will be operated at the same time, the scale of the impact may increase to a regional level. Then (also taking into account the Impact Significance Assessment Matrix) the cumulative impact of all investments will be classified as low.

In order for significant impacts to occur, it would be necessary for a factor to have an impact on a scale larger than regional, having a long-term impact with high frequency. The possibility of such an impact may occur if a significant portion of the POM is developed for OWF use, in which case there will be a significant decrease in fishing mortality if the areas are closed to fishing.

9.3. Decommissioning stage

At the decommissioning stage, as at the OWF construction stage, there are negative impacts in the form of noise and vibration, an increase in suspended solids concentration in the depths, and the possibility of toxic substances entering the water from sediments or due to accidents during the implementation of the works, as well as habitat alteration.

According to the assumptions, the decommissioning of the farm will take place after 20 years of operation. It should be taken into account that during this period there will be significant technological advances and it will be possible to avoid drastic interference with the environment, thus minimizing the negative effects of the decommissioning of the farm on ichthyofauna.

Analysis of this impact is hampered by the lack of experience in this type of project due to the early stage of offshore wind development as well as the impossibility of predicting what technologies will be available twenty or more years down the road when farm dismantling is carried out (OSPAR, 2008). Therefore, the assessment of the impact of decommissioning factors is largely in the nature of a precautionary approach assuming impacts like those of OWF construction.

A full description of the decommissioning work can be found in Section 6 of Volume II of the EIA.

At the decommissioning stage of the BIII OWF, the following emissions and environmental disturbances are expected to cause impacts on fish:

1) an increase in the concentration of suspended solids in water,
2) the release of pollutants and nutrients from the sediment into the water body,
3) noise and vibration emissions,
4) the formation of a mechanical barrier,
5) habitat modification - removal of the "artificial reef".

Unplanned impacts may also occur during decommissioning, particularly contamination of water depths and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the decommissioning of the farm, which may indirectly affect fish.

Unplanned impacts are assessed in Chapter 11.

9.3.1. Increase in the concentration of suspended solids in water

The negative impact on ichthyofauna of elevated concentrations of suspended solids in water is described in the chapter on wind farm construction. Thus, it can be assumed that there are similar potential risks associated with an increase in suspended solids concentration to those occurring during the construction phase, such as negative effects on the development of larvae and eggs, difficulties in obtaining food, and clogging of fish gills. Due to the lack of experience with the decommissioning of OWF components, it is difficult to quantify the amount of suspended solids that will be released into the water depths during this process, but it is not expected to be greater than the amounts generated during the construction phase, when a much larger area of bottom sediments will be disturbed (no removal of power cables, for example, is expected).

The assessment of impacts on ichthyofauna that may occur due to the appearance of increased concentrations of suspended solids in water as a result of decommissioning work is the same as for analogous impacts during the construction phase (section 9.1.1. above). Minimization measures are not required.

9.3.2. Release of pollutants and nutrients from the sludge into the water body

The negative impact on ichthyofauna of impacts related to the release of pollutants and nutrients from the sediment into the water body is described in the section on the construction of the wind farm (9.1.2.). The appearance of negative impacts of toxic chemicals at the decommissioning stage of the OWF may occur as a result of harmful substances entering the water along with suspended solids lifted from the bottom as a result of foundation removal work. It can be assumed that the scope and materiality of these risks are, like the construction phase, low.

The assessment of impacts on ichthyofauna that may occur due to the release of pollutants and nutrients from the sediment into the water body as a result of decommissioning work is the same as for analogous impacts during the construction phase (section 9.1.2. above). Minimization measures are not required.

9.3.3. Noise and vibration emissions

A source of disturbance during the decommissioning process will be noise associated with the increased traffic of vessels involved in the dismantling of infrastructure elements. The noise source will also be the turbine structure removal work itself. Noise generated during this phase of the project may prove to be a threat to species inhabiting the new habitats created after the farm's construction, with most of the effects described in the section on the construction phase. Wilhelmsson et al. (2010) suggest that, assuming the use of technologies similar to those used in dismantling oil rigs (blasting, cutting), the noise generated during the work could cause death or serious injury to fish in the immediate vicinity and an avoidance response similar to that occurring as a reaction to noise from work during the construction phase. However, it should be noted that there are currently no plans to use explosives during the decommissioning of the farm and during decommissioning there will be no driving of foundation piles, which is a major source of noise during the construction phase.

Noise and vibration generated during the decommissioning of the various elements of the farm can directly negatively affect ichthyofauna. These will be regional-scale, medium-term, reversible or irreversible, recurrent (during the construction period), medium-intensity impacts.

An assessment of the significance of this impact for the set of parameters of the Project constituting the 2015 NIS is presented in the table below.

The parameters of the Project approved by the Environmental Decision assume the construction of 40% fewer foundations than envisaged for the set of Project parameters constituting the 2015 NIS, so noise and vibration emissions during their decommissioning will be shorter. Thus, the 2015 Report considered that the variant indicated in the Environmental Decision would result in lower impacts on ichthyofauna than the 2015 NIS.

Therefore, it should be considered that the Project in the variant implemented after the requested change will cause even smaller impacts both with respect to the parameters of the Project approved by the Environmental Decision and from the set of parameters of the Project constituting the 2015 NIS.

Thus, it should be considered that both the nature of impacts and their extent and magnitude of impacts related to noise and vibration emissions will be the same as for the 2015 NIS and the variant approved by the Environmental Decision, and thus the update of the parameters for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Given that even in the 2015 NIS, noise and vibration impacts are negligible or small, **minimization measures are not required**.

Table 31. Assessment of the impact of noise and vibration on fish (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	High	legally protected species	Small (scale of exposure - regional, duration - medium-term, intensity - medium)	Small (magnitude of impact - low, importance of the resource - medium)
Dennik	Medium	High	legally protected species		
Cod	Large	High	commercial genre		Small (magnitude of impact - low, importance of the resource - high)
Plaice	Small	High	commercial genre		Negligible (magnitude of impact - low, importance of the resource - low)
Skarp	Medium	High	commercial genre		
Orchid	Medium	High	commercial genre		
Sprat	Medium	High	commercial genre		
Herring	Medium	High	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

9.3.4. Elimination of the "artificial reef"

Royal Haskoning DHV's technical report stipulates that wind turbine generators should be removed in their entirety, and foundations should be removed up to 3 meters below seabed level. The cables can be removed from the bottom or left covered under a layer of sediment. If erosion protection is used, it is not recommended to remove it. The remaining technical infrastructure should be removed.

During the construction phase, there is irreversible destruction of relatively small areas. In the case of decommissioning, an area similar in area is destroyed, but differing significantly in density and nature of settlement. At this stage, a significant part of the artificial reef is destroyed, providing habitat, feeding, shelter and reproduction sites for many representatives of ichthyofauna. This negative effect can be partially mitigated by, as proposed in the design study, leaving erosion protection on the bottom that is an important part of the habitat created during mining. The decommissioning of the OWF infrastructure will likely allow the area to resume fishing. This may cancel out the beneficial effect that the cessation of fishing activities has had on ichthyofauna, especially on the reproductive processes of some fish species (denfish, gobies).

The elimination of the "artificial reef" may directly negatively affect ichthyofauna (especially benthic and bottom spawning species). These will be local-scale, short-term, reversible or irreversible, repetitive (during the decommissioning period), medium-intensity impacts.

An assessment of the significance of this impact for the set of parameters of the Project constituting the 2015 NIS is presented in the table below.

In the case of the parameters of the Project after the amendment of the Environmental Decision, 50% fewer wind turbine foundations will be realized in relation to the parameters set by the Decision and as much as 70% less in relation to the set of parameters of the Project constituting the 2015 NIS. Thus, it should be recognized that the hard surface to be destroyed will be smaller than that which was considered at the stage of evaluation of the 2015 Report as well as for the variant indicated in the Environmental Decision. The project after the proposed modifications will have 70% fewer foundations compared to the set of parameters of the Project constituting the 2015 NIS, in addition, the possibility of using gravity foundations for the foundation of the power plant has been ruled out. Therefore, it should be considered that the Project scheduled for implementation after the amendment of the Environmental Decision, at the stage of its decommissioning, will cause even smaller impacts on ichthyofauna than the 2015 NIS. The smaller amount of hard substrate constituting the "artificial reef" that will be subject to decommissioning will result in less impact on ichthyofauna relative to that identified in the 2015 NIS.

Given that even in the 2015 NIS the impacts associated with the removal of the artificial reef on fish are negligible or small, **minimization measures** are **not required**.

Thus, it should be considered that both the nature of the impacts and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters for the implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Table 32. Assessment of fish impacts associated with habitat alteration due to seabed decommissioning activities (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	legally protected species	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium	Low	legally protected species		
Cod	Large	Low	commercial genre		Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small	Low	commercial genre		Negligible (magnitude of impact - insignificant, importance of the resource - low or medium)
Skarp	Medium	Low	commercial genre		
Orchid	Medium	Low	commercial genre		

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Sprat	Medium	Low	commercial genre		
Herring	Medium	Low	commercial genre		

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

9.3.5. Cumulative impact

At the liquidation stage, the accumulation scenario is the most difficult to predict. In the most far-reaching one, all wind farms built are decommissioned at the same time (i.e. depending on the scenario and obtaining additional connection conditions), e.g. as a result of legal changes that make their operation completely unprofitable.

The magnitude of the cumulative impact of the decommissioning phase can be considered like the construction phase in two ways, understood as the dependence of the impacts associated with the decommissioning of the wind farm itself and the cumulative impacts as a result of the demolition of various other installations, and in this case listed in Section 3.2.

In the first case, the total scale of impact of the BIII offshore wind farm is influenced by the intensity of the factor and the timing and scale of the impact. For the most part, the magnitude of the impact was described as insignificant and the significance of the impact as low or negligible. Taking into account the specified order of decommissioning of the construction of individual elements estimated at 3 years, the demolition can be classified (according to the methodology) as: **negative in nature, direct impact, local scale, impact frequency constant, medium duration, medium intensity.**

Taking into account the Impact Significance Assessment Matrix, the impact of decommissioning the OWF will be a small impact for cod and negligible for other species.

In the second case, assuming that the impact of the other farms is identical to that of OWF BIII, and that they will be decommissioned at the same time, the scale of impact may increase to a regional level. Then (also taking into account the Impact Significance Assessment Matrix) the cumulative impact of all investments will be classified as low.

It should be emphasized here that due to the reduction in the number of wind power plants planned for the Project, the cumulative impacts will also be correspondingly smaller if all the OWFs are decommissioned.

In addition, a possible reduction in cumulative impact will occur as a result of the reduction in the time of the work scheduled for decommissioning and the involvement of fewer resources to do so.

In order for significant impacts to occur, it would be necessary for a factor to have an impact on a scale larger than regional, having a long-term impact with high frequency.

10. Related impacts

The primary element of **receptor-associated** interactions may be **trophic relationships between benthos and fish.** Habitat change during construction will lead to the complete destruction of the benthos in the

areas of excavation for foundations and trenches where cables will be run. This will deplete food resources for benthic fish. However, the area where the habitat change will completely eliminate benthic organisms will be relatively small (about 0.4% of the total project area in the variant after the amendment of the Environmental Decision). Also, the reduction in the food base of fish caused by the negative impact of covering the bottom with a layer of fine sediment settling from the water depths should not be significant. The results of studies of the structure of the zoobenthos and analyses of its susceptibility to the influence of the above-mentioned factor presented in the expert analysis of the benthos (Studies of the benthos in the area of the OWF Baltic Central II. Final Report with Environmental Impact Assessment) indicate that organisms, which are a component of the diet of bentophagous fish, such as bivalves or crustaceans (Monitoring of ichthyofauna of the area of the OWF Central Baltic III. Final Report with Study Results - Volume III Section 7 of the report) are not sensitive to the impact of increased sedimentation. Thus, there is no reason to assume that this factor can negatively affect ichthyofauna by reducing the availability of food for benthic fish.

Inhabitation of turbine structural elements by benthic epiphytic organisms increases the potential food base for benthic fish. As predicted in the benthic survey report, the dominant component of the epiphytic fauna will be the mussel*(Mytilus trossulus*), which is an important food component for flounder and plaice. Thus, while a large increase in the biomass of *M. trossulus* may result in an increase in the abundance/biomass of flat fish in the BIII OWF area, a marked increase in the abundance of other species is not expected. Such a conclusion is confirmed by studies in the area of the Nysted OWF (Danish Straits), where no changes were observed in the distribution of ichthyofauna associated with the location of the turbines. This may have been due to the very homogeneous taxonomic structure of the benthic fauna that populated the structural elements. The newly formed hard substrate was dominated entirely by mussels*(M. edulis*), which are not an important food component of the ichthyofauna in the area, hence no fish were observed to congregate near the turbines.

The appearance of new habitats dominated by epiphytic organisms can create suitable additional substrate for demersal fish eggs (herring, gobies, demersal, horse mackerel, devil hens) as well as provide hiding places for early life stages of fish, thus positively affecting spawning efficiency and fry survival.

Another factor indirectly related to habitat change and affecting fish is, in the furthest scenario, the exclusion of the OWF area from fishing activities. This can positively affect ichthyofauna by eliminating fishing mortality and disruption of reproductive processes locally.

Possible losses to fisheries caused by the ban on fishing in the OWF area are not expected to be large due to the aforementioned low fishing productivity of the area and the possibility of increased fishing productivity in neighboring areas.

The destruction at the OWF decommissioning stage of part of this habitat created by benthic organisms, as well as the return to fishing activities after the technical infrastructure is removed, is likely to have a negative impact on the diversity and abundance of ichthyofauna on a local scale.

11. Unplanned impacts

Unplanned impacts are the result of sudden events or failures that are not related to activities included in the project schedule (e.g., leakage of toxic substances into the water due to a collision between two vessels).

In assessing the significance of unplanned impacts, additional factors were taken into account, i.e. the probability of an event that will be the source of the impact and its potential consequences.

Based on data from other OWF projects and from similar projects, as well as on the knowledge and experience of the study's authors, the following potential unplanned events that could become a source of unplanned environmental impacts of offshore wind farms were selected:

- leakage of petroleum substances during normal operation or in an emergency situation (collision, accident or construction disaster),
- accidental release of municipal waste or domestic sewage,
- accidental release of construction materials or chemicals,
- contamination of the water tone and bottom sediments with antifouling agents;
- noise emissions associated with unexploded conventional weapons explosions.

It should be noted that as a result of unplanned events , the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. On the other hand, indirectly, these events can also affect living organisms that inhabit or otherwise use the seabed, the water table and the sea surface.

Compared to the 2015 Report, this Report has been supplemented with impacts related to noise emissions associated with explosions of unexploded conventional weapons. Since the 2015 Report, knowledge of both unexploded POM conventional weapons and the potential impacts associated with their disposal has increased.

A full description of potential unplanned events can be found in Section 12 of Volume II of the report. In contrast, the indirect impacts of unplanned events on fish are assessed below, based on this description .

11.1. Pollution of water depths and bottom sediments with petroleum substances (during normal ship operations)

During normal ship operation, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) can occur. They will be a minor contributor to the deterioration of water quality. Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. There they can be bound by bottom sediments. However, due to the nature of the sediments in the BIII offshore wind farm area (small amount of organic matter and low content of fine fractions), they will not cause any noticeable deterioration in their quality. It should be assumed that these spills will be small (stage I), up to 20^{m3}.

Visible traces of such contamination under favorable conditions can disappear spontaneously due to evaporation and dispersion in the water. The size of these spills will be practically limited to the OWF area.

As a primary minimization measure, it is recommended that vessels be supplied with means to deal with minor oil spills. Mitigation activities are described in more detail in Section 12 of Volume II of the EIA.

The spill of a small amount of petroleum substances into the sea may indirectly negatively affect ichthyofauna. These will be local, temporary or short-term, reversible, repeatable, low-intensity impacts. Experimental studies have shown that different taxonomic units of animals have very different resistance to pollution by petroleum compounds. The lower limit of impact on fish is estimated at 16 $^{mg/dm3}$, while juveniles react much more strongly and an oil concentration of 1.2 $^{mg/dm3}$ is taken as the limit for them. However, it should be noted that even at a concentration of 0.05 $^{mg/dm3}$, fish meat can have an unpleasant odor, which eliminates it from the trade (Fabisiak, 2008).

An assessment of their importance to fish, if the set of parameters of the Project constituting the 2015 NIS is implemented, is presented in the table below.

In the variant assumed to be implemented by the Environmental Decision, 40% fewer power plants were to be built, respectively, than envisaged for the set of parameters of the Project constituting the 2015 NIS, which also entails the use of fewer vessels for the implementation of the project, its operation or decommissioning. Thus, the risk of occurrence and the number of potential leaks will decrease proportionally. Thus, it is considered that the variant indicated for implementation in the Environmental Decision will result in lower impacts on ichthyofauna than the 2015 NIS.

With the above in mind, it should be pointed out that the Project after the update will have 70% fewer wind turbines than the set of Project parameters constituting the 2015 NIS and 50% fewer than the variant envisioned in the Environmental Decision, which means that the risk of generation and the number of potential spills will be even lower than the variant indicated in the Environmental Decision.

Table 33. Assessment of the impact on fish of a small amount of petroleum substances released into the sea during normal vessel operations (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	During the normal operation of ships, a small leakage of petroleum substances may occur.	Insignificant (scale of exposure - local, duration - temporary or short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium				Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Cod	Large				Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small				Negligible (magnitude of impact - insignificant, importance of the resource - low)
Skarp					
Orchid					
Sprat					
Herring					

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

11.2. Pollution of the water tone and bottom sediments with petroleum substances (in an emergency)

During the construction, operation or decommissioning of the farm, leakage of substances may occur as a result of a shipwreck or collision, a construction disaster of one of the farm facilities, as well as during maintenance work. In the event of a ship collision or collision, a Grade III spill can be expected, i.e. more than 50^{m3}, but a maximum of about 200^{m3} (cf: Unplanned Events, Section 12 of Volume II of the EIA).

It has been calculated that the probability of serious accidents is very low, on the order of $^{10-5}$ - $^{10-4}$. For the Southeast Baltic, which may include the BIII offshore wind farm area, the risk of collision was estimated at 1 case per 1060 years. The significance of this impact can be considered negligible, as the unplanned impacts described are extremely rare and practically impossible. In this case, there are organizational structures, plans of conduct in carrying out actions to combat hazards and pollution, and effective methods of cleaning up pollution.

However, if an oil spill were to occur in the area of OWF BIII during its construction, 24 hours after the accident at a probable wind direction distribution for the Southern Baltic of 3°B, its extent would cover the eastern slope of Slupsk Shoal (Pawelec et al., 2014), threatening not only the benthic organisms of the farm area, but the Slupsk Shoal Natura 2000 area, which protects, among other things, the habitat of marine clam beds and many species of macroalgae. In the best-case scenario (calm sea), oil splashes will not threaten the benthos, but only those groups of organisms living in the water's depths. During a storm, the dispersion of the oil spill will contaminate the food chain in the area of the failure (Malaczynski and Czarnecki, 2010). Oil spilled at sea is subject to a number of physical and chemical processes, the intensity of which depends on the type of oil, as well as environmental conditions. Among the most significant are: dissolution in water, mainly light hydrocarbons, evaporation of low-boiling fractions, dispersion in seawater, adsorption on suspension, sedimentation of heavy fractions, oxidation and microbial degradation (Burwood and Spears, 1974). The solubility of hydrocarbons in water and some non-polar compounds included in oils is low. There has also been a recent increase in deliberate oil pollution. Water discharged from ships overboard usually contains more than 15 $^{mg/dm3}$ of compounds. These are usually small volumes, less than 1^{m3}, and therefore difficult to detect (Fabisiak, 2008). In addition to direct toxic effects on ichthyofauna in the event of a large accident, oil spills cause indirect effects by upsetting gas relations in the aquatic environment, resulting in oxygen loss in the bottom zone and the occurrence of dead zones. It should be noted that the threshold oxygen value for fish is 2 mg/L. Experimental studies have shown that different taxonomic units of animals have very different resistance to pollution by petroleum compounds. The lower limit of impact on fish is estimated at 16 $^{mg/dm3}$, while juveniles react much more strongly and an oil concentration of 1.2 $^{mg/dm3}$ is taken as the limit for them. However, it should be noted that even at a concentration of 0.05 $^{mg/dm3}$, fish meat can have an unpleasant odor, which eliminates it from the trade (Fabisiak, 2008).

The spill of more petroleum substances into the sea may indirectly negatively affect ichthyofauna. These will be local, short-term, reversible, repetitive, low-intensity impacts.

An assessment of their importance to fish, if the set of parameters of the Project constituting the 2015 NIS is implemented, is presented in the table below.

In the 2015 Report, for the parameters of the Project approved by the Environmental Decision, it was assumed that 40% fewer power plants would be built than envisaged for the set of Project parameters constituting the 2015 NIS, which also entails the use of fewer vessels for project implementation, operation or decommissioning. Thus, the risk of occurrence and the number of potential leaks will decrease proportionally. Thus, it is considered that the variant that was indicated for implementation in the Environmental Decision will cause lesser impacts on ichthyofauna than the 2015 NIS.

With the above in mind, it should be pointed out that the Projects in the parameters after the update will have 70% fewer wind turbines than in the 2015 NIS and 50% fewer than in the **variant approved by the Environmental Decision,** which means that the risk of generation and the number of potential spills will be even lower.

Thus, it should be considered that both the nature of the impacts and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the project parameters does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Table 34. Assessing the impact on fish of more petroleum substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	In emergency situations, more oil spills may occur.	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium				Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Cod	Large				Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small				Negligible (magnitude of impact - insignificant, importance of the resource - low)
Skarp					
Orchid					
Sprat					
Herring					

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

11.3. Contamination of water bodies and bottom sediments with accidentally released municipal waste or domestic sewage

During the construction of the wind farm, waste, municipal and other, not directly related to the construction process, as well as domestic sewage, will be generated on vessels as well as at the

construction facilities located on land (at the port serving the project). Their expected types of quantities, as well as how they will be handled, are presented in Section 10 of Volume II of the EIA. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel (only in random cases, related to adverse weather or transfers between vessels) and in the event of an accident, causing a local increase in nutrient concentrations and deterioration of water quality and sediment, and indirectly negatively affecting fish. However, the pollutants should quickly disperse, so they will not contribute to permanent deterioration of the environment in the project area. It is recommended to create internal procedures to regulate the handling of waste and wastewater.

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An assessment of their importance to fish, if the set of parameters of the Project constituting the 2015 NIS is implemented, is presented in the table below.

The variant that was considered in the 2015 Report and approved by the Environmental Decision assumes the construction of 40% fewer power plants than envisaged in the set of parameters for the Project constituting the 2015 NIS, which also entails the use of fewer vessels for project implementation, operation or decommissioning. Thus, the risk of accidental release of municipal waste or domestic sewage into the water will be reduced proportionately.

With the above in mind, it should be pointed out that in the case of the Project, after the proposed modifications to the conditions of implementation and operation specified in the Environmental Decision, there will be 70% fewer wind turbines than in the case of the 2015 NIS and 50% fewer than in the **variant approved by the Environmental Decision,** which is equivalent to the fact that the risk of generation and the number of potential spills of municipal or domestic wastewater will be even lower than in the case of the variant indicated in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the Project parameters does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Table 35. Assessing the impact on fish of more petroleum substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	During the construction, operation or decommissioning of the farm, a small amount of municipal waste or domestic sewage may be accidentally released into the sea.	Negligible (scale of exposure - local, duration - temporary, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium				Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Cod	Large				Small (magnitude of impact - insignificant,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					importance of the resource - high)
Plaice	Small				Negligible (magnitude of impact - insignificant, importance of the resource - low)
Skarp					
Orchid					
Sprat					
Herring					

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

11.4. Contamination of water bodies and bottom sediments with accidentally released chemicals and waste from construction, operation or decommissioning of the farm

During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that incidents involving the sinking of about $5^{m3\ of}$ product could occur during handling. Grouts, mortars and other binders often contain hazardous substances. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 $^{g\text{-}cm\text{-}1}$, they sink and are deposited on the bottom. These substances are considered a serious threat because they cannot be easily removed from the bottom and are toxic to marine organisms.

During the operation of the farm, maintenance of its facilities will be carried out. Accidental release of small amounts of waste or operating fluids into the sea cannot be ruled out.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out this work (cf: description of the decommissioning stage - Volume II Section 6 of the report), and the greatest pollution may occur if the gravity foundations have to be crushed.

Each of these impacts can negatively affect fish.

This type of pollution affects the ichthyofauna causing neurophysiological and behavioral changes, as well as affecting reproduction. These effects can often be interrelated: neurological changes can affect behavior, changes in behavior can affect reproduction, and so on.

Compounds like resins, esters and binder fragments do not always have an effect on the target organism or communities. This depends on the concentration of the substance and the time of exposure. These effects can be acute or chronic. Acute toxicity occurs quickly, is often fatal and rarely reversible. Chronic ones develop after prolonged exposure to low doses and can eventually lead to death. In the case of a wind farm, this will not happen, as a detailed plan is generally developed to deal with risks and pollution arising during the construction, operation and decommissioning of the OWF, which develops

minimization measures and how to deal with such events. **By analogy, the 2015 Report recommends creating such procedures for the BIII OWF project.**

The anticipated types and quantities of waste are presented in Section 10 of Volume II of the EIA.

The release of chemicals and waste from the construction, operation or decommissioning of the farm into the sea may indirectly negatively affect ichthyofauna. These will be local, short-term, reversible or irreversible, repetitive, low-intensity impacts.

An assessment of their importance for fish, in the case of implementation of the set of parameters of the Project constituting the NIS 2015, which is shown in the table below.

In the 2015 Report, for the Project parameters approved by the Environmental Decision, it was assumed that 40% fewer power plants would be built than envisioned for the set of Project parameters constituting the 2015 NIS. Thus, the risk of releasing chemicals and waste from the construction, operation or decommissioning of the farm into the sea will be reduced proportionately. Thus, it is considered that the variant indicated for implementation in the Environmental Decision will result in lower impacts on ichthyofauna than the 2015 NIS.

With the above in mind, it should be pointed out that the Project in the updated parameters will have 70% fewer wind turbines than in the 2015 NIS and 50% fewer than in the variant approved by the Environmental Decision, which means that the risk of creation and number of potential releases to the sea of chemicals and waste from the construction, operation or decommissioning of the farm will be even lower than in the variant indicated in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Table 36. Assessment of the impact on fish of chemicals and wastes from the construction, operation or decommissioning of the farm released accidentally into the sea (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	During the construction, operation or decommissioning of the farm, there may be accidental release of related wastes into the sea, and at any stage of the project there may be accidental release of various types of chemicals.	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium				Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Cod	Large				Small (magnitude of impact - insignificant,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					importance of the resource - high)
Plaice	Small				Negligible (magnitude of impact - insignificant, importance of the resource - low)
Skarp					
Orchid					
Sprat					
Herring					

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

11.5. Contamination of water depths and bottom sediments with antifouling agents

To protect the hulls of ships from overgrowth, biocides are used, which may include, for example, copper compounds, mercury compounds, organotin compounds (such as tributyltin - TBT). These substances can pass into the water's depths and eventually be retained in the sediment. It should be assumed that the emission of these compounds will be limited by dilution in the water depths. Of the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. TBT (the most harmful substance) is currently banned in antifouling paints, but the presence of these compounds in older units cannot be ruled out. **It is recommended that vessels whose hulls have not been coated with TBT-containing antifouling paint be used at any stage of the project. This will eliminate this most harmful impact on aquatic organisms.**

TBT has been detected in the tissues of fish living in the marine environment of the Baltic Sea and is at an acceptable level as far as human health is concerned. TBT threatens the marine environment and, above all, organisms at a lower level of the trophic network, such as the fauna inhabiting bottom sediments. Tributyltin compounds are moderately to highly persistent organic pollutants that undergo bioconcentration in the food chain of marine predators. They are harmful to many aquatic organisms, including algae, mollusks and crustaceans, fish. (Toropovs, 2012)

Studies have shown the effects of TBT on embryonic development (skeletal deformities, abnormalities in the development of internal organs). TBT has a detrimental effect on the immune system, reducing resistance to infection in fish that live on the sea floor. They are exposed to high concentrations of TBT because relatively high levels of TBT are found in muddy sediment (Antizar-Ladislao B., 2008).

Antifouling agents can indirectly negatively affect ichthyofauna. These will be local, temporary or short-term, reversible, repeatable, low-intensity impacts.

An assessment of their importance to fish, if the set of parameters of the Project constituting the 2015 NIS is implemented, is presented in the table below.

The Project variant approved by the Environmental Decision stipulates that 40% fewer power plants will be built than envisioned in the 2015 NIS. This circumstance will therefore affect the number of hull units by reducing the risk of releasing antifouling substances.

With the above in mind, it should be pointed out that the Project in the updated parameters will generate 70% fewer wind turbines than in the 2015 NIS and 50% fewer than in the variant indicated in

the Environmental Decision. Therefore, it should be considered that the risk of antifouling releases for the Project implemented after the amendment of the Environmental Decision is lower than assumed when it was issued.

Thus, it should be considered that both the nature of the impacts and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters for the implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Table 37. Assessment of the impact on fish of antifouling agents released into the sea (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	Low	During the normal operation of ships, the release of antifouling substances from their hulls may occur.	Insignificant (scale of exposure - local, duration - temporary or short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium				Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Cod	Large				Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small				Negligible (magnitude of impact - insignificant, importance of the resource - low)
Skarp					
Orchid					
Sprat					
Herring					

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

11.6. Impacts associated with noise emissions during UXO unexploded ordnance

If the elimination of UXOs through their in situ detonation proves necessary, such activity could affect fish at the individual level. This is because the detonation of conventional weapons residues will be a

source of underwater noise and vibration emissions. The handling of UXO and the likelihood of such an event are described in more detail in Volume II Section 12 of the Report.

The scale and scope of impacts associated with a possible detonation on fish will vary with the size of the detonated cargo, but will not exceed the regional scale. These will be high-intensity but temporary impacts. The effect of noise emissions during detonation can, in extreme cases, cause bodily harm, including fatal injuries, to fish that would be in the immediate vicinity of the explosion site (at a distance of 600-700 m, see: Table 38below). The maximum zones of potential impact in the form of fatal injuries and physical injuries to fish resulting from noise emissions associated with controlled detonation of unexploded ordnance are presented in the table below.

Table 38. Limit distances from the source of the UXO explosion relative to the threshold values of fish sensitivity to underwater noise impacts

Detonation of unexploded ordnance	Threshold value	150 kg TNT		950 kg TNT	
		Summer	Winter	Summer	Winter
Impact on fish	SEL (Cum*) [dB re $^{1\mu Pa2s}$]	[km]	[km]	[km]	[km]
Mortality (fatal injuries)	207 dB (229-234 dB peak.)	0.6	0.6	0.7	0.7
Physical injuries	203 dB	0.7	0.7	0.7	0.7

Source: SMDI/Ramboll 2019

An assessment of the impact of UXO detonation noise on fish on an individual basis is presented in the table below.

Table 39. UXO explosions - analysis of the significance of the impact on fish at the individual level

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Cupcakes	Medium	High	legally protected species	Moderate (scale of exposure - local, duration - long-term*, intensity - very high)	Small (magnitude of impact - moderate, importance of the resource - medium)
Dennik	Medium	High	legally protected species		
Cod	Large	High	commercial genre		Moderate (magnitude of impact - moderate, importance of the resource - high)
Plaice	Small	High	commercial genre		Small (magnitude of impact - moderate, importance of the resource - low)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Skarp	Medium	High	commercial genre		Small (magnitude of impact - moderate, importance of the resource - medium)
Orchid	Medium	High	commercial genre		
Sprat	Medium	High	commercial genre		
Herring	Medium	High	commercial genre		

* for individuals

Source: SMDI/Ramboll 2019

Although the impact of UXO detonation on fish in the form of permanent injury and/or mortality will not be an impact that is considered significant, both in terms of individuals and in terms of their populations in the area of OWF BIII, due to the irreversibility of its effects, it is recommended to implement a minimization measure in the form of conducting a sonar survey of the area of potential detonation, allowing to determine the presence of schools or groups of fish in the area. Based on the results of the sonar survey, an assessment should be made as to whether the timing of munitions clearance is appropriate or whether detonation should be postponed. This action is aimed at protecting schools of fish that may be in the area of OWF BIII.

11.7. Cumulative impact in emergency situations

The only unplanned impact that may be cumulative will be potential oil spills resulting from a disaster or collision.

In the case of simultaneous implementation or operation of several projects, vessel traffic in neighboring areas also increases, with an increased risk of such an event. To the north of the farm is a heavily used shipping route, in the area of which there is an increased risk of oil spills. There are also three hydrocarbon exploration and appraisal licenses in the area. During exploration and in the event that potential deposits of the aforementioned raw materials are discovered and a decision is made on their possible extraction in the region, vessel traffic may increase.

The spill of more petroleum substances into the sea may indirectly negatively affect ichthyofauna. These will be local, short-term, reversible, repetitive, low-intensity impacts.

An assessment of their importance to fish, for the set of parameters of the Project constituting the 2015 NIS is presented in the table below. It should be noted here that the parameters of the Project after the amendment of the Environmental Decision will be significantly lower than the 2015 NIS.

The variant approved by the Environmental Decision assumes that 40% fewer power plants will be built than envisaged for the set of parameters of the Project constituting the 2015 NIS, which also entails the use of fewer vessels, as well as the shorter operating time required for the project, its operation or decommissioning. Thus, the risk of occurrence and the number of potential leaks were reduced proportionally. At that time, it was considered that the variant identified for implementation in the Environmental Decision would result in lower impacts on ichthyofauna than the 2015 NIS.

With the above in mind, it should be pointed out that the Project in the updated parameters will have 70% fewer wind turbines than the set of parameters of the Project constituting the 2015 NIS and 50%

fewer than the **variant approved by the Environmental Decision,** which means that cumulative impacts will be lower.

Thus, it should be considered that both the nature of the cumulative impacts, as well as their scope and magnitude, are smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the project parameters does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

Table 40. Assessing the cumulative impact on fish of more oil substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	Significance of impact
Cupcakes	Medium	Low	In emergency situations, more oil spills may occur.	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Dennik	Medium				Negligible (magnitude of impact - insignificant, importance of the resource - medium)
Cod	Large				Small (magnitude of impact - insignificant, importance of the resource - high)
Plaice	Small				Negligible (magnitude of impact - insignificant, importance of the resource - low)
Skarp					
Orchid					
Sprat					
Herring					

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

12. Impacts on the integrity, coherence and object of protection of Natura 2000 areas

This chapter analyzes the potential for the BIII OWF, singly and in cumulation with other projects, to affect the integrity, coherence and object of protection of Natura 2000 areas as a result of impacts

caused by fish. The assessment was performed in accordance with the methodology described in Section 5 of Volume I.

12.1. Initial assessment - screening

Pre-assessment is the process by which the project's likely impacts on Natura 2000 sites are identified (either singly or in conjunction with other projects or plans) and an analysis is made of whether the anticipated impacts are likely to have a significant effect on these sites.

12.1.1. Zone of potential impacts of offshore wind farm BIII

The assessment of the impact of the subject project on Natura 2000 areas was carried out taking into account the occurrence of potential significantly negative impacts (direct, indirect, secondary, cumulative, short-, medium- and long-term, permanent and temporary) on the natural environment (ichthyofauna and its habitats). The assessment presented in this chapter is limited to species and habitats that are recognized as objects of protection of Natura 2000 areas within the range of impacts of the analyzed project. The need to achieve the goal of species and habitat conservation - achieving/maintaining favourable conservation status - was considered the primary benchmark of this analysis.

12.1.2. Natura 200 areas in the zone of influence of OWF BIII

The area designated for the project lies outside the boundaries of the European Natura 2000 network areas (Figure 4 below). The closest Natura 2000 sites are located at a distance:

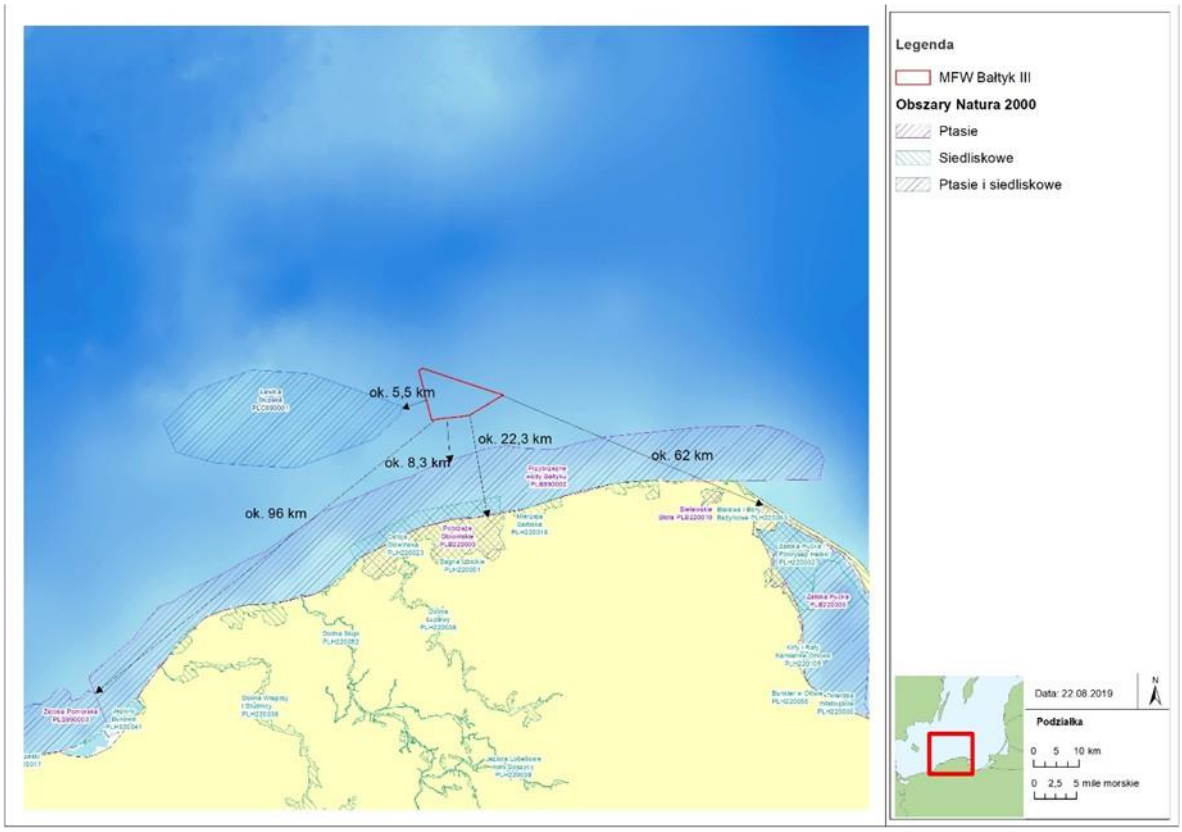
- PLC990001 Slupsk Shoal - 5.5 km,
- PLH220023 Ostoja Słowińska - 18.9 km,
- PLH220018 Sarbska Mierzeja - 23.6 km,
- PLH220036 Dolina Łupawy - 34.3 km,
- PLH220052 Dolina Słupi - 48.1 km.

The assessment of the impact on Natura 2000 areas was carried out on the basis of current natural data - on the basis of a natural inventory, carried out in accordance with best research practices, and on the basis of all available materials, created as the results of ichthyological studies conducted in the waters of the South Baltic. The assessment also made use of available documentation of Natura 2000 areas - standard data forms - and available materials created in the course of work on conservation plans and plans of protection tasks prepared for individual areas. Each Natura 2000 site and each species (and its habitat) was assessed individually, taking into account their natural and geographic specificities.

Of the aforementioned, only Dolina Łupawy, Dolina Słupi and Ostoja Słowińska are of significance as a site for the occurrence of fish and lamprey species listed in Annex II of Council Directive 92/43/EEC, which are also objects of protection in these areas.

Given the above, it is these three areas that will be analyzed in the most detail as part of the project's Natura 2000 impact assessment.

Figure 4 . Natura 2000 areas closest to the BIII OWF (BS III OWF)



ok. 5,5 km	approx. 5.5 km
ok. 96 km	approx. 96 km
ok. 8,3 km	approx. 8.3 km
ok. 22,3 km	approx. 22.3 km
ok. 62 km	approx. 62 km
Legenda	Legend
Obszary Natura 2000	Natura 2000 areas
Ptasie	Birds
Siedliskowe	Habitat
Ptasie i siedliskowe	Bird and habitat
Data: 22.08.2019	Date: 22.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

12.1.3. Object of protection of Natura 2000 areas in the impact zone

12.1.3.1. Ostoja Słowińska PLH220023

The Natura 2000 area "Ostoja Słowińska" is located at a distance of about 18.9 km from the planned OWF BIII. The Special Area of Protection Ostoja Słowińska encompasses the coastal lakes Gardno and Łebsko, the areas located around them and the sea waters surrounding the Gardneńsko-Łebsko Spit. Its area overlaps with that of the Slowinski National Park, protecting, among other things, unique coastal barchans, bogs and swamp forests.

In the area of Ostoja Słowińska, the occurrence of habitats typical of coastal areas has been identified, including 26 types listed in Annex I of Council Directive 92/43/EEC. Most of the protected area is occupied by lagoons and coastal lakes (lagoons), mixed forests and forests on coastal dunes, as well as forests and swamp forests. Among other things, the area protects important habitats for marine, freshwater and bi-environmental ichthyofauna: 1150 Coastal lagoons, 1170 Rocky and rocky seabeds (reefs), 3110 Lobelia lakes, 3150 Old rivers and natural eutrophic water bodies with communities with Nympheion, Potamion, 3160 Natural dystrophic water bodies, 3260 Lowland and submontane rivers with communities of Ranunculion fluitantis.

In addition, the following fish and lamprey species are protected: sea lamprey *Petromyzon marinus*, stream lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, parrotfish *Alosa fallax*, roseate *Rhodeus sericeus amarus*, piscator *Misgurnus fossilis*, goat *Cobitis taenia*, blowfish *Pelecus cultratus*.

Of the aforementioned species, only parrotfish and sea lamprey were considered to have the potential to occur in the impact zone (direct and/or indirect) of the subject project. These species are characterized in detail in the following section 12.1.3.

12.1.3.2. Łupawa Valley PLH220036

Special Habitat Protection Area Łupawa Valley is located at a distance of about 34.4 km from the planned area of OWF BIII. It covers part of the natural, deep valley of the Lupawa River and its largest tributary, the Bukovina. The Łupawa Valley SAC is considered one of the largest concentrations of springs in Pomerania.

The object of protection of the Łupawa Valley is 14 types of habitats listed in Annex I of Council Directive 92/43/EEC. Among them, important habitats for freshwater ichthyofauna and bi-environmentalists are observed: 3140 Hard-water oligo- and mesotrophic water bodies with underwater meadows of *Charetea* brachiopods, 3150 Old rivers and natural eutrophic water bodies with communities of *Nympheion*, *Potamion*, 3260 Lowland and submontane rivers with communities of *Ranunculion fluitantis*, 3270 Flooded muddy river banks.

Currently, the following fish and lamprey species are also protected in the area: stream lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, goat *Cobitis taenia*, Atlantic salmon *Salmo salar*.

Of the aforementioned species, only Atlantic salmon was considered as a species potentially occurring in the zone of influence (direct and indirect) of the subject project. These species are characterized in detail in the following section 12.1.3.

12.1.3.3. Dolina Słupi PLH220052

The "Valley of Slupia" Special Habitat Protection Area is located at a distance of about 48.1 km from the planned BIII OWF. The area includes the basin of the middle section of the Slupia River from Sulęczyn to its mouth, along with its tributaries: Bytowa, Dawn and Skotawa. In the described area, a varied, post-glacial relief is observed, with extrusion and trough lakes, terminal moraines and sand plains.

Among the natural habitats found within the boundaries of the Slupia Valley SAC, 21 types are listed, occupying a total of nearly 50% of the area. Among them, important habitats for freshwater ichthyofauna and bi-environmentalists are observed: 3110 Lobelia lakes, 3140 Hard-water oligo- and mesotrophic water bodies with submerged meadows of *Charetea* brachiopods, 3150 Old rivers and natural eutrophic water bodies with communities of *Nympheion*, *Potamion*, 3160 Natural, dystrophic water bodies, 3260 Lowland and submontane rivers with communities of *Ranunculion fluitantis*, 3270 Flooded muddy river banks.

The object of protection of the described area is 6 species of fish and lampreys: Atlantic *salmon Salmo salar*, goat *Cobitis taenia,* roseate *Rhodeus sericeus amarus* , whitetiphead *Cottus gobio,* river lamprey *Lampetra fluviatilis* and stream lamprey *Lampetra planeri*.

Of the aforementioned species, only Atlantic salmon have been inventoried in the zone of influence (direct and indirect) of the project in question.

The following is a characterization of the species of fish and lampreys from Annex II of Council Directive 92/43/EEC, for the protection of which the indicated Natura 2000 areas were designated.

In the course of the inventory studies conducted as part of the environmental impact assessment of the BIII OWF, no species listed in Annex II of Council Directive 92/43/EEC were found in the research catch. However, taking into account the location of the project, this study analyzed the potential possibility of occurrence of species that are objects of protection in the nearest Natura 2000 areas (Tables 43, 44). This is because it was considered that the fact that not a single one of the above-mentioned species was recorded in the annual survey catch does not yet prove the impossibility of finding selected fish and lamprey species in the study area, for the protection of which Natura 2000 areas have been designated. These include the sea lamprey, for which there are no proven methods of fishing in marine waters, and its low density and specific body structure make trawling ineffective. Currently, monitoring of this bi-environmental species can only take place during spawning migrations in inland waters. In addition, similarly, standard open-water survey methods do not apply to Atlantic salmon (although one individual was caught). Salmon moving quickly and actively in the water's depths are caught on so-called drift nets (now banned) and longlines (not used during monitoring). Incidental fishing and research catches occur during pelagic hauls, but their frequency is very low. Point-based annual monitoring is also unable to capture populations of parrotfish moving through the open sea due to the low densities of these fish - this is only possible with a substantial multi-year survey effort.

Table 41. Fish species occurring in Natura 2000 areas and found during ichthyofauna monitoring

Species name	Ostoja Słowińska PLH220023	Slupia Valley PLH220052	Łupawa Valley PLH220036	OWF Area BIII
Sea lamprey***	X			X (a)
Stream lamprey*	X	X	X	
River lamprey**	X	X	X	
Parposz***	X			X (a)
Atlantic salmon***		X	X	X
Rosanka*	X	X		
Piskorz*	X			
Goat*	X	X	X	
Oceanic whitetiphead**		X	X	
Ciosa**	X			

*** - a bi-environmental species that occurs periodically in open marine waters, ** - a species that resides periodically in coastal waters and/or estuarine zones of rivers and estuaries, * - a typically freshwater species

(a) Species not found during pre-investment monitoring, but occurring in the zone of the entire open sea. Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Table 42. Species of fish and lampreys from Annex II of Council Directive 92/43/EEC that are objects of protection in the analyzed Natura 2000 areas (along with a general assessment of the importance of the species for the area)

Natura 2000 area Species	Ostoja Słowińska PLH220023	Slupia Valley PLH220052	Łupawa Valley PLH220036
Sea lamprey***	B		
Stream lamprey*	C	B	C
River lamprey**	B	C	B
Parposz***	C		
Atlantic salmon***		B	B
Rosanka*	C	B	
Piskorz*	C		
Goat*	B	B	B
Oceanic whitetiphead**		A	
Ciosa**	C		

A, B, C - overall assessment of significance for the area based on current SDFs

*** - a bi-environmental species that occurs periodically in open marine waters, ** - a species that resides periodically in coastal waters and/or estuarine zones of rivers and estuaries, * - a typically freshwater species

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

12.1.3.4. Sea lamprey

The sea lamprey *(Petromyzon marinus)* is the subject of protection in Natura 2000 PLH220023 Ostoja Słowińska. Its range of occurrence in Europe mainly includes the coastal zone of the Atlantic Ocean, the western and northern parts of the continent, as well as parts of the Mediterranean Sea and the Baltic Sea. In Poland, the species has been recorded only a few times in the coastal zone of the Baltic Sea, the Vistula Lagoon and rivers flowing into the Baltic Sea. Its occurrence is limited to the northern part of the country. The last observation of two individuals took place in April and May 2013 in the territory of the Slovinski National Park, the borders of which coincide with the Special Protection Area "Ostoja Słowińska".

Spawning of lampreys occurs in the spring after entering spawning sections of rivers. The length of the lamprey's reproductive migrations can vary from several to several hundred kilometers. After hatching, sea lamprey larvae populate the stagnant pools of the middle sections of rivers. The most common habitat for adults of this species is the coastal parts of the sea and estuaries. However, this species, which has a parasitic lifestyle, can also be found in open marine waters, where it seeks fish that can become its hosts. Attached, sometimes for life, to the body of its host, it can also passively roam virtually the entire South Baltic. Given the above, it was considered that this species could potentially occur in the impact zone of the analyzed project.

The main threats to the species were identified within its inland habitats. These included deteriorating water quality in rivers, interruption of the continuity of watercourses and their development with hydraulic engineering facilities.

12.1.3.5. River lamprey

The river lamp rey *(Lampetra fluviatilis)* is protected in the Natura 2000 areas PLH220036 Dolina Łupawy, PLH220052 Dolina Słupi and PLH220023 Ostoja Słowińska. The species is widespread in coastal parts of Europe from Norway to the waters lapping the Apennine Peninsula. In Poland, it is known to occur in some rivers of Pomerania, the lower Vistula and lower Oder river basins. The river lamprey is an anadromous bi-environmental fish. This species reproduces in rivers, where it also undergoes larval development. Adults reside in the sea, leading a parasitic lifestyle. They prefer the brackish waters of the coastal part of the sea and estuaries. At sea, river lampreys have never been caught farther than a few kilometers from shore. In view of the above, taking into account the location of the investment in question outside the boundaries of the Natura 2000 areas and its distance from the habitats of the aforementioned species, there is no reason to believe that the implementation of the investment could negatively affect both the conservation status of the species and the conservation status of its natural habitats.

The main threats to the species were identified within its inland habitats. These included the pollution of river water and the interruption of fish migration routes to spawning grounds through hydraulic engineering of watercourses.

12.1.3.6. Stream lamprey

The stream lamp rey *(Lampetra planeri)* is listed in the catalogs of Natura 2000 sites PLH220036 Dolina Łupawy, PLH220052 Dolina Słupi and PLH220023 Ostoja Słowińska. It is a species found in the fresh waters of the Baltic and North Sea catchment areas. Its area of distribution also includes some southern and western regions of Europe. The stream lamprey is found throughout the country. It is found in the rivers of the Oder, Vistula, Neman and Elbe systems. It prefers the upper and middle sections of small streams and rivers.

Stream lampreys, unlike river lampreys, are species that inhabit only freshwater. Consequently, they make reproductive migrations only short distances to higher spawning grounds. Their reproduction usually begins in late April and early May. In view of the above, taking into account the location of the investment in question outside the boundaries of the Natura 2000 areas and its distance from the habitats of the aforementioned species, there is no reason to believe that the implementation of the investment could negatively affect both the conservation status of the species and the conservation status of its natural habitats.

The biggest threats to the stream lamprey are fragmentation of watercourses through river baffling, habitat destruction and water pollution.

12.1.3.7. Parposz

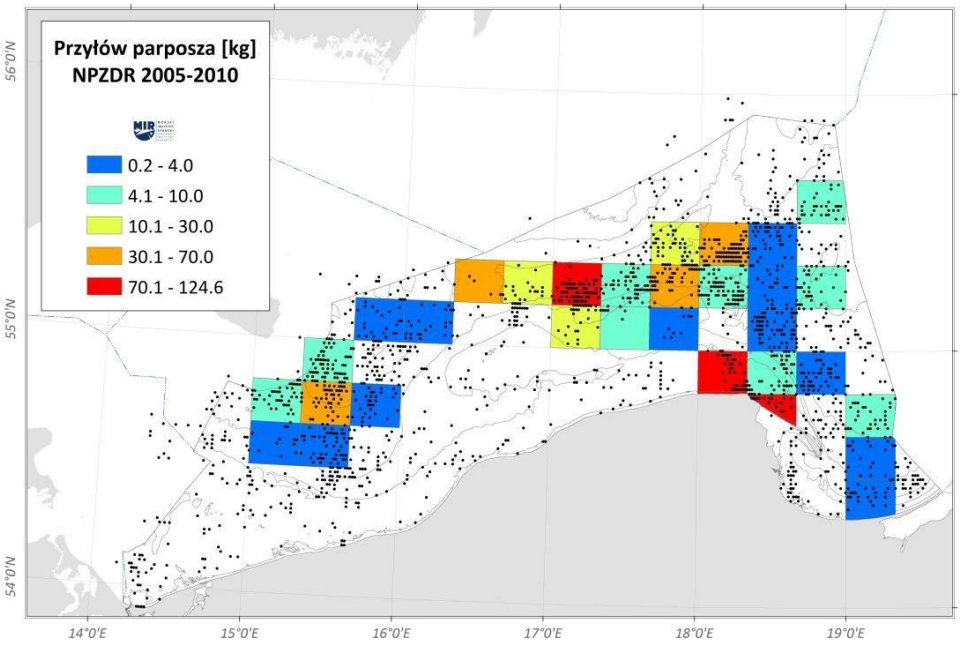
The parrotfish *(Alosa fallax)* is the subject of protection in Natura 2000 PLH220023 Ostoja Słowińska. The range of the parpochus extends around Europe and the northern part of Africa, where it forms several subspecies. In Poland, it mainly inhabits marine waters. Few observations confirm its presence in the Szczecin and Vistula Lagoons, as well as the coastal lakes Gardno and Lebsko. As an anadromous species, the parrotfish inhabits marine waters, especially in the coastal zone. For spawning, it makes migrations to brackish waters and rivers, but they are not as long as the migrations of the allosa. Potential spawning sites for Parposz are lakes Gardno and Lebsko, which remain within the Special Area of Protection "Ostoja Słowińska".

The species is recorded in cutter and scientific research fisheries conducted in the open waters of the Baltic Sea. Given the above, it was considered that this species could potentially occur in the impact zone of the analyzed project. However, habitats associated with estuaries (estuaries) should be

considered important for the conservation of the species. Threats to the parpochus are land reclamation activities, especially dredging, the expansion of ports and shipyards, and the construction of damming and retention basins on rivers.

Figure 8 shows the observed bycatch of parrotfish in the POM, as part of the implementation of the National Fishery Data Collection Program from 2005 to 2010. The black dots represent the location of the observed catches, the rectangles represent the variation in the size of the observed parrotfish bycatch in a given fishing quadrant.

Figure 5. Observed bycatch of parrotfish in POM as part of the implementation of the National Fisheries Data Collection Program from 2005 to 2010

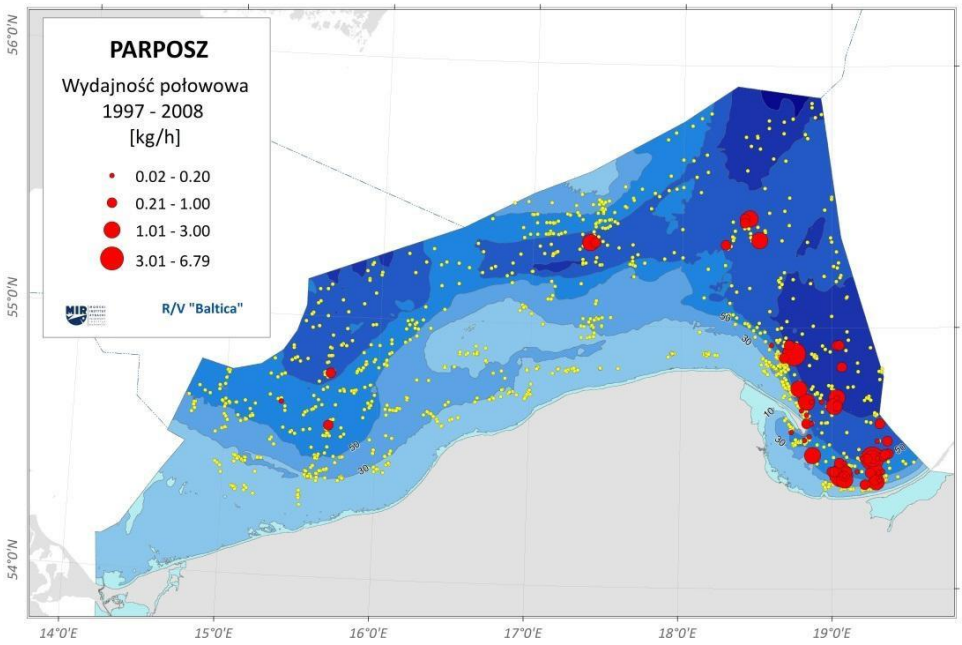


Przyłów parposza [kg] NPZDR 2005-2010	Parpochus by-catch [kg] NPZDR 2005-2010

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

The next figure shows the fishing locations and catch rates of parrotfish (in kg/h) in POM, in the research cruises of the r/v "Baltica" from 1997 to 2008. Yellow dots mark the test stations - the sites of control hauls.

Figure 6. Fishing sites and catch rates of parrps (kg/h) in (POM) in research cruises of r/v "Baltica" in 1997-2008



Parposz	Parposz
Wydajność połowowa 1997 -2008 [kg/h]	Fishing capacity 1997 -2008 [kg/h]
RT/V „Baltica”	RT/V "Baltica"
0.02 – 0.20	0.02 - 0.20
0.21 – 1.00	0.21 - 1.00
1.01 – 3.00	1.01 - 3.00
3.01 – 6.79	3.01 - 6.79

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

12.1.3.8. Atlantic salmon

Atlantic *salmon (Salmo salar)* is listed in the catalogs of objects of protection of Natura 2000 areas PLH220036 Dolina Łupawy and PLH220052 Dolina Słupi. It is a widely distributed species in the North Atlantic. It inhabits the seas from the coast of Portugal to the White Sea and the northeastern parts of the Baltic Sea. Salmon is a migratory, anadromous fish that migrates to rivers to spawn. In Poland, as part of ongoing restoration efforts, smolts and salmon fry are stocked in the Vistula and Pomeranian rivers.

After living in the sea, adults of this species migrate to sections of rivers characterized by gravelly bottoms and oxygenated water. Convenient conditions for spawning and development of juvenile stages of salmon are created by rivers with a sequential system of rapids and plos. The species, during the period of migration made in the sea, is recorded in cutter and scientific research fisheries conducted in the waters of the open Baltic Sea. One individual salmon was found during monitoring.

Salmon is a species that is particularly sensitive to water pollution and especially the associated oxygen deficiency. Cross-building of rivers, preventing mature fish from reaching spawning areas, is also a threat to these fish.

12.1.3.9. Różanka

The rosehip *(Rhodeus sericeus amarus)* is listed in the catalogs of the objects of protection of the Natura 2000 areas PLH220023 Ostoja Słowińska and PLH220052 Dolina Słupi. In Poland, it is found almost throughout the country, except in some foothills and mountainous areas.

It inhabits only fresh waters. It is most often found in small lakes, ponds and canals. Habitat types inhabited by this species include: oxbow lakes and natural eutrophic water bodies with communities of Nympheion, Potamion, shores or drained bottoms of water bodies with communities of Littorelletea, Isoëto-Nanojuncetea, and lowland and submontane rivers with communities of Ranunculion fluitantis. Natural, dystrophic bodies of water are also potential habitats for the rosehip. In view of the above, taking into account the location of the investment in question outside the boundaries of the Natura 2000 areas and its distance from the habitats of the aforementioned species, there is no reason to believe that the implementation of the investment could negatively affect both the conservation status of the species and the conservation status of its natural habitats.

12.1.3.10. Piskorz

Siskorz *(Misgurnus fossilis)* is the subject of protection in Natura 2000 PLH220023 Ostoja Słowińska. In Poland, it is found throughout almost the entire country. It inhabits most lowland river systems, reaching low numbers.

The piscator inhabits standing fresh waters or those characterized by low flow. These are mainly shallow, overgrown lakes and mid-field reservoirs, oxbow lakes, drainage ditches, canals, and carp ponds. The types of natural habitats in which piscatoria can potentially occur are: oxbow lakes and natural eutrophic water bodies with communities of Nympheion, Potamion, lowland and submontane rivers with communities of trichomonads Ranunculion fluitantis, and natural dystrophic water bodies. In view of the above, taking into account the location of the investment in question outside the boundaries of the Natura 2000 areas and its distance from the habitats of the aforementioned species, there is no reason to believe that the implementation of the investment could negatively affect both the conservation status of the species and the conservation status of its natural habitats.

12.1.3.11. Goat

The goat *(Cobitis taenia)* is the subject of protection in the Natura 2000 areas PLH220036 Dolina Łupawy, PLH220052 Dolina Słupi and PLH220023 Ostoja Słowińska. Cytogenetic studies of the goat conducted in Poland have shown the presence of a pure diploid population of the goat at only three sites: Lake Wigry, Klawój and Głębokie. The remaining populations, widely distributed in freshwaters throughout the country (except in mountainous river sections), are diploid-polyploid complexes of species in the genus Cobitis.

The goat prefers riverine habitats with sandy or sandy-muddy bottom structure, and lakes characterized by poorly hydrophysed waters. Habitat types that are potential habitat for the goat include hard-water oligo- and mesotrophic water bodies with underwater meadows of Charetea brachiopods, oxbow lakes and natural eutrophic water bodies with communities of Nympheion, Potamion, lowland and submontane rivers with communities of Ranunculion fluitantis, as well as flooded muddy riverbanks. In view of the above, taking into account the location of the investment in question outside the boundaries of the Natura 2000 areas and its distance from the habitats of the aforementioned species, there is no reason to believe that the implementation of the investment could negatively affect both the conservation status of the species and the conservation status of its natural habitats.

12.1.3.12. Oceanic whitetiphead

White-headed seabass *(Cottus gobio)* is the subject of protection in Natura 2000 areas PLH220036 Dolina Łupawy and PLH220052 Dolina Słupi. In Poland, it is observed in relatively large numbers in the Carpathian region of the Vistula River basin, the upper tributaries of the Oder River and most of the coastal rivers. It prefers rivers with a sub-mountainous and upland character, belonging to the grayling or barbel lands. It is much rarer in the higher river zone, which is the land of trout. Few sites of this species are also known in lowland rivers and lakes, where rocky bottom structure and high water oxygenation values are observed. It is also found in the bays of the Baltic Sea with salinity up to 7‰. In view of the above, taking into account the location of the investment in question outside the boundaries of the Natura 2000 areas and its distance from the habitats of the aforementioned species, there is no reason to believe that the implementation of the investment could negatively affect both the conservation status of the species and the conservation status of its natural habitats. The main threats to the species were identified within its inland habitats. These included the deterioration of water quality, the receding of organisms that constitute the species' food base, habitat destruction through the extraction of aggregate from riverbeds, and lateral development of rivers.

12.1.3.13. Ciosa

Ciosa *(Pelecus cultratus)* is an object of protection in Natura 2000 PLH220023 Ostoja Słowińska. In Poland, its sites are located primarily in the lower Oder and Vistula regions. A strong population of blowfish is observed in the Vistula Lagoon. Ciosa, as a rheophilic species, mainly inhabits large and medium-sized rivers. It is also found in the sweetened waters of marine lagoons with salinity up to 5‰, as well as the coastal strip of the Baltic Sea and the pelagic zone of deep dam reservoirs and large lakes. In view of the above, taking into account the location of the investment in question outside the boundaries of the Natura 2000 areas and its distance from the habitats of the aforementioned species, there is no reason to believe that the implementation of the investment could negatively affect both the conservation status of the species and the conservation status of its natural habitats.

The main threats to the species were identified within its inland habitats. These included water pollution and river hydraulic development.

12.1.4. Impact of OWF BIII on the object of protection, integrity, coherence of Natura 2000 areas

A total of 10 fish species were found to occur within the Słowińska Ostoja Słupi, Słupia Valley and Łupawa Valley, which are the subject of protection of these areas. Of the aforementioned, 4 are typically freshwater species (goat, screech owl, roseate, stream lamprey), for which the analysis of possible negative impacts arising from the subject project is greatly simplified. This is because the distance separating and isolating the habitats of inland fish and lamprey species from the area of the planned wind farm clearly excludes the possibility of any negative impacts that could worsen the conservation status of the aforementioned species or their habitats.

A similar situation is observed in the case of bi-environmentalor freshwater species, periodically occurring in the coastal zone and spending their entire life cycle outside the zone of influence of the planned project. These species include river lamprey and blowfish. Species may be periodically typical of estuaries, estuarine river sections and/or coastal marine waters. The open waters of the Baltic, characterized by much higher salinity, do not provide a favorable habitat for them. This is indicated not only by the absence of these species in the inventory fishery (carried out as part of the environmental impact assessment for the project under review), but also by their absence from the other scientific and research fisheries conducted over many years in South Baltic waters. These species are also not recorded in commercial fisheries conducted in open marine waters. Therefore, as in the case of freshwater fish, the analysis of possible negative impacts arising from the subject project clearly

indicates that there is no possibility of any negative impacts of the project on the habitats of these species as well as on the species themselves. Even at the implementation stage, when negative impacts on ichthyofauna will be relatively greater, there is no reason to believe that the impacts will be significant. The distance of the BIII offshore wind farm area from the coastal zone precludes the creation of disturbances to coastal habitats caused by moving suspended bottom sediments. Maintenance of the construction area will be carried out on the basis of the existing harbor infrastructure, so the increased traffic of vessels in the coastal zone will be concentrated in zones with already existing increased anthropopressure and will not cause additional disturbance to coastal protected natural habitats and habitats of fish and lamprey species, for the protection of which Natura 2000 areas have been established.

Thus, taking into account the geographic location, scale and nature of the project, as well as the extent of its potential impact on natural elements, there is no reason to believe that the implementation of the project could modify the ecological conditions of the above-mentioned refuges, and thus cause deterioration of the habitats of the above-mentioned animal species, as well as negatively affect the species themselves.

There are also no differences between the variants under consideration, i.e. those indicated for implementation in the Environmental Decision and those assumed to be implemented in the most far-reaching scenario to the extent described above.

After a detailed analysis of the possible negative impacts of the subject project on Natura 2000 areas, after taking into account current natural data and based on all available materials created as a result of ichthyological research conducted in the waters of the South Baltic, species that could potentially and periodically occur in the zone of direct and indirect impacts of the analyzed project were determined. Not only were all species currently protected as objects of conservation in Natura 2000 areas assessed, but also the others included in Annex II of Council Directive 92/43/EEC. Indeed, taking into account the emerging conservation plans and plans of conservation tasks (drawn up for Natura 2000 refuges) and the related modifications of standard data forms, the need for a possible future expansion of the catalogs of objects of conservation cannot be ruled out. Each Natura 2000 site and each species (along with its habitat) was assessed individually, taking into account their natural and geographic specificities.

After the aforementioned analysis, it was concluded that among the species listed in Annex II of Council Directive 92/43/EEC, only Atlantic salmon, sea lamprey and parrotfish may potentially and periodically occur in the zone of direct and indirect impacts of the analyzed project.

In identifying possible threats of the project to the Natura 2000 areas located in the vicinity of the zone designated for the planned investment, it is necessary to take into account the spatial scale and the time and degree of their impact.

During the period of operation, both positive (creation of new habitats, cessation of fishing, attraction of predators) and possible negative impacts of OWF BIII on ichthyofauna (creation of spatial barrier, generation of electromagnetic field, vibrations, etc.) will be phenomena observed within the OWF zone itself and its buffer strip. Given this, it is not possible that they will directly affect the ichthyocenoses protected within the boundaries of the Natura 2000 areas subject to this assessment.

The only anticipated negative impact may be on migratory species, migrating (actively or passively) outside the above-mentioned N2000 refuges.

The analysis of impacts indicates the potential occurrence of the following negative impacts of the planned project on ichthyofauna species protected within the European Natura 2000 network:

- direct mortality,
- hounding,

- habitat loss,

creating a barrier that makes migration difficult (or impossible).

12.1.4.1. Direct mortality

In the case of the analyzed project, direct mortality could potentially occur only during the implementation phase or possibly during the decommissioning phase of the project. However, the impact of this type of impact on the populations of Atlantic salmon, sea lamprey and parr should be considered insignificant. Direct mortality could occur only if the project is started in an area where fish in larval stages, unable to escape from the construction site on their own, are present. Starting this type of work in a spawning area, for example, would probably result in losses in the number of eggs laid and fish hatchlings and larvae. However, in the case of the analyzed species, we cannot speak of any threat of disruption to the spawning season, since spawning takes place in rivers or lakes outside the area of influence of the OWF. The BIII offshore wind farm, in all phases of the project (construction, operation, decommissioning), will only affect the migration of adults with unlimited opportunity to bypass or leave the project area. Moreover, taking into account the fact that during the period of construction and/or decommissioning of the project, these species will not appear in the area of the OWF in large numbers (if they appear at all) - the negative impact causing direct mortality must be considered insignificant and impossible to occur, with regard to healthy fish and lampreys, protected in the analyzed Natura 2000 areas.

12.1.4.2. Hounding

Crowding is a negative impact that can occur both during the construction and decommissioning phases of the project and during its operation. Construction and demolition work will result in the overpollination of the aforementioned species from the project area. However, this will not significantly disrupt any of the key phases of their life cycle. Nor will it primarily disrupt the breeding season, which takes place for these species within inland water habitats. Undoubtedly, construction work will force adult, migrating individuals to change their migration route, however, given the practically unlimited possibility of their avoidance of the project area - this impact can be considered negligible from the point of view of the need to maintain the population in a proper state of conservation.

A different character may be the crowding effect caused by vibration, the stroboscopic effect and the flicker created during the operation of the project. This impact should be classified as long-term and may negatively affect migrating individuals. However, it should be borne in mind that the occurrence of parr, sea lamprey and Atlantic salmon in the farm area and buffer zone will not be numerous, and the area may be closed to fishing. Given the above, it can be assumed that the effect of crowding caused by the operation of wind turbines will be much less intense than the crowding caused by the activity of the fishing fleet operating in other parts of the basin. This situation will induce the creation of a kind of refuge for fish escaping from the anthropopressure caused by the fishing gear used. In addition, the wind farm will be sited in waters with naturally strong dynamics and in an area that has been subject to both fishing and shipping pressure for years. If we add to this the relatively small area occupied by the BIII OWF, the sparse occurrence of the analyzed species in the project area, and the possibility of adult individuals bypassing the farms at will, it should be concluded that the negative impact of scaring will not have a significant and negative impact on the population of fish and lampreys protected under the Natura 2000 network.

12.1.4.3. Habitat loss

Habitat loss for the analyzed species will also not have a significant negative impact on the status of their populations. Salmon, sea lamprey and parr are not closely associated with open sea habitats.

Impacts that deteriorate the structure and function of habitats in which these species enter to breed (inland waters) would be considered significantly negative. The open marine waters of the South Baltic only serve as one large habitat where these species freely migrate and search for food. Excluding a small area from the foraging area for a while (during the construction and decommissioning stages) will not have any negative impact on the conservation status of the populations of these species. This will only result in correcting migration routes and adjusting them to accommodate shifting food resources. Thus, taking into account the geographic location, scale and nature of the project, as well as the extent of its potential impact on natural elements, there is no reason to believe that the implementation of the project could modify the ecological conditions of these habitats, and thus cause deterioration of the habitats of the above-mentioned animal species, as well as negatively affect the species themselves.

12.1.4.4. Barrier effect

The barrier effect of the project in question will also not have a significant negative impact on the populations of the above-mentioned species. OWF BIII, due to its distance from the shore and estuaries, will not be a barrier to spawning migrations and will not block access to spawning areas. The small area occupied by the farm and the virtually unlimited opportunity for adult fish and lampreys to avoid it (during the construction and decommissioning phases) will also not cause any disturbance during foraging migrations. When assessing the possible impact of the electromagnetic field and physical barrier created by the planned offshore wind farms, it is important to take into account the high swimming capacity of salmon and other species. Given this, the physical barrier effect of foundations and other structural elements of wind turbines appears to be negligible or nonexistent.

12.1.4.5. Other impacts

When assessing the impact of the investment on the individual elements of the basin's ichthyocenosis, one cannot ignore the obvious positive impact of the project on the fish and lampreys living in the area - including protected species listed in Annex II of Council Directive 92/43/EEC.

The creation of a fishery exclusion area in the area, and the foundation of structures there that will be a substrate for the settlement of encrusting organisms in the future, may create a unique habitat serving as a refuge for many species of fish and lampreys. The area can become a habitat for species at different stages of development and occupying different levels in the trophic pyramid. The area can become an excellent feeding and resting place for migrating species, for the protection of which the Natura 2000 area was established.

In addition, the OWF may affect the environment by polluting water (e.g., with oil substances from ships), generating acoustic disturbances (noise and vibration of turbines), and stirring up sediments during work on the seabed (both during the construction and decommissioning phases of the OWF). The aforementioned phenomena are considered large-scale and should be evaluated on a spatial scale.

Water pollution by sediment stirred up during construction activities can move with sea currents to other areas of the sea. Taking into account the geographic location of the project and its distance from the analyzed Natura 2000 refuges, it should be concluded that all Natura 2000 areas, designated for the protection of fish and lampreys and their habitats, are outside the range of the impact of these factors. In the case of the Lupawa Valley and the Slupia Valley, the risk of the impact of water pollution and sediment raised from the seabed is further minimized due to the hydrological dynamics of the area. The steep slope of the riverbeds of the Slupia and Lupawa rivers and the sustained flows of these rivers prevent contaminated water masses from entering the protected areas.

The impact of suspended solids on the migration and feeding of adult parr, Atlantic salmon and lamprey will also be negligible. The dynamics of the waters in this area and the sandy nature of the bottom will result in the relatively short persistence of suspended solids in the water depths, and the strong water

dynamics will furthermore affect their relatively rapid dispersion in the basin. If we take into account the ease with which the species in question bypass the project area and the high resistance of adult fish to suspended solids, there is no reason to believe that the negative impact of this type of impact can be considered significant.

Another type of danger is the penetration of so-called acoustic pollutants into the environment, related to the high propagation capacity of sound in water. During the construction of the OWF, noise is generated from ships moving in the area, as well as particularly dangerous sounds associated with the foundation of wind turbines on the seabed. If the investor chooses the option of pile foundations, it is also possible to create a short-term threat of high acoustic pressure sound generated during the installation of wind power bases. The sound waves generated by piling can be registered by fish within a radius of tens of kilometers and trigger an avoidance response. Taking into account the peculiarities of sound propagation in water, the ease with which adult fish avoid the project area, and the location of the analyzed Natura 2000 areas in relation to the planned area of OWF BIII, it is assessed that the noise threat to the analyzed populations will not occur.

12.1.5. Zone of potential cumulative impacts

Impacts that may cumulate with the OWF impacts described above, caused by other projects described in Section 13 of Volume II of the EIA, will not go beyond the 50-kilometer zone that was designated for the assessment of BIII OWF impacts.

12.1.6. Natura 2000 sites in the zone of cumulative impacts

Impacts that may cumulate with the OWF impacts described above, caused by other projects described in Section 13 of Volume II of the EIA, will not go beyond the 50-kilometer zone that was designated for the assessment of BIII OWF impacts.

12.1.7. Object of protection of Natura 2000 areas in the zone of cumulative impacts

Impacts that may cumulate with the OWF impacts described above, caused by other projects described in Section 13 of Volume II of the EIA, will not go beyond the 50-kilometer zone that was designated for the assessment of BIII OWF impacts.

12.1.8. Cumulative impact of OWF BIII on the subject of protection, integrity, coherence of Natura 2000 areas

Cumulative impacts on fish, as described for the construction phase in Section 9.1.6, for the operation phase in Section 9.2.6, and for the decommissioning phase in Section 9.3.5 above, have been assessed as insignificant, and thus will not cause significant impacts on fish species of conservation concern within the Natura 2000 network.

12.1.9. Results of the preliminary assessment

In conclusion, it should be said that adult sea lamprey, Atlantic salmon and parr in the open waters of the South Baltic are caught in small numbers. Representatives of these species, which have their key habitats in inland waters, remain outside the impact zone of the project in question during most of their life cycle. For this reason, it is assumed that the above-mentioned factors affecting their populations will not have a significant negative impact on the conservation status of these species and the conservation status of their habitats.

The possible negative impact of the BIII OWF on fish species for the protection of which Natura 2000 areas have been established is limited to noise, water pollution and raised bottom sediments during construction. In the course of conducting this analysis, it was assessed as unlikely and insignificant. Thus, there are no grounds for concluding that there are significant impacts on ichthyofauna, which is the subject of protection in Natura 2000 areas.

The conducted assessment of the project's impact on Natura 2000 areas showed that the impact of the project will not adversely affect the possibility of obtaining/maintaining a proper conservation status of fish and lamprey species and their habitats, thus:

- will not result in the reduction of the natural range and fragmentation of the habitat of fish and lamprey species protected under the European Natura 2000 network,
- will not result in the loss of natural, specific habitat structure and function, and the prospects for preserving the habitat of fish and lamprey species protected under the European Natura 2000 network,
- will not deteriorate the conservation status of typical, for the above-mentioned habitats, species,
- will not adversely affect the population dynamics of the fish and lamprey species under consideration,
- will not reduce the natural range of the fish and lamprey species under consideration, and their ranges and abundances will not decrease in the foreseeable future,
- will not adversely affect the chances of preserving the populations of the analyzed fish and lamprey species,
- will not result in the loss of availability of sites necessary for certain vital functions (e.g., foraging or reproductive sites).

Also, the analyzed project (in terms of ichthyofauna) will not have a significant negative impact on the integrity of Natura 2000 areas, as it will not affect any of the structural and functional factors that enable obtaining/maintaining a proper conservation status of species and their habitats, for the protection of which the area was designated.

It will also not result in the decomposition of natural resources in the network and will not disrupt the functional links between the various elements of the network (i.e., Natura 2000 sites) at the level of the biogeographical region in the country, guaranteeing the maintenance in a proper state of protection of fish and lamprey species and their habitats, so it will not affect the coherence of Natura 2000 sites.

Taking into account the geographic location and the scale and nature of the project, there is no reason to believe that the implementation of the project could modify the ecological conditions of the refuge, and thus cause: deterioration of the habitats of fish and lamprey species for whose protection the analyzed Natura 2000 areas were designated, negatively affect the species of ichthyofauna for whose protection the areas were designated, deteriorate the integrity of the Natura 2000 area or its links with other areas.

Due to the lack of identified significant negative impacts on fish and lamprey species protected under the European Natura 2000 network (and their habitats), ways to minimize negative impacts were not formulated, and conditions for the implementation of the above project (in terms of impact on the Natura 2000 area in terms of ichthyofauna) were not specified. Therefore, there is no need to perform a proper assessment.

13. Transboundary impacts

Due to the low or negligible significance of the impact at the stage of construction, operation and potential decommissioning of the OWF, the cross-border impact of the investment is not expected. The OWF will only have a negative impact in the local zone. A potential impact of the OWF could exist in the case of strong electromagnetic field interference with fish migration. However, observations based on tracking eel migration routes showed that electromagnetic fields generated by cables associated with the operation of the OWF caused only minor (up to 50 minutes) delays in migration or insignificant changes in the route, without causing disturbances that could significantly affect migration efficiency (Westerberg et al., 2007 after Wilhelmsson et al., 2010). Similarly, studies conducted on the impact of the power cable connecting Poland and Sweden (SwePol Link) did not show a significant effect of this factor on salmonids (Westerberg et al., 2007 after Wilhelmsson et al., 2010). Thus, no disruption of salmonid migrations to the rivers of other Baltic states is expected.

14. Monitoring proposal

The Environmental Decision specified in Pct. II.2.2.a) (-fish) monitoring requirements that also apply to ichthyofauna. Since the proposed changes to the conditions for implementation and operation of the Project do not cause changes in the type of impacts and an increase in their significance, this condition is sufficient. At the same time, it is not the subject of the proceedings for the purpose of which this report was prepared to change the conditions of the Environmental Decision in the field of monitoring.

Due to the low or negligible significance of the OWF's impact on ichthyofauna, typical post-investment monitoring is not proposed. However, the formation of an "artificial reef" will potentially promote the existence and reproduction of naturally valuable or commercially important fish species or cause succession of invasive species. Given the relatively little knowledge and experience of the processes of colonization by organisms of OWF areas in the exploitation phase, it would be advisable to consider conducting periodic monitoring studies to track the successive stages of the formation of plant and animal communities in OWF areas against the background of adjacent areas.

15. Summary and conclusions

The first stage of the analysis identified all possible impacts that offshore wind farms may cause on ichthyofauna. These impacts are described based on the available literature in Chapter 7. Noise and vibration, suspended solids, electromagnetic field, water pollution, habitat alteration and mechanical barrier were considered as impacts that may occur in the case in question.

The second stage analyzed the sensitivity of individual species to impacts caused by the construction, operation and decommissioning of the OWF and found that high sensitivity applies to all species in the case of acoustic impacts and in the case of changing the habitat of fish, for which the artificial reef will create more favorable conditions for reproduction (bottomfish, gobies), or shelter (cod).

Based on the previous stages of analysis, an assessment was made of how and to what scale the project might affect the various species selected for evaluation. The analysis takes into account the anticipated variants, the technical parameters of the project and the proposed technological solutions, as well as the results of studies conducted for other elements of the environment in the BIII OWF area.

Based on the impact significance assessment matrix, it is concluded that the occurrence of a significant impact can only occur if the impact of negative factors is on a scale equal to or greater than the regional scale. Due to the extensive presence of fish stocks (or wide dispersion of protected individuals) included in the analysis and the low importance of the area in question for the Baltic population, the impact of

the wind farm construction on ichthyofauna will be mostly local (except for noise impacts), so the significance of the impact will be mostly small or negligible.

For the proposed modifications to the Project, 60 wind turbine foundations are assumed, with monopole foundations likely to cause the greatest acoustic impacts. In the case of the parameters of the Project approved by the Environmental Decision, it was assumed that 120 wind turbines could be sited using monopile technology, and the set of project parameters analyzed in the 2015 Report constituting the 2015 NIS gave grounds for as many as 200 wind turbines to be sited. In both cases, i.e. the parameters of the Project approved by the Environmental Decision and the set of parameters of the Project analyzed as the most far-reaching NIS 2015 scenario, the OWF implementation did not cause significant negative impacts. As a result of the analysis and modeling of noise propagation for the variant to be implemented on the basis of the amended Environmental Decision, it was determined at this stage that the process of piling monopile foundations will not cause significant negative impacts, even though the analyzed acoustic power of the hammer has increased. The possibility of using measures to minimize the impact of these works on the environment, i.e. the use of bubble curtain, is important for reducing the impact. Consequently, it should be considered that the proposed modifications lead to a reduction in the impacts of OWF BIII on ichthyofauna.

The next step was to assess the impact on the integrity, coherence and object of protection of Natura 2000 sites, and it was concluded that the impact of the project will not adversely affect the possibility of obtaining/maintaining the proper conservation status of fish and lamprey species and their habitats.

Analysis of associated impacts showed that their primary element would be trophic relationships between benthos and fish. During the construction phase, a decrease in food availability due to the destruction of the benthos can be expected, while during the operation phase, the biomass of the epiphytic organisms that are the food component of some fish species will increase. However, in both cases, the scale of these changes is likely to be too small to significantly affect fish.

The emergence of new habitats dominated by epiphytic organisms can create suitable additional substrate for demersal fish eggs (herring, gobies, demersal, horse mackerel, devil hens), as well as provide hiding places for early life stages of fish, thus positively influencing spawning efficiency and fry survival.

Due to the distances to other countries' EEZs and the mostly local scale of impacts, the BIII OWF is not expected to cause transboundary impacts on fish, either alone or in cumulation. The condition is the use of measures to mitigate noise from foundation piling.

The most important cumulative impacts on fish that may occur during the various stages of the project are the spreading of suspended solids due to the disturbance of the bottom sediment structure, which may then sink to the bottom up to 20 km from the site of the construction work (and thus at the locations of other proposed farms), and noise generated during piling. Noise mitigation measures are recommended. Cumulative impacts are assessed as low.

Potentially, the most significant unplanned impact could be a larger oil spill resulting from an accident or collision. However, even in this case, its importance to fish is rated as negligible or low.

A summary of the assessment results is presented in the tables below.

The tables are divided according to the stages of investment and the importance of each receptor (species), as defined in Chapter 8:

- species of minor importance - plaice,
- species of medium importance - gobies, bottomfish, salmon, turbot, flounder, sprat, herring,

- species of great importance - cod.

15.1. Plaice

Table 43. Summary of the results of the assessment of the impact of OWF BIII on plaice - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Increase in the concentration of suspended solids in water	Small	No	Insignificant	Skip	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Skip	Reducing the impact
Noise and vibration emissions (after mitigation measures)		Technical solutions to reduce noise from piling, such as bubble curtains	Small	Skip	Reducing the impact
The formation of a mechanical barrier		No	Insignificant	Skip	Reducing the impact
Habitat change		No	Insignificant	Skip	Reducing the impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Table 44. Summary of the results of the assessment of the impact of OWF BIII on plaice - operational phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Emissions of compounds from corrosion protection agents	Small	No	No change	No change	Reducing the impact
Noise and vibration emissions		No	Insignificant	Skip	Reducing the impact

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
The formation of a mechanical barrier		No	No change	No change	Reducing the impact
Habitat change - creation of an "artificial reef"		No	Insignificant	Skip	Reducing the impact
Emission of electromagnetic fields and radiation		No	Insignificant	Skip	No impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Table 44. Summary of the results of the assessment of the impact of OWF BIII on plaice - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Increase in the concentration of suspended solids in water	Small	No	Insignificant	Skip	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Skip	Reducing the impact
Noise and vibration emissions		No	Small	Skip	Reducing the impact
Habitat change - removal of "artificial reef"		No	Insignificant	Skip	Reducing the impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

15.2. Gobies, bottomfish, salmon, turbot, flounder, sprat and herring

Table 45. Summary of the results of the assessment of the impact of OWF BIII on goby, demersal, salmon, turbot, flounder, sprat and herring - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Increase in the concentration of suspended solids in water	Medium	No	Insignificant	Skip	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Skip	Reducing the impact
Noise and vibration emissions (after mitigation measures)		Technical solutions to reduce noise from piling, such as bubble curtains	Small	Small	Reducing the impact
The formation of a mechanical barrier		No	Insignificant	Skip	Reducing the impact
Habitat change		No	Insignificant	Skip	Reducing the impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Table 46. Summary of the results of the assessment of the impact of OWF BIII on goby, demersal, salmon, turbot, flounder, sprat and herring - operational phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Emissions of compounds from corrosion protection agents	Medium	No	No change	No change	Reducing the impact
Noise and vibration emissions		No	Insignificant	Skip	Reducing the impact

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
The formation of a mechanical barrier		No	No change	No change	Reducing the impact
Habitat change - creation of an "artificial reef"		No	Insignificant	Skip	Reducing the impact
Emission of electromagnetic fields and radiation		No	Insignificant	Skip	No impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Table 47. Summary of the results of the assessment of the impact of OWF BIII on goby, demersal, salmon, sockeye, flounder, sprat and herring - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Increase in the concentration of suspended solids in water	Medium	No	Insignificant	Skip	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Skip	Reducing the impact
Noise and vibration emissions		No	Small	Small	Reducing the impact
Habitat change - removal of "artificial reef"		No	Insignificant	Skip	Reducing the impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

15.3. Cod

Table 48. Summary of the results of the assessment of the impact of OWF BIII on cod - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Increase in the concentration of suspended solids in water	Large	No	Insignificant	Small	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Small	Reducing the impact
Noise and vibration emissions (after mitigation measures)		Technical solutions to reduce noise from piling, such as bubble curtains	Small	Small	Reducing the impact
The formation of a mechanical barrier		No	Insignificant	Small	Reducing the impact
Habitat change		No	Insignificant	Small	Reducing the impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Table 49. Summary of the results of the assessment of the impact of OWF BIII on cod - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Emissions of compounds from corrosion protection agents	Large	No	No change	No change	Reducing the impact
Noise and vibration emissions		No	Insignificant	Small	Reducing the impact
The formation of a mechanical barrier		No	No change	No change	Reducing the impact

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Habitat change - creation of an "artificial reef"		No	Insignificant	Small	Reducing the impact
Emission of electromagnetic fields and radiation		No	Insignificant	Small	No impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

Table 50. Summary of the results of the assessment of the impact of OWF BIII on cod - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Increase in the concentration of suspended solids in water	Large	No	Insignificant	Small	Reducing the impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Small	Reducing the impact
Noise and vibration emissions		No	Small	Small	Reducing the impact
Habitat change - removal of "artificial reef"		No	Insignificant	Small	Reducing the impact

Source: Nermer T., Drgas A., Janusz J., et al. "Monitoring of ichthyofauna of the area of the offshore wind farm Central Baltic III. Final Report with Impact Assessment," Marine Fisheries Institute - National Research Institute, Gdynia, 2015.

16. Shortcomings of technology and gaps in modern knowledge

The authors of environmental impact assessments each time plan field studies based on established standards, or in the absence of such standards - create them based on their own expertise supported by a search of available data. The last element is particularly important because of the possibility of translating experience showing the impact of similar investments on fish assemblages found during

monitoring studies. In the course of comparing the results of individual works on the impact of factors modifying the abiotic environment, it is extremely important to refer to a specific geographic location with all the parameters that characterize it. Unfortunately, the currently planned investment will be one of the first implemented within the unique Baltic Sea conditions of the POM, also it is impossible to simply relate the already studied impact of similar investments on the ichthyofauna found during the current study.

Potential knowledge gaps may be the result of imperfections in the adopted research methodology. Conducting observations over a period of one full year (in addition, poorly supported by the results of previous studies), cannot be fully compensated for by high values of research effort. During a single year of trapping, the possibilities for increasing the applied survey effort are strictly limited (due to the limited survey period, as well as the relatively small spatial extent), which reduces the likelihood of perfectly depicting the fish assemblage with all its necessary characteristics and capturing their changes over time. For the above reasons, interpretation of the results obtained may be subject to some error.

In the case of the investment in question, the designation of a reference area (a parallel study area with similar characteristics) was abandoned. In the case of strongly interacting external factors (unrelated to the farm's impact on the environment), this can make it somewhat difficult to clearly interpret the results obtained.

Currently, the establishment of reference zones is being abandoned because, according to experience from studies of other OWFs, no negative impact of the investment has been found, rather the increase in biodiversity within the farm itself.

Moreover, it seems impossible to compare the biomass of two points or areas of the OWF and the reference zone against the existence of species in the entire Baltic Sea. Stock estimation is mostly done at the level of stocks constantly moving across the areal of the entire sea, and is a process using multi-year data and their trends.

When planning the work in question, the authors were aware of the fact that it is necessary to ensure full repeatability of the research scheme (e.g., for the purposes of monitoring conducted in later years), both in terms of time and the proposed detailed solutions. For this reason, the methodology chapter includes a detailed description of the fishing gear used, along with a brief description of the regime of their use (in Monitoring of ichthyofauna of the area of the offshore wind farm "Central Baltic III". Final report with research results - Volume III Section 7 of the report). Unfortunately, due to potential technical difficulties (resulting from the seabed foundation of the towers serving as the base for the wind farm turbines and/or the delineation - for safety reasons - of an exclusion zone in the vicinity of the planned infrastructure), it is not possible to guarantee with certainty the possibility of research within the ideally repeated geographic location of the individual research stations. If necessary due to the above-mentioned factors, the authors allowed to move the location of the monitoring station by tens to hundreds of meters (in such a range, due to the homogeneity of the marine environment, the comparison of the obtained results will still be legitimate).

The authors raise serious doubts about the effectiveness of lamprey trapping in the sea. Due to the occurrence of this group of organisms within the high seas in very low concentrations, trawling methods seem to be the only theoretically effective means of acquiring data, but one would have to rely on multi-year data series and practically impossible effort values. An inventory of lampreys based solely on the assumptions provided for in the current methodology could be subject to considerable error, so it is very difficult to delineate trends in the occurrence of vertebrates in particular areas of the sea. Unfortunately, the above difficulties completely rule out the possibility of assessing the impact of the investment on this group of organisms.

The long-term impact on ichthyofauna of the generated electromagnetic field remains a debatable and not fully studied issue. The experiments performed in the past (both in the laboratory and in the natural

environment) generally did not cover more than a couple of years. We are inclined to argue that it is unlikely that the negative impact of a single considered farm will increase with time, but there is currently no hard evidence for this in the literature.

17. Literature and other sources

17.1. Sources of information on the planned technical solutions and the results of the research on the elements of the environment carried out for OWF BIII

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17.2. Literature

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 5

Impact assessment on migratory birds

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Abbreviations and definitions

AIC	Akaike's information criterion
AIS	Automatic Identification System for Vessels (Automatic Identification System)
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
Sediment deposition	The process of sediment accumulation on the seabed (accumulation, deposition)
DSU	Decision on environmental conditions
Birds Directive	The colloquial name of Directive 2009/47/EC of November 30, 2009 on the conservation of wild birds
Habitats Directive	Common name of Directive 92/43/EEC on the conservation of natural habitats and wild fauna and flora
EEZ	Exclusive Economic Zone (Exclusive Economic Zone)
ENINA 2022	Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Bałtyk Środkowy III ("OWF BIII"), ENINA Andrzej Łuczak, Poznań, April 2022
ENINA 2015	Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Bałtyk Środkowy III ("OWF BIII"), ENINA Andrzej Łuczak, Poznań, March 2015
ESW	Distance covered by visual observation (Effective Strip Width)
Eutrophication	The process of enriching water bodies with biogenic elements (nitrogen and phosphorus), resulting in an increase in their fertility
GAM	Generalized additive model
Grążyce	ducks of the genus Aythya
HELCOM	Helsinki Commission
Habituation	Getting used to the constant presence of a given factor that does not cause immediate danger
IUCN	International Union for the Conservation of Nature and Natural Resources
Sea ducks	Ducks of the Mergini tribe
Ducks proper	Ducks of the genus Anas
KE	European Commission
KIP	Information sheet of the project
MIP-E	Maritime Transmission Infrastructure - eastern part
IMF	Offshore wind farm
IMF Baltica 2	Baltica 2 offshore wind farm
IMF Baltica 3	Offshore wind farm Baltica 3

IMF BII	Offshore wind farm Baltic II
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF BP	North Baltic offshore wind farm
Natura 2000	Network of EU nature conservation areas
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings concluded with the issuance of the Environmental Decision
EIA	Environmental impact assessment
CSO	Natura 2000 Special Bird Protection Area
SCI	Area of Community Importance, protected under the Natura 2000 network
PBR	Potentially Biological Removal (PBR) safe level of extraction
PGE	Polish Energy Group
POM	Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of updating the conditions for implementation and operation of the Project - OWF BIII, for which the Environmental Decision was issued, on migratory birds is included in Section 5.5 of Volume VI of the Report.

2. Introduction

This Section of the Report assesses the potential impacts of the proposed updates and refinements to the conditions for implementation and operation of the Project - BIII OWF on migratory birds.

It is based on the research and analysis and findings made for the impact assessment done in the 2015 Report. It should be pointed out here that these data remain valid for the variant indicated for implementation under the Environmental Decision. In the case of the variant proposed for implementation on the basis of an amendment to the Environmental Decision, they should also be considered adequate, which is due to the fact that the scale of the planned Project changes, where its parameters related to the number of wind turbines are reduced by 50% in relation to the Environmental Decision, and the vast majority of parameters remain the same, and some of those identified as possible are clarified, such as the method of foundation.

The assessment was based on surveys of birds flying over the BII offshore wind farm area, conducted by DHI from anchored vessels during spring and fall migrations in 2013. These comprehensive surveys included daily visual observations, daytime (horizontal radar) and nighttime (vertical radar) radar surveys, and nighttime listening for migratory birds. The results of the above studies are described in the 2015 Report, as well as in Section 9 of Volume III of the EIA.

The above-mentioned studies were part of a comprehensive pre-investment marine environmental research program that was conducted between 2012 and 2014 for the proposed wind farm.

Subsequently, for the purpose of this Report, an Impact Assessment on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII") was prepared (Appendix S), which was performed by Prof. Piotr Tryjanowski, Andrzej Luczak and Agata Gawlik. It constitutes an additional, supplementary study, which in essence does not change the results of the assessment carried out in the 2015 Report (Appendix R), but allows estimating the positive effect of the modifications proposed as part of the amendment to the Environmental Decision.

The full expert reports, in their original language version, are available as appendices to the Report.

3. Description of the planned project

The parameters of the BIII OWF that are relevant to the assessment of the project's impact on migratory birds are:

- farm location,
- area of the farm - total and buildable,

- power plants - number, dimensions (including, in particular, clearance between the sea surface and the lower wing position, tower height and rotor diameter).

3.1. Basic parameters of the project

Currently, the project planned for implementation is defined by the decision of the RDEP dated July 7, 2016, marked RDOŚ-Gd-WOO.4211.12.2015.KP.22. With regard to the conditions for implementation of the Project as defined by the Environmental Decision, its key parameters, which were the source of impacts on migratory birds in 2015, have significantly decreased (such as the maximum number of power plants or the total rotor zone) or remained unchanged (the coastal parameters of the power plants - the maximum total height of the power plants above sea level, the minimum clearance between the lower position of the wing and the sea surface, and the maximum rotor diameter).

Table 1. Technical parameters of the BIII OWF relevant to the assessment of the impact on migratory birds

Parameter	The variant chosen for implementation specified in the Environmental Decision	Variant to be implemented under the revised Environmental Decision
Maximum total height of the power plant above sea level. [m]	275 m	310 m
Minimum clearance between the bottom position of the wing and the sea surface [m]	20 m	20 m
Maximum rotor radius [m]	100 m	125 m
Maximum rotor diameter [m]	200 m	250 m
Maximum number of power plants [pcs.]	120 pcs.	60 pcs.
Maximum zone of a single rotor [m^2]	31 400^{m2}	49 088^{m2}
Maximum total rotor area [m^2]	3 768 000^{m2}	2 945 280^{m2}
Maximum number of foundations of supporting infrastructure [pcs]	6	1
Maximum cable length of internal farm connection infrastructure [km]	200 km	200 km

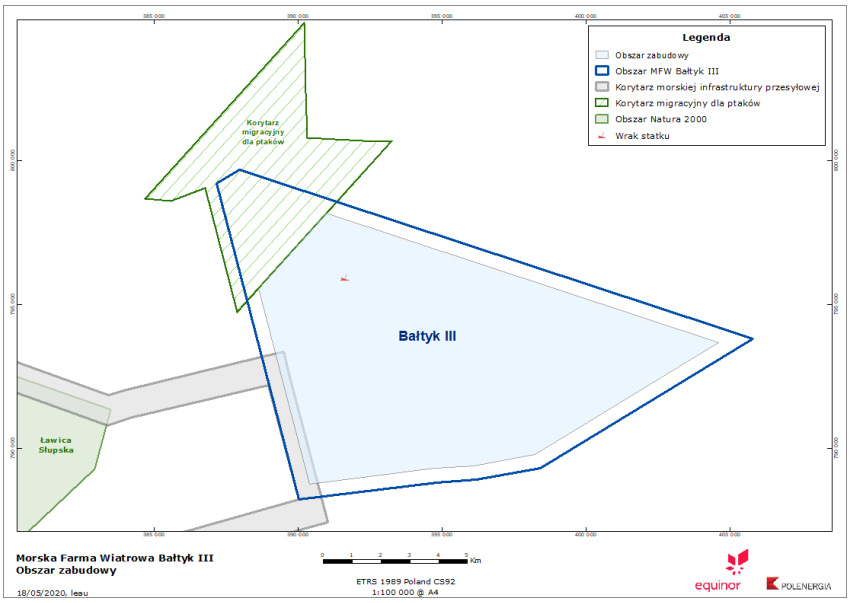
Source: own elaboration

The boundaries of the Project area and the boundaries of the development area[1], including the wind turbine development area, are shown in Figure 1 below. The area of power plant development was

[1] The development area is understood as the area inside which all elements of the Project will be located, in the case of wind turbines designated by the range of rotors.

determined taking into account the maximum considered rotor radius of 125 meters. It should be noted here that regardless of the final parameters of the wind turbines selected for the BIII OWF project, their foundations will not be located closer than about 6 km from the boundaries of the Slupsk Shoal Natura 2000 area (in the western part of the farm area). In the northwestern part of OWF BIII, in the currently assumed variant, the area for farm development will be limited, leaving an exclusion zone that constitutes a migration corridor for birds with a width of about 5 km.

Figure 1. Offshore wind farm Central Baltic III.

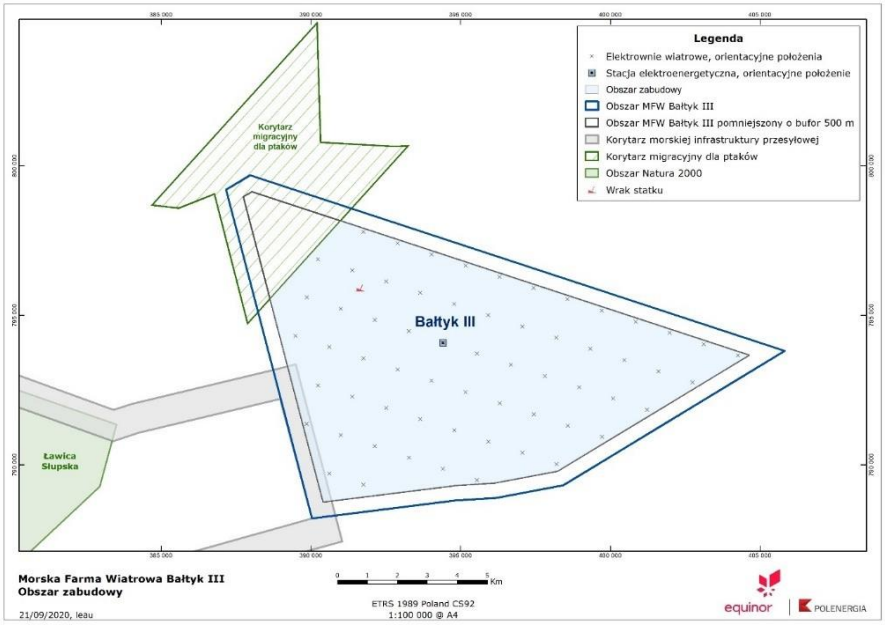


Korytarz migracyjny dla ptaków	Migration corridor for birds
Ławica Słupska	Slupsk Shoal
Bałtyk III	Baltic III
Legenda	Legend
Obszar zabudowy	Development area
Obszar MFW Bałtyk III	Baltic III offshore wind farm area
Korytarz morskiej infrastruktury przesyłowej	Offshore transmission infrastructure corridor
Korytarz migracyjny dla ptaków	Migration corridor for birds
Obszar Natura 2000	Natura 2000 area
Wrak statku	Shipwreck
Morska Farma Wiatrowa Bałtyk III Obszar zabudowy	Offshore Wind Farm Baltic III Development area

Source: materials based on Investor's data

For the planned Project in the variant selected for implementation, a preliminary spacing of the wind farm elements (development plan) was developed, shown on Error! The source of the reference cannot be found. below.

Figure 2. Planned spacing of elements of the Project constituting the Central Baltic III offshore wind farm in the variant selected for implementation assuming the construction of the maximum number of power plants requested (development plan).



Korytarz migracyjny dla ptaków	Migration corridor for birds
Ławica Słupska	Slupsk Shoal
Bałtyk III	Baltic III
Legenda	Legend
Elektrownie wiatrowe, orientacyjne położenia	Wind power plants, approximate locations
Stacja elektroenergetyczna, orientacyjne położenie	Electricity substation, approximate location
Obszar zabudowy	Development area
Obszar MFW Bałtyk III pomniejszony o bufor 500 m	The area of the offshore wind farm Baltic III reduced by a buffer of 500 m
Obszar MFW Bałtyk III	Baltic III offshore wind farm area
Korytarz morskiej infrastruktury przesyłowej	Offshore transmission infrastructure corridor
Korytarz migracyjny dla ptaków	Migration corridor for birds
Obszar Natura 2000	Natura 2000 area
Wrak statku	Shipwreck
Morska Farma Wiatrowa Bałtyk III Obszar zabudowy	Offshore Wind Farm Baltic III Development area

Source: materials based on Investor's data

3.2. Projects whose impacts may cumulate with those of OWF BIII on migratory birds

There are or are being designed other projects in the project area that could potentially, along with the BII OWF, cause cumulative impacts on migratory birds.

At the beginning of this chapter, it is necessary to clarify how cumulative impacts are understood in the report. Three types of it can be distinguished:

1) the cumulation of the same impacts within the BIII OWF,

2) accumulation of various impacts within the BIII OWF,

3) the cumulation of the same or different impacts of the BIII OWF and other projects.

An example of the cumulative effect of the same impacts within a project could be the barrier effect caused by ships installing elements of wind farm foundations and laying connecting cables to power plants already sited.

As an example of the accumulation of different impacts within the BIII offshore wind farm, the simultaneous operation of the aforementioned dredgers and the laying of power cables by a cable-laying vessel can be given as an example

On the other hand, the third type of accumulation is the subject of this chapter and the "evaluation" chapters

9.1.3 (construction stage), 9.2.3 (operation stage) and 9.3.3 (decommissioning stage).

The current analysis of cumulative impacts on migratory birds took into account the following issues.

First, a collision analysis was performed for several wind farm development scenarios in the project area, as described in Section 13, Volume II of the EIA. These scenarios apply to IMF projects: BSIII, BSII, Baltica 3, Baltica 2 which are likely to be implemented in the near future (their owners have conditions for connection to the network, and for some of them applications for an environmental decision have been submitted or they have such a decision).

Secondly - an additional, simplified collision analysis was performed, which took into account the 4 above-mentioned OWF projects and additionally the Baltic Power OWF, which borders from the east directly with the 4 above-mentioned projects, forming one "group" of farms located at the northeastern part of the Slupsk Shoal (see map in section 9.2.4. below).

Table 2 List of offshore wind farms considered in the cumulative impact assessment

Lp.	Type and name of the project	Distance from IMF BII	Basic parameters, relevant to the assessment of cumulative impacts	Status
1.	IMF BSII	a minimum of about 17 km, in a northwest direction	Up to 60 wind power plants. Expected completion date 2025-28	The investment has received an environmental decision
2.	IMF Baltica (Baltica 2 and Baltica 3)	in the immediate vicinity of Baltica 3 to the north, Baltica 2 to the northwest	90 Baltica 3 wind power plants, 119 Baltica 2 wind power plants, expected completion date - 2023-25 Baltica 3 and 2025-28 Baltica 2	Projected investment - PSZW issued and paid for; Project has DSU: The project has connection conditions and a connection agreement for up to 1.045 GW (1,045

Lp.	Type and name of the project	Distance from IMF BII	Basic parameters, relevant to the assessment of cumulative impacts	Status
				MW) of power in the Baltica 3 range
3.	Baltic Power OWF	approx. 8 km, in the eastern direction (taking into account the corridor left between the two farms)	126 wind power plants, expected completion date 2028-30	Projected development - PSZW issued and paid for; Project has DSUs
4.	IMF C-Wind	approx. 20 km in the eastern direction	41 wind power plants, expected completion date 2028-30	Projected investment - PSZW issued and paid for; Investment at the stage of obtaining DSUs
5.	FEW Baltic II	a minimum of about 30 km, in a northwest direction	44 wind power plants, expected completion date 2028-30	Projected development - PSZW issued and paid for; Project has DSUs

Source: documentation of the aforementioned projects, made available as public information or environmental information

The 2015 Report indicated that a group of three projects farther north, on the border of the Polish EEZ, at the southern Central Shoal, were also considered in the barrier effect analyses, including two Polish projects, the Baltic I OWF (its implementation is currently suspended) and Baltica 1, and one Swedish project, the Södra Midsjöbanken OWF, whose scale has been significantly reduced. At this stage, these projects have not been included in the assessment of cumulative impacts due to their location and scale, which has been limited. Given the migration of birds along the northeast-southwest axis, it is unlikely that birds on their route will encounter obstacles located in the area where the Project is to be implemented and the area located to the north, so the cumulative effect of the barrier may only be partial, rather than considering all planned OWFs together. It should be expected that the probable avoidance by birds of the southern area is similar to the northern area.

At this point, it should be pointed out that the main migratory routes of birds are in the southwest-northeast directions. Across these directions, during the lifetime of the BIII offshore wind farm, the BII offshore wind farm, Baltica 3 and 2 offshore wind farms, Baltic Power offshore wind farm, and Baltic II offshore wind farm may also operate directly in its vicinity. However, the planned area for the development of these OWFs leaves more than 20 kilometers of undeveloped marine area along the coast to the south, where the main migration corridor runs, and more than 30 kilometers of corridor to the north, between other OWF projects being prepared on the southern slope of the Central Shoal. This means that the cumulative effect of the barrier on birds migrating from Eurasian areas to areas in western and west-southern Europe will not be significant.

In addition, a gap of about 8 km has been maintained between the BIII OWF and the Baltic Power farm, which can act as a migration corridor.

In relation to birds wintering in areas of the Southern Baltic, such as Slupsk Shoal, Odrzanska Shoal or the coastal strip of Polish marine areas, an uninterrupted string of 4-6 projects on the northeastern slope of Slupsk Shoal may be a barrier to populations migrating to and from these wintering areas.

4. Existing pressures anthropogenic

Helcom (2010a) compiled a list of anthropogenic pressures occurring in the Baltic Sea. For the Arkona Basin and the Bornholm Basin (and to some extent the Gulf of Gdansk), which are the areas closest to the Slupsk Shoal, the most important anthropogenic pressures (which are not necessarily the most important factors determining the distribution of birds) specific to these areas are:

- fishing by bottom trawling, fishing with gill nets, surface trawling and at medium depths, fishing with inshore stationary fishing gear (standing nets, beetles),
- introduction of nutrients (nitrogen and phosphorus) and heavy metals (lead and cadmium),
- introduction of organic matter from rivers,
- underwater noise generated by ships (coastal areas and open waters),
- hunting,
- climate change.

Of the above factors, most will primarily affect seabirds. Impacts on migratory birds may be mainly from hunting and climate change. They are discussed below. Other anthropogenic pressures are discussed in the chapter on seabirds.

4.1. Hunting

Recreational hunting affects virtually all waterbirds (swans, geese, ducks) migrating in the Baltic Sea region. According to Danish hunting statistics, the number of eiders killed each year has declined since the mid-1980s, from 190,000 birds killed in 1982 to 47,700 killed in 2009[2]. In 2007, a total of 66,350 eider were killed in the Baltic Sea (Skov et al. 2011), representing 8.7% of the winter population (760,000 individuals) (Desholm et al. 2002). A large part of the culls in Germany and Denmark were wintering gulls from the Baltic Sea area. In Germany, about 90% of the shooting of migrating woodcocks takes place in the north of the country, with the birds mainly breeding in Scandinavia (IfAÖ 2010). Cormorant populations in Estonia, Germany, Finland and Sweden are declining annually. In 2006, between 10,000 and 15,000 cormorants were shot (HELCOM 2009). About 6,000 cormorants are shot in Poland each year (CSO 2013).

[2] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In Poland, 10,929 wild geese and 105,072 wild ducks were shot in the 2013/2014 season, according to the Polish Hunting Association. In the Pomeranian and West Pomeranian provinces alone, the numbers were as follows:

- gdansk district - goose 272 pcs, duck 2868 pcs,
- słupsk district - goose 252 pcs, duck 1343 pcs,
- koszalin district - goose 177 pcs, duck 1569 pcs,
- szczecin district - goose 2013 pcs, duck 1091 pcs.

4.2. Changes climate

Like all other species, seabirds have adapted to local environments under current climatic conditions, and it can be inferred that they will adapt to global climate change if it is gradual. Recent studies show that the potential breeding areas of many European bird species are likely to shift hundreds of kilometers to the northeast (Huntley et al. 2007). The distribution of waterbirds outside the breeding season, like the distribution of breeding areas, will depend on changes in climatic conditions, as well as the availability of food and possible disturbances (np. Huntley et al. 2006, 2008, Doswald et al. 2009). It is predicted that with current climate change trends, the distribution of many waterbird species outside the breeding season will shift northward (FEBI 2013b).

The impact of climate change on the project is discussed further in Section 14 of Volume II of the report.

5. Description of anticipated effects on the environment if the project is not undertaken project

This chapter analyzes the effects on migratory birds if the project is not undertaken. In doing so, three scenarios were considered:

- offshore wind energy will not develop in Polish maritime areas, and therefore the project under assessment or similar projects, including the mining industry, will not be implemented, offshore wind energy will develop in Polish maritime areas, but the project under assessment - BIII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind power are not being made, but the mining industry is developing.

The results of the analysis are shown in the table below.

Table 3. Effects on migratory birds if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy will not be developed	The zero option is to not undertake the investment. In this variant, all basic elements of the natural environment, including avifauna, will remain unchanged from the existing state. A detailed description of

Lp.	Script	Environmental implications
		the status quo can be found in the study "Pre-investment monitoring of birds flying over the area of the offshore wind farm Central Baltic III. Final Report with Study Results" (Volume III Section 9 of the EIA).
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	The case where offshore wind energy will be developed, but OWF BIII will not be implemented, can be compared to the situation of cumulative impact with other farms. It was evaluated in Chapter 9.
3.	Offshore wind power will not develop, but mining industry will grow	If wind energy is not developed in Polish maritime areas, but the mining industry is, there will be bird scaring and displacement caused by ship traffic and mining operations. However, this will mainly affect seabirds residing at least temporarily in the area of such works, rather than migratory birds that will only fly over the mining installations. Impacts on migratory birds will be negligible in most cases, as most of them will be able to bypass the working vessels incurring minimal additional energy costs. However, there may be a few collisions, primarily of night-migrating passerines, which may be attracted to the lights.

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

6. Assessment methodology impact

The project's impact assessment was conducted in accordance with the framework methodology adopted by the project, as described in Section 5 of Volume I of the Report, with certain modifications or refinements, as discussed below.

6.1. Framework methodology for assessing impact

For the current analysis, the results of surveys of birds flying over the BII offshore wind farm area conducted by DHI from anchored vessels during spring and autumn migrations in 2013 were used, supported by citations of relevant literature, which is indicated at the end of this Report. The indicated survey results formed the basis for the impact assessments on migratory birds by DHI and ENINA, which were used to prepare the 2015 Report and this Report. It should be noted, however, that the analysis in this Report is also based on the assessment performed by ENINA (2022) for the Project variant currently proposed for implementation under the amendment to the Environmental Decision.

6.2. Modifications or refinement of the framework methodology evaluation

6.2.1. Determine the vulnerability of migratory birds to the impacts of the OWF

The sensitivity of individual migratory bird species to the impact of offshore wind farms was adapted from Langston (2010) and the European Commission's Wind Energy Developments and Natura 2000 guidelines (European Union 2011). See section 8.2 below for details.

6.2.2. Assessment of the scale of impact

For the purposes of the assessment of impacts on birds, the definitions of the scale of impacts, as defined in the framework assessment methodology (cf. Section 4.3.6. in Section 5 of Volume I of the report), were refined. For clarity and consistency of assessment, they were assigned specific, albeit somewhat arbitrary values, indicating the percentage of the population affected. The specific values or thresholds were based on the 1% criterion used to identify concentrations of waterbirds of international importance, which was first used in the Ramsar Convention (Ramsar Convention Bureau 1988) and subsequently used worldwide in assessing the importance of a site for waterbirds. The 1% threshold logically follows from the 1% criterion and refers to the number of birds that is equal to the nominal 1% population size for site selection purposes.

Table 4. Criteria for assessing the scale of impact

Scale of impact (Original definition from Section 4.3.6. in Section 5 of Volume I of the report).	Scale of impact (definition expanded for the purposes of bird impact assessment)
local - impact on locally significant populations/socio-economic elements	< 0.1% of the relevant biogeographic population exposed
regional - impact on regionally significant populations/socio-economic elements	≥ 0.1% but < 0.5% of the relevant biogeographical population, exposed
national - impact on populations/socio-economic elements of national importance	≥ 0.5% but < 1% of the relevant biogeographic population exposed
international - impact on internationally significant populations/socio-economic elements	≥ 1% of the relevant biogeographic population exposed to the impact

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

6.2.3. Evaluation of the duration impact

The following refinements to this category have been made:

a) temporary - an impact that ceases when the activity that is the source of the impact ends, and the receptor of the impact returns to its initial state with the cessation of the activity that was the source of the impact; also intermittent, sporadic impacts,

b) short-term - a time-limited impact that does not cease with the termination of the activity that gave rise to it and persists for no more than 1 year/vegetation cycle after the end of that activity,

c) medium-term - a time-limited impact that persists from 1 year/vegetation cycle to 3 years/vegetation cycle after the cessation of the activity that gave rise to it; also an intermittent, sporadic impact regularly recurring over an extended period of time (e.g., seasonal disturbances). For the purposes of assessing the impact on birds, medium-term impact is understood as lasting from 1 to 3 years,

d) long-term - an impact that persists for more than 3 years/vegetation cycles from the cessation of the activity that gave rise to it, or an impact that causes permanent changes in the affected resources that persist after the end of operation. For the purpose of assessing the impact on birds, long-term impact is understood as lasting more than 3 years.

6.2.4. Matrix for assessing the magnitude and significance impact

Classification of the magnitude of the impact was made into one of 5 categories: no change, insignificant, small, moderate, large, according to the standard matrix adopted in the report, unless more direct and quantifiable evidence is available. For example, in the following section of the report, it is proven that the extension of bird migration routes resulting from the bypassing of the wind farm barrier results in the extension of migration routes and energy expenditure of negligible value, and thus the significance of the impact of the barrier effect is negligible or small.

A standard matrix for assessing the magnitude of the impact was used in classifying the significance of the impact. Significant impacts include those impacts from the large and very large categories that cause long-term, irreversible deterioration of the environment or an element of it that threatens its proper functioning.

It was assumed that if significant impacts were identified for a species, additional analysis would be conducted to verify that the formal assessment criteria were biologically sensitive. Possible additional analysis may include detailed analysis of literature data, bioenergetic calculations, habitat modeling, demographic analysis.

6.2.5. DHI's collision risk assessment of migratory birds

In the 2015 Report, a collision risk assessment of migratory birds was performed by DHI. In this analysis, the commonly used Band collision risk model (Band, 2012) was used to determine the collision risk of individual bird species. "The "basic" Band model (Band, 2000; Band et al., 2007), created for onshore wind farms, was developed in 2012 to better fit seabird analyses for offshore wind farms. The updated model has been dubbed the "extended Banda model." In this study, an extended version of the model was applied to three species of sea ducks for which there is sufficient data to determine the frequency distribution of flight heights at 1 m intervals. For the remaining species, the "basic Band model" was used, and both models were calibrated according to guidelines (Band, 2012) and spreadsheets available at: http://www.bto.org/science/wetland-and-marine/soss/projects.

Estimating the risk of collision requires quantitative data on birds, as well as information on individual turbines and wind farm parameters. Next, collision risk estimation relies on a series of assumptions. First, it is assumed that the probability of collision with the rotor depends only on the size of the bird

(wingspan and area), the range and angle of the blade, the speed of the rotor and the speed of the bird. To facilitate calculations, it was assumed that the bird has a simplified cruciform shape, that the wings are halfway from the beak to the tail, the rotor blade has a width and blade angle but no thickness, and the bird's flight will not be affected by potentially hazardous events (so-called "near misses"), despite the airflow around the rotor blades. It was further assumed that birds fly through the turbine at 90 degrees, even if they approach the rotor diagonally. This is justified by the fact that the reduction in the area crossed and the increase in the time required for the bird to cross the rotor plane during oblique flight probably cancel each other out (Band, 2012).

Band (2012) describes the model in six stages:

- Stage A - collects data on the number of migrating birds that have not moved from the wind farm area, are not avoiding it, or have been attracted to the wind farm area by curiosity and are potentially at risk of collision,
- Stage B - uses bird activity data to estimate the potential number of birds flying through the wind farm's rotors,
- Stage C - calculates the risk of collision for the passage through the rotor of a single individual,
- Stage D - multiplies the above to obtain the potential collision mortality rate for bird species, taking proportional account of the time the turbines are not operating, assuming current use and no avoidance,
- Stage E - allows consideration of the contribution of birds that are most likely to avoid the wind farm or turbines, for the reason that they have moved out of the area or will be wiped out; takes into account the attraction of birds by the wind farm, e.g. due to habitat change,
- Stage F - expresses the uncertainty of the collision risk analysis carried out in this way.

Details of the species-specific input and output data of the Banda (2012) collision risk model. This study, although it was the analysis tool for the evaluation of the option selected for implementation and confirmed by the Environmental Decision in the 2015 Report, can be used for comparison with the current assumptions made for this Report. As indicated earlier, the current collision assessment, relevant to the scope of the Project in the currently proposed variant, was performed by ENINA 2022 and in its findings refers to the findings of the assessment performed by DHI in the 2014 Report and the ENINA2015 anlysis.

The assessment by ENINA (2022) forms the basis for collision analyses and impact assessments on migratory birds.

The DHI Report will serve as a source of information, data and findings that remain relevant to the evaluation conducted as part of this Report.

6.2.6. Migratory bird collision risk assessment performed by ENINA

For the purpose of assessing the impact on birds as a result of the collision with the BIII OWF, two assessments were performed by ENINE, which were based on the results of the DHI Report.

The first is the assessment that was performed for the 2015 Report (ENINA2015) - which is Appendix P to the Report - referred to the scope of the Project as it was then covered by the DSU application, as well as the then-reasonable alternative, and assumed at the time the construction of 120 to 200 turbines characterized by different rotor suspension heights and diameters.

The second evaluation was performed in 2022. (ENINA 2022) - it is attached as Appendix S to the Report. This assessment assumes the realization of the Project consisting in the construction of the offshore wind farm OWF Baltic III, where the number of turbines planned for construction is reduced in relation to the variant for which the Environmental Decision was issued and which assumed a maximum of 120 wind turbines. It currently assumes the construction of a maximum of 60 turbines. The current analysis also considered cumulative impacts and assessed the impact of the planned project on local bird populations and nearby Natura 2000 sites.

Both assessments were based on the same methodological assumptions, with the caveat that the 2022 assessment took into account the current level of knowledge about migratory birds, as well as information available from documents and assessments conducted for other offshore wind farm projects, which was particularly important for assessing collision resulting from the cumulative impact of other wind farms.

In describing the cumulative impact during the 2022 analyses, the collision results contained in:

Report on the environmental impact of the Baltic Power offshore wind farm. Appendix 4 - assessment of the impact of the Baltic Power OWF on migratory birds in relation to the barrier effect and collision risk based on model calculations (July 2020).

Appendix No. 4 - Assessment of the impact of the Baltic offshore wind farm on migratory birds in relation to the barrier effect and collision risk based on model calculations (November 2017).

Environmental Impact Report for the FEW Baltic II Offshore Wind Farm - Volume III Environmental Impact Assessment (September 25, 2019).

Assessment of the impact on migratory birds of the project to build the offshore wind farm Baltic II ("OWF BII") (August 10, 2020).

Report on the environmental impact of the BC-WIND offshore wind farm (October 2021).

Evaluating the impact of wind farms (WFs) on birds is one of the key issues assessed by predicting bird-rotor collisions. In the case of the proposed BII offshore wind farm, Band's model, dedicated to offshore wind farms (Band 2000, 2012), which is commonly used in the British Isles, was used for migrants. A spreadsheet was used to calculate bird flux and collision probability https://www.bto.org/our-science/wetland-and-marine/soss/projects in which the full procedure of the Band model was implanted.

The execution of the calculation here consists of three steps:

Stage I - is based on estimating the number of birds flying through the farm area and calculating the proportion of birds moving at collision height. The above calculations are made on the basis of the results of bird counts in the area of the planned farm. The study in question used the DHI report's (DHI 2015) estimated bird passage from the spring and fall migration periods.

Based on information from DHI studies (DHI 2015) and the POMARINUS Group report (Kosmicki 2015), the proportion of birds moving at collision height ("M" models) was calculated.

The literature indicates that certain bird species migrate at night (King et al. 2009), so not including this fraction of birds would underestimate the real number of birds flying through the project area. In order to make the actual condition more realistic and to make the models more pessimistic, the authors proposed multiplying the estimated abundance by the nocturnal activity factor (King et al. 2009), which gives certain ranks to nocturnal activity from 1 to 5. The aforementioned ranks of the degree of migration, respectively, can be expressed as a percentage: 0%, 25%, 50%, 75% and 100% which all correspond to daily activity (Band 2012).

For the model, it is necessary to specify the technical parameters of the power plant, i.e. the width of the migration corridor, the number of windmills, the height of their tower and the radius of the rotor in order to calculate what fraction of birds will come within range of the rotor arms.

Stage II - is based on predicting the probability of collision risk of birds that have come within the rotor work. The calculation uses turbine parameters such as the number of rotor blades, the width of the blade at its widest point, the radius of the rotor, the angle of inclination of the rotor plane, the average speed of rotation, the average percentage operating time, and parameters describing the morphology of birds and their flight: length, wingspan, speed, mode of flight: gliding or active.

Stage III - adopting the appropriate degree of avoidance and estimating the uncertainty of the obtained result. The avoidance rate is determined by actual mortality. It tells how many birds in the area of the farm will miss working wind turbines (SNH 2010). For species or groups of species already studied as to this phenomenon, the avoidance rates in Table 6 were adopted.

Table 5. Recommended avoidance rates for different species or groups of species taken from the study (Maclean et al. 2009, SNH 2017, Skov et al. 2018).

Avoidance rate (WU)	Species/Group of species
99.0%	Terns, common cormorant, ducks, grebes, common puffin,
99.5%	Alki, gulls, common loon, divers, swans,
99.80%	Geese, other large gulls
99.9%	Fulmar, beached, silver gull

When empirical data on farm avoidance are lacking, a factor of 98% is recommended (SNH 2010, Cook et al. 2012). In addition, as recommended, collision values were given at different levels of the avoidance factor, i.e.: 95%, 98%, 99%, 99.5% (Band 2012).

The range of uncertainty in the estimated result was calculated from the formula: $\sqrt{(u1^2 + u2^2 + u3^2 + u42^2)}$ where $u1$, $u2$, $u3$, and $u42$, are the accepted uncertainties from the following sources, respectively:

1) the number of bird migration,
2) nighttime bird activity,
3) the proportion of birds flying at collision altitudes,
4) collision model.

Table 6. Technical data of turbines and OWF, which were used in the collision analyses (ENINA 2022) - consistent with the variant to be implemented under the amended Environmental Decision

The venture after modification		
The width of the analyzed corridor along the migration route		14
Number of turbines		60
Turbine power	MW	> 12 MW
Number of blades		3
Average speed	rpm	10
Rotor radius	m	125
Tower height	m	175
Average operating time	%	90
Clearance		20
Maximum height		275
Blade width	m	7.0
Rotor angle	°	10

Source: Tryjanowski P.,Łuczak A., Gawlik A.,Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project consisting in the construction of the Maritime Wind Farm Bałtyk Środkowy III", ENINA, Poznań, 2022.

Regarding the data that ENINA 2022 used for the assessment, it should be pointed out that compared to the assumptions for the assessment made in the 2015 Report, they remain valid except for the number of turbines, which has been reduced to 60.

The ornithological data used in the assessment is presented in the table below. The ornithological data used in the analyses are also available in ENINA's expert study, an electronic version of which is attached to this Section of the Report - Appendix S.

Table 7. Parameters characterizing selected bird species for different variants of the planned wind farm

Parameters	Gavia sp.	C. hyemalis	M. nigra	M. fusca	A. penelope	Anserini	Cygnus sp.	A. torda	P. carbo	L. minutus	P. apricaria	L. ridibundus	G. grus	C. palumbus
Bird parameters														
Length [m][a]	0.63	0.44	0.49	0.54	0.48	0.76	1.52	0.38	0.9	0.26	0.28	0.36	1.15	0.41
Span [m][a]	1.16	0.76	0.845	0.94	0.8	1.57	2.265	0.66	1.45	0.78	0.72	1.05	2.32	0.78
Speed [m/s][c]	18.6	27.8	22.1	20.1	20.6	16.8	16.8	16	15.2	11.5	17,9b	11.9	14.3	17
Nocturnal activity (1-5)[d]	1	3	3	3	5	5(1)I	5	1	1	2	5	2	n.a.	n.a.
Type of flight	slide.	acts.	acts.	acts.	acts.	acts.	acts.	acts.	acts.	acts.	acts.	acts.	acts.	acts.
Proportion of birds at collision height in different variants*														
Variant indicated for implementation in the Environmental Decision	0.43	0.01/0.002	0.17	0.19	0.59	0.93	0.3	0.004	0.62	0.17	0.96	0.19	0.65	0.34
Prop. of birds against the wind	0.39	0,34/0,50	0.17	0.47	0.67	0.13	0.77	0.80	0.12	0.24	0.04	0.83	0.37	0.09
Uncertainty used in the model resulting from:														
The flight of birds	0.2	0,07/0,53	0.22	0.19	0.14	0.19	0,[18g]	0.27	0,[18g]	0,[18g]	0,[18g]	0,[18g]	0,[5f]	0,[5f]
nocturnal activity	0	0.08	0.08	0.08	0.08	-	-	-	-	0.08	0.08	0.08	-	-
overflight in the colic zone.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Collision model	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total uncertainty	0.38	0,34//0,62	0.40	0.38	0.36	0.37	0.37	0.42	0.37	0.38	0.38	0.38	0.59	0.59

Explanations:

a - (Perrins 1998), b - data for Pluvialis apricaria, c - (Alerstam et al. 2007) , d - (King et al. 2009), e - (Cook et al. 2012), f - due to lack of data on nocturnal activity, increased uncertainty due to bird passage to 0.5, g - due to lack of data, an average value calculated based on uncertainty of bird passage from species where these values were reported, h - *according to radar input, i - assumed as 1 because according to. (Griffin et al. 2011). birds migrate above collision height at night.

Source: Tryjanowski P. Łuczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III ENINA, Poznań, 2022.

The updated collision analyses took into account previous data available at the 2015 Report stage, with the proviso that for the purposes of amending the Environmental Decision, they were revised with the current level of knowledge about the projects included in the assessment. The following offshore wind farms were considered in the analyses of cumulative impacts:

- Baltic Power;
- Baltica 2 and 3;
- FEW Baltic II;
- IMF BII;
- C-WIND.

The assessment of cumulative impacts made in the 2015 Report was performed in the marine area for a power plant consisting of (depending on the variant) 120 to 200 turbines characterized by different rotor suspension heights. Cumulative impacts were also taken into account and the impact of the planned project on local bird populations and nearby Natura 2000 sites was assessed. The authors of the ENINA 2022 assessment decided to use values calculated on the basis of the avoidance factor recommended for the species based on (Maclean et al., 2009) for comparison. In addition, the table shows the total projected mortality determined for the project in question and for the farms planned for the area. It should also be emphasized that the ENINA 2022 assessment did not present the impacts of the variant approved by the Environmental Decision (these are included in the ENINA 2015 analysis and remain valid) and the currently proposed variant of the Project after its actulization. Such an approach is also in line with the framework assessment methodology, as it provides a basis for comparing the impacts that may occur after the amendment of the Environmental Decision with those authorized by the Environmental Decision and currently considered to be the most far-reaching. The results of these analyses are shown in the table below.

Table 8. Predicted bird mortality from the cumulative impact of planned wind farms for the currently proposed Project variant

WR20	RWU (%)*	WR20 - 60 turbines	Wind farms planned for development in the area of the subject wind farm					Σ (WR20 - 60)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Alka Alca torda	99.50	0.01	0	0	0.00	0.00	0	0.0
Long-tailed duck Clangula hyemalis	99.00	0.04	1	2	0.00	0.75	0	3.8
Uhla Melanitta fusca	99.00	0.60	1	2	0.22	0.57	1	5.4
Marquise Melanitta nigra	99.00	1.32	2	3	0.77	2.74	0	9.8
Nur Gavia sp.	99.50	0.09	0	2	0.26	0.18	2	4.5
Anas penelope marmot	99.00	3.00	0	1	4.02	7.74	2	17.8
Anserini geese	99.80	6.55	56.0	4.0	21.2	3.0	4	94.7

WR20	RWU (%)*	WR20 - 60 turbines	Wind farms planned for development in the area of the subject wind farm					Σ (WR20 - 60)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Swans Cygnus sp.	99.50	0.25	0	0	0.00	0.45	0	0.7
Cormorant Phalacrocorax carbo	99.00	0.41	0	1	0.40	0.22	1	3.0
Lesser gull Larus minutus / Hydrocoleus minutus	99.50	0.09	1	3	1.34	0.13	1	6.6
Ridibundus Chroicocephalus ridibundus	99.50	0.13	0	5	0.19	0.44	0	5.8
Crane Grus grus	98.00	6.00	107	1	0.63	0.13	14	128.76
Columba palumbus mane	98.00	3.55	lack of data	lack of data	lack of data	lack of data	lack of data	lack of data
Golden plover Pluvialis apricaria	98.0	4.87	lack of data	lack of data	lack of data	lack of data	lack of data	lack of data

Source: Tryjanowski P. Łuczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III ENINA, Poznań, 2022.

The table below shows the results of cumulative impact mortality for the variant envisaged by the Environmental Decision. The results of the cumulative impact assessment in terms of mortality, compared to the impact assessed for the variant to be implemented after the amendment of this Decision, show that the assumed mortality in this case for most bird species considered is lower.

Table 9. Predicted bird mortality as a result of the cumulative impact of wind farms for the variant indicated in the Environmental Decision

WR20	RWU (%)*	WR20 - 120 Wind farms planned for construction in the turbine area of the subject wind farm						Σ (WR20-120)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Alka Alca torda	99.50	0.02	0	0	0.00	0.00	0	0.0
Long-tailed duck Clangula hyemalis	99.00	0.09	1	2	0.00	0.75	0	3.8
Uhla Melanitta fusca	99.00	1.93	1	2	0.22	0.57	1	6.7
Marquise Melanitta nigra	99.00	2.57	2	3	0.77	2.74	0	11.1
Nur Gavia sp.	99.50	0.32	0	2	0.26	0.18	2	4.8

WR20	RWU (%)*	WR20 - 120 Wind farms planned for construction in the turbine area of the subject wind farm						Σ (WR20-120)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Anas penelope marmot	99.00	6.70	0	1	4.02	7.74	2	21.5
Anserini geese	99.80	12,15a	56.0	4.0	21.2	3.0	4	100.3
Swans Cygnus sp.	99.50	0,78b	0	0	0.00	0.45	0	1.2
Cormorant Phalacrocorax carbo	99.00	0.75	0	1	0.40	0.22	1	3.4
Lesser gull Larus minutus / Hydrocoleus minutus	99.50	0.21	1	3	1.34	0.13	1	6.7
Ridibundus Chroicocephalus ridibundus	99.50	0.28	0	5	0.19	0.44	0	5.9
Crane Grus grus	98.00	10.78	107	1	0.63	0.13	14	133.5
Columba palumbus mane	98.00	4.27	lack of data	lack of data	lack of data	lack of data	lack of data	lack of data

*RWU (%) - real avoidance rate

Source: Own elaboration based on Tryjanowski P. Łuczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III ENINA, Poznań, 2022.

It should be pointed out here that since the issuance of the Environmental Decision, the preparation of other OWF projects has advanced. Environmental decisions have been obtained for all projects except C-WIND. All the identified projects provide for minimization measures to reduce the impact of the planned projects, especially from the point of view of cumulative impacts. The main two solutions for limiting impacts envisaged in the OWF projects are to move the area planned for the construction of the power plant away from the border of the Slupsk Shoal Natura 2000 area by a distance of no less than 5.5 km km for projects located in the immediate vicinity of this area, and to create free corridors, as well as the cumulative impacts of the offshore wind farms planned for construction will be limited thanks to the free corridors that will be created between them. It is assumed that the corridors will be about 5 km wide. The existence of corridors between farms adjacent to important areas for birds is indicated as one of the best and strongly recommended practices during the construction of this type of investments (Tryjanowski P. Łuczak A., Gawlik A., Ocena oddziaływania na ptaki migrowaćjące przedsięwzięcia polegający na budowa morskiej farmy wiatrowej Bałtyk Środkowy III ENINA, Poznań, 2022).

6.2.7. Evaluation of the effect of barriers

The impact of the construction of an OWF barrier on the movement and long-distance migration of seabirds, resulting in changes in migration routes, flight paths and heights, and thus their energy costs, is well described based on studies conducted for existing wind farms (Masden et al. 2009, 2010).

Monitoring at existing OWFs included visual and radar observations of behavioral responses of migratory birds to turbine structures. In the Baltic Sea, data on the response of individual species was collected at the Nysted wind farm. Waterbirds (ducks, geese, and auks) responded at a distance of 5 km from the turbines and generally changed their flight direction at a distance of 3 km from the wind farm (Petersen et al. 2006). At a distance of 1-2 km, more than 50% of the birds flying towards the wind farm abandoned flying through the area. Waterbirds that flew into the wind farm area minimized the risk of collisions by flying between the rows of turbines, often maintaining an even distance between the turbines, reducing flight heights below rotor height, and taking the shortest route to get out of the wind farm.

Studies conducted at the Nysted and Horns Rev 1 wind farms in Denmark have shown that OWFs are more avoided and evaded by migrating waterbirds than by those residing offshore (Blew et al. 2008). Significant numbers of sea ducks have been recorded in the vicinity of the wind farms, especially scoters at the Horns Rev OWF and eider at the Nysted OWF. Although ducks generally avoided crossing the boundaries of wind farms, single individuals and groups of individuals of this species were also found inside their areas. Birds of the genus Mellanitta also clearly avoided turbines in areas of Dutch OWFs (Leopold, et al. 2011). Extreme reactions, such as turning around when encountering a wind farm, were not observed. The birds avoided the offshore wind farms by flying above or around them (Pettersson 2005, Blew et al. 2008).

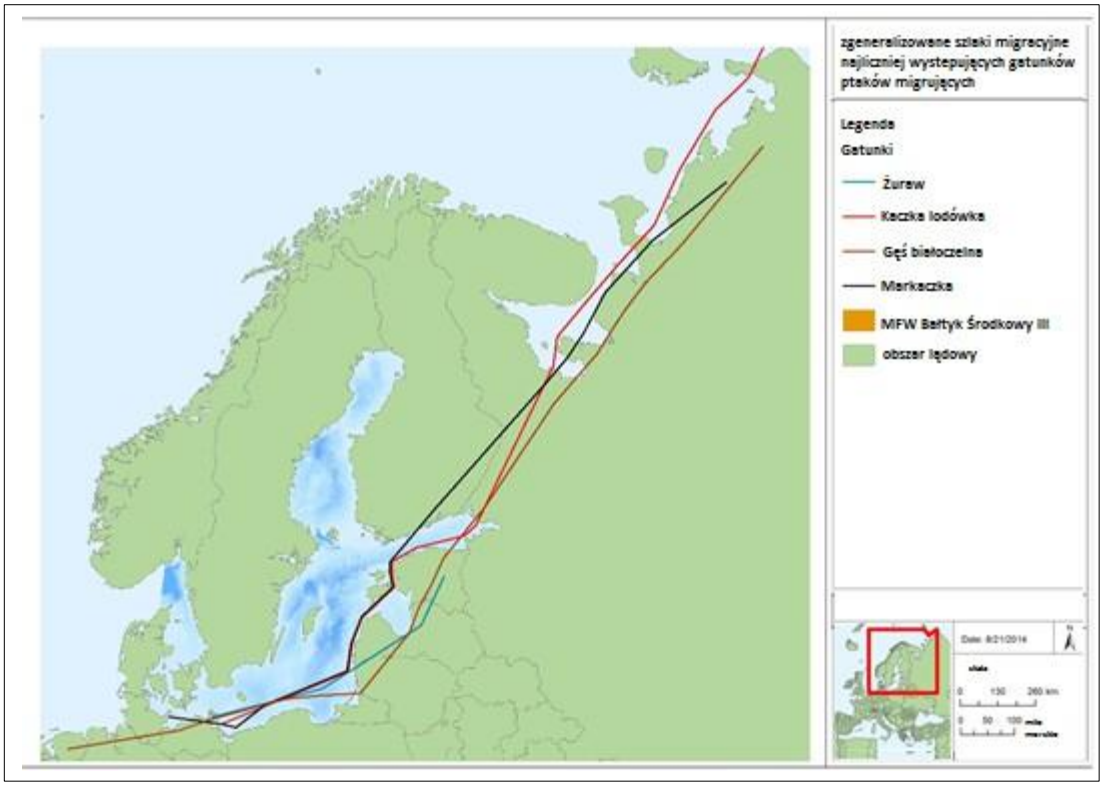
Masden et al. (2009, 2010) proved that the impact of the barrier effect is negligible for migrating eiderdowns. In this study, the same approach, described in Masden et al. (2009), was used to assess the barrier effect on the most abundant species or groups of migratory bird species found during surveys in the BII OWF basin: long-tailed ducks, scoters, cranes and geese. These bird species are also among the large, albeit different sized birds with active flight types, so it can be assumed that if there is a significant barrier effect on migratory birds, it will be noticed for at least some of the analyzed species.

At the stage of the 2015 Report, it was assumed that all variants of the BIII offshore wind farm project would result in the same barrier effect, since knowledge of the behavioral responses of birds does not allow to distinguish impacts according to the type of turbines or their density. The entire farm area will be perceived by incoming birds as an obstacle. The Enina 2022 Assessment, which forms the basis for the preparation of this Report assessing the scale of the impact on individual species in Section 9.2.2, provides an assessment of the barrier effect for the Project to the extent that it will be implemented under the amended Environmental Decision.

The basis for the assessment was first to determine the likely migration routes of the analyzed species before the start of construction. Long-tailed ducks, long-tailed ducks, scoters and geese used satellite telemetry data, which shows that long-tailed ducks move from the southern Baltic towards the Arctic part of Russia to the Kara Sea (long-tailed ducks migrate a slightly shorter distance, towards the Malozemelskaya Tundra, located in this area), see the study "Sea ducks in the Fehmarn Belt (southern Baltic)" at www.movebank.org. Since it is not known where the cranes arrive from, the migration direction was assumed to be from Estonia to the island of Rügen, which is home to a large number of individuals of the species during the autumn. There is also no publicly available telemetry data on geese, so migration routes were assumed for the most abundant species, the white-fronted goose, which moves between a key wintering area in the Netherlands and breeding grounds in the Russian Arctic (Malozemelskaya Tundra) (BirdLife International 2013). Detailed information on the nature and migration routes of individual species is described in the report with the results of surveys of birds flying

over the farm area (Volume III Section 9 of the EIA). All four migration routes have been simplified to represent the shortest routes between breeding and wintering grounds, take into account the habits of individual species (e.g., sea ducks fly mainly over water), and cross the BIII OWF area (see figure below). The same routes were adopted for spring and fall migrations. There are no studies that prove otherwise for the species analyzed.

Figure 3. Migration routes of the four most abundant migratory bird species



zgeneralizowane szlaki migracyjne najliczniej występujących gatunków ptaków migrujących	generalized migration routes of the most abundant migratory bird species
Legenda	Legend
Gatunki	Species
Żuraw	Crane
Kaczka lodówka	Long-tailed duck
Gęś białoczelna	White-fronted goose
Markaczka	Markaczka
MFW Bałtyk Środkowy III	OWF Central Baltic III
Obszar lądowy	Land area
Mile morskie	Sea miles
Skala	Scale
Data	Date

Source: Žydelis R. Thomsen F., Brogaard Buhl A., Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III OWF area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Migration routes were then modified by assuming that birds perceive the BII OWF area as a barrier and avoid the farm at a distance of 1-2 km. The difference between changing the route further south or north, or the difference between birds arriving from the northeast (autumn migrations) or southwest (spring migrations) was negligible, so a single flight path was considered representative. This was

followed by calculating the total energy cost of migration and the additional cost incurred due to bypassing the wind farm. Using Masden's approach (Masden et al. (2009)) energy cost modeling was performed using Flight 1.24 software (Pennycuick 2008). The model estimates flight costs based on aerodynamic principles. Data on wingspan and area were taken from Pennycuick et al. (2013) or Alerstam et al. (2007), and pre-migration weight from the same and other sources (see table below). It was assumed that cranes move in active flight, although when weather conditions are favorable, the species combines active flight with passive (gliding) flight over land. However, it is not known what type of flight prevails during migration, so it has been conservatively assumed that active flight prevails, which may be true in upwind flight over the water surface.

Table 10. Input data for migration modeling in Flight 1.24 software showing the most numerous bird species

Species/variable	Value	Reference source
Long-tailed duck		
Body weight	800 g	Own unpublished data, average weight of males and females before migration period
Wingspan	0,69 m	Pennycuick et al. (2013)
Wing area	0,058^{m2}	Pennycuick et al. (2013)
Cruising height	10 m	This study, the average amount of migration
Distance to target - without barriers	3,245 km	This study, see methodology
Markaczka		
Body weight	1200 g	Durinck et al. 1993, Kaiser et al. 2002
Wingspan	0,85 m	Alerstam et al. (2007)
Wing area	0,06816^{m2}	Alerstam et al. (2007)
Cruising height	10 m	This study, the average amount of migration
Distance to target - without barriers	2,840 km	This study, see methodology
Crane		
Body weight	5 607 g	Alerstam et al. (2007)
Wingspan	2 m	Alerstam et al. (2007)
Wing area	0,5857^{m2}	Alerstam et al. (2007)
Cruising height	200 m	This study, the average amount of migration
Distance to target - without barriers	974 km	This study, see methodology
White-fronted goose		
Body weight	2 450 g	Pennycuick et al. (2013)

Species/variable	Value	Reference source
Wingspan	1,38m	Pennycuick et al. (2013)
Wing area	0,239^{m2}	Pennycuick et al. (2013)
Cruising height	125 m	This study, the average amount of migration
Distance to target - without barriers	3,359 km	This study, see methodology

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with impact assessment of the variant selected for implementation and rational alternative", DHI Poland, Warsaw, 2015 per: Pennycuick 2007

The cumulative effect of the barrier was assessed using the same methodology as above, but assuming that migratory bird flyways bypass all the "southern group" farms (Baltic II, BII, BSIII, Baltica 2, Baltica 3, Baltic Power, C-Wind) instead of just Baltic BII. It was assumed that the flight paths around the "northern group" (Södra Midsjöbanken OWF, Baltic I OWF - formerly Baltic North OWF, Baltica 1 OWF) would be similar, so separate calculations were not carried out for them, especially since information on bird migrations in this area is not available.

6.2.8. Analysis of the safe level of yield (PBR)

A tool to predict the significance of additional mortality (Chylarecki et al., 2011) was also used in an auxiliary way to assess whether the projected collision of birds migrating over the farm area would be significant to their population. The model that allows such an assessment is the analysis of the biologically safe level of extraction (so-called "potential biological removal", PBR). It is, so to speak, a "top-down" method that tells you the safe level of additional mortality that the study populations may be exposed to. This method is widely used in fisheries and whaling, assessment of additional mortality on wind farms (Watts, 2010) and safe harvesting of seabirds (Runge, Sauer, Avery, Blackwell & Koneff, 2009). The calculations were made by ENINA[3].

PBR is expressed by the formula:

PBR = 0.5 * Rmax * Nmin * f

where:

Rmax - maximum potential population growth rate

Nmin - minimum population size

f - a coefficient in the range [0.1; 1], reflecting the status of the population and its conservation priority.

It is recommended to use (Dillingham & Fletcher, 2008) the threat categories proposed by the International Union for Conservation of Nature (IUCN, 2020), which refer to the status of the global population and for which a conservative (=minimum) variant for estimating its size has always been chosen. For bird species of the "least concern" (lc) category, a factor of f = 0.5 is recommended (if the population status is stable or increasing, f = 1.0 can be used). For species in the "near threatened" (nt)

[3] Source: Tryjanowski P, Luczak A, Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic II ("OWF BII"), 2022.

category, a factor of f = 0.3 is assumed. For endangered species, and these categories are: "vulnerable" (vu), "endangered" (en) and "critically endangered" (cr), f = 0.1 is used.

Rmax was estimated based on the known average age of first breeding in the population (a) and the annual survival rate of mature individuals (s), using the maximum population growth rate (λmax) :

λmax = {(s *a - s + a +1) + [(s - s *a - a - 1)2 - 4 *s * a2]-1} / 2*a,

Rmax = λmax - 1

Nmin - is the minimum size of the regional migrant population. This value was taken from the DHI report, which was based on calculations obtained from (Birdlife International, 2004; International Wetlands, 2014). In the absence of information on the minimum population size, when only one value of population size was available, the calculation according to. Dillingham and Fletcher, 2008.

The values of the parameters that were used to obtain the value of the safe yield level (PBR) of a species are shown in the table below. It should be noted that with respect to the previous assessment made for the 2015 Report, in the case of black-throated darter, marmot, bean goose, white-fronted goose, alka and laughing stock, the f-factor reflecting the population status and PBR has changed, as reflected in the table below.

Table 11. The values of the parameters that were used to obtain the value of the safe level of harvest (PBR) of a species

Species	Scientific name	sa	ab	Nminc	fd	PBR
Red-throated diver	*Gavia stellata*	0.84	3	150000	0.5	6888
Black-throated diver	*Gavia arctica*	0.89	3	250000	0.5	9894
Long-tailed duck	*Clangula hyemalis*	0.72	2	976000	0.1	15160
Markaczka	*Melanitta nigra*	0.783	3	361000	0.5	18607
Uhla	*Melanitta fusca*	0.84	3	296000	0.1	2719
Swistun	*Mareca penelope*	0.53	1	986000	1	337984
Bean goose	*Anser fabalis*	0.77	3	394000	1	41496
Goose	*Anser anser*	0.83	3	401000	1	37701
White-fronted goose	*Anser albifrons*	0.724	3	861000	1	96846
Canadian barnacle	*Branta canadensis*	0.724	3	79500	0.5	4471
White-tailed Gooseberry	*Branta leucopsis*	0.91	3	506000	0.5	18442
Mute swan	*Cygnus olor*	0.85	4	164000	1	11923
Whooper swan	*Cygnus cygnus*	0.801	4	39000	1	3131

Species	Scientific name	sa	ab	Nminc	fd	PBR
Bewick's swan	*Cygnus columbianus*	0.822	4	14000	0.1	108
Alka	*Alca torda*	0.905	4	102500	0.3	1884
Nurzyk	*Uria aalge*	0.946	5	2600000	1	109907
Kormoran	*Phalacrocorax carbo*	0.88	3	380000	1	31153
Lesser Black-backed Gull	*Larus minutus*	0.8	3	72000	0.5	3600
Daredevil	*Chroicocephalus ridibundus*	0.9	2	4770000	1	477000
Silver gull	*Larus argentatus*	0.88	4	1300000	0.3	26121
Crane	*Grus grus*	0.9	4	269000	1	16813
Grzywacz	*Columba palumbus*	0.607	1	17 7400 000	1	5560577
Gold seedling	*Pluvialis apricaria*	0.73	1	92000	1	23902

Source: Tryjanowski P, Luczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

Explanations:
a - (BTO, 2014; Garthe and Hüppop, 2004), b - ("Avibirds," 2014; BTO, 2014), c - (Birdlife International, 2004; Wetlands International, 2014), d - (IUCN, 2020)
s - annual survival rate of adult individuals, a - the age of joining breeding, Nmin - the minimum size of the migrating population; f - a coefficient in the range [0.1; 1], reflecting the status of the population and its conservation priority
The lack of estimates for raptor and passerine species is due to the extremely low abundance of birds from the aforementioned species groups and the lack of species identification preventing the correct application of the Banda model. Pages 106-107 of the DHI report.

6.2.9. Methodology for assessing significant impacts on Natura sites 2000

The main purpose of the Natura 2000 impact assessment is to answer the question of whether a particular project, individually and in conjunction with other planned projects, may cause a significant impact on the integrity, coherence or object of protection of Natura 2000 areas.

Integrity of the Natura 2000 area - according to (Engel J., 2009) is the maintenance of a proper conservation status of those natural habitats and populations of plants and animals for the protection of which the area was designated. The integrity of the area also consists of the preservation of ecological structures and processes that are essential for the sustainability and proper functioning of natural habitats and plant and animal populations.

Coherence - adopted according to (the Institute for eco-development) the Natura 2000 network of areas is the completeness of natural resources in the network and the preservation of functional links between individual Natura 2000 areas at the level of the biogeographical region in the country, ensuring the maintenance in a proper state of protection of natural habitats and species. Consistency refers to the links between Natura 2000 sites, and thus to the ecological corridors that condition the spatial continuity of the entire network. The coherence assessment takes into account:

- representativeness and numerical criteria,
- incidence relative to range,
- fragmentation of space,
- assessment of adequate conservation status based on national natural monitoring.

The assessment of the impact on the coherence of the Natura 2000 network should take into account the importance of the site for maintaining the coherence of the network in relation to the species and habitats that are protected there.

The basis of this assessment is to determine whether the BIII OWF may cause significant impacts on the integrity, coherence and object of protection of Natura 2000 areas.
The evaluation was made taking into account:

- the best available scientific knowledge,
- the subject of protection of the individual Natura 2000 areas remaining in the zone of potential impacts of the project,
- factors that determine the cohesion and integrity of these areas.

According to the methodological guidance on the provisions of Article 6 (3) and (4) of Habitats Directive 92/43/EEC, performed on behalf of the EC DG Environment, and the direct position of the EC (MN2000, par. 4.6(3)): "The integrity of the area includes its ecological functions. The decision as to whether it is subject to negative impacts should focus and be limited to the area's conservation objectives." For this reason, the assessment began by determining which species or habitats are subject to protection in the areas identified in the screening, and the assessment itself will address the impacts that the project in question may cause.

The surveyed Natura 2000 sites were designated in accordance with the criteria set forth in the Regulation of the Minister of the Environment of April 13, 2010 on natural habitats and species of Community interest, as well as the criteria for selecting areas eligible for recognition or designation as Natura 2000 sites (Journal of Laws of 2014, item 1713).

Before assessing the impact of the project on Natura 2000 sites, it was determined which of the environmental factors that determined the establishment of the site may be affected by the project and whether these impacts may cause the factor to disappear in the long term.

The species assessed were those that are subject to protection in these areas, so their conservation status in the Standard Data Form for the area was determined by category A, B or C. If any of the species meeting these criteria in existing Natura 2000 areas within the range of impacts of OWF BIII were found in the area of the planned project in the pre-execution monitoring, it was determined for such species whether the project may cause significant impacts to them.

In accordance with the guidelines for interpreting Article 6 of the Habitats Directive (Management of Natura 2000 sites - Provisions of Article 6 of the "Habitats" Directive 92/43/EEC), reference was made to the definition of Beneficial Conservation Status (NSO), as defined in Article 1 (i), to assess whether the interference with the objectives of the directive is significant.

KSO for a species takes place if:

- data on the population dynamics and abundance of the species under consideration indicate that it persists on a long-term scale as a viable component of its habitats,

- the natural range of the species is not decreasing, nor is it likely to decrease in the foreseeable future,
- a sufficiently large area of habitat exists and is likely to exist in the future for the preservation of its population in the long term.

Significant disturbance can thus be referred to projects that may cause a long-term decline in population numbers in a given area and within the entire network, a permanent reduction in the range of a species in a given area, and/or a permanent reduction in the size of a species' habitat to the extent that it is impossible to maintain a population in a given area.

In addition, with regard to migratory species, criteria defined by BirdLife International, indicating specific threats to the sustainability and quality of European bird populations, were additionally taken into account as a factor supporting the analysis of the scale of impacts. Fulfillment of one of them places the species in the endangered category. The above criteria include:

Size criterion (size criterion) - the threshold of vulnerability is the size of the range of occurrence less than 20,000 ^{km2} combined with either declining or fluctuating: extent of occurrence, habitat quality/permanence, or population size and small number of locations or their fragmentation.

Population persistence criterion (population trend) - the sensitivity threshold determines the amount of population decline above 30% over 10 years or three generations.

The criterion of population size (population size) - the threshold of sensitivity determines the abundance of less than 10,000 mature individuals with a steady estimated decline of more than 10% over 10 years or three generations or a specific population structure.

The assessment of the scale of impact on bird populations under protection in Natura 2000 areas remaining in the zone of potential impact of OWF BIII was based on the analysis of how individuals of protected populations use the area of the planned farm:

- the presence of breeding sites of populations under protection in the zones of impact of the project in question,
- the frequency of foraging in a given area and the importance of a given area to the sustainability and quality of a population's food base,
- the way in which individual individuals of protected populations use the farm's airspace - the amount of movement, the directions and nature of movement (local or migratory),
- the occurrence of resting places in the project's zone of influence and their importance for the ecology of the subject populations.

A component of the assessment, in cases where there is a credible probability of significant impacts on birds, can be a statistical estimate of expected population loss due to increased mortality. Unfortunately, at present, there are no models that would make it possible to make such an estimate in an unquestionable way.

In assessing the impact on the coherence and integrity of Natura 2000 areas, with regard to the impact on birds, it was verified whether the BIII OWF may cause hindrance to movement within or between areas of species of conservation concern in these areas to an extent that affects the sustainability of the populations of these species. In assessing the magnitude of the impact, it was taken into account that a possible barrier would have to either contribute to significant energy losses for migrating birds, due to

a significant extension of the migration route, or completely prevent the movement of birds between habitats important for their biology.

The assessment also took into account the cumulative impact with other investments planned for implementation in the area of the wind farm in question.

It should be borne in mind that the subject of the assessment of impact on Natura 2000 areas, in accordance with the wording of Article 6 of the Habitats Directive, is only the scope and scale of the impact of the planned project on those elements of the environment for whose protection individual Natura 2000 areas have been established, as well as the integrity and cohesion of these areas, ensuring their proper state of protection.

Instead, the purpose of the analysis is to demonstrate whether the Project's impacts may reach the scale of significant impacts, i.e. permanently deteriorating the proper state of protection of habitats and bird species for whose protection Natura 2000 areas were established.

6.3. The most far-reaching scenario of the venture - NIS 2015

The EIA conducted on the basis of the 2015 Report was conducted on the basis of a set of parameters of the Project constituting the investment scenario, which was to take into account the potentially greatest impact on migratory birds (the most far-reaching scenario - NIS 2015). At the time, it was considered to be the construction of 200 wind power plants with associated infrastructure (7 offshore substations and one additional platform), i.e. the maximum number of power plants allowed to be installed in the BIII offshore wind farm area according to the location decision, with a minimum clearance of 20 m and a maximum rotor diameter of 192.5 m. The total maximum rotor zone of these power plants (a key parameter in collision analyses) 5,820,800^{m2}. For the purposes of issuing the Environmental Decision, it constituted a reasonable alternative.

It was already recognized at the 2015 Report stage that any other Project scenario considered, including the variant that was selected for implementation and confirmed by the Environmental Decision, would result in environmental impacts less than or at most equal to the set of Project parameters constituting the 2015 NIS. The option selected for implementation consists of 120 power plants, about 40% less than in the 2015 NIS. The total diameter of the rotors is 3,768,000^{m2}, which is about 40% smaller than the diameter of the rotors in the rational alternative. This variant was indicated in the Environmental Decision and, in terms of the number of power plants, was about 33% smaller and thus caused fewer impacts in the form of bird-rotor collisions.

It should be pointed out that the variant planned for implementation on the basis of the amended Environmental Decision provides for the implementation of a maximum of 60 power plants, leaving the minimum clearance between the lower position of the rotor wing and the sea surface unchanged, i.e. not less than 20 m, and changing the rotor diameter to not more than 250 and changing the total height of the structure to not more than 310 m. As demonstrated earlier, the parameter that can affect the impacts generated by wind turbines is the rotor diameter (the total height of the structure is actually derived from the diameter of the rotor used). The key size is, depending on the diameter of a single rotor (rotor), the maximum total rotor zone, a size that also depends on the number of power plants comprising the OWF. As a result of the proposed changes, the maximum average of a single rotor is increased from 31,400^{m2} to 49,088^{m2}, but no less as a result of the simultaneous halving of the number

of power plants, the maximum total rotor zone is reduced from 3,768,000^{m2} to 2,945,244^{m2} - i.e. by about 22% in relation to the parameters of the Project approved by the Environmental Decision. Such assumptions also formed the basis for the current ENINA 2022 assessment.

7. Potential impacts of offshore wind farms offshore wind farms

The following description of potential impacts of OWFs on seabirds is based on scientific publications and reports of pre- and post-investment surveys conducted in the area of existing wind farms (Erickson et al. 2001, Christensen et al. 2003, Christensen et al. 2004, Kahlert et al. 2004a, b, Petersen et al. 2004, Desholm & Kahlert 2005, Fox et al. 2006, Hüppop et al. 2006, Petersen et al. 2006, Everaert & Stienen 2007, Blew et al. 2008, Drewitt & Langston 2008, Krijgsveld et al. 2011, Leopold et al. 2011, Cook et al. 2012).

It should be noted that in addition to typical OWF emissions and environmental disturbances (which can be planned), unplanned emissions may occur at any stage of the project, such as contamination of the water body and bottom sediments with petroleum substances (during normal operation and in an emergency), antifouling agents, accidentally released municipal waste or domestic sewage, chemicals, and waste from the construction, operation or decommissioning of the farm. They will indirectly affect living organisms, however, as far as ornithofauna is concerned - primarily seabirds. Therefore, they were not analyzed in the report's section on migratory birds. Instead, they are devoted to Chapter 11 in Section 5.1. Volume IV of the report.

7.1. Stage construction

The impacts of offshore wind farm construction activities primarily affect seabirds residing at least temporarily in or near the areas designated for the wind farm. As for migratory birds, they may be attracted to the project site by strong nighttime construction lighting. Construction work is usually carried out without interruption, due to the very high cost of mobilizing specialized vessels and the need to take advantage of weather windows, so night work is unavoidable. Vessel traffic in the farm area can be a kind of barrier, increasing migrants' energy expenditures as they bypass the site. There may also be collisions between passing birds and construction vessels.

Table 12. Potential impacts of OWF on migratory birds - construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Barrier caused by the presence of ships	The presence of a large number of vessels used in the construction of the wind farm may result in a barrier effect, reducing the possibility of birds moving between stopover areas during migration. The scale of the impact will depend on the number of vessels involved in the construction phase, their size, the duration of the construction phase and the season in which the work will be carried out.

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Collisions with ships	There may be collisions between birds and vessels used for wind farm construction, mainly during nighttime hours, when birds are attracted by the light they emit. The scale of the impact will depend on the number of vessels involved in the construction phase, their size, the configuration of the lights and their intensity, the duration of the construction phase and the season in which the work will be carried out.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

7.2. Stage operation

The potential impact of wind turbines located on offshore bodies of water on migratory birds is related to the creation of a mechanical barrier to migrating birds in the form of OWFs and the risk of increased mortality from collisions with turbines. It should be noted that the effect of the "barrier effect" is that most birds avoid the farm area, which in turn significantly reduces the number of potential collisions.

Studies conducted in bodies of water occupied by offshore wind farms show that most bird species avoid the power plant area at a considerable distance, and when they get between the power plants, they lower their flight and maintain equal distances from obstacles. The birds' avoidance of the area where the wind turbines stand, and the low flight ceiling between the power plants, leads to a reduced risk of collisions, so that mortality from collisions with power plant structures in offshore areas is low. However, with poor visibility due to fog and rainfall, the risk of collision increases. The number of collisions with wind turbines increases markedly when they are located on bodies of water attractive to birds, where their densities are high, and when the power plants stand on regular migration-related or local migration routes.

The risk of collision also depends on the species of bird. Large bird species, such as swans, are more likely to collide with turbines because of the difficulty in making sudden maneuvers in the air (Brown et al. 1992).

Most seabird species move low over the water, and when they are between powerhouses they lower their flight and maintain equal distances from obstacles (Desholm & Kahlert 2005, Hüppop et al. 2006, Petersen et al. 2006). This means that the risk of collision is affected by the clearance between the lower position of the wing and the sea surface. The smaller it is, the greater the chance of a bird colliding with a working rotor.

Table 13. Potential impacts of OWF on migratory birds - construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Offshore wind farm barrier	The project, due to its physical structure, may be a barrier to non-breeding waterbirds moving between different feeding

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	areas and to migratory birds preferring to take flight over open water and reluctant to fly over such obstacles. Migrants flying at night and in conditions of limited visibility are most affected. The most important parameters affecting the level of impact are the number of power plants, the clearance between the sea surface and the lower level of the wing, the height of the tower, the diameter of the rotor, the total area of the rotors, the type and intensity of lighting of the farm.
Collisions with power plants	Birds migrating through the Baltic Sea may collide with OWF wind turbine structures (blades and tower) when they fail to see the obstacle during prevailing severe weather conditions and at night, or when they are attracted to their vicinity by OWF lights. The level of collision risk depends on the number of wind turbines, their size, rotor area, rotor height range and total area of all rotors, the proportion of operating time and the lighting system at night.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

7.3. Stage decommissioning

With the gradual removal of wind turbine masts, the impact of scaring birds away from the area occupied by structures that protrude high out of the water will decrease. The possibility of collisions will also be reduced. It was assumed that the medium-term impact of the investment during the construction and decommissioning phases would be similar in nature.

Table 14. Potential impacts of the OWF on migratory birds - decommissioning stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Barrier caused by the presence of ships	See description for construction phase
Collisions with ships	See description for construction phase

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

8. Species subject to environmental impact assessment environment

Migratory bird species considered in the environmental impact assessment were selected based on the results of the monitoring report on migratory birds in the BII offshore wind farm area (Volume III Section 9 of the ROOŚ). Species that were observed sparsely, i.e., for which the total number of registrations

did not exceed 10 during one season, were excluded from the assessment, as it was assumed that their observations were sporadic and do not represent regular migrations that could be affected by the wind farm (except when there is scientific knowledge indicating otherwise).

The number of registrations of several passerine species exceeded 10, although these species were not included in the assessment because the number of passerine birds flying over the BII offshore wind farm area was a small percentage of their very numerous European populations, consisting of tens to hundreds of millions of individuals (cf.: chapter with monitoring results, Section 9 Volume III of the EIA).

Fourteen species/groups of species were assessed in detail, taking into account the estimated number of migrating individuals, their conservation status and the criteria of significance of the object of impact, according to the adopted framework methodology.

Each species was assigned a category of its importance. A preliminary assessment of the species' vulnerability to impacts was made on the basis of existing knowledge about the potential impacts of offshore wind farms on the movement and migration of birds. This information was provided for two main types of impacts on bird migration and movement: the risk of collision and the occurrence of a barrier effect. The sensitivity of the species and their importance are shown in the tables below.

8.1. Basic characteristics of migratory bird species assessed assessed

Characteristics of migratory bird species can be found in the chapter with survey results (Section 9 Volume III of the EIA).

8.2. Sensitivity of migratory birds to potential impacts project

Of the potential impacts of offshore wind farms on migratory birds, the most important are the risk of collision and the barrier effect, occurring at all stages of the project. The impacts associated with the construction and decommissioning phases are very similar. Assuming that the wind turbines will not be operated during the construction and decommissioning stages, it is estimated that the risk of collisions at these stages will be negligible. The impact in the form of a barrier effect will be the same at all stages, since the work plan needed to carry out the work and the required activities are currently unknown. Information on the vulnerability/susceptibility of selected migratory bird species to collision risk and barrier effect was adapted from Langston (2010) and the European Commission's "Wind Energy Developments and Natura 2000" guidelines (European Union 2011).

Table 15. Sensitivity of migratory birds to potential impacts of wind farms

Species	Sensitivity to wind farms (Langston 2010)		Sensitivity to wind farms (European Union 2011)	
	Collision	Barrier effect	Collision	Barrier effect
Black-throated diver Gavia arctica	*	**	X	
Gavia stellate	*	**	X	
Cormorant Phalacrocorax carbo	**	**	X	x

Species	Sensitivity to wind farms (Langston 2010)		Sensitivity to wind farms (European Union 2011)	
	Collision	Barrier effect	Collision	Barrier effect
Cygnidae [swans1]	***	*	X (whooper swan only)	
Anserini geese	**	*	X (white-fronted goose only)	
Marquise Melanitta nigra	*	**	X	X
Uhla Melanitta fusca	*	**	X	X
Long-tailed duck Clangula hyemalis	*	**	X	X
Anas Penelope marmot				x
Crane Grus grus			X	x
Golden plover Pluvialis apricaria			X	X
Lesser Black-backed Gull Larus minutus	*	*	X	
Laughing gull Larus ridibundus	*	*		
Alka Alca torda	*	**	X	
Columba palumbus mane			X	

Source: Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Explanations:
[1] If there is no information for a specific species in the primary reference guideline (European Union 2011), expert judgment based on similarity to a closely related species was used.
In Langston's overall risk index:
* - means low risk, ** - moderate risk, and *** - high risk, on - sensitivity assessment not available In EC Guidelines:
XXX = evidence of significant impact risk,
XX = evidence or indications of impact risk,
X = potential impact risk,
x = low or insignificant risk of impact

8.3. The importance of resources environment

The importance of migratory bird species taken into account in the EIA is specified in the table below. It indicates the size of the biogeographic population, the estimated % of the biogeographic population flying over the BII OWF area, the conservation status and the assigned category of importance of the species. The following categories are given for protected status:

- Annex I of the EU Birds Directive,

- iUCN extinction risk category i.e.. VU (vulnerable) - vulnerable, EN (endangered) - endangered),
- sPEC category (SPEC1, SPEC2, SPEC3),
- Appendix 1 - "Species of wild animals under strict protection, listing species in need of active protection" from the Regulation of the Minister of the Environment of October 14, 2014 on the protection of animal species (Journal of Laws of 2014, item 1348) (Z-1).

Population estimates were based on Wetlands International (2014) for all species except alka and boar, for which estimates from BirdLife International (2004) were adopted.

For the significance of the area, the percentage of the European population stationed in the BII OWF area exceeding 0.1% during any trip during one migration season or stationed and wintering in the area was considered.

Table 16. Categories of importance of migratory bird species assessed

Species	Biogeographic population size (number of individuals)	Significance of BII offshore wind farm area % of biogeographic population	International and national protection status	Category of meaning of the species
Black-throated diver and red-throated diver Gavia arctica & G. stellata	> 400 000	0.4% spring 0.03% autumn	Birds Directive Annex I, SPEC3, Z-1	Large
Cormorant Phalacrocorax carbo	380000	0.55 % spring 0.1% autumn		Small
Whooper swan Cygnus Cygnus	300000	0.25% spring 0.26% autumn	Birds Directive Annex I	Large
Mute swan Cygnus olor				Small
Bewick's swan Cygnus bewickii			Birds Directive Annex I	Large
White-fronted goose Anser albifrons	>3 500 000	0.46% spring 0.09% autumn		Small
Bean goose Anser fabalis				Small
Goose Anser anser				Small
Bernadette Branta bernicla			SPEC3	Large
White-tailed Goose Branta leucopsis			Birds Directive Annex I	Large
Anas penelope marmot	1500000	0.36% spring 1.08% autumn		Small

Species	Biogeographic population size (number of individuals)	Significance of BII offshore wind farm area % of biogeographic population	International and national protection status	Category of meaning of the species
Long-tailed duck Clangula hyemalis	1600000	3.0% spring 1.3% autumn	IUCN VU	Large
Marquise Melanitta nigra	550000	7.5% spring 3.9% autumn		Small
Uhla Melanitta fusca	450000	0.7% spring 0.3% autumn	IUCN EN	Large
Crane Grus grus	410000	0.05% spring - autumn	Birds Directive Annex I, SPEC2, Z-1	Large
Lesser Black-backed Gull Larus minutus	>72 000	3.9% spring 2.6% autumn	Birds Directive Annex I, SPEC3, Z-1	Large
Laughing gull Larus ridibundus	>3 700 000	0.05% spring 0.07% autumn	Z-1	Small
Golden plover Pluvialis apricaria	>140 000	3.74% spring 0% autumn	Birds Directive Annex I, Z-1	Very large
Alka Alca torda	>1 000 000	1.3% spring 1.0% autumn		Medium
Nurzyk Uria aalge	>4 000 000	>0.1% spring >0.1% autumn		Medium

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

9. Assessment of the impact of OWF BII on birds migrating

9.1. Stage construction

This chapter evaluates the variant of the project that will be implemented on the basis of the amended Environmental Decision in accordance with the application in question and the information contained in the Report. The current assessment has as its subject the project, the scope of which, in relation to the number of turbines envisaged for implementation by the Environmental Decision, has been reduced by half, i.e. from 120 to 60. The foundations of the turbines planned for implementation will not be located closer than about 6 km from the boundaries of the Slupsk Shoal Natura 2000 area (in the western part of the farm area) extending the exclusion zone in the western direction to a width of about 5 km. As outlined in this ENINA 2022 Report and Assessment, the primary threat to migrating birds is the risk of collision with wind turbines. As predicted, the projected mortality has decreased due to the lower number of turbines planned to be used compared to that envisioned for implementation under

the Environmental Decision At this stage, it is known that the Project has been approved for implementation in the variant specified in the Environmental Decision, which was analyzed in terms of collision in the ENINA 2022 assessment. The conflictiveness of the variant envisaged for implementation under the revised Environmental Decision was assessed in the same way. At the current stage, the furthest possible environmental impacts, including on migratory birds, may occur in the case of implementation of the variant indicated in the Environmental Decision, because it is affected by the change, which will consist in reducing it

During the construction phase of the farm, increased boat traffic is to be expected, as well as periodically increased noise levels.

The following emissions and environmental disturbances are expected to affect birds flying over the surface of the farm during the construction phase of OWF BII:

1) a barrier caused by the presence of ships,
2) collisions with ships.

Helicopters will also be used during the construction phase, but due to the unknown number and types of helicopters, their impacts are being evaluated together with those of watercraft.

Due to the lack of significant impacts, no minimization measures are proposed during the construction phase. In contrast, recommendations to reduce even these relatively minor impacts are:

- building more power plants starting from one place, so that the body of water intended for the investment is filled with structures gradually, expanding the area of the farm with neighboring power plants;
- maximize the pace of construction work during the months of May-September, when bird abundance in the basin is at its lowest, but taking into account any restrictions related to the lighting of structures at night during the fall migration period;
- limiting sources of strong light at night during migration periods.

9.1.1. The barrier caused by the presence of ships

The presence of a large number of vessels used in construction may result in a barrier effect, thus affecting the movement of migrating birds. The scale of the impact will depend on the number of vessels used during the construction phase, their size, the duration of the construction work and the season of the work. Helicopters will also be used during the construction phase, but due to the unknown number and types of helicopters, their impacts are being evaluated together with those of watercraft.

The construction of wind turbines is associated with the presence of a large fleet of technical vessels, which can be a barrier affecting bird migration. The strength of this impact will, of course, depend on the number of vessels used, their size, the timing of the construction and the timing of the work. However, this is a local disturbance, and its intensity - even very high - will occur in a relatively short time and on a local scale, so the impact on migrating birds is estimated to be negligible. Such a barrier will result in a change of trajectory vertically or horizontally. However, such changes in flight path are not associated with high energy costs in the overall cost of the entire migration flight, so the energy expenditure of such behavior for the species in question is insignificant and negligible. This is confirmed

by the example of the migratory flight of the common eider (Somateria mollissima) through a farm located in Denmark (Masden et al. 2009), which avoids the wind farm; however, the additional distance it travels as a result of this behavior is negligibly small.

It is believed that at night during migration, birds may be attracted to the artificial lighting of ships, risking collisions (Blew et al. 2013). However, this effect will be insignificant for migrating birds, among other reasons, due to its relatively short duration.

It is estimated that the cumulative effect with other farms and differences in work intensity due to the different proposed alternatives will not increase the impact on the populations of the species analyzed in this study. The cumulative effect of construction will occur if all the farms are constructed at one time. The authors of the study do not have data on when to proceed with the work. However, assuming simultaneous construction time for each of the proposed variants, the cumulative effect during the construction phase will be no greater than at the stage of an operating wind farm.

Migratory birds sensitive to disturbance from the presence of ships will avoid them vertically or horizontally, which may slightly lengthen their migration route and increase the energy cost of the flight. However, bypassing will be a small part of the total migration route, and the additional energy expenditure will be negligible (Masden et al. (2009). Taking into account the above, the impact of creating a barrier effect through the presence of construction vessels in the BIII OWF area is assessed as small to negligible for all migratory bird species.

The presence of ships during the construction phase will create a barrier to the movement of birds, causing direct negative impacts on birds migrating over the surface of the farm, of local scope, short-term, reversible, repeatable during the construction period, with low intensity. Similar impacts will occur at the stage of eventual decommissioning.

Below is a table that shows the results of the analysis of the impact of the barrier caused by the presence of ships on individual species of birds migrating over the surface of the farm during the construction phase. Although the results presented therein refer to the 2015 NIS, it should be noted here that the scale of construction for the implementation variant specified in the Environmental Decision (40% fewer power plants compared to the 2015 NIS) will be significantly smaller. The planned Project in the currently requested variant assumes the possibility of building 50% fewer power plants than in the variant indicated for implementation by the Environmental Decision, and 70% fewer power plants compared to the 2015 NIS. This means that the traffic of vessels used during the construction phase will be considerably less. If with regard to the BIII OWF itself in the proposed modified parameters, it can be considered that the barrier effect will be the same regardless of the area of the occupied body of water, then with regard to the movement of ships necessary for operations related to the construction of the Project, not only the number of ships will decrease, but also the working time associated with the implementation of the power plant will be dramatically reduced.

Given the above, it should be considered that the variant implemented after the amendment of the Environmental Decision will generate fewer impacts.

Table 17. Barrier caused by the presence of ships - analysis of the impact on individual species of birds migrating over the surface of the farm during the construction phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver Gavia arctica	Large	** (Langston) / not indicated (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Red-throated diver Gavia stellata	Large	** (Langston) / not indicated (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Mute swan Cygnus olor	Small	* (Langston) / not indicated (EC)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; Importance of the resource - low)
Bewick's swan Cygnus bewickii	Large	* (Langston) / not indicated (EC)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Whooper swan Cygnus cygnus	Large	* (Langston) / not indicated (EC)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Geese Anserini	Small	* (Langston) / not indicated (EC)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Swistun Anas Penelope	Small	not indicated (Langston) / x (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Overlooked (magnitude of impact - insignificant; importance of the resource - low)
Long-tailed duck Clangula hyemalis	Large	** (Langston) / X (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Markaczka Melanitta nigra	Small	** (Langston) / X (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Uhla Melanitta fusca	Very large	** (Langston) / X (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Crane Grus grus	Very large	not indicated (Langston) / x (KE)	The presence of ships during the construction phase will create	Negligible (scale of exposure - local; duration - short-	Small (magnitude of impact - insignificant;

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			a barrier to the movement of birds	term; intensity - low)	importance of the resource - very high)
Gold seedling Pluvialis apricaria	Very large	not indicated (Langston) / X (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Laughing gull Larus ridibundus	Medium	* (Langston) / not indicated (EC)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Lesser Black-backed Gull Hydrocoloeus minutus / Larus minutus	Very large	* (Langston) / not indicated (EC)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Alka Alca torda	Small	** (Langston) / not indicated (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Cormorant Phalacrocorax carbo	Small	** (Langston) / x (KE)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Columba palumbus mane	Small	not indicated (Langston) / not indicated (EC)	The presence of ships during the construction phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Offshore wind farm Central Baltic III. Environmental Impact Report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015 after Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the area of the OWF Central Baltic III. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.2. Collisions with ships

Migratory birds, especially some species of shorebirds, may be attracted to the lights emitted by ships used during construction during inclement weather and at night. The degree to which collisions are likely to occur is poorly understood, and the available knowledge on the subject does not allow an estimate, but there is information reporting that, as with structures on land, migrating species of passerines occasionally collide with structures of anthropogenic origin at sea (Blew 2013). In addition, during nighttime hours when special weather conditions prevail, birds may be attracted to the lights emitted from ships used in construction. Collisions between waterbirds and ships at night have been documented for ships in southwest Greenland, and were closely linked to poor visibility (Merkel and Johansen 2011). When birds are attracted to light emissions, the level of collisions is not expected to be related to the height of the vessels. However, existing knowledge on the subject does not indicate that this is a significant problem, hence it is estimated that the impact of construction vessels will be limited to a relatively small area. The number of collisions is expected to be low, hence the impact is assessed from negligible to low, depending on the category of importance of the migratory bird species in question.

Collisions between migratory birds and vessels involved in construction are direct, negative impacts that are local in scope, short-term, irreversible, repeatable during the construction period, and of low intensity. Similar impacts will occur at the stage of eventual decommissioning of the farm.

Below is a table showing the results of the analysis of the impact of potential collisions with ships on individual species of birds migrating over the surface of the farm during the construction phase. Although the results presented therein refer to the set of parameters of the Project constituting the 2015 NIS, it should be noted here that the scale of construction in the case of the implementation

variant specified in the Environmental Decision (40% fewer power plants compared to the 2015 NIS) will be significantly smaller. With respect to the planned Project in the currently requested variant, the scale of the Project will be further reduced (50% fewer power plants than envisioned in the variant approved by the Environmental Decision), and thus the scope of work. The time it will take to implement the Project and install the power plant will be reduced. This will reduce the working time of vessels and the number of vessels needed to carry out construction work. The planned Project relative to the set of Project parameters constituting the 2015 NIS involves the construction of 70% fewer power plants. This means that the traffic of vessels used during the construction phase will be considerably less. The Project's impacts will therefore be less than those of the variant indicated in the Environmental Decision, let alone the set of Project parameters constituting the 2015 NIS, on the basis of which the magnitude of impacts was assessed in the 2015 Report.

Table 18. Collisions with ships - analysis of impacts on individual species of birds migrating over the surface of the farm during the construction phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver Gavia arctica	Large	* (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Red-throated diver Gavia stellata	Large	* (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Mute swan Cygnus olor	Small	*** (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Bewick's swan Cygnus bewickii	Large	*** (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					the resource - high)
Whooper swan Cygnus cygnus	Large	*** (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Anserini geese	Small	** (Langston) / x (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Swistun Anas Penelope	Small	not indicated (Langston) / not indicated (EC)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Overlooked (magnitude of impact - insignificant; importance of the resource - low)
Long-tailed duck Clangula hyemalis	Large	* (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Marquise Melanitta nigra	Small	* (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Uhla Melanitta fusca	Very large	* (Langston) / X (KE)	During the construction of the farm, there may	Negligible (scale of exposure -	Small (magnitude of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			be collisions between seabirds and working power plants	local; duration - short-term; intensity - low)	impact - insignificant; importance of the resource - very high)
Crane Grus grus	Very large	not indicated (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of resource - very high)
Golden plover Pluvialis apricaria	Very large	not indicated (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of resource - very high)
Laughing gull Larus ridibundus	Medium	* (Langston) / not indicated (EC)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Lesser Black-backed Gull Hydrocoloeus minutus / Larus minutus	Very large	* (Langston) / not indicated (EC)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - very high
Alka Alca torda	Small	* (Langston) / X (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					the resource - low)
Cormorant Phalacrocorax carbo	Small	** (Langston) / x (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Columba palumbus mane	Small	* (Langston) / x (KE)	During the construction of the farm, there may be collisions between seabirds and working power plants	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.3. Measures to minimize negative impacts at the stage of construction

Due to the lack of significant impacts on migratory birds, no minimization measures are proposed at the construction stage - these will mainly affect seabirds residing in the area of the proposed farm and are described in detail in Section 5.2. Volume IV of the report.

In the content of the Environmental Decision, a number of conditions were imposed to minimize impacts on birds at the stage of construction of OWF BIII. The conditions imposed resulted from the impact assessment carried out on the basis of the 2015 Report and were proposed in the report in question as measures to reduce anticipated impacts. These are the following conditions:

- Design a maximum of 120 power plants with a minimum clearance between the lower position of the rotor wing clearance and the sea surface (mean sea level) of not less than 20 m, a rotor diameter of not more than 200 m, and a total height of the structure of not more than 275 m above sea level - condition I.3.1 of the Environmental Decision;

- Include in the design of the farm a system that allows short-term shutdown of wind turbines in particularly severe weather conditions causing limited visibility during the period of the most intense bird migration, i.e., from March 15 to April 30 and from September 1 to October 15. The system is to ensure constant observation and recording of the stream of birds migrating through the farm area and immediate shutdown of turbines along the route of the anticipated passage of registered birds through the farm - condition I.3.12 of the Environmental Decision;

- A maximum of 120 power plants are allowed with a minimum clearance between the lower position of the rotor wing clearance and the sea surface (mean sea level) of not less than 20m, a rotor diameter of not more than 200m, and an overall height of the structure of not more than 275m above sea level - condition II.1B.1 of the Environmental Decision;

- Adopt a construction order in the detailed design that assumes the construction of successive neighboring power plants, starting from one site, so that the body of water intended for the investment is filled with structures gradually, expanding the area of the farm with neighboring power plants - condition II.1B.2 of the Environmental Decision;

- Schedule the work so that the activities causing the greatest impact on the natural environment (i.e., driving foundation piles) are carried out in the months of May - September - condition II.1B.3 of the Environmental Decision;

- During bird migration periods, i.e., from early July to mid-November and from early March to mid-May, on ships and farm structures, limit the use of strong light sources (e.g., floodlights) at night and do not direct light upward - condition II.1B.4 of the Environmental Decision;

- Paint the tips of the blades in bright colors, taking into account the current regulations for marking air obstacles - condition II.1B.5 of the Environmental Decision.

The above measures were considered to reduce the significance of impacts on migratory birds, because as indicated for migratory birds, the impacts associated with the construction of the power plant are not significant.

Considering the current results of the evaluation and the scope of the application, the condition specified in II.1B.1 and I.3.1 of the Environmental Decision requires modification in accordance with the current parameters of the Project. Condition I.3.1 of the Environmental Decision refers to the requirements describing the permitted parameters of the Project that should be included in the construction project. A related condition establishes as minimization and mitigation measures the impact of an offshore wind farm on migratory birds indicated in point. II.1B.5 of the Decision. Through the introduction of the aforementioned provision, the construction of a maximum of 120 wind turbines was guaranteed, for which the minimum clearance between the rotor wing and the sea surface, the maximum rotor diameter and the maximum height of the entire power plant were established.

This report proposes and evaluates changing the condition on the number of power plants to a maximum of 60 power plants, leaving the minimum clearance between the bottom position of the rotor wing and the sea surface unchanged, i.e. not less than 20 m, and changing the rotor diameter to not more than 250 and changing the overall height of the structure to not more than 310

m. As demonstrated earlier, the parameter that can affect the impacts generated by wind turbines is the rotor diameter (the total height of the structure is actually derived from the diameter of the rotor

used). The key size is, depending on the diameter of a single rotor (rotor), the maximum total rotor zone, a size that also depends on the number of power plants comprising the OWF. As a result of the proposed changes, the maximum average of a single rotor is increased from 31,400^{m2} to 49,088^{m2}, but no less as a result of the simultaneous halving of the number of power plants, the maximum total rotor zone is reduced from 3,768,000^{m2} to 2,945,244^{m2} - i.e. by about 22% in relation to the parameters of the Project approved by the Environmental Decision.

The proposed modifications to the conditions for implementation and exploration of the Project result in the need to amend the condition set forth in II.1B (1) establishing measures to minimize and mitigate negative environmental impacts and the environmental protection requirements necessary to be included in the construction project, referred to in I.3 (1) of the Environmental Decision .

The need for the changes is due to the fact that the scope of the project has been reduced in terms of the number of planned turbines from 120 (according to the Environmental Decision) to 60, as well as a change in their parameters of maximum height, which, according to the requested change, will be 310 m (275 m according to the Environmental Decision) and the maximum rotor diameter to 250 m (200 m according to the Environmental Decision). The analyses carried out showed that the proposed amendment will not cause negative impacts on the environment, and in terms of causing a barrier effect and impact on collision with birds, it will reduce the impacts of BSIII.

9.1.4. Impacts cumulative

Assumptions for analyses of cumulative impacts of OWF BIII and other projects on migratory birds are presented in Section 3.3. On the other hand, a broad description regarding this issue can be found in Section 13 of Volume II of the EIA.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for wind farm development in the POM for cumulative impact analyses presented below:

At the time, it was assumed that power plants with a total capacity of 900 MW would be built between 2019 and 2021, including 600 MW under the BSIII offshore wind farm and 300 MW under the Baltica 3 offshore wind farm. Assuming that the average power plant will have a capacity of 6 MW, it was assumed that 150 of them would be built. The construction of supporting infrastructure in the form of (substations, social and measurement and research platforms, etc.) was also assumed. The scale of the infrastructure to be built assumed 158 foundations and about 158 km of internal cables.

Export cables were to be built to these 2 farms to land with an estimated length of 95 km and 45 km, respectively.

In 2019-2021, geotechnical drilling was also to be carried out in the areas of the Gaz South and Slupsk E concessions, but these impacts should also be considered negligible, due to the vastness of the concession areas and only minor overlaps with the areas of wind farms planned in the area. Export cables and geotechnical studies in hydrocarbon concession areas were therefore not taken into account in further cumulative impact analyses.

This scenario has not been realized.

In addition, there are heavily used shipping routes (including the Traffic Separation Scheme - TSS) in the vicinity of the farm, in the area of which the risk of oil spills increases. The activity was expected to contribute to increasing the scale of impact.

The second scenario assumed that more power plants would be built between 2023 and 2026, with a total capacity of 1,350 MW, including 600 MW under the BSIII offshore wind farm and 750 MW under the Baltica 3 offshore wind farm. Assuming an average power plant of 6 MW, 225 will be built. Associated infrastructure (e.g., substations, additional platforms, such as social.) will also be built. It can be assumed that 232 foundations and about 232 km of internal cables will be installed on the seabed in this connection.

There is also another scenario for this construction phase, which is that the above numbers of power plants and infrastructure will be built not in the areas of the BSIII and Baltica 3 offshore wind farms, but as the BSII and Baltica 2 offshore wind farms (the PSZWs belong to the same owners). However, such an alternative scenario will not significantly change the level of impacts.

Compared to the scenario assumptions adopted in the 2015 Report, the timing of all planned projects has changed, as they have all been delayed.

It is currently anticipated that the implementation of the BIII offshore wind farm could be carried out between 2023 and 2025. During this period, the Baltica 2 offshore wind farm, which has a signed connection agreement with a completion date similar to the BIII offshore wind farm, may also be implemented. Ultimately, it is expected that the Baltica OWF (Baltica 2 and Baltica 3), MIP B III, MIP BIII, Baltic Power OWF and C-WIND will be built (the latter, unlike the previously mentioned, does not yet have an environmental decision issued).

The impact of construction work, carried out simultaneously on several farms, on migratory birds will be negligible to small - impacts will not be cumulative. Most migratory birds will avoid the construction area with minimal increased energy costs. It is also expected that collisions with vessels used in construction will be few. Therefore, no significant impacts are expected during the implementation phase of MF BIII. Of significance at the construction stage is the barrier effect, which will be similar in nature to that of the decommissioning stage of the BIII OWF. Thus, construction of the Project in the area covered by the PSZW would be of negligible or minor importance, as the rerouting associated with the bypass of the construction site would be only a small part of the overall migration route, so the additional energy costs would be very small. Collisions between birds and ships would be negligible to small, as ship traffic would be limited to a relatively small area.

The proposed modification of the parameters of the Project's implementation and operation conditions significantly reduces the number of power plants planned for construction compared to the parameters of the Project approved in the Environmental Decision - by 50%. In addition, an additional measure to further mitigate the impact of cumulative impacts that may arise is the proposal to designate a power plant-free corridor between the Project and the planned Baltica MEW project, adjacent to the Project from the northwest. Modifying the parameters of the Project and the Baltica SHPP project in accordance with this concept (see Section 1, Volume II of the Report) would ensure that a corridor with a minimum width of 5 km would remain free of power plant development.

Taking into account that the possibility of simultaneous implementation of all the OWF projects described above is unrealistic, if only due to the level of preparation for the implementation of individual

projects (the C- Wind project has so far not received a decision on environmental conditions), and also taking into account that the Project update does not lead to a change in the nature or magnitude of the impact of any of the construction stage impacts on migratory birds, it should be considered that the proposed change in the conditions of implementation of the Project will not affect the nature and magnitude of cumulative impacts. The introduction of the proposed modifications, due to the reduction of the time of occurrence of some impacts and the proposed mitigation measures, will contribute to the reduction of potential cumulative impacts.

9.2. Stage operation

Two factors associated with the working OWF that could have a negative impact on birds migrating over its basin are the barrier effect and the risk of collisions with the turbines. These factors are interrelated.

The Environmental Decision in the conditions contained therein specifies measures to minimize the negative impact of OWF BIII on migratory birds at the stage of operation. In this Project Impact Report, after the proposed modifications, the implementation conditions are referred to the assessment carried out in the 2015 Report, which in essence means their verification against the set of parameters of the Project that constitutes the most far-reaching scenario - the 2015 NIS. At this stage, designated corridors between offshore wind farms were considered as a minimization measure. Their designation definitely minimizes the effect of collision and deterrence on local bird populations and should ensure the permeability of bird migration routes (ENINA 2022). This type of minimization measure in the form of leaving a 5 km corridor free of power plant development between the Baltica 2 and Baltica 3 areas was implemented in the terms of the environmental decision issued for the Baltica offshore wind farm, Baltic Power and the amended decision for BII. Similar solutions are also being considered in the ongoing procedure aimed at issuing an environmental decision for the C-WIND project. For the currently proposed Project variant, an additional measure to further mitigate the impact of any cumulative impact that may arise in relation to the designated corridor is the proposal to designate a power plant-free corridor between the Project and the planned FEW Baltic 2 project, adjacent to the Project to the northwest. Modification of the parameters of the Project and the design of the Baltica 2 and Baltica 3 offshore wind farms in accordance with this concept (see Section 1, Volume II of the Report) would guarantee that a corridor of a minimum width of 5 km would remain free of power plant development.

In the context of the changes made to the Project as a result of the modification, verification of the validity of the conditions set forth in the Environmental Decision is also presented, including in the context of minimization measures.

9.2.1. Barrier caused by presence of offshore wind farm offshore wind farm

Located over water, the wind farm facilities may be a barrier to birds flying over the farm's water body. The scale of the barrier effect will depend on the number of turbines created, their size, and the light and noise they emit.

Birds respond to the presence of an obstacle in their path by changing their flight path in a horizontal or vertical direction, hence they are expected to avoid the wind farm area. The length of the route required to avoid this obstacle will increase the energy cost of the flight being made, but this will not be a large change, and the energy costs of the birds' daily flights, even when doubled, will still be a small

part of their daily activity and energy consumed. Pelagic bird species, such as gulls, spend most of the day taking flight under natural conditions, and the additional bypassing of an obstacle, in this case the presence of a wind farm, will not cause any measurable effect on their daily activity or energy balance.

9.2.1.1. Red-throated diver and black-throated diver (Gavia stellata and Gavia arctica)

The BIII OWF will be centrally located on a 170-kilometer stretch of sea between Poland and Sweden. A large number of waterbirds, including black-throated and red-throated divers, most likely use the area as part of a route between wintering grounds in the Danish Straits-North Sea and breeding sites located to the north. Most likely, migrating aurors will avoid the wind farm in operation by circling it. The consequences in terms of additional energy expenditure and reduced physical fitness due to the increased distance of flight performed are considered small. A similar assessment applies to other long-tailed duck migratory seabirds (long-tailed duck, scoter and geese, assessment later in the report). Available telemetry data suggest that long-tailed ducks wintering in the Baltic Sea migrate for breeding purposes to the Kara Sea in the Arctic, as do long-tailed ducks (research "Seabird telemetry in Lithuania"[4]). Hence, the impact caused by the barrier effect on migrating divers is assessed as small. of flatfish and juvenile cod.

9.2.1.2. The cormorant (Phalacrocorax carbo)

As with other waterbird species, cormorant migration over the Bornholm Basin is highly dispersed, and the impact on this migration through the barrier effect due to the presence of the OWF BIII wind farm is estimated to be negligible due to the small additional distance the cormorants will have to travel to avoid the wind farm area. Yet the species often does not see offshore wind farms as a barrier to be avoided (Kahlert et al. 2011).

9.2.1.3. Swans (Cygnidae)

Migrating swans were sometimes indeterminate as to species due to the long distance of the birds from the observers, hence they are often analyzed together (see results of migratory bird sightings, Section 9 Volume III of the ROOŚ). The tagged species are the mute swan, whooper swan and whooper swan. Like other species of waterbirds, swans migrate over the Bornholm Basin in a broad front, and the magnitude of the impact on migration, due to the barrier effect from the construction of OWF BIII, is estimated to be low. The low magnitude of the impact translates into a negligible assessment of the significance of the impact on the unprotected species of mute swan and a low one for whooper swans and whooper swans.

9.2.1.4. Geese (Anserini)

Since only a few geese were marked as to species, the impact was assessed for all geese. The tagged species are the white-fronted goose, the bean goose, the goose, the white-fronted barnacle and the collared barnacle. As with other waterfowl species, geese migrations over the Bornholm Basin take place in a broad front. The distance traveled by geese due to migration will lengthen as a result of circling IMF BII by only 0.06%, or an additional 2 km. Such a route extension will not result in an increase in energy

[4] www.movebank.org (Access date: 04.05.2022 r.)

cost. Based on the evaluation criteria, the low magnitude of the impact means negligible significance of the impact for unprotected white-fronted geese, bean geese and geese, and low for protected species: white-fronted barnacle and collared barnacle.

9.2.1.5. Swallowtail (Anas penelope)

As with other species of waterbirds, the migration of marmots over the Bornholm Basin is highly dispersed, and the significance of the impact on their migration due to the occurrence of a barrier effect from the resulting OWF BIII wind farm is estimated to be low, as for other duck species.

9.2.1.6. Long-tailed duck (Clangula hyemalis)

As with other waterbird species, long-tailed ducks' migrations over the Bornholm Basin are highly dispersed, and the significance of the impact on their migrations, due to the barrier effect from the construction of OWF BIII, is estimated to be low. The distance traveled by long-tailed ducks due to migration will lengthen as a result of circling the wind farm by just 0.2%, or an additional 6 km. Such an extension of the route, according to calculations using specialized software, will result in a 0.24% increase in energy cost during migration, or an additional consumption of 10 kJ. Such an increase in energy costs is negligible. Individual differences in bird flight routes as well as weather-related effects are undoubtedly higher.

9.2.1.7. Marquise (Melanitta nigra)

As with other waterbird species, long-tailed ducks' migrations over the Bornholm Basin are highly dispersed, and the significance of the impact on their migrations, due to the barrier effect from the construction of OWF BIII, is estimated to be low. The distance traveled by long-tailed ducks due to migration will lengthen as a result of circling the wind farm by just 0.2%, or an additional 6 km. Such an extension of the route, according to calculations using specialized software, will result in a 0.24% increase in energy cost during migration, or an additional consumption of 10 kJ. Such an increase in energy costs is negligible. Individual differences in bird flight routes as well as weather-related effects are undoubtedly higher.

9.2.1.8. Uhla (Melanitta fusca)

Like other species of waterbirds, urchins make their migrations over the Bornholm Basin in great dispersion. The significance of the impact on their migrations, due to the occurrence of a barrier effect due to the construction of OWF BIII, is estimated to be low, as for the long-tailed duck and scoter.

9.2.1.9. Crane (Grus grus)

During pre-investment monitoring in the BIII offshore wind farm area in autumn 2013, a large-scale southward migration of cranes was recorded. The geographic migration routes of cranes are not well understood, however, the birds most likely fly in a broad front over open Polish waters. During the autumn migration, they fly to the island of Rügen (Germany) and return from it in the spring. Rügen is a well-known stopping place for thousands of cranes. These birds, arriving from Poland in autumn and departing from Rügen to the east in spring, were mentioned as early as 30 years ago by Prange (1975).

A more recent hypothesis suggests that the cranes' migratory route is along the eastern Baltic coast, which also includes migration over the southern Baltic (Prange 2010).

The impact as a result of barrier effects due to the presence of the farm was assessed as low. It was estimated that the distance traveled by the cranes would increase by 0.22%, or 2 km, as a result of the cranes bypassing the farm, compared to the route taken by the birds. Such additional route extension, according to calculations using specialized software, will result in a 1.26% increase in energy cost during migration, or an additional 100 kJ consumed. Such an increase in energy costs is negligible. Individual differences in bird flight routes as well as weather-related effects are undoubtedly higher.

9.2.1.10. Golden plover (Pluvialis apricaria)

Golden plovers fly over the BIII IMF area on their way to breeding areas located in eastern Europe and Russia and to wintering grounds located in southwestern Europe. Migrations of golden plovers seem to be taking place in a broad front over the southern Baltic Sea. The significance of the impact on the migration of this species due to the presence of the BIII OWF as a barrier is assessed as low, due to the fact that the additional distance traveled by the birds necessary to bypass the wind farm will be minimal, and the associated additional energy cost of the flight will be very small.

9.2.1.11. Lesser Black-backed Gull (Larus minutus)

Lesser Black-backed Gulls fly over the Bornholm Basin on their way to breeding grounds located in eastern Europe and wintering grounds on the eastern Atlantic coast. Like other species of seabirds, the migrations of Lesser Black-backed Gulls in this region take place in a wide dispersion. The significance of the impact on this species, due to the barrier effect created by the presence of OWF BIII, is assessed as low. The impact was assessed similarly for ducks, geese and cranes, in which the energy cost of taking flights is much higher than for gulls.

9.2.1.12. Laughing gull (Larus ridibundus)

Migrations of blackheads flying over the BIII OWF basin are carried out in a broad front, and the significance of the impact on the species' migrations due to the presence of the barrier effect of the BII OWF is assessed as negligible.

9.2.1.13. Alka (Alca torda)

Migrations of alkas flying over the BIII OWF basin take place in a broad front, and the significance of the impact on the species' migrations due to the presence of the barrier effect of the BIII OWF is assessed as negligible, as for other waterbird species.

9.2.1.14. Woodpigeon (Columba Columbus)

Migrations of woodpigeons flying over the BIII offshore wind farm area take place in a broad front, and the significance of the impact on the species' migrations due to the presence of the barrier effect of the BIII offshore wind farm is assessed as negligible, due to the very small additional distance the birds have to travel to bypass the wind farm.

9.2.1.15. Summary

Due to the lack of detailed information on the behavioral responses of birds to the presence of wind farms, the effects for the Project variant indicated for implementation in the Environmental Decision should be considered comparable to the set of parameters of the Project representing the furthest-reaching NIS 2015 scenario.

A barrier in the form of a working BIII OWF will be a source of direct, negative impacts on migratory birds of species-dependent magnitude, long-term, reversible, permanent during the period of operation, with low intensity.

An assessment of the significance of this impact for the set of parameters of the Project constituting the furthest-reaching NIS 2015 scenario is presented in the table below.

In the case of the proposed modifications to the conditions of implementation and operation of the Project, the number of power plants will be reduced, by 50% in relation to the parameters of the Project specified in the Environmental Decision, however, the area of the body of water occupied by the OWF will be slightly reduced (due to the designation of the corridor between the Projects and the OWF Baltica 2 and Baltica 3). Therefore, it should be considered that the impact of the Project in the modified parameters will be comparable to the impact for the Project in the parameters approved in the Environmental Decision.

Table 19. Barrier caused by the presence of an offshore wind farm - analysis of the impact on birds migrating over the surface of the farm during the operation stage (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	** (Langston) / not indicated (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Red-throated diver *Gavia stellata*	Large	** (Langston) / not indicated (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - regional; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Mute swan *Cygnus olor*	Small	* (Langston) / not indicated (EC)	A working wind farm will provide a mechanical barrier to	Negligible (scale of exposure - national; duration - long-	Negligible (magnitude of impact - insignificant;

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			birds flying over its water body	term; intensity - low)	importance of the resource - low)
Bewick's swan *Cygnus bewickii*	Large	* (Langston) / not indicated (EC)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Whooper swan *Cygnus cygnus*	Large	* (Langston) / not indicated (EC)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Geese *Anserini*	Small	* (Langston) / not indicated (EC)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Swistun *Anas Penelope*	Small	not indicated (Langston) / x (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Overlooked (magnitude of impact - insignificant; importance of the resource - low)
Long-tailed duck *Clangula hyemalis*	Large	** (Langston) / X (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Markaczka *Melanitta nigra*	Small	** (Langston) / X (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Uhla *Melanitta fusca*	Very large	** (Langston) / X (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Crane *Grus grus*	Very large	not indicated (Langston) / x (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of resource - very high)
Gold seedling *Pluvialis apricaria*	Very large	not indicated (Langston) / X (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of resource - very high)
Laughing gull *Larus ridibundus*	Medium	* (Langston) / not indicated (EC)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Lesser Black-backed Gull	Very large	* (Langston) / not indicated (EC)	A working wind farm will provide a mechanical barrier to	Negligible (scale of exposure - local; duration -	Small (magnitude of impact - insignificant;

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Hydrocoloeus minutus / Larus minutus			birds flying over its water body	long-term, intensity - low)	importance of resource - very high)
Alka *Alca torda*	Small	** (Langston) / not indicated (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Kormoran *Phalacrocorax carbo*	Small	** (Langston) / x (KE)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Grzywacz *Columba palumbus*	Small	not indicated (Langston) / not indicated (EC)	A working wind farm will provide a mechanical barrier to birds flying over its water body	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Explanations:

* The significance of the impact has been assessed as low, as estimates of the energy costs of rerouting show that the barrier effect causes an impact of low significance. In this case, the data and estimates go beyond the standard EIA matrix as included in the methodology description and species assessment

Therefore, it should be considered that the magnitudes of impacts presented in the table above, adopted for the set of parameters of the Project constituting the 2015 NIS, due to the reduction in the scope of the Project and the significant reduction in the number of power plants, allow accepting them as valid and confirming that the impacts of the Project in this area will be comparable to those specified in the Environmental Decision, and at the same time smaller than those projected for the 2015 NIS. In addition, an additional measure to further mitigate the impact of cumulative impacts that may arise is the proposal to designate a power plant-free corridor between the Project and the planned Baltica 2 and Baltica 3 OWF projects.

Modification of the parameters of the Project and the design of the Balica 2 and Baltica 3 offshore wind farms in accordance with this concept (see Section 1 Volume II of the Report) would guarantee that a corridor with a minimum width of 5 km would be left free of power plant development.

9.2.2. Estimating mortality

Birds migrating over the BIII OWF area will be at risk of collision with wind farm structures. Collision risk was determined using the widely used Band risk model (Band et al. 2012), in a version dedicated to offshore wind farms. The calculation methodology is described in Chapter 6 above. All the worksheets of the Banda model calculation results (the worksheet named "General Collision Risk") are presented in Appendix B of the DHI expert study, the electronic version of which is attached as Appendix P to the Report. The predicted collision rate was calculated by two independent teams - DHI and ENINA. These analyses were performed for the 2015 Report, but the results were used in this Report.

The predicted level of collision relating to the current state of knowledge and scope of the Project has been updated and calculated by the ENINA team (ENINA 2022) and is presented in full in Appendix S

According to the latest assumptions for the Baltic III Offshore Wind Farm Project, the number of turbines to be installed has decreased. The implementation variant approved by the Environmental Decision assumed the construction of 120 wind turbines, while the current variant assumes the construction of 60 turbines and the exclusion of the northwestern corner of the BIII OWF area from development, which will allow the creation of a power plant-free corridor of about 5 km between the planned farm and the Baltica OWF project (see Figure 8). The assessment of the impact on migratory birds in the marine area carried out in the 2015 Report was performed for a Project consisting (depending on the variant) of 120 to 200 turbines characterized by different rotor suspension heights. Cumulative impacts were also taken into account and the impact of the planned project on local bird populations and nearby Natura 2000 sites was assessed (Tryjanowski et al. 2016). For the purposes of this report, up-to-date calculations and mortality assessments were made taking into account the implementation of the project in the variant indicated for implementation by the Environmental Decision and after the amendment of this decision (ENINA 2022).

Table 20. Parameters characterizing the collisions of selected bird species for different variants of the planned wind farm

WR20	RWU (%)*	WR20 - 120 turbine bird/year	WR20 - 60 turbine bird/year
Alka Alca torda	99.50	0.02	0.01
Long-tailed duck Clangula hyemalis	99.00	0.09	0.04
Uhla Melanitta fusca	99.00	1.93	0.60
Marquise Melanitta nigra	99.00	2.57	1.32
Nur Gavia sp.	99.50	0.32	0.09
Anas penelope marmot	99.00	6.70	3.00
Anserini geese	99.80	12.15	6.55

WR20	RWU (%)*	WR20 - 120 turbine bird/year	WR20 - 60 turbine bird/year
Swans Cygnus sp.	99.50	0,78b	0.25
Cormorant Phalacrocorax carbo	99.00	0.75	0.41
Lesser gull Larus minutus / Hydrocoleus minutus	99.50	0.21	0.09
Ridibundus Chroicocephalus ridibundus	99.50	0.28	0.13
Crane Grus grus	98.00	10.78	6.00
Columba palumbus mane	98.00	4.27	3.55

Source: Own elaboration based on Tryjanowski P, Łuczak A, Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Bałtyk Środkowy III ("OWF BIII"), 2022.

Table 21. Parameters characterizing the collisions of selected bird species for different variants of the planned wind farm taking into account the cumulative effect

WR20	RWU (%)*	WR20 - 120 turbines	WR20 - 60 turbines	Wind farms planned for development in the area of the subject wind farm					∑ (WR20-120)	∑ (WR20-60)
		bird/year	bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	BC-WIND		
Alka Alca torda	99.50	0.02	0.01	0	0	0.00	0.00	0	0.0	0.0
Long-tailed duck Clangula hyemalis	99.00	0.09	0.04	1	2	0.00	0.75	0	3.8	3.8
Uhla Melanitta fusca	99.00	1.93	0.60	1	2	0.22	0.57	1	6.7	5.4
Marquise Melanitta nigra	99.00	2.57	1.32	2	3	0.77	2.74	0	11.1	9.8
Nur Gavia sp.	99,50	0.32	0.09	0	2	0.26	0.18	2	4.8	4.5
Anas penelope marmot	99.00	6.70	3.00	0	1	4.02	7.74	2	21.5	17.8
Anserini geese	99.80	12,15a	6.55	56.0	4.0	21.2	3.0	4	100.3	94.7
Swans Cygnus sp.	99.50	0,78b	0.25	0	0	0.00	0.45	0	1.2	0.7
Cormorant Phalacrocorax carbo	99.00	0.75	0.41	0	1	0.40	0.22	1	3.4	3.0
Lesser gull Larus minutus / Hydrocoleus minutus	99.50	0.21	0.09	1	3	1.34	0.13	1	6.7	6.6
Ridibundus Chroicocephalus ridibundus	99.50	0.28	0.13	0	5	0.19	0.44	0	5.9	5.8
Crane Grus grus	98.00	10.78	6.00	107	1	0.63	0.13	14	133.5	128.76
Columba palumbus mane	98.00	4.27	3.55	lack of data	lack of data	lack of data	lack of data	lack of data	lack of data	lack of data

Source: Own elaboration based on Tryjanowski P, Łuczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

9.2.2.1. Red-throated diver and black-throated diver (Gavia stellata and Gavia arctica)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-investment monitoring showed that divers appear in the BIII offshore wind farm area in greater numbers in spring than in autumn. The total estimated number of individuals of the two species of divers flying over the area in the spring season was 939, while 256 were recorded in the fall season.

Both species show a strong avoidance response, with only a few birds observed in wind farm areas. According to Smartwind (2013), avoidance rates for divers are 98%, which, in terms of the collision risk estimates made, results in 1 collision in the spring and 0 in the fall. Krijgsveld et al. (2011) indicated an even higher avoidance rate for divers of 99.2%, but this report uses the more conservative value determined by Smartwind (2013).

Table 22. Estimated number of collisions of red-throated and black-throated divers migrating over the IMF BIII basin, calculated by DHI

Migration period	Avoidance rate	Option selected for implementation
		175 m tower Clearance Min. 20 m
		Number of birds undergoing collisions
Spring (N=939 individuals)	95%	2
	98%	**0**
	99%	0
	99,5%	0
Autumn (N=256 individuals)	95%	0
	98%	**0**
	99%	0
	99,5%	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

On the topic of divers, the existing literature (Maclean et al., 2009) indicates a 99% avoidance rate, so it is a realistic assumption to take this value in collision estimates. The calculations were made taking

into account data on the flight height of birds from the area of the planned farm - M as well as the distribution of flight heights - MR (Cook et al., 2012). Collision estimates are shown in the table below.

Table 23. Estimated number of collisions of divers migrating over the BIII OWF basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	36.04	18.94	44.13	1.4001	1.00	1.80
	95%	1.60	1.00	2.21	0.070	0.05	0.09
	98%	0.64	0.40	0.88	0.028	0.02	0.04
	99%	0.32	0.20	0.44	0.014	0.01	0.02
	99,5%	0.16	0.10	0.22	0.007	0.01	0.01

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) is 6,888 for red-throated monkshood and 9,894 for black-throated monkshood, respectively (Table 11). The collision analysis (Table 20) predicts a mortality rate of 0.32 (1 individual per 3 years) for the WR20 120-turbine farm and about 5 individuals in cumulative impact per year. For WR20 60 turbines (clearance height of 20 m and 60 turbines), the mortality rate was 0.09 individuals, and with a cumulative impact of 4.5. For the WR60 farm, the impact of the project itself is not expected - the coefficient was 0 individuals, while the cumulative impact with this farm was 4.4 individuals, and these values were less than the PBR limit. According to the guidelines cited above, the species is hardly susceptible to the barrier effect. Therefore, no significant negative impact is expected from the planned project on the migratory population of the burrowing owl.

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment updated with the latest data for the variant indicated for implementation based on the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migratory population of dura. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at the level of 0.9 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, 4.4 individuals per year, while the PBR is at the level of 9,894 (black-throated diver) and 6,888 (red-throated diver) individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.2. The cormorant (Phalacrocorax carbo)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Table 24. Estimated number of collisions of cormorants migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	Option selected for implementation
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=959 people)	95%	0
	98%	**0**
	99%	0
	99,5%	0
Autumn (N=651 individuals)	95%	0
	98%	**0**
	99%	0
	99,5%	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

The existing literature on this species (Maclean et al., 2009) indicates a 99% avoidance rate, so it is a realistic assumption to take this value in collision estimates. The calculations were made taking into account data on the flight height of birds from the area of the planned farm - M as well as the distribution of flight heights - MR (Cook et al., 2012). Collision estimates are shown in the table below.

Table 25. Estimated number of collisions of cormorants migrating over the OWF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
Option selected for	0%	75.18	47.56	102.79	0.35	0.26	0.45
	95%	3.76	2.38	5.14	0.02	0.01	0.02
	98%	1.50	0.95	2.06	0.01	0.01	0.01

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
implementation 175 m tower Clearance of 20 m	99%	0.75	0.48	1.03	0.00	0.00	0.01
	99,5%	0.38	0.24	0.51	0.00	0.00	0.00

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for the cormorant is 31,153 (Table 11). The collision analysis (Table 20) predicts a mortality rate of 0.75 for the WR20 120-turbine farm and about 3.4 individuals in cumulative impact per year, for the WR20 60-turbine farm about 0.41 individuals and in cumulative impact 3 individuals per year, while for the WR60 60-turbine farm the mortality values are 0.04 individuals for the farm and in cumulative impact 2.7 individuals per year. These values were less than the PBR cutoff value. According to the guidelines cited above, the species is hardly susceptible to the barrier effect. The species migrates in a broad front, so the barrier effect will be negligible. It should also be noted that some studies indicate that this species does not regard offshore wind farms as an obstacle (Kahlert et al. 2011). According to the information presented in the chapter Error! The source of the appeal cannot be found. cormorants do not reduce their numbers either at wind farms or in their immediate vicinity (0%). Therefore, no significant negative impact of the planned project on the cormorant's migratory population is expected.

The impact of the implementation of the planned project during the construction and decommissioning phases is described in section 9.1 I 9.3

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment updated with the latest data for the variant indicated for implementation based on the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the cormorant migratory population. The predicted mortality of this species for the variant implemented after the modification of the Environmental Decision is at 0.75 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, 3 individuals per year, while the PBR is at 31,153 individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.3. Swans (Cygnidae)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-investment monitoring showed relatively frequent sightings of swans over the BIII offshore wind farm area, both during spring and autumn migrations. Estimates indicate that 457 swans migrate through the farm area in spring and 1,526 in autumn. According to the results of pre-investment monitoring, 28% of the birds flew at a rotor height of 20 m, and only 2% at a rotor height of 75 m. Collision risk calculations indicate 0-2 fatal collisions per migration season, depending on the wind turbine variant and the assumed avoidance rate. Krijgsveld et al. (2011) put the avoidance rate for swans at 99.2%. Therefore, a 99% avoidance rate is assumed to be a reasonable value, and with this assumption, calculations indicate that no swans will collide during the migration period.

Table 26. Estimated number of collisions of swans migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	Option selected for implementation
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=457 individuals)	95%	0
	98%	**0**
	99%	0
	99,5%	0
Autumn (N=1,526 individuals)	95%	1
	98%	**0**
	99%	0
	99,5%	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

Due to the lack of written data on the flight altitude distribution of this species, an extended model was not made for it. It is known from the literature that this is a species that also migrates extensively at night (King et al., 2009) (5 on the scale shown there), so the estimated number of individuals was multiplied by 100%. An avoidance rate of 98% was assumed. Collision estimates are shown in the table below.

Table 27. Estimated number of collisions of swans migrating over the BIII OWF basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	156.77	99.19	10.72
	95%	7.84	4.95	10.72
	98%	**3,14**	**1,98**	**4,29**
	99%	1.57	0.99	2.14
	99,5%	0.78	0.50	1.07
Uncertainty		0.37		

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for swans is shown in Table 11 and is respectively: 11,923 for mute swans, 3131 for whooper swans and 108 for black swans. The collision analysis (Table 20) predicts the highest mortality rate of 0.78 for the WR20 120-turbine farm and about 1 individual in cumulative impact per year. For WR20 60 turbines, the mortality rate was 0.25 individuals, and 0.7 with cumulative impact. For the WR60 farm, the impact of the project itself is not expected - the coefficient was 0 individuals, while the cumulative impact with this farm was 0.5. These values were less than the PBR cutoff value. According to the guidelines cited above, the species is not susceptible to the barrier effect. Therefore, no significant negative impact of the planned project on the migratory swan population is expected.

The impact of the implementation of the planned project during the construction and decommissioning phases is described in section 9.1 I 9.3

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment, updated with the latest data, for the variant indicated for implementation based on the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migratory population of the three swan species. The predicted mortality of these species for the variant implemented after the amendment of the Environmental Decision is at 0.25 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, 0.7 individuals per year, while the PBR is at 31,153 individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.4. Geese (Anserini)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

During pre-investment monitoring over the BIII OWF area, 703 migrating geese were recorded in spring and 103,091 individuals in autumn. According to the pre-investment survey, about 89% of the birds fly at a rotor height of 20 m and about 73% at a rotor height of 75 m . Assuming an avoidance rate value of 99.2% as indicated by Krijgsveld et al. (2011), assume an indicator value from the Band model of 99%, resulting in a collision risk score of 0-1 individual geese during spring and 67-124 during autumn migration depending on the turbine variant. Other reports such as Smartwind (2013) suggest an even higher avoidance rate of 99.8%.

Table 28. Estimated number of collisions of geese migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=703 individuals)	95%	2
	98%	2
	99%	**0**
	99,5%	0
Autumn (N=103,091 individuals)	95%	333
	98%	133
	99%	**67**
	99,5%	33

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

Due to the lack of written data on the flight height distribution of this group of birds, an extended model was not made for them. It is known from the given literature that species of this genus migrate intensively at night (King et al., 2009) (5 on the scale shown there). In addition, the literature indicates that at night birds of this order fly very high, that is, above the collision height (Griffin et al., 2011), so the number of individuals on the farm was not multiplied by 100%. If this assumption is made, then the collision rate would be 100% higher. Existing literature (Maclean et al., 2009) indicates a 99% avoidance

rate for geese, so it is a realistic assumption to take this value in collision estimates. Collision estimates are shown in the table below.

Table 29. Estimated number of collisions of geese migrating over the OWF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	6122.41	3843.10	8401.73
	95%	306.12	192.15	420.09
	98%	122.45	76.86	168.03
	99%	**61,22**	**38,43**	**84,02**
	99,5%	30.61	19.22	42.01

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of sea birds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III" ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for the three species analyzed is 41,496 for the Bean Goose, 37,701 for the Goose, 96,846 for the White-fronted Goose, and 4,471 for the Canada Goose and 18,442 for the White-breasted Goose, respectively (Table 11). The estimated collisions of geese were distributed to species according to the minimum size of the migrating population (Table 20).

Table 30. Split collision of Anserini geese according to the minimum size of the migratory population (N min) of Bean, Goose and White-fronted Geese

Species	N min	%	wR20 variant - 120 turbines	wR20 variant - 60 turbines	cumulative ∑ (WR20-120)	Cumulative ∑ (WR20-60)	PBR
Bean goose	394000	17.60	2.14	1.15	17.65	16.67	41496
Goose	401000	17.90	2.17	1.17	17.95	16.95	37701
White-fronted goose	861000	38.40	4.66	2.52	38.51	36.36	96846
Canadian barnacle	79500	3.50	0.43	0.23	3.52	3.31	4471

Species	N min	%	wR20 variant - 120 turbines	wR20 variant - 60 turbines	cumulative ∑ (WR20-120)	Cumulative ∑ (WR20-60)	PBR
White-tailed Gooseberry	506000	22.60	2.75	1.48	22.67	21.40	18442
Total	2241500	100	12.15	6.55	100.3	94.7	

Source: Tryjanowski P, Luczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

The calculated safe yield limit (PBR) for geese is shown above. In the collision analysis **(Error! The source of the reference cannot be found.)** projected highest mortality of 12.15 for the WR20 120-turbine farm and about 100 individuals in cumulative impact per year. For WR20 60 turbines, the mortality rate was 6.55 individuals, and with cumulative impact was 94.7. For the WR60 60-turbine farm, the ratio was 5.9 individuals, while the cumulative impact with this farm was 94.1. These values were less than the PBR cutoff value. According to the guidelines cited above, the species is not susceptible to the barrier effect. Therefore, no significant negative impact of the planned project on the migratory population of geese is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in **Error! The source of the appeal cannot be found.**

The impact of the implementation of the planned project at the construction and decommissioning stages is described in Section 9.1 I 9.3.

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment, updated with the latest data, for the variant indicated for implementation based on the amendment to the Environmental Decision, do not predict a significant negative impact of the planned project on the population of geese. Mortality is projected at 6.55 individuals for the farm and about 94.7 individuals in cumulative impact per year.

The current calculated safe yield limit (PBR) has changed for:
- bean geese (currently - 41,496 at the stage of the 2015 Report - 20,748),
- white-fronted geese (currently - 96,846 at the stage of the 2015 Report - 48,423).

At the same level, it remained for the goose or the white-throated barnacle.

With reference to the assessment results obtained at the 2015 Report stage for the variant indicated for implementation in the Environmental Decision and the current ENINA 2020 assessment results for the variant to be implemented after the amendment of the Environmental Decision, it should be recognized that in the case of the PBR, it remains at values below the PBR limit for the farm itself, as well as for the cumulative impacts of the other farms. The value of collision risk is not high compared to the large abundance of biogeographic populations of geese and accounts for 0.01% of it.

9.2.2.5. Swallowtail (Anas penelope)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-investment monitoring has shown that marmots are quite common over the BIII OWF area during seasonal migrations. Estimates indicate that 1,945 marmots fly over the farm area during spring and 5,683 individuals of the species during autumn. According to the results of pre-investment monitoring, 75% of all marmots flew at a rotor height of 20 m, 0% of birds at a rotor height of 75 m. Hence, it is estimated that between 0 and 25 individuals of this species will die from collisions with the wind farm each migration season, depending on the type of turbine used and the avoidance rate adopted. Krijgsveld et al. (2011) reports an avoidance rate value of 98.3% for ducks other than sea ducks. If one assumes a similar rate value of 98%, calculations indicate that between 0 - 3 gophers will collide with the wind farm in spring and 0 - 10 in autumn.

Table 31. Estimated number of collisions of marmots migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=1,945 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**
Autumn (N=5,683 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

Due to the lack of written data on the flight altitude distribution of this species, an extended model was not made for it. It is known from the literature that it is a fully migratory species at night (King et al., 2009) (5 on the scale shown there), so the estimated number of individuals was multiplied by 100%. On ducks, the existing literature (Maclean et al., 2009) indicates a 99% avoidance rate, so it is realistic to assume this value in collision estimates. Collision estimates are shown in the table below.

Table 32. Estimated number of collisions of marmots migrating over the OWF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	669.93	429.43	910.44
	95%	33.50	21.47	45.52
	98%	13.40	8.59	18.21
	99%	**6.70**	**4,29**	**9,10**
	99,5%	3.55	2.15	4.55

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for gopher is 337,984 (Table 11).

The collision analysis (Table 20) predicts the highest mortality rate of 6.7 for the WR20 120-turbine farm and about 21.5 individuals in cumulative impact per year. For WR20 60 turbines, the mortality rate was 3 individuals, and with a cumulative impact of 17.8. For the WR60 farm, the impact of the project itself is not expected - the coefficient was 0 individuals, while the cumulative impact with this farm was 14.8. These values were less than the PBR cutoff value. According to the aforementioned guidelines, the species is not strongly susceptible to the barrier effect (low or insignificant impact risk). Therefore, no significant negative impact of the planned project on the migratory population of marmots is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in sections 9.1 and 9.3

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment, updated with the latest data, for the variant indicated for implementation on the basis of the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migrating marmot population. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at the level of 3 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, 17.8 individuals per year, while the PBR is at the level of 337,984 individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.6. Long-tailed duck (Clangula hyemalis)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-intervention monitoring showed that long-tailed ducks are commonly found in the study area during spring and fall migrations. Sea ducks have a very high avoidance rate of offshore wind farms, Krigsveld et al. (2011) reports a value of 99.3%, according to Smartwind (2013) it is even higher at >99.%. Accordingly, the indicator value of 99.5% is assumed to be reasonable. The results of the estimates based on Banda's model show that no individuals will collide with the wind farm during the spring migration period, and none during the fall migration period for each of the wind farm alternatives considered. However, cases of collision with a wind farm cannot be completely ruled out.

Table 33. Estimated number of collisions of long-tailed ducks migrating over the IMF BIII basin, as calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=13,369 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**
Autumn (N=3,597 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

Due to the lack of written data on the flight altitude distribution of this species, an extended model was not made for it. It is known from the literature that it is a moderately nocturnal migratory species (King et al., 2009) (3 on the scale shown there), so the estimated number of individuals was multiplied by 50%. Existing literature on ducks (Maclean et al., 2009) indicates a 99% avoidance rate, so it is realistic to assume this value in collision estimates. Collision estimates are shown in the table below.

Table 34. Estimated number of collisions of long-tailed ducks migrating over the IMF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	9.08	6.01	12.14
	95%	0.45	0.30	0.61
	98%	0.18	0.12	0.24
	99%	**0,09**	**0,06**	**0,12**
	99,5%	0.05	0.03	0.06

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for long-tailed duck is 15,160 (Table 11). The collision analysis (Table 20) predicts the highest mortality rate of 0.09 for the farm in the WR20 variant of 120 turbines and about 4 individuals in cumulative impact per year. The WR20 60-turbine variant had a mortality rate of 0.04, and the WR60 60-turbine variant had a mortality rate of 0.08. In the cumulative impact, mortality was about 4 individuals per year for all variants. These values were significantly lower than the PBR cutoff value. The long-tailed duck, according to the above data, is protected in the Natura 2000 area "Coastal Baltic Waters", where the wintering population is estimated at 90,000 -120,000 individuals, and in the Natura 2000 area "Slupsk Shoal", where the wintering population is 101148 - 231180 individuals, and the passage population is 76,440 - 214,374 individuals. According to the aforementioned guidelines, the species is not strongly susceptible to the barrier effect (low or insignificant impact risk). Therefore, no significant negative impact of the planned project on the long-tailed duck migratory population is expected.The impact of the implementation of the planned project during the construction and decommissioning phases is described in 9.1 and 9.2.

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment updated with the latest data for the variant indicated for implementation under the amendment to the Environmental Decision, do not predict a significant negative impact of the planned project on the long-tailed duck migratory population. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at 0.9 individuals per year, and with the consideration of cumulative impacts with other offshore wind farms, 4 individuals per year, while the PBR is at 15,160 individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.7. Marquise (Melanitta nigra)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-intervention monitoring showed that scoters are commonly found in the study area during spring and fall migrations. Sea ducks have a very high avoidance rate of offshore wind farms, Krigsveld et al. (2011) reports a rate of 99.3%, according to Smartwind (2013) it is even higher at >99.9%. Accordingly, the indicator value of 99.5% is assumed to be reasonable. According to Banda's extended model, only one marker will collide with the wind farm in the rational alternative with minimum turbine height.

Table 35. Estimated number of collisions of scoters migrating over the IMF BIII basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=18,493 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**
Autumn (N=4,712 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

It is known from the literature that the scoter is a moderately nocturnal migratory species (King et al., 2009) (3 on the scale shown there), so the estimated number of individuals was multiplied by 50%. Existing literature on ducks (Maclean et al., 2009) indicates a 99% avoidance rate, so it is realistic to assume this value in collision estimates. Collision estimates are shown in the table below.

Table 36. Estimated number of collisions of scoters migrating over the BIII OWF basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	256.60	154.83	358.37	4.25	2.94	5.65
	95%	12.83	7.74	17.92	0.21	0.15	0.28
	98%	5.13	3.10	7.17	0.09	0.06	0.11
	99%	2.57	1.55	3.58	0.04	0.03	0.06
	99,5%	1.28	0.77	1.79	0.02	0.01	0.03

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for scotch is 18,607 (Table 11). The collision analysis (Table 20) predicts the highest mortality rate of 2.57 for the WR20 120-turbine farm and about 11 individuals in cumulative impact per year. For WR20 60 turbines, the mortality rate was 1.32 individuals, and 9.8 with cumulative impact. For the WR60 farm, the impact of the project itself is not expected - the coefficient was 0 individuals, while the cumulative impact with this farm was 8.5 individuals. These values were less than the PBR cutoff value. According to the guidelines cited above, the species is hardly susceptible to the barrier effect. Therefore, no significant negative impact of the planned project on the migratory population of scoters is expected. The spotted owl, according to the above data, is protected in the Natura 2000 area "Coastal waters of the Baltic Sea", where the wintering population is estimated at 5,000 - 8,000 individuals, and the transient population is estimated at 3,000 individuals. According to the presented in the chapter Error! The source of the reference cannot be found. information part of the species may avoid wind farms and their surroundings, but it is predicted that due to the distance (about 2 km from the planned OWF) there will be no decrease in the number of this species in the protected area. The impact of the implementation of the planned project during the construction and decommissioning phases is described in Chapter 9.1 I 9.2.

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment updated with the latest data for the variant indicated for implementation based on the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migrating scoter population. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at 1.3 individuals per year, and when taking into account cumulative impacts

with other offshore wind farms, at 9.8 individuals per year, while the PBR is at 15,160 individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.8. Uhla (Melanitta fusca)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-investment monitoring has shown the widespread occurrence of the uhla in the BIII OWF area, both during spring and autumn migration. Sea ducks have a very high avoidance rate of offshore wind farms, Krigsveld et al. (2011) reports a rate of 99.3%, according to Smartwind (2013) it is even higher at >99.9%. Accordingly, a rate value of 99.5% is assumed to be reasonable, and estimates of the number of collisions based on the extended Banda model indicate that no uhla will collide with the wind farm during both the spring and fall migration seasons. However, occasional collisions between the uhla and the wind farm cannot be completely ruled out.

Table 37. Estimated number of collisions of uhla migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=5,812 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**
Autumn (N=2,251 individuals)	95%	0
	98%	0
	99%	0
	99,5%	**0**

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

Due to the lack of written data on the flight altitude distribution of this species, an extended model was not made for it. It is known from the literature that the species moderately migrates at night (King et al., 2009) (3 on the scale shown there), so the estimated number of individuals was multiplied by 50%.

Existing literature on ducks (Maclean et al., 2009) indicates a 99% avoidance rate, so it is realistic to assume this value in collision estimates. Collision estimates are shown in the table below.

Table 38. Estimated number of collisions of uhla migrating over the BIII OWF basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
The option selected for implementation 175 m tower Clearance of 20 m	0%	140.13	86.77	193.49
	95%	7.01	4.34	9.67
	98%	2.80	1.74	3.87
	99%	1.40	0.87	1.93
	99,5%	0.70	0.43	0.97

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for uhla is 2,719 (Table 11). The collision analysis (Table 20) predicts the highest mortality rate of 1.93 for the WR20 120-turbine farm and about 7 individuals in cumulative impact per year. For WR20 60 turbines, the mortality rate was 0.6, and with cumulative impact was 5.4. For the WR60 farm, the impact of the project itself is not expected - the coefficient was 0 individuals. These values were less than the PBR cutoff value. According to the guidelines cited above, the species is not particularly sensitive to the impact of wind farms. Accordingly, no significant negative impact of the planned project on the migratory population of the uhla is expected. According to the above data, the Uhla is protected in the Natura 2000 area "Coastal waters of the Baltic Sea", and the wintering population is estimated at 14,000-20,000 individuals. It is also the subject of protection of the "Slupsk Shoal" Natura 2000 area, where the wintering population is 5565-23611 individuals, and the transient population is 910 - 1789 individuals. According to the presented in the chapter Error! The source of the reference cannot be found. information some species may avoid wind farms and their surroundings, but it is predicted that due to the distance (about 2 km from the planned OWF), there will be no decrease in the number of this species in the protected area. The impact of the implementation of the planned project during the construction and decommissioning phases is described in Chapter 9.1 I 9.3.

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment, updated with the latest data, for the variant indicated for implementation on the basis of the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migratory population of the scops. The predicted mortality of this species for the variant implemented after the amendment of the

Environmental Decision is at 0.6 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, at 5.4 individuals per year, while the PBR is at 15,160 individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.9. Crane (Grus grus)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

The results of pre-investment monitoring showed the presence of nearly 200 cranes flying over the BIII OWF area during spring migration. The survey shows that about 79% of the cranes fly at altitudes corresponding to the range of wind turbine rotor blades starting at 20 m above sea level and 59% at altitudes corresponding to the range of wind turbine rotor blades starting at 75 m above sea level, but extending to a height of 275 m.

In view of the lack of information on the response of cranes to the OWF, a discussion was held among experts on the various possible responses of this species and the associated collision rates during the collision estimation. Finally, one of the analyzed scenarios was selected for impact assessment, justifying the choice accordingly. You can read more about this in DHI's expert study, which is Appendix P to the Report.

In the absence of adequate emipric knowledge regarding the cranes' response to the IMF's presence, the choice of a single "true" scenario remains speculative and uncertain. However, due to the large range of estimated number of collisions, in order to minimize the risk of both overestimating and underestimating the impact of collisions in the BIII OWF area, a scenario with a 98% avoidance rate was selected. Estimates obtained for this response scenario indicate that between 9 and 14 cranes will collide with the BIII OWF wind farm per year, which corresponds to a very small portion of the species' biogeographic population (>330,000 individuals; Wetlands International 2014).

In addition, occasional collisions of more birds cannot be ruled out in situations where migrating cranes encounter unfavorable weather conditions, such as poor visibility due to fog, darkness or strong winds. Bird migrations are most intense during periods of favorable weather conditions and although localized heavy haze over the maritime area is a common occurrence during spring, weather conditions can change dynamically, and birds do not always make optimal decisions about when to take flight.

Finally, it is important to note that collision risk calculations are not available for migrating cranes in the fall, and it is likely that cranes will also be at risk of collision during fall migration. Although no autumn migrations of cranes were observed in the BIII offshore wind farm area during pre-investment monitoring in 2013, observations in other areas of the Polish exclusive economic zone indicate that cranes migrated quite intensively during a few days of that season. If the BIII offshore wind farm is located on the migration route of cranes, the wind farm could cause collision risks ranging from single individuals in the most optimistic scenario to hundreds of collisions in the worst case scenario. However, assuming an avoidance rate of 98%, the likely risk of collision is for 9 - 11 individuals per migration season, and thus the significance of the impact associated with collision risk remains low, as it corresponds to a very small portion of the species' biogeographic population (410,000 individuals; Wetlands International 2014).

The adopted scenario may need to be reconsidered when new post-construction monitoring data becomes available for offshore wind farms located on crane migration routes (e.g., Baltic 2 OWF in Germany's Krieger's Flak sector).

Table 39. Estimated number of collisions of cranes migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=6 migrants)	95%	1
	98%	**0**
	99%	0
	99,5%	0
Autumn (N=8,311 migrants)	95%	28
	98%	11
	99%	5
	99,5%	3

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

Due to the lack of written data on the flight altitude distribution of this species, no, extended model was made for it. There are no data on these birds' avoidance of power plants, hence a 98% avoidance rate was assumed. Collision estimates are shown in the table below.

Table 40. Estimated number of collisions of cranes migrating over the OWF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Option selected for implementation 175 m tower	0%	433.10	175.96	690.24
	95%	21.66	8.80	34.51
	98%	8.66	3.52	13.80

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Clearance of 20 m	99%	4.33	1.76	6.90
	99,5%	2.17	0.88	3.45

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for the crane is 16,813 (Table 11). The collision analysis (Table 20) predicts the highest mortality rate of 10.78 for the WR20 120 turbine farm and about 133.5[5] individuals in the cumulative impact per year, for the WR20 60 turbine farm the corresponding values are 6 individuals for the project alone and 128.76 individuals in the cumulative impact, while for the WR60 60 turbine farm the mortality rate was 6.08, and in the cumulative impact it was almost the same as for the WR20 60 turbine farm i.e. 128.84 and these values were less than the PBR cutoff value. The species migrates with a broad front across the Polish coast, so the barrier effect will be small or insignificant. Therefore, no significant negative impact of the planned project on the migratory population of the crane is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in Chapter 9.1 I 9.3.

Summary

Calculated, in the ENINA 2022 assessment and at the 2015 Report stage, the safe yield limit (PBR) for the crane is 16,813.

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment updated with the latest data for the variant indicated for implementation based on the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migrating crane population. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at the level of 10.78 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, 128.76 individuals per year, while the PBR is at the level of 15,160 individuals, indicating the absence of negative impacts both individually and cumulatively.

The numbers of annual collisions estimated by both teams at the stage of the 2015 Report for the variant indicated for implementation in the Environmental Decision, and in the ENINA 2022 assessment for the variant that would be implemented after the amendment of the Environmental Decision, are

[5] This value is due to the adoption for the Baltic Power offshore wind farm of a very conservative avoidance factor not used for other farms

insignificant in comparison with the safe yield limit (PBR), as well as from the point of view of the biogeographical population size of the species (410,000 individuals, Wetlands International 2014).

9.2.2.10. Golden plover (Pluvialis apricaria)

Analysis by DHI

Pre-investment monitoring showed that golden plovers were observed in the BIII OWF area only during spring migration. Observations were not frequent, although the recorded flocks consisted of a large number of individuals. Plovers exhibit a high rate of avoidance, amounting to a high rate of avoidance according to Krijgsveld et al. (2011) 98%. Pre-investment surveys suggest that 96% of recorded golden plovers flew at wind turbine rotor heights, but these calculations are based on a very small sample. Migrating plovers fly over a very wide range of altitudes, from a few meters above sea level up to several kilometers. Most individuals take flight at altitudes above the rotor range (Krijgsveld et al. 2011). Another study, conducted in the UK, indicates that all golden plovers flew below the height of the rotor (Smartwind 2013). Hence, the proportion of these birds taking flight at rotor height is unknown. Therefore, it was assumed after Smartwind (2013) that 75% of individuals of this species fly at rotor height with a clearance of 20 m. This is lower than that recorded during observations in the BIII OWF area, but the information presented in Krijgsveld et al. was taken into account. (2011) suggesting that most plovers fly at altitudes above wind turbines. For the turbine variant, where the rotor zone ranges from 75 to 275 meters above sea level, it was assumed that 90% of golden plovers take flight in the rotor zone.

Table 41. Estimated number of collisions of cranes migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N= 5,236 migrants)	95%	12
	98%	5
	99%	2
	99,5%	1

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis by ENINA

Due to the lack of written data on the flight altitude distribution of this species, an extended model was not made for it. There are no data on these birds' avoidance of power plants, hence a 98% avoidance rate was assumed. Collision estimates are shown in the table below.

Table 42. Estimated number of collisions of golden plovers migrating over the BIII OWF basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	361.72	225.75	497.69
	95%	18.09	11.29	24.88
	98%	7.23	4.52	9.95
	99%	3.62	2.26	4.98
	99,5%	1.81	1.13	2.49

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

In the implementation variant, the highest collision rate with a 95% avoidance rate was 24.88 individuals per year. For a recommended avoidance rate of 99%, the highest collision rate is projected at 9.95 individuals per year.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for the crane is 16,813 (Table 11). The collision analysis (Table 20) predicts the highest mortality rate of 10.78 for the WR20 120 turbine farm and about 133.5[6] individuals in the cumulative impact per year, for the WR20 60 turbine farm the corresponding values are 6 individuals for the project alone and 128.76 individuals in the cumulative impact, while for the WR60 60 turbine farm the mortality rate was 6.08, and in the cumulative impact it was almost the same as for the WR20 60 turbine farm i.e. 128.84 and these values were less than the PBR cutoff value. The species migrates with a broad front across the Polish coast, so the barrier effect will be small or insignificant. Therefore, no significant negative impact of the planned project on the migratory population of the crane is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in Chapter 9.1 I 9.3.

Summary

Calculated, in the ENINA 2022 assessment and at the 2015 Report stage, the safe yield limit (PBR) for the crane is 16,813.

[6] This value is due to the adoption for the Baltic Power offshore wind farm of a very conservative avoidance factor not used for other farms

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2022 assessment updated with the latest data for the variant indicated for implementation based on the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migrating crane population. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at the level of 10.78 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, 128.76 individuals per year, while the PBR is at the level of 15,160 individuals, indicating the absence of negative impacts both individually and cumulatively.

The numbers of annual collisions estimated by both teams at the stage of the 2015 Report for the variant indicated for implementation in the Environmental Decision, and in the ENINA 2022 assessment for the variant that would be implemented after the amendment of the Environmental Decision, are insignificant in comparison with the safe yield limit (PBR), as well as from the point of view of the biogeographical population size of the species (410,000 individuals, Wetlands International 2014).

9.2.2.11. Lesser black-backed gull (Larus minutus / Hydrocoleus minutus)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

The results of pre-investment monitoring indicate that Lesser Black-backed Gulls were quite common in the study area during both spring and fall migrations. Gulls show a high rate of avoidance, according to Krijgsveld et al. (2011) of 98%, and even higher >99.9% (Forewind 2013). Hence, an avoidance rate value of 99% was adopted as appropriate for this species, best matching current recommendations for avoidance rates (Cook et al. 2014). Pre-intervention monitoring showed that 28% of Lesser Black-backed Gulls flew at a rotor height of 20 m above sea level, and only 2% of individuals flew at a rotor height of 75 m above sea level. Hence, the estimated number of bird collisions for this species is 0-1 for each migration season.

Table 43. Estimated number of collisions of small gulls migrating over the OWF BIII basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=1,004 individuals)	95%	0
	98%	0
	99%	**0**
	99,5%	0
Autumn	95%	0

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
(N=1,514 individuals)	98%	0
	99%	**0**
	99,5%	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision From the literature data, it is known that this is a species that migrates little at night (King et al., 2009) (2 on the scale shown there), so the estimated number of individuals was multiplied by 25%. The existing literature on gulls (Maclean et al., 2009) indicates a 99.5% avoidance rate, so it is a realistic assumption to take this value in collision estimates. Collision estimates are shown in the table below.

Table 44. Estimated number of collisions of small gulls migrating over the OWF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	42.70	26.65	58.76	9.85	7.09	12.62
	95%	2.14	1.33	2.94	0.49	0.35	0.63
	98%	0.85	0.53	1.18	0.20	0.14	0.25
	99%	0.43	0.27	0.59	0.10	0.07	0.13
	99,5%	**0,21**	**0,13**	**0,29**	**0,05**	**0,04**	**0,06**

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for the Lesser Black-backed Gull is 3,600 (Table 11). The collision analysis (Table 20) predicts a mortality rate of a modest 0.21 for the WR20 120-turbine farm and about 6.7 individuals in cumulative impact per year. For WR20 60 turbines, the mortality rate was 0.09 individuals, and with cumulative impact was 6.6. For the WR60 farm, the ratio was 0 individuals, while the cumulative impact with this farm was 6.5 These values were less than the PBR limit. According to the guidelines cited above, the species is not susceptible to the barrier effect. Therefore, no significant negative impact of the planned project on the migratory population of Lesser Black-backed Gull is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in Chapter 9.1 I 9.2.

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2020 assessment, updated with the latest data, for the variant indicated for implementation on the basis of the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migratory population of Lesser Black-backed Gull. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at 0.21 individuals per year, and 6.7 individuals per year when taking into account cumulative impacts with other offshore wind farms, while the PBR is at 3,600 individuals, indicating no negative impacts both individually and cumulatively.

9.2.2.12. The black-headed gull Chroicocephalus ridibundus

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-investment monitoring showed that blackheads were common in the study area during spring and autumn migrations. Gulls show a high rate of avoidance, according to Krijgsveld et al. (2011) of 98%, and even higher >99.9% (Forewind 2013). Hence, an avoidance rate value of 99% can be accepted as appropriate for this bird species as best meeting current recommendations for avoidance rates (Cook et al. 2014). According to the results of the pre-investment monitoring, 27% of the laughing stock flew at a rotor height of 20 m and 8% of the birds flew at a rotor height of 75 m above sea level.

Table 45. Estimated number of collisions of black-headed gulls migrating over the OWF BIII basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=2,264 individuals)	95%	1
	98%	0
	99%	**0**

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
	99,5%	0
Autumn (N=3,494 individuals)	95%	1
	98%	0
	99%	**0**
	99,5%	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

It is known from the literature that it is a lowly nocturnal migratory species (King et al., 2009) (2 on the scale shown there), so the estimated number of individuals was multiplied by 25%. The existing literature on gulls (Maclean et al., 2009) indicates a 99.5% avoidance rate, so it is a realistic assumption to take this value in collision estimates. Collision estimates are shown in the table below.

Table 46. Estimated number of collisions of black-headed gulls migrating over the OWF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	0%	55.20	34.45	75.95	9.32	6.70	11.94
	95%	2.76	1.72	3.80	0.466	0.34	0.60
	98%	1.10	0.69	1.52	0.186	0.13	0.24
	99%	0.55	0.34	0.76	0.093	0.07	0.12
	99,5%	**0,28**	**0,17**	**0,38**	**0,047**	**0,0**	**0,06**

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe take limit (PBR) for the black-crowned darter is 477,000 (Error! The source of the reference cannot be found.). In the collision analysis (Error! The source of the reference cannot be found.) the highest mortality rate is projected at a low 0.28 for the WR20 120-turbine farm and about 5.9 individuals in cumulative impact per year. For WR20 60 turbines, the mortality rate was 0.13 individuals, and with a cumulative impact of 5.8. For the WR60 farm, the ratio was 0 individuals, while the cumulative impact with this farm was 5.6. These values were less than the PBR cutoff value. According to the guidelines cited above, the species is not particularly sensitive to the impact of wind farms. As a result, no significant negative impact of the planned project on the migratory population of the black-headed duck is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in Chapter 9.1 I 9.2.

Summary

The assessments carried out, both the one for the 2015 Report for the variant approved by the Environmental Decision and the ENINA 2020 assessment, updated with the latest data, for the variant indicated for implementation on the basis of the amendment to the Environmental Decision, do not predict a significant negative impact of the planned investment on the migrating population of black-headed gulls. The predicted mortality of this species for the variant implemented after the amendment of the Environmental Decision is at 0.13 individuals per year, and when taking into account cumulative impacts with other offshore wind farms, at 5.8 individuals per year, while the PBR is at 477,000 individuals, indicating the absence of negative impacts both individually and cumulatively.

9.2.2.13. Alka (Alca torda)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-intervention monitoring showed that alcids are very common in the study area during spring and fall migrations. According to the results, all birds flew at altitudes below the height of the rotor, and thus no individuals of this species are expected to collide with OWF III. However, occasional collisions cannot be completely ruled out.

Table 47. Estimated number of collisions of alkas migrating over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring	95%	0

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
(N=6,294 individuals)	98%	0
	99%	0
	99,5%	0
Autumn (N=2,883 individuals)	95%	0
	98%	0
	99%	0
	99,5%	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

The DHI study did not include two individuals that flew at an altitude of 15-60 m for the altitude analysis. The authors of this study counted them as flying at collision height, This is because the augmented models, which take into account the distribution of alka flight heights from various UK marine farms, indicate that this species can fly above 20 m, hence the resulting collision rate in the augmented models. alk The existing literature on the subject (Maclean et al., 2009) indicates a 99.5% avoidance rate, so it is a realistic assumption to take this value in collision estimates. Collision estimates are shown in the table below.

Table 48. Estimated number of collisions of alkas migrating over the OWF BIII basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
Option selected for implementation 175 m tower	0%	3.70	2.15	5.26	4.50	2.97	6.03
	95%	0.19	0.11	0.26	0.23	0.15	0.30
	98%	0.07	0.04	0.11	0.09	0.06	0.12
	99%	0.04	0.02	0.05	0.05	0.03	0.06

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area			Calculations taking into account the flight altitude distribution given in Cook et al., 2012		
		Individuals / year	Scope		Individuals / year	Scope	
Clearance of 20 m	99,5%	0.02	0.01	0.03	0.02	0.12	0.03

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated limit of safe yield (PBR) for the laughing stock is 477,000 (Table 11). The collision analysis (Table 20) predicts the highest mortality rate at a low 0.28 for the WR20 120-turbine farm and about 5.9 individuals in cumulative impact per year. For WR20 60 turbines, the mortality rate was 0.13 individuals, and with a cumulative impact of 5.8. For the WR60 farm, the ratio was 0 individuals, while the cumulative impact with this farm was 5.6. These values were less than the PBR cutoff value. According to the guidelines cited above, the species is not particularly sensitive to the impact of wind farms. As a result, no significant negative impact of the planned project on the migratory population of the black-headed duck is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in sections 9.1 and 9.2.

Summary

The calculated safe yield limit (PBR) for alka is 1,884 according to the ENINA 2020 assessment; at the 2015 Report stage, the safe yield limit was calculated at 3,140 for alka. However, this does not change the results of the assessment confirming the lack of negative impact of the Project on this species caused by additional mortality due to collisions.

The numbers of annual collisions estimated in the 2015 Report for the variant indicated for implementation by the Environmental Decision by both teams are insignificant in comparison with the safe yield limit (PBR), as well as from the point of view of the biogeographic population size of the species (>1,000,000 birds, Birdlife International 2004). The same conclusions are drawn from the ENINA 2022 assessment for the variant that would be implemented after the amendment of the Environmental Decision.

9.2.2.14. The woodpigeon (Columba palumbus)

Analysis performed by DHI in 2015 for the variant approved by the Environmental Decision

Pre-intervention monitoring showed that woodpigeons were common in the study area during spring migration and rather sporadic during fall migration (DHI 2014b). A value of 98% for the avoidance rate for this species appears to be an appropriate conservative scenario, and is in line with recommendations

that for species for which estimates of this parameter do not exist, it is conservative values that should be used (Smartwind 2013). According to the results of the pre-investment survey, 34% of the birds fly at rotor height (i.e., in the collision zone) with a clearance of 20 meters, and all of them flew below the collision zone if the clearance is 75 meters.

Table 49. Estimated number of collisions of migratory woodpigeons over the BIII OWF basin, calculated by DHI

Migration period	Avoidance rate	The option selected for implementation based on the 2015 Report
		175 m tower Clearance 20 m
		Number of birds undergoing collisions
Spring (N=13,126 individuals)	95%	0
	98%	0
	99%	0
	99,5%	0
Autumn (N=33 individuals)	95%	0
	98%	0
	99%	0
	99,5%	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Analysis performed by ENINA in 2015 for the variant approved by the Environmental Decision

Nurzyk did not show flight at a collision altitude in the DHI survey, however, the POMARINUS group recorded one individual flying between 15-60 m. In addition, an augmented model was used. On the subject of nurzyk, the existing literature (Maclean et al., 2009) indicates a 99.5% avoidance rate, so it is a realistic assumption to take this value in collision estimates. Collision estimates are shown in the table below.

Table 50. Estimated number of collisions of nules migrating over the BIII OWF basin, calculated by ENINA

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
	0%	213.32	86.67	339.98

Variant	Avoidance rate	Calculations taking into account overflight height data from the OWF BIII area		
		Individuals / year	Scope	
Option selected for implementation 175 m tower Clearance of 20 m	95%	10.67	4.33	17.00
	98%	4.27	1.73	6.80
	99%	2.13	0.87	3.40
	99,5%	1.07	0.43	1.70

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

ENINA 2022 assessment for the variant indicated for implementation under the amendment to the Environmental Decision

The calculated safe yield limit (PBR) for the woodpigeon is 5,560,577 (Table 11). The collision analysis (Table 20) predicts a mortality rate of 4.27 individuals for WR20 120 turbines, for WR20 60 turbines the value of the coefficient was 3.55, while for WR60 60 turbines the project is not expected to affect the population of the woodpigeon. For the cumulative impact, this value was not studied with the implementation of neighboring farms, but no significant deviation from the data obtained is expected. These values will be less than the PBR limit. According to the guidelines cited above, the species is not susceptible to the barrier effect. Therefore, no significant negative impact of the planned investment on the migratory population of the woodpigeon is expected. The impact of the implementation of the planned project during the construction and decommissioning phases is described in Chapters 9.1 and 9.3.

Summary

The calculated safe yield limit (PBR) for borers both at the stage of the 2015 Report forming the basis for the issuance of the Environmental Decision is 109,907. It also remains valid for the ENINA 2022 assessment.

The numbers of annual collisions estimated at the stage of the 2015 Report for the variant approved by the Environmental Decision and within the ENINA 2022 assessment for the variant that would be implemented after the amendment of the Environmental Decision are insignificant in comparison with the safe yield limit (PBR), as well as from the point of view of the biogeographical population size of this species (> 4,000,000 birds, BirdLife International 2004).

9.2.2.15. Summary

Collisions of migratory birds during the operation stage are direct, negative impacts that are local in scope, long-term, irreversible, repeatable during the operation period, with low to medium intensity.

In terms of conflicts of interest, a comparison between the variant that was determined by the Environmental Decision and the one envisaged for implementation under the amended Environmental Decision is presented in the table below.

Table 51. Comparison of mortality for the variant currently indicated for implementation by the Environmental Decision and the variant envisaged for implementation after amendment of the Environmental Decision

Bird species	RWU (%)*	WR20 - 120 turbines	WR20 - 60 turbines
		bird/year	bird/year
Alka Alca torda	99.50	0.02	0.01
Long-tailed duck Clangula hyemalis	99.00	0.09	0.04
Uhla Melanitta fusca	99.00	1.93	0.60
Marquise Melanitta nigra	99.00	2.57	1.32
Nur Gavia sp.	99.50	0.32	0.09
Anas penelope marmot	99.00	6.70	3.00
Anserini geese	99.80	12,15a	6.55
Swans Cygnus sp.	99.50	0,78b	0.25
Cormorant Phalacrocorax carbo	99.00	0.75	0.41
Golden plover Pluvialis apricaria	98.00	7.24	lack of data
Lesser gull Larus minutus / Hydrocoleus minutus	99.50	0.21	0.09
Ridibundus Chroicocephalus ridibundus	99.50	0.28	0.13
Crane Grus grus	98.00	10.78	6.00
Columba palumbus mane	98.00	4.27	3.55

*RWU (%) - real avoidance rate

a - earlier Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III (Tryjanowski P., Jankowiak Ł. I Łuczak A. 2015) was carried out based on a real avoidance rate of 99% for geese, and the collision rate for this rate was 61.22 wasps/year; currently, according to Table 1, the avoidance rate for geese is 99.8, and this rate was used for calculations for the old variant WR120 (for a more complete comparison) and the current implementation variant of the different variants of the offshore wind farm OWF Central Baltic III within the range defined by the envelope (depending on the clearance size): WR20 - 60 turbines

b - earlier Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III (Tryjanowski P., Jankowiak Ł. I Łuczak A. 2015) was carried out based on an avoidance rate of 98% for swans, and the collision rate for this rate was 3.14 wasps/year; currently, according to Table 1, the avoidance rate for geese is 99.5, and this rate was used for calculations for the old WR120 variant (for a more complete comparison) and for the current implementation variant of the various variants of the offshore wind farm OWF Central Baltic III within the range defined by the envelope (depending on the clearance size): WR20 - 60 turbines

Source: Own elaboration based on Tryjanowski P, Luczak A. Gawliok A. Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

From the above comparison, it is clear that the variant in which the Project is to be implemented will, in principle, result in mortality from collisions with the wind farm at a level approximately 50% lower than that currently in effect according to the findings of the Environmental Decision.

Below is a table that shows the magnitudes and significance of impacts determined for the set of parameters of the Project constituting the 2015 NIS (in this case, depending on the technical parameters of the power plant), which would cause impacts greater than or equal to the variant approved by the Environmental Decision. This assessment was based on the DHI analysis done for the 2015 Report and serves as the baseline for this assessment. The results of the ENINA 2020 assessment clearly indicate that the impacts on migratory birds associated with collisions with wind turbines and their significance for the variant implemented after the amendment of the Environmental Decision will be lower than for the variant currently approved by this decision.

Table 52. Collisions with power plants - analysis of the impact on birds migrating over the surface of the farm during the operation stage (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver Gavia arctica	Large	* (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Pollack diver Gavia stellata	Large	* (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Mute swan Cygnus olor	Small	*** (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bewick's swan Cygnus bewickii	Large	*** (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Whooper swan Cygnus cygnus	Large	*** (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Anserini geese	Small	** (Langston) / x (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Small (scale of exposure - local; duration - long-term; intensity - medium)	Negligible (magnitude of impact - low; importance of the resource - low)
Anas Penelope marmot	Small	not indicated (Langston) / not indicated (EC)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Overlooked (magnitude of impact - insignificant; importance of the resource - low)
Long-tailed duck Clangula hyemalis	Large	* (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Marquise Melanitta nigra	Small	* (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			operating power plants		the resource - low)
Uhla Melanitta fusca	Very large	* (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Crane Grus grus	Very large	not indicated (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of resource - very high)
Golden plover Pluvialis apricaria	Very large	not indicated (Langston) / X (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of resource - very high)
Laughing gull Larus ridibundus	Medium	* (Langston) / not indicated (EC)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Lesser Black-backed Gull Hydrocoloeus minutus / Larus minutus	Very large	* (Langston) / not indicated (EC)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Alka Alca torda	Small	* (Langston) / X (KE)	During the operation of the farm, there may	Negligible (scale of exposure -	Negligible (magnitude of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			be collisions between seabirds and operating power plants	local; duration - long-term; intensity - low)	impact - insignificant; importance of the resource - low)
Cormorant Phalacrocorax carbo	Small	** (Langston) / x (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Columba palumbus mane	Small	* (Langston) / x (KE)	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

9.2.3. Measures to minimize negative impacts at the stage operation

No specific mitigation measures are recommended, as no significant impacts of OWF BIII on birds flying over the farm basin have been identified. However, some general principles that can make the OWF a safer area for birds are described below.

Currently, the primary measures to minimize the possible impacts of the OWF on birds are the selection of an appropriate area for the establishment of the project and its design. Site selection is most often the first criterion when considering siting an OWF. Avoid building OWFs in areas of high importance to seabirds or that are migration corridors. Since the BIII OWF site is not located directly in the main migration corridor, which on the POM extends along the coast, in or near an area of high density of waterbirds, and the location of the project is already established, mitigation measures involving the selection of another location for the planned project cannot be applied.

The EIA of the BIII OWF found that the number of turbines and the height of the rotor above sea level are key parameters determining the risk of bird collisions. The large number of turbines causes a high risk of collisions. This is evidenced by calculations of a higher number of collisions for the rational alternative, where 150 turbines are planned, compared to the variant selected for implementation, where only 100 turbines are assumed. In addition, turbine parameters such as tower height, clearance

between the water surface and the bottom position of the wing, and rotor area are very important factors affecting bird collision rates. Since many of the waterbirds fly close to the surface of the water, the greater height of turbine rotor placement translates into fewer potential collisions. However, this state of affairs does not necessarily apply to land birds, which generally fly higher above sea level. For example, it was estimated that cranes will collide with wind turbines when the turbine rotor is positioned quite high, hence the worse potential collision results for the variant selected for implementation.

The risk of collision for migrating waterfowl and passerine birds at night, which are attracted to the wind farm by the light emitted, can be reduced by matching the lighting system of the wind farm and the vessels used in its construction. Although knowledge in this area is poor, it is generally assumed that the lower the lighting the better, and the lights should be placed as low as possible, since the lower the lights are placed, the fewer birds they will attract (Blew et al. 2013). Reducing light emissions can be:

- shielding light sources, if necessary during construction work;
- avoiding lighting if it is not necessary;
- avoiding upward positioning of lights.

In addition, potential impacts in the form of bird collisions can be reduced by shutting down wind turbines during periods of the most intense migration of sensitive species, and extremely unfavorable meteorological conditions (high fog, low visibility). The peak migration of some species, such as cranes, usually occurs only during a few days of the migration season. Knowing the migration dates of species, the prevailing weather conditions, and conducting visual and radar monitoring, it is possible to predict the period when there will be several days of intense bird migration.

In addition, it is proposed to paint the tips of the blades in bright colors, which should increase the likelihood of the working turbine being spotted by passing birds. However, this does not solve the problem of nighttime collisions and in conditions of limited visibility (fog), which account for the vast majority of cases.

In addition, it is recommended to use towers of solid construction and not to use truss structures. The minimum clearance between the lower position of the rotor wing and the sea surface should be set at a minimum of 20 m.

9.2.4. Impacts cumulative

Assumptions for the analyses of cumulative impacts of the BIII OWF as it will be implemented after the amendment of the Environmental Decision and other projects on the environment are presented in Section 3.2. On the other hand, a broad description regarding this issue is provided in Section 13 of Volume II of the EIA report.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for wind farm development in the POM for cumulative impact analyses presented below:

At the time, it was assumed that power plants with a total capacity of 900 MW would be built between 2019 and 2021, including 600 MW under the BSIII offshore wind farm and 300 MW under the Baltica 3 offshore wind farm. Assuming that the average power plant will have a capacity of 6 MW, it was

assumed that 150 of them would be built. The construction of supporting infrastructure in the form of (substations, social and measurement and research platforms, etc.) was also assumed. The scale of the infrastructure to be built assumed 158 foundations and about 158 km of internal cables.

Export cables were to be built to these 2 farms to land with an estimated length of 95 km and 45 km, respectively.

In 2019-2021, geotechnical drilling was also to be carried out in the areas of the Gaz South and Slupsk E concessions, but these impacts should also be considered negligible, due to the vastness of the concession areas and only minor overlaps with the areas of wind farms planned in the area. Export cables and geotechnical surveys in hydrocarbon concession areas were therefore not taken into account in further cumulative impact analyses.

This scenario has not been realized.

In addition, there are heavily used shipping routes (including the Traffic Separation Scheme - TSS) in the vicinity of the farm, in the area of which the risk of oil spills increases. The activity was expected to contribute to increasing the scale of impact.

The second scenario assumed that more power plants would be built between 2023 and 2026, with a total capacity of 1,350 MW, including 600 MW under the BSIII offshore wind farm and 750 MW under the Baltica 3 offshore wind farm. Assuming an average power plant of 6 MW, 225 will be built. Associated infrastructure (e.g., substations, additional platforms, such as social.) will also be built. It can be assumed that 232 foundations and about 232 km of internal cables will be installed on the seabed in this connection.

The 2015 Report also analyzed another scenario for this construction phase, which was that the above numbers of power plants and infrastructure would be built not in the areas of the BSIII and Baltica 3 offshore wind farms, but as the BSII and Baltica 2 offshore wind farms (the PSZWs belong to the same owners). However, such an alternative scenario will not significantly change the level of impacts.

Compared to the scenario assumptions adopted in the 2015 Report, the timing of all planned projects has changed, as they have all been delayed.

It is currently anticipated that the implementation of the BIII offshore wind farm could be carried out between 2023 and 2025. During this period, the Baltica 2 offshore wind farm, which has a signed connection agreement with a completion date similar to the BIII offshore wind farm, may also be implemented. Ultimately, it is expected that the Baltica OWF (Baltica 2 and Baltica 3), MIP B III, MIP BIII, Baltic Power OWF and C-WIND will be built (the latter, unlike the previously mentioned, does not yet have an environmental decision issued).

A cumulative assessment of the impact on migratory birds was also conducted with the aforementioned projects in mind.

The project, which has obtained an Environmental Decision for 120 power plants, will be implemented for 60 power plants after taking into account the proposed amendment, which will significantly reduce the cumulative impacts projected to date.

The Baltica 2 and 3 offshore wind farms received an environmental decision on January 24, 2020, which calls for the construction of 209 wind farms.

The Baltic II project, which could be a maximum set of 44 wind power plants, also received the decision.

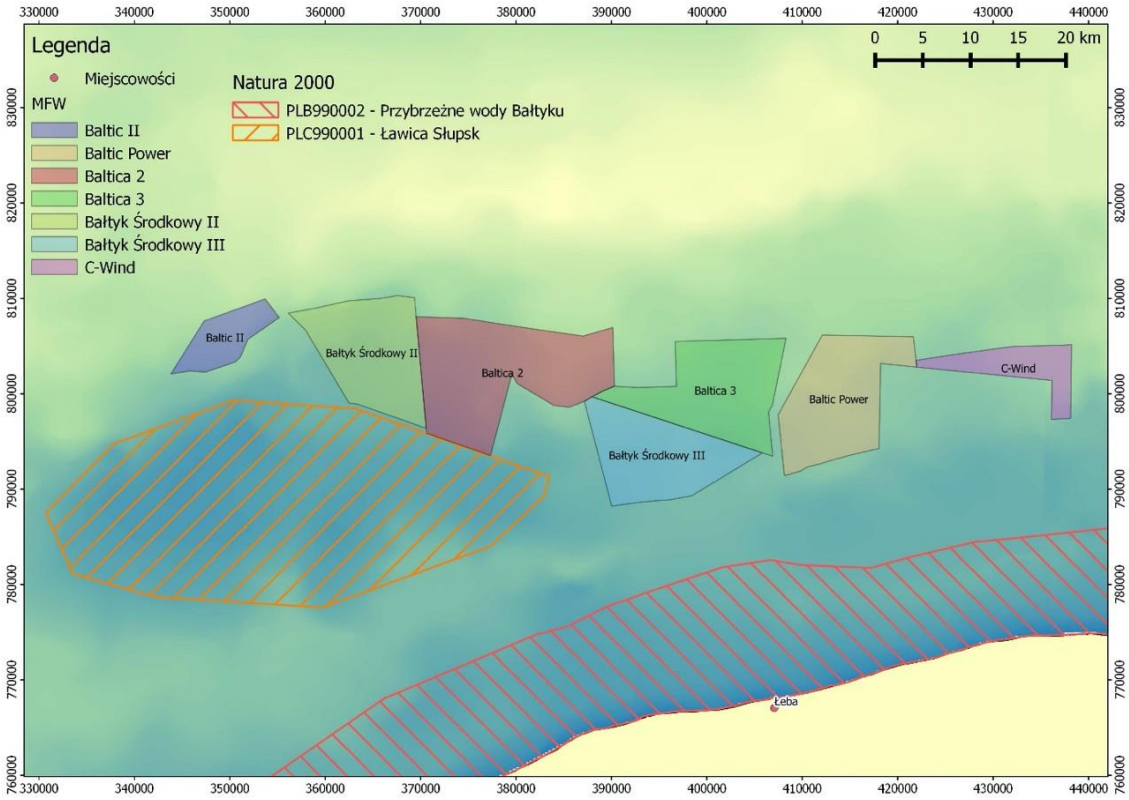
Another investment that is planned and has been granted a DWA is the Baltic Power offshore wind farm, which involves the construction of up to 126 wind power plants.

At this stage, the above-mentioned projects have been considered for the assessment of the cumulative impact on migratory birds as the most likely due to either obtaining an environmental decision or applying for one. The assessment also includes the C- WIND OWF, which is in the process of obtaining a DWA.

Below is a drawing showing the distribution and locations of the wind farms considered in the cumulative impact analyses, with the caveat that the C-Wind wind farm indicated therein.

The farms identified for analysis were considered a potential risk of creating a barrier to moving birds. (See figure below).

Figure 4. Location of planned OWFs in the vicinity of BIII against the background of the nearest Natura 2000 areas



Legenda	Legend
Miejscowości	Localities
MFW	IMF
Baltic II	Baltic II
Baltic Power	Baltic Power
Baltica 2	Baltica 2
Baltica 3	Baltica 3
Bałtyk Środkowy II	Central Baltic II
Bałtyk Środkowy III	Central Baltic III
C-Wind	C-Wind
Natura 2000	Natura 2000

PLB990002 – Przybrzeżne wody Bałtyku	PLB990002 - Coastal waters of the Baltic Sea
PLC990001 – Ławica Słupsk-	PLC990001 - Slupsk Shoal-

Source: Tryjanowski P., Jankowiak Ł., Łuczak A., Assessment of the impact on migratory birds and selected species of seabirds (long-tailed duck and seagull) of the project involving the construction of the offshore wind farm Bałtyk Środkowy III", ENINA, Poznań, 2015.

9.2.4.1. Effect barriers

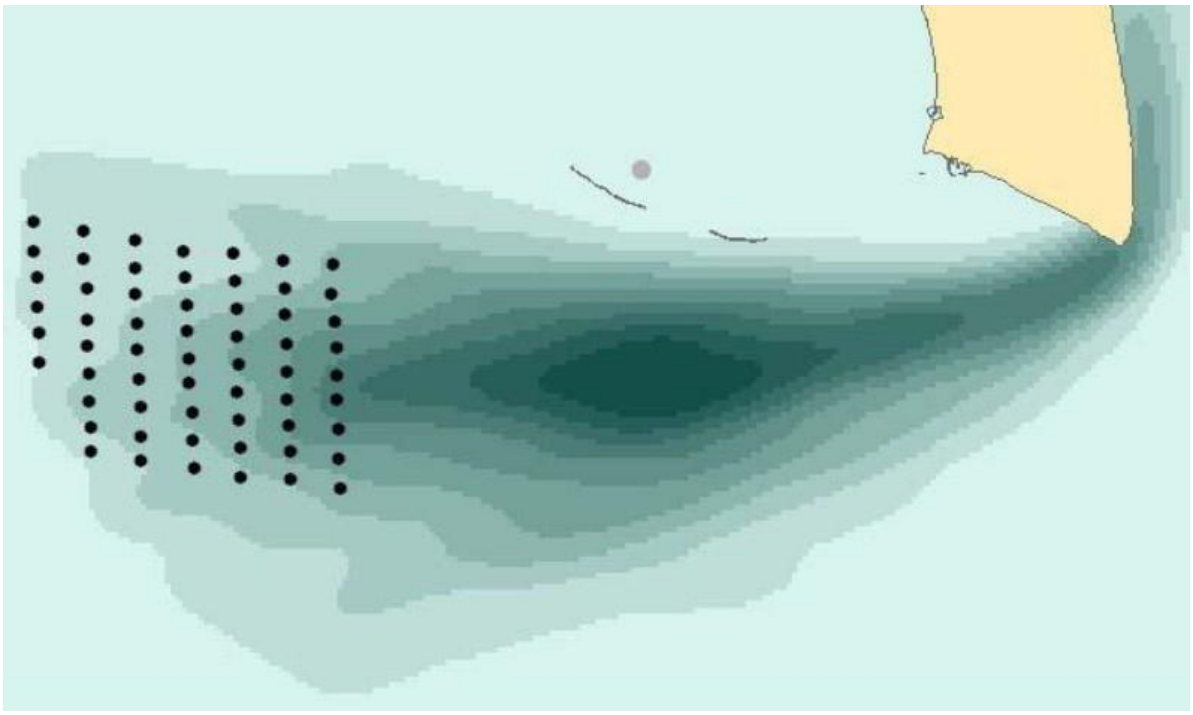
There is a potential risk that wind turbines located along migratory or long-distance migration routes, or along regular flight paths between feeding grounds and resting or nesting sites at the local level, could pose a barrier to the movement of bird species (European Commission, 2010).

There is a potential risk that wind turbines located along migratory or long-distance migration routes, or along regular flight paths between feeding grounds and resting or nesting sites at the local level, could pose a barrier to the movement of bird species (European Commission, 2010).

To verify the real threat of the barrier factor to moving birds, it is worth analyzing the results of a study conducted at the Nysted offshore wind farm, located off the coast of Denmark, for geese migrating in its area. Bird flight paths in the area of the farm have been monitored by radar since 2005. Every year, 200,000-300,000 geese fly over the farm area during the fall and spring seasonal migration periods (Kahlert 2005, (Petersen K. et al., 2006). The research began prior to the project's implementation and continues throughout the years of its operation. The results of the study show that the birds bypass the wind turbines, thereby overriding the original routes by about 500 meters. Considering that the migratory route traveled by geese is more than 1,400 kilometers, this is an additional but unnoticeable energy effort for the birds with no significance for their condition. Only the need to avoid nearly 100 similar facilities could affect the noticeable loss of bird mass, although it would be only 1% (Madsen J., Boertman D., 2008).

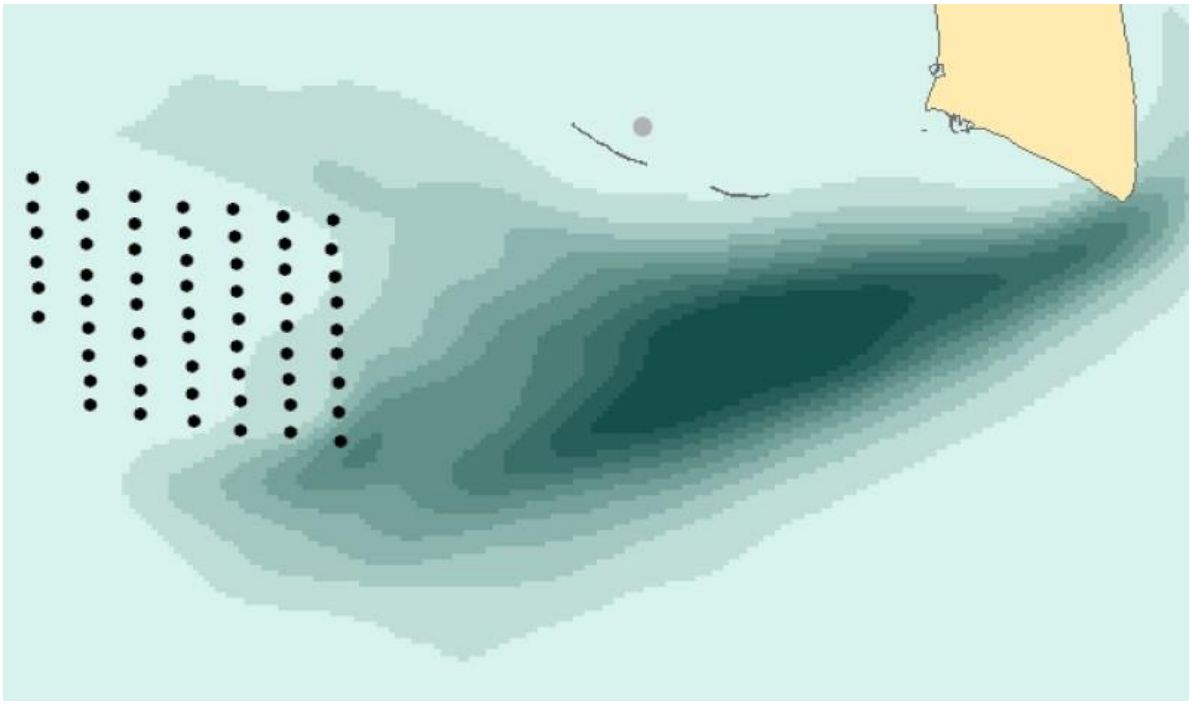
As the two figures below (Figures 5 and 6) show, the wind farm is recognized and avoided by birds.

Figure 5. The stream of migrating birds in the area of the Nysted farm in Denmark, during the pre-implementation period. Black dots indicate planned wind turbine locations, gray indicates radar locations



Source: Tryjanowski P, Luczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

Figure 6. The stream of migrating migratory birds in the area of the Nysted farm in Denmark, during the period of the farm's operation. Black dots mark wind turbine locations, gray marks radar locations



Source: Tryjanowski P, Luczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

The above results show that the barrier effect caused by wind farms, which could be considered to cause a significant impact on birds, can only occur for local migrations or for huge, multi-hundred wind farms or a group of many wind farms spread over a large area that is a seasonal migration route.

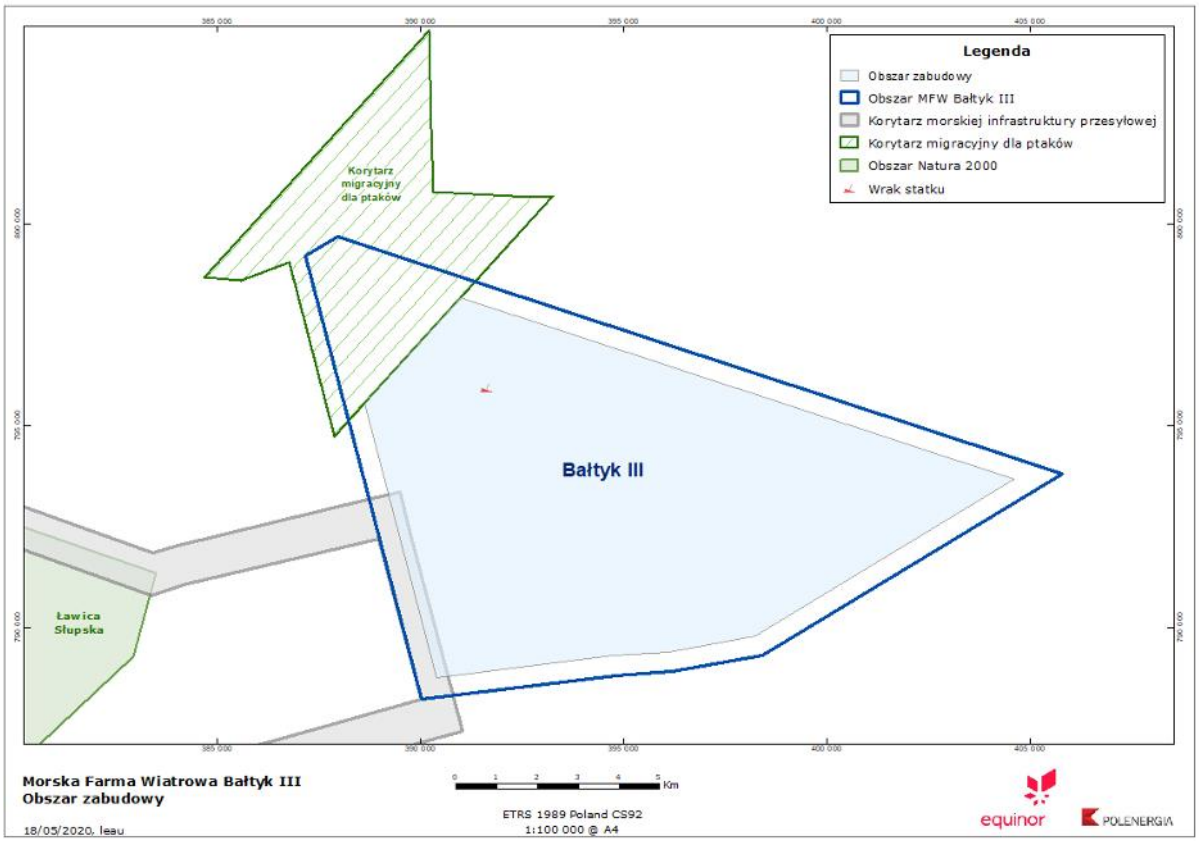
Avoidance of wind farms has been documented for many bird species, especially waterfowl and passerines. These behaviors are very species-specific. During the day, birds can maintain a distance of 100-3000 m from the wind farm, while at night these distances can be smaller (Madsen J., Boertman D., 2008) (Petersen K. et al., 2006). While the short-term benefits of avoidance mechanisms are obvious, due to the elimination of the risk of injury or death from collisions, such flight rerouting may involve increasing energy and time expenditures that could theoretically, in the long term, affect fitness, with which parameters such as survival and reproductive capacity are associated.

The solution of guaranteeing a free corridor was implemented in the terms of the environmental conditions decision issued for the Baltica OWF, and it provides for leaving a 5 km corridor free of development with power plants between the Baltica 2 and Baltica 3 areas - condition II.3.9 of the environmental conditions decision, mark RDOŚ-Gd- WOO.4211.21.2017.MJ.PW.AJ.37, and assuming that this width of undeveloped corridor is left to the borders of the Slupsk Bank Natura 2000 area.

Analogous solutions are proposed in the project impact report for the Baltic Power project, they assume leaving an additional area between the Baltica 3 offshore wind farm and the Baltic Power offshore wind farm free of power plant development, and supporting the above-described 5 km corridor.

Bearing in mind the above and the need to minimize cumulative impacts, including impacts on Natura 2000 sites, an additional mitigation measure is proposed to not develop the northwestern part of the BIII OWF and thus leave space creating a migration corridor for birds, which could ensure the continuity of the migration corridor and the continuation of the described measures in this regard, thanks to the already implemented actions. The proposal is shown in the figure below.

Figure 7. Proposal for a development-free corridor between OWF BIII and FEW Baltica offshore wind farm



Korytarz migracyjny dla ptaków	Migration corridor for birds
Ławica Słupska	Slupsk Shoal
Bałtyk III	Baltic III
Legenda	Legend
Obszar zabudowy	Development area
Obszar MFW Bałtyk III	Baltic III offshore wind farm area
Korytarz morskiej infrastruktury przesyłowej	Offshore transmission infrastructure corridor
Korytarz migracyjny dla ptaków	Migration corridor for birds
Obszar Natura 2000	Natura 2000 area
Wrak statku	Shipwreck
Morska Farma Wiatrowa Bałtyk III Obszar zabudowy	Offshore Wind Farm Baltic III Development area

Source: Tryjanowski P, Luczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

The area of wind farms will affect the designed corridor, but it is so wide that, according to the literature data presented below, it should fully perform its function of connecting the areas most attractive to birds. Its establishment definitely minimizes the effect of collision and deterrence on local bird populations and should ensure the permeability of bird migration routes. It was designed in such a way that it even ideally provides an inlet to the Slupsk Bank (PLC990001), covering an area of 80,969 hectares. It is a large marine refuge covering a shallow body of water lying about 25 kilometers from the coast, and at the same time, in the planned development, is the most important refuge, also protected under Natura 2000 (SPA).

Changing the conditions for implementation and operation of the Project can therefore be considered an important mitigation measure by creating additional corridors to ensure bird migration.

9.2.4.2. Risk collision

For the purposes of this report, the current "Assessment of the impact on migratory birds of the project involving the construction of the Central Baltic III offshore wind farm" was carried out, the author of which is ENINA. This assessment also takes into account cumulative collision analyses whose results are presented in the table below. These analyses are based on research and data prepared for the 2015 Report but have been updated with the level of knowledge, experience currently available and information from other projects currently planned for implementation.

Below are the results including a summary of the potential cumulative collision assessment for migratory species performed by ENINA 2022. This analysis takes into account the cumulative mortality results for the Project after the amendment of the Environmental Decision.

Table 53. Predicted maximum cumulative collision of migratory birds based on ENINA 2022 calculations.

WR20	RWU (%)*	WR20 - 60 turbines	Wind farms planned for development in the area the wind farm in question					∑ (WR20-60)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Alka Alca torda	99.50	0.01	0	0	0.00	0.00	0	0.0
Long-tailed duck Clangula hyemalis	99.00	0.04	1	2	0.00	0.75	0	3.8
Uhla Melanitta fusca	99.00	0.60	1	2	0.22	0.57	1	5.4
Marquise Melanitta nigra	99.00	1.32	2	3	0.77	2.74	0	9.8
Nur Gavia sp.	99.50	0.09	0	2	0.26	0.18	2	4.5
Anas penelope marmot	99.00	3.00	0	1	4.02	7.74	2	17.8
Anserini geese	99.80	6.55	56.0	4.0	21.2	3.0	4	94.7
Swans Cygnus sp.	99.50	0.25	0	0	0.00	0.45	0	0.7
Cormorant Phalacrocorax carbo	99.00	0.41	0	1	0.40	0.22	1	3.0
Golden plover Pluvialis apricaria	98.00	7.24	lack of data	lack of data	lack of data	lack of data	lack of data	lack of data

WR20	RWU (%)*	WR20 - 60 turbines	Wind farms planned for development in the area the wind farm in question					∑ (WR20-60)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Lesser gull Larus minutus / Hydrocoleus minutus	99.50	0.09	1	3	1.34	0.13	1	6.6
The common pochard Chroicocephalus ridibundus	99.50	0.13	0	5	0.19	0.44	0	5.8
Crane Grus grus	98.00	6.00	107	1	0.63	0.13	14	128.76
Columba palumbus mane	98.00	3.55	lack of data	lack of data	lack of data	lack of data	lack of data	lack of data

*RWU (%) - real avoidance rate

Source: Tryjanowski P, Łuczak A., Gawlik A.,Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

The results of the collision analysis of migratory birds clearly indicate a positive impact of the proposed modifications to OWF BIII on cumulative impacts resulting from the existence of a group of OWF projects on the east-west axis along the eastern and northeastern slopes of Slupsk Shoal. Consequently, it should be considered that the proposed modification of the parameters of the BIII OWF not only will not affect the result of the impact assessment conducted for the Project in the parameters approved by the Environmental Decision, but can be considered to reduce the potential impacts associated with the implementation of the BIII OWF, including in the context of cumulative impacts.

9.2.4.3. Summary

It should be borne in mind that the relevant technical parameters of most of the considered OWF projects should be treated as maximum despite the fact that they have been disclosed either in environmental decisions or in applications for their issuance, as the farms may be implemented with fewer turbines than indicated in the decisions. Using the example of the BII offshore wind farm, which received a decision amending the 2015 DWA, it can be seen that the original assumptions were significantly reduced. The same effect will result, i.e., a further reduction in the scale of impacts, from the proposed amendment to the decision for OWF BIII. By the same token, their assumptions indicate that they should be treated as the most far-reaching scenarios.

As can be seen from the above calculations and analysis, there will be no significant collision, and the barrier effect with minimization measures will not significantly affect migration over the area.

The significance of the cumulative impact of collision risk and barrier effect was assessed as negligible to small for all analyzed migratory bird species.

The reduction in the risk of collision will be primarily influenced by a 70% reduction in the number of wind turbines relative to the set of parameters of the Project evaluated in the 2015 Report, which is the

most far-reaching scenario - NIS 2015, and by 50% in the variant envisaged for implementation in the Environmental Decision. As an additional measure of mitigating the barrier effect, the proposal to leave the area free of development between the BIII OWF and the proposed Baltica OWF (Baltica 2).

As a whole, consider that the proposed modification of the parameters of the BIII OWF will not only not affect the result of the impact assessment conducted for the Project in the parameters approved by the Environmental Decision, but can be considered to reduce the potential impacts associated with the implementation of the BIII OWF, including in the context of cumulative impacts.

9.3. Stage decommissioning

Assessing the impact of the BIII offshore wind farm on individual bird species during the decommissioning phase is hampered by the lack of data on similar projects, as no offshore wind farm has yet entered this stage.

Similar emissions and environmental disturbances to those that may affect ornithofauna at the construction stage of OWF BIII are expected to occur. However, they will be important mainly for seabirds residing in the area of the farm, and not for birds flying over it, for which they may only be relevant:

1) a barrier caused by the presence of ships,
2) collisions with ships.

For a description of the above disturbances, see Section 9.1 (construction phase). This chapter contains only tables of evaluations.

Helicopters will also be used during the decommissioning phase, but due to the unknown number and types of helicopters, their impacts are being evaluated together with those of watercraft. No minimization measures are proposed for the decommissioning stage of the farm, due to the low or negligible significance of the impacts of this stage on migratory birds. However, it can be recommended to apply the same measures indicated for the construction phase, which will still reduce these minor impacts of the farm.

9.3.1. The barrier caused by the presence of ships

Below is a table that shows the results of the analysis of the impact of the barrier caused by the presence of ships on individual species of birds migrating over the surface of the farm during the decommissioning stage. While the results presented therein refer to the 2015 NIS, it should be noted here that the scale of decommissioning for the implementation option specified in the Environmental Decision (40% fewer power plants compared to the 2015 NIS) will be considerably smaller. The planned Project in the currently requested variant assumes the possibility of building 50% fewer power plants than in the variant indicated for implementation by the Environmental Decision, and 70% fewer power plants compared to the 2015 NIS. This means that the traffic of vessels used in the decommissioning phase will be less. If, with regard to the BIII OWF itself in the proposed modified parameters, it can be considered that the barrier effect will be the same regardless of the area of the occupied body of water, then with regard to the movement of ships necessary for operations related to the decommissioning of the Project, not only their number will be reduced, but also the working time associated with the

implementation of the power plant will be dramatically reduced. However, these changes are not significant enough to speak of changes in the barrier scores assessed for the 2015 NIS.

With regard to offshore wind farms, it is the presence of power plants on a given body of water, as well as the units that support the decommissioning process, that is a significant source of impact. Due to the planned change in the Project in relation to the variant approved by the Environmental Decision, through its slight reduction in relation to the parameters of the Project approved, this Decision, it should be assumed that due to the smaller number of power plants, the time required for decommissioning will be shorter. Considering the above, it should be concluded that the variant implemented after the amendment of the Environmental Decision will generate comparable or smaller impacts than those identified for the 2015 NIS.

Table 54. Barrier caused by the presence of ships - analysis of the impact on birds migrating over the surface of the farm during the decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	** (Langston) / not indicated (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Red-throated diver *Gavia stellata*	Large	** (Langston) / not indicated (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Mute swan *Cygnus olor*	Small	* (Langston) / not indicated (EC)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bewick's swan *Cygnus bewickii*	Large	* (Langston) / not indicated (EC)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Whooper swan *Cygnus cygnus*	Large	* (Langston) / not indicated (EC)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Geese *Anserini*	Small	* (Langston) / not indicated (EC)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Swistun *Anas Penelope*	Small	not indicated (Langston) / x (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Overlooked (magnitude of impact - insignificant; importance of the resource - low)
Long-tailed duck *Clangula hyemalis*	Large	** (Langston) / X (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					resource - high)
Markaczka *Melanitta nigra*	Small	** (Langston) / X (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Uhla *Melanitta fusca*	Very large	** (Langston) / X (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Crane *Grus grus*	Very large	not indicated (Langston) / x (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of resource - very high)
Gold seedling *Pluvialis apricaria*	Very large	not indicated (Langston) / X (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Laughing gull *Larus ridibundus*	Medium	* (Langston) / not indicated (EC)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus / Larus minutus*	Very large	* (Langston) / not indicated (EC)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - very high)
Alka *Alca torda*	Small	** (Langston) / not indicated (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Kormoran *Phalacrocorax carbo*	Small	** (Langston) / x (KE)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Grzywacz *Columba palumbus*	Small	not indicated (Langston) / not indicated (EC)	The presence of ships during the decommissioning phase will create a barrier to the movement of birds	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with impact assessment of the variant selected for implementation and the rational alternative variant", DHI Poland, Warsaw, 2015

Therefore, it should be considered that both the nature of impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision,

and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.2. Collisions with ships

Collisions between migratory birds and ships are direct, negative impacts of local scope, short-term, irreversible, repeatable during the decommissioning period, with low intensity.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

For the Project in the variant approved by the Environmental Decision, approximately 40% fewer power plants will be decommissioned than envisioned in the set of parameters for the Project representing the most far-reaching scenario - the 2015 NIS, so vessel traffic will be correspondingly lower, with potentially fewer collisions. It was therefore considered that the option approved in the Environmental Decision would result in impacts less than the 2015 NIS.

Below is a table showing the results of the analysis of the impact of potential collisions with ships on individual species of birds migrating over the surface of the farm during the decommissioning stage. Although the results presented therein refer to the set of parameters of the Project constituting the 2015 NIS, it should be noted here that the scale of decommissioning in the case of the implementation variant specified in the Environmental Decision (40% fewer power plants compared to the 2015 NIS) will be significantly smaller. With respect to the planned Project in the currently requested variant, the scale of the Project will be further reduced (50% fewer power plants than envisioned in the variant approved by the Environmental Decision), and thus the scope of work. The time it will take to decommission power plants will be reduced. This will reduce the working time of vessels and the number of vessels needed to carry out decommissioning work. The planned Project relative to the set of Project parameters constituting the 2015 NIS involves the construction of 70% fewer power plants. This means that the traffic of vessels used in the decommissioning phase will be considerably less. The Project's impacts will therefore be less than or equal to those of the variant identified in the Environmental Decision, or the Project constituting the 2015 NIS, on the basis of which the magnitude of impacts was assessed in the 2015 Report.

Table 55. Collisions with ships - analysis of the impact on birds migrating over the surface of the farm during the decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver Gavia arctica	Large	* (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			ships may occur		
Red-throated diver Gavia stellata	Large	* (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Mute swan Cygnus olor	Small	*** (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)
Bewick's swan Cygnus bewickii	Large	*** (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Whooper swan Cygnus cygnus	Large	*** (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Geese Anserini	Small	** (Langston) / x (KE)	During farm decommission	Negligible (scale of exposure -	Negligible (magnitude of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			ing, collisions between migratory birds and ships may occur	local; duration - short-term; intensity - low)	impact - insignificant; importance of the resource - low)
Swistun Anas Penelope	Small	not indicated (Langston) / not indicated (EC)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Overlooked (magnitude of impact - insignificant; importance of the resource - low)
Long-tailed duck Clangula hyemalis	Large	* (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Markaczka Melanitta nigra	Small	* (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of resource - markable)
Uhla Melanitta fusca	Very large	* (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Crane Grus grus	Very large	not indicated (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Gold seedling Pluvialis apricaria	Very large	not indicated (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - very high)
Laughing gull Larus ridibundus	Medium	* (Langston) / not indicated (EC)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Lesser Black-backed Gull Hydrocoloeus minutus / Larus minutus	Very large	* (Langston) / not indicated (EC)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - very high)
Alka Alca torda	Small	* (Langston) / X (KE)	During farm decommissioning, collisions between migratory birds and	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			ships may occur		
Kormoran Phalacro corax carbo	Small	** (Langston) / x (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)
Grzywacz Columba palumbu s	Small	* (Langston) / x (KE)	During farm decommissioning, collisions between migratory birds and ships may occur	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - low)

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Therefore, it should be considered that both the nature of impacts does not change and their scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.3. Measures to minimize negative impacts at the stage of decommissioning

The proposed modifications to the conditions for implementation and operation of the Project do not affect the conditions for implementation of the Project specified in the Environmental Decision, and introduced due to limitations on the impact on birds during the decommissioning phase of the Project. The subject of this report is also not a change in these conditions.

9.3.4. Impacts cumulative

The impact of decommissioning work performed simultaneously on several farms on migratory birds will be negligible to small. Most migratory birds will avoid the construction area with minimal increased energy costs. Collisions with vessels used in decommissioning are also expected to be few and unquantifiable. Moreover, simultaneous decommissioning of more than one farm is extremely unlikely.

Updating the parameters of the Project does not change the nature or magnitude of the impacts associated with their cumulative impact during the decommissioning stage of the Project. Given the fact that there is a significant reduction in the number of power plants, and thus in both the units needed to carry out the decommissioning process and the time needed to carry out the decommissioning, it should be considered that the impact of the proposed modifications to the farm should be conducive to reducing the cumulative effect.

10. Impacts related

Related impacts are understood as the accumulation of all impacts affecting a given receptor. The purpose of assessing associated impacts is to verify whether impacts that individually do not have a significant impact on the environment, when linked together, will not ultimately become a source of significant negative impact. This is because in such a situation it becomes necessary to apply additional measures aimed at minimizing such impact.

In order to identify potential associated impacts, the interrelationships between individual resources/receptors (receptors) were reviewed first. A matrix with the results of the analysis is shown in the table below. Along the vertical axis, first-order receptors are listed, representing a potential source of impacts on receptors listed along the horizontal (second-order) axis. "X" indicates the existence of a potential direct relationship between the receptors in question, which should be analyzed in detail as part of the impact assessment.

As can be seen in the table below, several components affect birds (hydrology, benthos and fish), and this will primarily affect seabirds residing at least part of the year in the area of the proposed farm. The effects of these components on birds are described in this Section of the report as well as in Section 5.1., on seabirds. In conclusion, it can be said that the impact of the construction, operation and decommissioning of the BIII OWF on hydrology, fish and benthic resources will be relatively small, so the resulting impact on birds will not be noticeable or will be masked by the direct impacts of the wind farm.

Table 56. Interaction receptor interaction matrix

	Hydrology and	Seabed	Sediments	Mineral resources	Acoustic environment	Atmosphere	Bentos	Fish	Marine mammals	Birds	Bats	Fishing	Shipping and navigation	Military operations	Military aviation	Civil aviation	Radar systems	Landscape	Tourism and recreation	Material goods	Maritime industry	Health and life of people	Cultural heritage
Hydrology and hydrochemistry							X	X	X	X									X			X	
Seabed																							

	Hydrology and	Seabed	Sediments	Mineral resources	Acoustic environment	Atmosphere	Bentos	Fish	Marine mammals	Birds	Bats	Fishing	Shipping and navigation	Military operations	Military aviation	Civil aviation	Radar systems	Landscape	Tourism and recreation	Material goods	Maritime industry	Health and life of people	Cultural heritage
Sediments	X						X		X														
Mineral resources																				X			
Acoustic environment								X	X			X										X	
Atmosphere																			X			X	
Bentos								X		X													
Fish									X	X		X											
Marine mammals																							
Birds																							
Bats																							
Fishing																				X			
Shipping and navigation	X				X	X						X								X			
Military operations																							
Military aviation																							
Civil aviation																							
Radar systems																							
Landscape																			X				
Tourism and recreation																				X			
Material goods																						X	
Maritime industry																							

	Hydrology and	Seabed	Sediments	Mineral resources	Acoustic environment	Atmosphere	Bentos	Fish	Marine mammals	Birds	Bats	Fishing	Shipping and navigation	Military operations	Military aviation	Civil aviation	Radar systems	Landscape	Tourism and recreation	Material goods	Maritime industry	Health and life of people	Cultural heritage
Health and life of people																							
Cultural heritage																							

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

The proposed modifications to the Project do not result in significant impacts on receptors where impacts would result in associated impacts. For all receptors that are relevant to impacts on migratory birds, the proposed modifications labo no change in projected impacts or result in a reduction in projected impacts.

11. Impacts unplanned

Unplanned impacts result from sudden unplanned events or failures that are not related to activities included in the project schedule (e.g., leakage of toxic substances into the water due to a collision between two vessels).

Based on data from other OWF projects and from similar projects, the 2015 Report selected the following potential unplanned events that could become a source of unplanned environmental impacts of offshore wind farms:

- leakage of petroleum substances during normal operation or as a result of a collision, accident or construction disaster,
- accidental release of municipal waste or domestic sewage,
- accidental release of construction materials or chemicals,
- contamination of the water tone and bottom sediments with antifouling agents.

It should be noted that as a result of unplanned events, the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. On the other hand, indirectly, these events can also affect living organisms that inhabit or otherwise use the seabed, the water table and the sea surface. Therefore, seabirds spending at least part of the year at sea in the project area will be at risk as a result of unplanned events Unplanned events are not expected to significantly affect migratory birds that only fly over the farm area. Accordingly, an analysis of the impact on birds of unplanned events can be found in Section 5.2, on seabirds.

It should also be noted that a full description of potential unplanned events can be found in Section 12 of Volume II, dedicated exclusively to this issue.

The proposed modifications to the conditions for implementation and operation of the Project do not introduce any additional activities, nor do they change the nature of the planned activities in terms of the possibility of additional unplanned activities arising or an increase in the risk of the possibility of their occurrence.

12. Assessment of the impact on the integrity, coherence and object of protection of Natura sites 2000

This chapter analyzes the potential for the BIII OWF, singly and in cumulation with other projects, to affect the integrity, coherence and object of protection of Natura 2000 areas as a result of impacts on migratory birds.

The assessment was performed in accordance with the methodology described in Section 5 of Volume I, Chapter 4.3.13.

The report also includes the second part of the assessment, on impacts on seabirds. It can be found in Section 5.1. The two assessments complement each other, so it is recommended that they be analyzed together. The assessment concerns the option selected for implementation and a reasonable alternative.

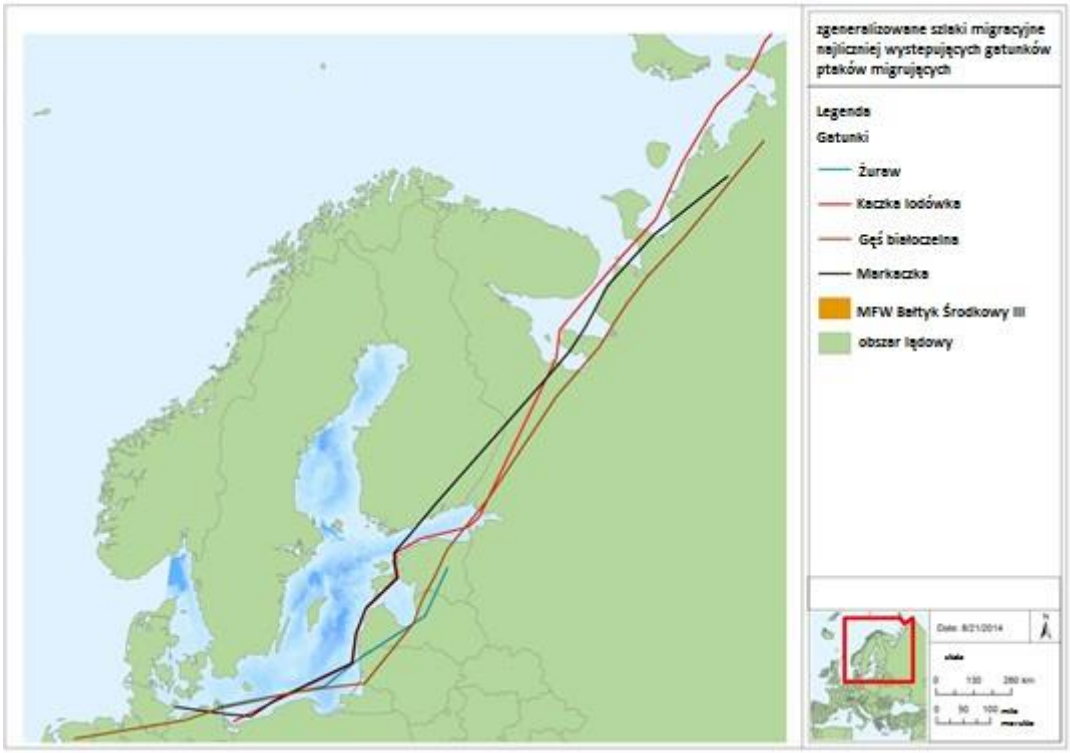
12.1. Initial assessment - screening

Pre-assessment is the process by which the project's likely impacts on Natura 2000 sites are identified (either singly or in conjunction with other projects or plans) and an analysis is made of whether the anticipated impacts are likely to have a significant effect on these sites.

12.1.1. Zone of potential impacts of the OWF BIII

When it comes to assessing the impacts of wind farms on migratory birds, indicating the extent of potential impacts is extremely difficult, and often impossible. Indeed, a wind farm located on a migration route may, through a barrier effect or significant mortality due to collisions between birds and rotors, affect the status of migrating populations, and thus affect the ecosystems in the places to which the populations migrate. However, since bird migration streams generally follow multiple corridors or are spread over wide areas, the impacts of wind farms on migratory birds, even when cumulative with other projects and anthropopressures, are not significant impacts. As indicated earlier, birds from Eurasian populations migrate over the BIII offshore wind farm area, for which the South Baltic coast is a very important migration corridor between breeding sites located in Northeast Asia and wintering grounds located in western and southern Europe and Africa. Important wintering grounds for some sea ducks are also the shoals of the Southern Baltic, including the Slupsk Shoal located in the Polish maritime areas.

Figure 8. Migration routes of the most common migratory birds, i.e. crane, long-tailed duck, white-fronted goose and scoter



zgeneralizowane szlaki migracyjne najliczniej występujących gatunków ptaków migrujących	generalized migration routes of the most abundant migratory bird species
Legenda	Legend
Gatunki	Species
Żuraw	Crane
Kaczka lodówka	Long-tailed duck
Gęś białoczelna	White-fronted goose
Markaczka	Markaczka
MFW Bałtyk Środkowy III	OWF Central Baltic III
Obszar lądowy	Land area
Mile morskie	Sea miles
Skala	Scale
Data	Date

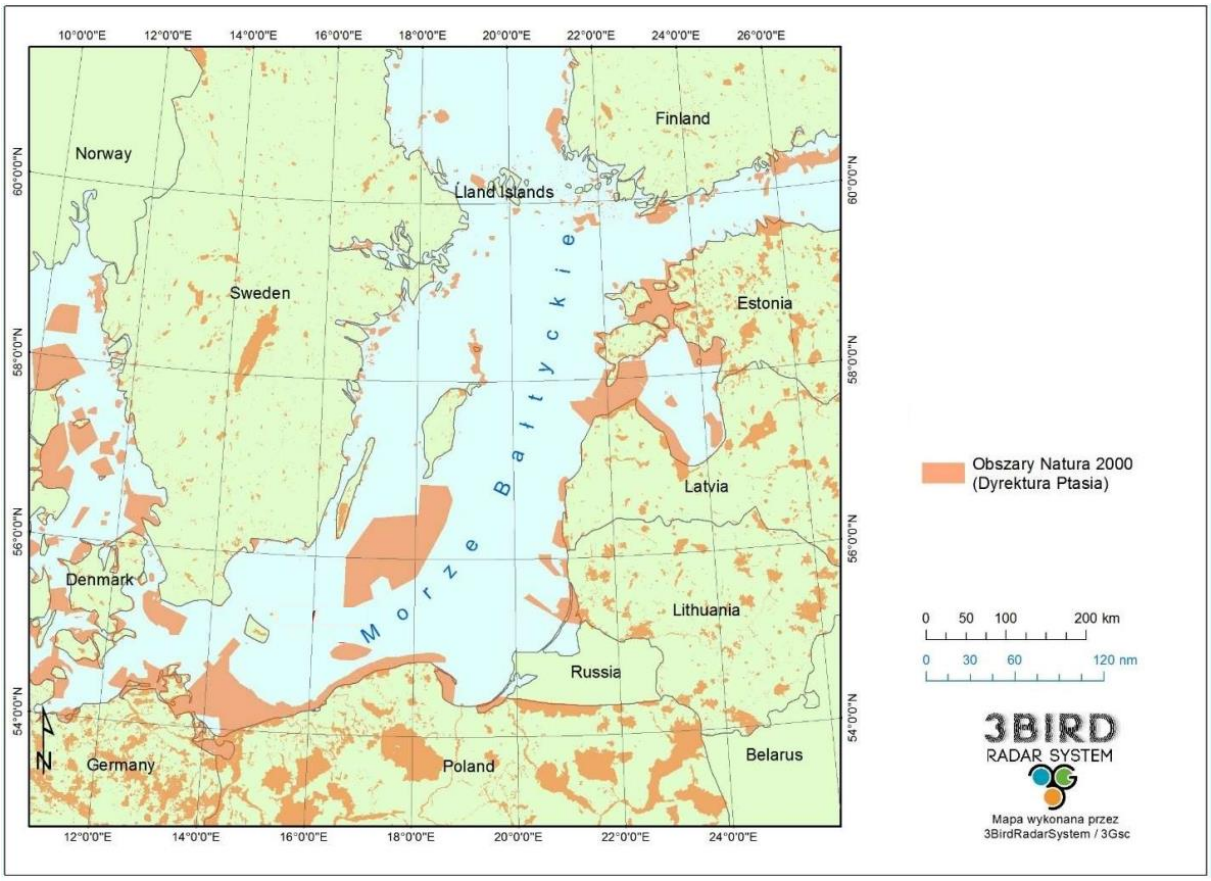
Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Due to the impossibility of determining whether the bird populations migrating over OWF BIII are subject to the protection of Natura 2000 areas during their wintering grounds in Europe, as well as which Natura 2000 areas have been established to protect the populations migrating over OWF BIII, it is not possible to give even an approximate range of potential impacts of the Project, and thus the Natura 2000 areas that should be the subject of this assessment. The exception is the areas closest to OWF BIII, which are the destination of autumn migration and the starting point of spring migration for some species of seabirds wintering in Polish sea areas.

Taking the above into account, the impact assessment for migratory birds on the integrity, coherence and object of protection of Natura 2000 areas will focus on assessing the impact on the coherence of

the Natura 2000 network, by assessing the impact of OWF BIII on the stream of migratory birds in its area, and especially on assessing the scale of impacts on the size and quality of the population of Eurasian migratory birds protected under the Natura 2000 network, as a result of the barrier effect and potential depletion of their numbers as a result of collisions with the power plants. In addition, the impact of OWF BIII on Natura 2000 areas located within 20 km of the farm's borders, which have been established to protect wintering grounds and migration corridors of birds, will be studied. This is because in this zone, the impact of the BIII OWF could potentially affect the integrity of these areas.

Figure 9. Natura 2000 special bird protection areas in the Baltic Sea



Obszary Natura 2000 (Dyrektura Ptasia)	Natura 2000 areas (Directorate of Birds)
Mapa wykonana przez 3BirdRadarSystem / 3Gsc	Map made by 3BirdRadarSystem / 3Gsc

Source: Ecozapas (2019) Environmental Impact Report for FEW Baltic II offshore wind farm

Taking into account the above, it was concluded that the assessment of the impact on the integrity, coherence and the object of protection of Natura 2000 areas, carried out in relation to migratory birds, should focus on the assessment of the impact of OWF BIII on the stream of migratory birds that are protected under this network (collision, barrier effect).

12.1.2. Natura 2000 areas in the zone of influence of the BIII OWF

The planned project will not be located in any Natura 2000 special bird protection area. There are also no plans to create new areas of this type in the area. However, the following SPAs are located within 20 km of the area of the planned project:

- Coastal waters of the Baltic PLB990002 - about 8 km in a southerly direction from OWF BIII;
- Slupsk Shoal PLC990001 - about 5.5 km westward from OWF BIII.

These areas are described below.

Special Bird Protection Area Natura 2000 "Coastal waters of the Baltic Sea" PLB990002

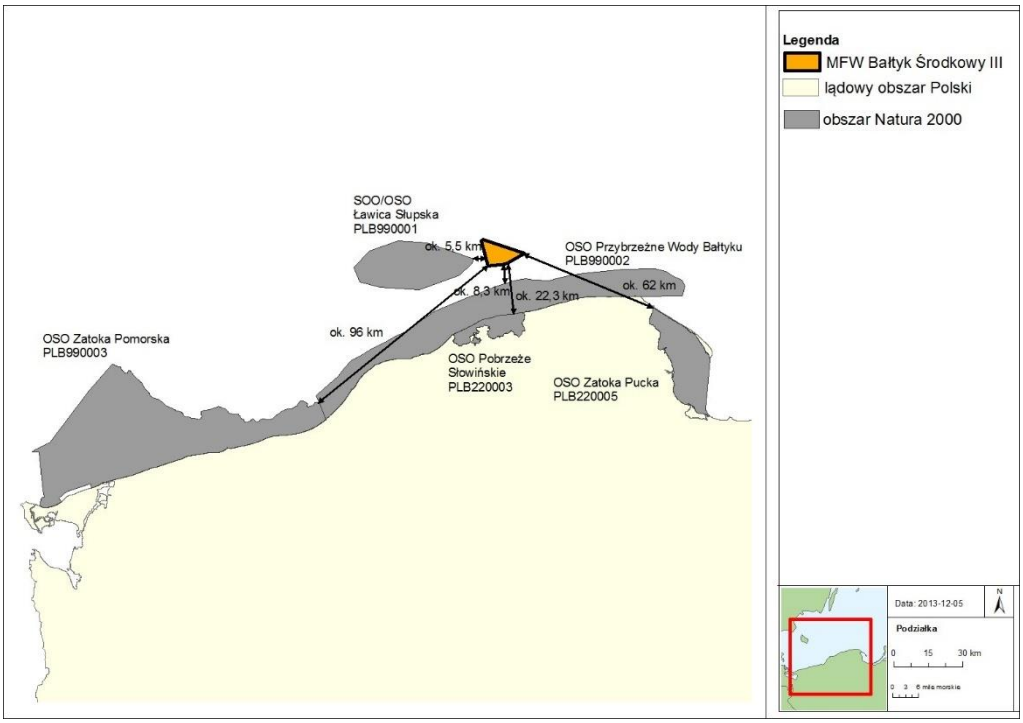
The Natura 2000 site Przybrzeżne wody Bałtyckie PLB990002, which is also an IBA PLM2 and a bird sanctuary of European rank E 80, is located to the south at a distance of about 8 km from the BIII Wind Farm. It covers the coastal waters of the Baltic Sea with a depth of 0 to 20 meters. Its boundaries stretch for 200 kilometers, starting from the base of the Hel Peninsula and ending at the Pomeranian Bay. The seabed is uneven, with denivelations reaching 3 meters. The area is wintered in significant numbers by 2 species of birds from Annex I of Council Directive 79/409/EEC: black-throated diver and red-throated diver (C7). During the winter there is more than 1% of the long-tailed duck's migratory path (C3) population, at least 1% of the guillemot and uhla. The benthic fauna is dominated by small crustaceans. Large marine mammals - gray seals Halichoerus grypus and ringed seals Phoca hispida and porpoises Phocaena phocaena - are rarely observed.

Special Bird Protection Area Natura 2000 "Slupsk Shoal" PLC990001

Slupsk Shoal Natura 2000 site PLC990001, which is also an IBA refuge PLM1, is located to the west at a distance of about 5.5 km from OWF BIII. It is a bird sanctuary of European rank E 79. Slupsk Shoal is a body of water in the southern Baltic Sea covering an area with a highly varied bottom with numerous hills and depressions with depths ranging from about 8.0 to about 35.0 meters. The shallowest parts of the bottom include elevations within the so-called "boulder pit" in the northern and western parts of the area (minimum depth of about 8.0 m) and parts of the sandy bottom of the central part of the area (minimum depth of about 12.0 m). The deepest parts of the bottom (up to 35 m) are located in the southeastern part of the area. The dominant plants are macroalgae, with many species already disappearing in the Gulf of Gdansk. There are no bird species from Annex I of Council Directive 79/409/EEC. During the winter, at least 1% of the long-tailed duck's migratory path population (C3) of the following species occurs here: long-tailed duck, guillemot. Wetland birds occur in concentrations of more than 20000 individuals (C4). Isolated are the sites - habitat 1170 (marine bivalve shoals) in Polish marine waters. The shallows are inhabited by numerous invertebrates, providing a rich food base for the flocks of wetland birds that stop in autumn and winter here. It is the site of the crayfish Delesseria sanguinea, which is considered lost in the Baltic Proper.

Descriptions of these areas, made on the basis of their SDFs, are presented below.

Figure 10. Location of the body of water intended for the construction of the offshore wind farm OWF BIII in relation to the nearest Natura 2000 areas



OSO Zatoka Pomorska	SPA Pomeranian Bay
SOO/OSO Ławica Słupska	SAC/OSO Slupsk Shoal
Ok. 5,5 km	Approximately 5.5 km
OSO Przybrzeżne Wody Bałtyku	SPA Baltic Coastal Waters
Ok. 8,3 km	Approximately 8.3 km
Ok. 22,3 km	Approximately 22.3 km
Ok. 62 km	Approximately 62 km
Ok. 96 km	Approximately 96 km
OSO Pobrzeże Słowińskie	SPA Pobrzeże Słowińskie
OSO Zatoka Pucka	SPA Puck Bay
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Lądowy obszar Polski	Land area of Poland
Obszar Natura 2000	Natura 2000 area
Data 2013-12-05	Date 2013-12-05
Podziałka	Pitch
Mile morskie	Sea miles

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015.

Table 57. Slupsk Shoal PLC990001 - types of natural habitats occurring in the area

CODE	HABITAT NAME	Coverage [ha]	Degree Reprezen.	Relative area.	Preservation status.	Overall assessment
1110	submarine sandbanks	30926.65	A	A	A	A
1170	reefs	13814.64	A	A	A	A

Table 58. Slupsk Shoal PLC990001 - species covered by Article 4 of Directive 2009I147IWE and species listed in Annex II to Directive 92I43IEWG, and an assessment of the importance of the area for these species

CODE	SCIENTIFIC NAME	GENERATION	POPULATION				ASSESSMENT OF THE IMPORTANCE OF THE AREA			
			RESIDENTIAL	MIGRING			Population	State of preservation	Insulation	Overall
				Reproductive	Overwintering	Transient				
BIRDS										
A001	Gavia stellata	Red-throated diver			28-66		D			
A00 2	Gavia artica	Black-throated diver			93-176		D			
A06 4	Clangula hyemalis	Long-tailed duck			101 148 - 231 180		B	A	C	B
A06 4	Clangula hyemalis	Long-tailed duck				76440 - 214 374	B	A	C	B
A06 6	Melanitta fusca	Uhla				910-1789	C	A	C	C
A06 6	Melanitta fusca	uhla			5565 - 23611		B	A	C	C
A20 2	Cepphus grylle	Diver			98-556		C	A	C	C
A20 2	Cepphus grylle	Diver				72-461	C	A	C	C

Source: SDF of the "Slupsk Shoal" Natura 2000 area, http://natura2000.gdos.gov.pl/datafiles, (Access date: 04.2022 r.)

Special Bird Protection Area Natura 2000 "Coastal waters of the Baltic Sea" PLB990002

The Natura 2000 site Przybrzeżne wody Bałtyckie PLB990002, which is also an IBA PLM2 sanctuary and a bird sanctuary of European rank E 80, is located approximately 19.5 kilometers from the BIII Wind Farm. It covers the coastal waters of the Baltic Sea with a depth of 0 to 20 meters. Its boundaries stretch for 200 kilometers, starting from the base of the Hel Peninsula and ending at the Pomeranian Bay. The seabed is uneven, with denivelations reaching 3 meters. The area is wintered in significant numbers by 2 species of birds from Annex I of Council Directive 79/409/EEC: black-throated diver and red-throated diver (C7). During the winter there is more than 1% of the long-tailed duck's migratory path (C3) population, at least 1% of the guillemot and uhla. The benthic fauna is dominated by small crustaceans. Rarely observed are large marine mammals - gray seals Phoca hispida and ringed seals Halichoerus grypus, and porpoises Phocaena phocaena.

Table 59. Baltic coastal waters PLB990002 - species covered by Article 4 of Directive 2009I147IWE

CODE	SCIENTIFIC NAME	GENERATION	POPULATION				ASSESSMENT OF THE IMPORTANCE OF THE AREA			
			RESIDENTIAL	MIGRING			Population	Western condition.	Insulation	Overall
				Reproductive	Overwintering	Transient				
BIRDS										
A200	Alca torda	alka			500-1000		C	C	C	C
A202	Cepphus grylle	plunger			1500		B	B	C	B
A064	Clangula hyemalis	long-tailed duck			90 000-120 000*		B	C	C	B
A002	Gavia arctica	black-throated diver			200-500		D			
A001	Gavia stellata	red-throated diver			100-500		D			
A184	Larus argentatus	silvery gull			8000- 15 000		C	C	C	C
A182	Larus canus	Common Gull			1000		D			
A066	Melanitta fusca	uhla			14 000-20 000*		C	C	C	C
A065	Melanitta nigra	scotch				3000	C	B	C	C
A655	Melanitta nigra	scotch			5000-8000		C	B	C	C

* in the SDF of the area was given an incorrect value - the population size was corrected according to the documentation of IBAs (Important Bird Areas).

Source: SDF of the Natura 2000 area "Coastal waters of the Baltic Sea", http://natura2000.gdos.gov.pl/datafiles, (Access date: 04.20202r.)

An additional area to be considered for the cumulative impact of the project is the Pobrzeże Słowińskie area (PLB220003). The 21819.43-hectare area protects the landscape and the variety of morphological forms observed on the Gardner-Lebanon Spit, including the two largest brackish coastal lakes: Lebsko (7140 hectares, max. gl. 6.3 m) and Gardno (2468 ha, max. depth. 2.6 m) along with adjacent meadows, bogs, forests and swamp forests. The area also includes coastal marine waters included in 2004. The area is listed as a Ramsar Convention site. There are at least 28 species of birds from Annex I of Directive 2009/147/EC of the European Parliament and of the Council, most of which are associated with terrestrial environments. During the migration period, there is at least 1% of the migratory path population of three waterbird species: white-tailed eagle, bean goose and partridge. Cormorant, white-fronted goose and marmot occur in relatively high numbers. A large population of silver-backed gulls also nests here.

Table 60. Basic information on birds covered by Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC contained in the Standard Data Form (SDF) for the Pobrzeże Słowińskie area

CODE	SCIENTIFIC NAME	GENERATION	POPULATION				ASSESSMENT OF THE IMPORTANCE OF THE AREA			
			RESIDENTIAL	MIGRING			Population	Western condition.	Insulation	General
				Reproductive	Overwintering	Transient				
BIRDS										
A04 1	Anser albifrons	White-fronted goose				1000-6200	C	C	C	C
A03 9	Anser fabalis	Bean goose				3200-4500	A	A	B	A
A09 1	Aquila chrysaetos	Golden eagle		1			B	A	A	B
A05 9	Aythya ferina	Common cephalopod				1-1500	C	A	C	A
A21 5	Bubo bubo	Puffin	5				B	A	C	B
A13 7	Charadrius hiaticula	Collared plover		10			C	B	C	C
A12 2	Crex crex	corncrake		200-250			C	C	C	C
A03 8	Cygnus cygnus	Whooper swan				560	B	B	B	B
A12 7	Grus grus	crane				7000	C	A	B	B
A18 4	Larus argentatus	Silver gull		400			B	C	C	B
A06 8	Mergus albellus	bleach				1700	B	B	C	B
A07 0	Mergus merganser	partridge				1-2100	C	C	C	C
A07 4	Milvus milvus	Red kite		7-8			C	B	C	C
A39 1	Phalacrocorax carbo sinensis	Common cormorant (continental subspecies)		200			C	B	C	C

Source: SDF of the Natura 2000 area "Pobrzeże Słowińskie", http://natura2000.gdos.gov.pl/datafiles, (Access date:04.2022)

Among migratory birds, the objects of protection of the Pobrzeże Słowińskie area are:

- white-fronted goose Anser albifrons - population from 1,000 to 6,200;
- bean goose Anser fabalis - population of 3,200 to 4,500;
- whooper swan Cygnus cygnus - population of about 560;
- grus grus crane - population of about 7,000;

- white-tailed godwit Mergus albellus - population of about 1,700;
- partridge Mergus merganser - maximum population of up to 2,100.

Most of the listed species, except for the white-tailed godwit, were recorded during surveys in the BIII OWF area, but the partridge was only 11 in a single observation during spring migration in 2013. Taking into account the direction of spring migrations, from west to northeast, and the location of the Pobrzeże Słowińskie SPA in relation to the planned OWF group (to the south), as well as the number of recorded birds, it can be assumed that the population of nurogies, which is the subject of protection in the Pobrzeże Słowińskie area, is not exposed to impacts from OWF BIII as well as the group of other OWF projects considered in the assessment of cumulative impact. Other species, due to the higher number of findings over the BIII offshore wind farm area and in its immediate vicinity during migration periods, may be affected by the assessed projects.

12.1.3. List of species found during monitoring and occurring in Natura 2000 areas within the potential range of impact of the project project

During the ornithological monitoring conducted for this project, 106 bird species were recorded in the area of the planned project. As part of the preliminary assessment, a potential negative impact of the BIII Wind Farm on the Natura 2000 bird areas in the vicinity of the farm was identified, through impacts on the bird species listed below (species found during monitoring at the project site and at the same time are objects of protection of one of the surrounding SPAs).

As can be seen from the above summaries, the potential negative impact of the Project may affect 6 species of birds that are the objects of protection of at least one of the above-mentioned Natura 2000 areas:

1. Alka - a species included in the regularly occurring migratory birds not listed in Annex I of the Birds Directive;
2. Diver - a species classified as a regularly occurring migratory bird not listed in Annex I of the Birds Directive;
3. Long-tailed duck - a species classified as a regularly occurring migratory bird not listed in Annex I of the Birds Directive;
4. Silver gull - a species included in the regularly occurring birds not listed in Appendix I of the Birds Directive;
5. Uhla - a species included in the regularly occurring migratory birds not listed in Annex I of the Birds Directive;
6. Marquise - a species included in the regularly occurring migratory birds not listed in Annex I of the Birds Directive.

Individuals of the above-mentioned species were found at the farm during ornithological monitoring.

Comparing the above list with data from the SDF, it can be concluded that these are transient or wintering populations. Taking into account the types of potential impacts of the OWF on migratory birds, as well as the uncertainty about the scale and effects of these impacts on the quality and

abundance of populations that are the subject of Natura 2000 protection, it is not possible to state unequivocally at the stage of the preliminary assessment that the BIII OWF will not significantly affect the integrity and subject of protection of the previously indicated areas protecting wintering populations of seabirds, through the impact in the form of a barrier that impedes access to these wintering grounds.

Also, significant impacts on the integrity of the Natura 2000 network cannot be ruled out, in the context of impacts on the aforementioned bird species covered by Article 4 of Directive 2009/147/EC that migrate in the study area.

Given the possible cumulation of impacts with other planned offshore wind farms, potential significant impacts on populations of some migratory species cannot be ruled out either.

The impacts of the BIII OWF on the above species, which are the objects of protection of at least one of the four Natura 2000 areas under consideration, as well as on the integrity and coherence of the network, were therefore included in the assessment as appropriate.

12.2. A proper assessment of the Natura 2000

A proper assessment is an evaluation of the impact of a project or plan on the integrity of a Natura 2000 site - either individually or in combination with other projects or plans. The following assessment is carried out for the populations of 14 species of migratory birds, for the structure of 3 areas, their functions and conservation objectives for migratory birds, and the coherence of the Natura 2000 network in the context of the protection of Eurasian migratory bird populations over the South Baltic.

12.2.1. Targets and conservation status of vulnerable species

The first step in a proper assessment should be to find out which of the area's conservation objectives are likely to be significantly disturbed by the BIII OWF, either alone or in cumulation with other projects.

The overall goal for Natura 2000 sites is to maintain or restore the favorable conservation status of habitats and species protected within the site. In the context of protecting migratory bird populations, important features of the study areas will be:

- their location on the migration route of birds of Eurasian populations,
- suitable habitat conditions that make these areas attractive as wintering grounds or resting places during fall and/or spring migration,
- the availability of these areas to migrant populations.

In the context of maintaining the coherence and conservation objectives of migratory birds within the Natura 2000 network, it is further important to preserve the possibility of movement between areas of bird populations, without the threat of significant depletion of population status and/or significant energy inputs that may affect the ecology and biology of these populations.

In its current state, before the construction of OWF BIII and other OWF projects in Polish marine areas, the conservation status of migratory birds in the areas of Slupsk Bank, Przybrzeżne Wody Bałtyku, Pobrzeże Słowińskie and Zatoka Pomorska is appropriate.

12.2.2. Potential impacts significant

The assessment used data from ornithological monitoring, the SDF of nearby SPAs, and the recommendations of the European Commission's guide "Wind Energy Development and Natura 2000."

Annex II to this guide provides a list of bird species identified by EC experts as particularly sensitive to the impact of wind farms. It considers three types of potential negative impacts of wind farms on avifauna, through:

- habitat loss,
- creating a barrier effect,
- mortality from collisions with the gym.

The above types of impacts are described in detail in Chapter 7 above, and assessed in Chapter 9. The following is an excerpt and summary of the analyses performed, in terms of potential impacts on the integrity, coherence and object of protection of Natura 2000 sites.

12.2.3. Loss of habitat

As shown in Chapters 2,3,4 of Volume IV of the BIII OWF, alone or in conjunction with other projects, it will not significantly affect the abundance and functionality of habitats in the assessed areas, and thus the food abundance (benthos, fish) of these areas, which constitute the attractiveness of the Slupsk Bank and the Baltic Coastal Waters as a wintering site for migratory birds. The BIII OWF will also not cause any impacts on the habitats of the Pobrzeże Słowińskie area.

The following is a brief description and assessment of any impacts that may result in subsequent stages of the project affecting the integrity of seabird wintering areas, thereby affecting the biology and ecology of populations migrating to and from these areas. The assessment was carried out for the furthest-reaching scenario of OWF BIII, i.e. for the construction of a rational alternative, taking into account the cumulative impact of other offshore wind farms, as assumed in Chapter 10 of Volume II of the EIA. The variant selected for implementation, in which 33% fewer power plants will be built, will have lower impacts than those described below.

12.2.4. Creating the effect of barrier

A working wind farm presents an obstacle to migratory birds, some of which may be associated with Natura 2000 areas, where they may have their stopover or breeding sites Avoiding an extensive obstacle results in a longer flight path.

For example, it can be pointed out that two small wind farms located in the Kalmarsund basin off the coast of Sweden increase the migration distance of eider migrating to wintering grounds in the Danish Straits by 0.2 - 0.4% (Pettersson 2005). In this case, the increase in energy expenditures is not large, but once more farms are built, the increase may become so large that the impact on the survival rate of individuals in the population may become significant. Hence the need to perform such assessments when increasing the number of wind farms along migration routes (Petersen et al. 2006).

The barrier effect can occur both during the construction and decommissioning phases, but especially during the operation phase (see Chapter 9 above).

Construction and decommissioning stage

At this stage, it is expected that birds will gradually increase in frightening from the construction site. This will cause changes in the distribution of individual species in the area of OWF BIII. The more skittish species, such as divers, alka, long-tailed duck, long-tailed duck and uhla, will move to neighboring bodies of water. It is likely that some of them will reside in nearby Natura 2000 areas: "Slupsk Shoal" and "Baltic Coastal Waters," where there are important seabird concentration sites in the Baltic. Displacement to the marine part of the "Pobrzeże Słowińskie" cannot be ruled out either. This will lead to a local increase in seabird density in these areas, increasing competition for habitat resources. However, bird counts in the area designated for the construction of OWF BIII were low and the increase will be small. Increased ship traffic and the presence of immovable structures protruding above the water's surface will cause gulls to congregate in greater numbers at the wind farm site. At this stage, the risk of collision with rotors not yet in operation is minimal. Once the power plants are operational, the density of gulls in the body of water occupied by the wind turbines will decrease.

The impact of increased ship traffic on birds residing in the Natura 2000 area "Coastal Baltic Waters", through which ships heading to the area of the installation works will have to pass, is also to be expected. The location of the other Natura 2000 areas practically excludes the possibility that there will be an increase in vessel traffic associated with the construction of the farm.

At the construction stage of OWF BIII, impacts on seabirds residing in the three neighboring Natura 2000 areas will mostly be negligible or cause no change. Only in the case of the Baltic Coastal Waters can an increase in ship traffic be expected, which will result in more frequent bird scaring than before. However, the strength of the impact will depend on the timing of the work.

In the variant proposed for implementation after the amendment of the Environmental Decision, about 70% fewer power plants will be built and then decommissioned than envisaged in the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, so the barrier effect on birds migrating over the surface of the farm, caused by the presence of construction vessels, will be correspondingly smaller. It is considered that the variant selected for implementation will result in impacts that are less than not only the 2015 NIS, but more importantly, the implementation variant specified in the Environmental Decision.

Operation stage

Located over water, the wind farm facilities may be a barrier to birds flying over the farm's water body. The scale of the barrier effect will depend on the number of turbines created, their size, and the light and noise they emit.

Birds respond to the presence of an obstacle in their path by changing their flight path in a horizontal or vertical direction, hence they are expected to avoid the wind farm area. The length of the route required to avoid this obstacle will increase the energy cost of the flight being made, but this will not be a large change, and the energy costs of the birds' daily flights, even when doubled, will still be a small part of their daily activity and energy consumed.

Although the wind farm is adjacent to a protected area, it is not on the route of regular movements of protected species between Slupsk Shoal and other important areas for birds. Therefore, the wind farm is not expected to affect the integrity and cohesion of the Slupsk Shoal Natura 2000 area.

A barrier in the form of a working BII OWF will be a source of direct, negative impacts on migratory birds of species-dependent exposure scale, long-term, reversible, permanent during the period of operation, with low intensity.

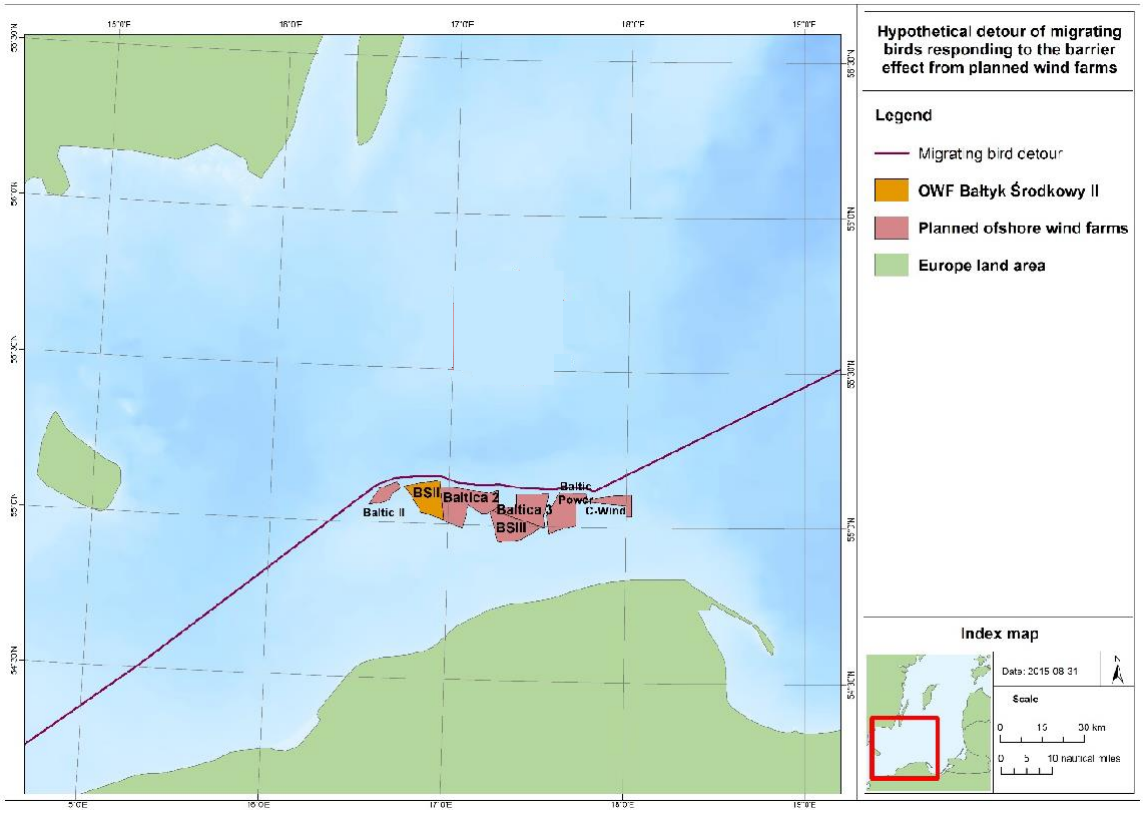
Due to the lack of detailed information on the behavioral responses of birds to the presence of wind farms, the barrier effect for the two considered project alternatives is considered to be the same.

Cumulative barrier effect

The cumulative effect of the barrier was calculated and assessed for the four most abundant migratory bird species found, i.e. long-tailed duck, scoter, white-fronted goose and crane, which are also the objects of protection of nearby Natura 2000 areas.

The methodology used in the BIII OWF evaluation was applied. It was assumed that the migrating birds changed the route of their flight and circled the IMF at a distance of 1-2 km (see figure below).

Figure 11. Hypothetical flight route of migratory birds (flying from NE to SW direction), modified due to cumulative barrier effect caused by planned wind farms



Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Given the migration of birds along the northeast-southwest axis, it is unlikely that birds on their route will encounter obstacles located in the two areas mentioned, so the cumulative effect of the barrier may be only partial and not taking into account all the planned OWFs together. It should be expected that the probable avoidance by birds of the southern area is similar to the northern area due to their similar size. The modeling results indicate that even if the birds avoid several wind farms, the additional distance they will cover and the increase in the energy cost of migration associated with it will be very

small, certainly within the range of differences in distance covered by different individuals and differences caused by atmospheric factors.

The resulting barrier will also affect seabirds residing in the neighboring Natura 2000 areas "Slupsk Shoal" and "Baltic Coastal Waters", as it will be located on the flight route of birds traveling from and to breeding grounds located in northeastern Europe and northern Asia. Most likely, migrating birds will avoid wind farms, thus lengthening their migration route. Estimates based on the assessment of energy expenditure per flight show that the negative effect of the creation of this barrier will be small (Žydelis et al., 2015), as shown in the table below with examples.

Table 61. Estimated increase in distance covered by birds due to avoidance response caused by the cumulative impact of the occurrence of the barrier effect of wind farms in the southern area of the Polish EEZ (OWF BII, OWF BIII, OWF Baltica 2, OWF Baltica 3)

Species	Distance traveled during migration (km)	Increase in distance traveled during migration due to barrier effect (km)	The energy cost of migration (kJ)	Increase in energy cost due to barrier effect (kJ)	Weight loss due to increase in energy cost (g)
Long-tailed duck	3245	22	8220	50	2 g
Markaczka	2846	21	9720	60	2 g
White-fronted goose	3358	15	20400	Undetectable	10 g
Crane	972	15	15900	300	10 g

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

It is also assumed that IMF BIII, alone and cumulatively, will not affect the ability of birds to find refugia. Using signals not yet recognized by researchers, seabirds are very good at locating shallow marine areas or other preferred habitats (unpublished DHI telemetry data on sea ducks). Therefore, it was considered that the planned farms would not affect the migrants' ability to find their preferred wintering grounds, including Slupsk Shoal.

A significant impact of a larger group of projects located on the northeastern slope of Slupsk Shoal could be to impede access to the area for those populations of seabirds for which this Natura 2000 area (and others, such as the Baltic Coastal Waters) is a wintering site. Such an extensive barrier would also be a hindrance to migrants flying over the area.

At the same time, it should be emphasized that in the Projects of other OWFs, for which the proceedings on the decision on environmental conditions were conducted after the decision for OWF BIII or are currently being conducted (OWF C-WIND), areas free from development of power plants were designed, which are important solutions from the point of view of minimizing cumulative impacts on the objects of protection of Natura 2000 areas. In this context, it is particularly important to point out the solution that was implemented in the conditions of the environmental decision issued for the Baltica

offshore wind farm, which provides for leaving a 5 km corridor free of power plant development between the Baltica 2 and Baltica 3 areas - condition II.3.9 of the environmental decision, mark RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37. Similar solutions are envisaged for the Baltic Power project, they assume leaving an additional supporting corridor free of development with power plants, and supporting the above-described 5 km corridor, and they also assume leaving a 4 km wide free area east of the area envisaged for development within the Baltic Power project. The solution of leaving the corridor free for bird migration was also implemented on the basis of an amendment to the decision on environmental conditions for OWF BII.

The existence of corridors between farms adjacent to important areas for birds is indicated as one of the best and strongly recommended practices during the construction of such projects. Thus, a paper done by the British Trust for Ornithology (Ross et al. 2017), which reviewed the impact of FW on birds, attempted to estimate not only its magnitude, but also the reliability of the information available. In the case of the long-tailed duck, a key species in terms of use of the Slupsk Shoal and the inlet to this part of the basin, it should be noted that for this species the barrier effect is of average importance at best. Fox et al (2015) practically point to the importance of wind farms in shaping the population dynamics of long-tailed ducks, including long-tailed ducks, as marginal - against the background of other factors (primarily water pollution and mortality in fishing nets). Thus, if the overall impact of wind farms is assessed as small, the barrier effect remains marginal. Similarly, Larsson & Karlsson (2016) estimates that the most serious threat is from ship traffic and fishing. The only practical conclusion arising from their study is that in the case of repairing and erecting turbines - the swimming period would have to be adapted to the biology of this species and the work would have to be carried out outside the winter period. They also suggest that just the existence of corridors is the best way to minimize potential collisions with wind turbines.

Petersen et al (2011) - indicated that the mere presence of the farm may shape the long-tailed duck density inside the WF somewhat negatively, while it is not a significant barrier and in other areas on the WF boundary the density is unchanged or even higher (compensated by long-tailed ducks arriving from the WF area). Any increase in the space between turbines, and therefore corridors, significantly positively affects the situation of this species.

Thus, the corridor provided for by the decision on environmental conditions for the Baltica offshore wind farm between the Baltica 2 and Baltica 3 areas and on the extension of its axis, up to the borders of the Slupsk Shoal Natura 2000 area with a width of about 5 km, will definitely have a positive impact on the populations of selected bird species, reducing potential collisions, as well as making it easier to reach mass wintering sites. In addition, the spatial arrangement of the designed corridor coincides with the flight directions of ducks and other seabirds, as confirmed by both field studies and other scientific work performed in the Baltic Basin (e.g., Bräger et al. 1995). Maximum airlift to mass wintering sites, including Slupsk Shoal, will be provided. It is worth mentioning that a natural corridor - the estuary of the river in the Lower Oder Valley, with a width of 2 km, is identified and used by birds that winter in large numbers in the Szczecin Lagoon (Marchowski et al. 2017).

In addition, the proceeding proposes to leave undeveloped the northwest corner of OWF BIII, which will allow the creation of a development-free corridor of about 5 km between the planned farm and the Baltica 2 area of OWF Baltica. This solution would be beneficial from an environmental point of view, this solution, however, is not necessary to avoid a significant negative impact of the cumulative offshore wind farm projects planned on the northern and northeastern slopes of Slupsk Shoal on birds. At the

same time, it should be noted that leaving spaces between farms free of development allows to minimize cumulative impacts, including impacts on Natura 2000 sites. This measure effectively reduces the clustering effect of power plants and the creation of a barrier effect by offshore wind farms in the vicinity of Slupsk Shoal.

The above indicates that the solutions envisaged in connection with the implementation of the Project in the scope established on the basis of the amended Environmental Decision, solutions also adopted in the implementation of other developed OWF projects, in particular the development-free corridor, is a systemic solution and effectively minimizes the barrier effect.

With the above in mind, in the course of design works a decision was made to leave the area located in the west-north corner of the farm undeveloped with power plants in such a way as to create a 5-kilometer wide corridor undeveloped with power plants, crossing the areas of the Baltica III offshore wind farm, which will be connected to the corridor between the Baltica 2 offshore wind farm and Baltica 3 offshore wind farm in the southwest-northeast direction.

12.2.5. Mortality from collisions

According to the latest assumptions for the Central Baltic offshore wind farm project, the number of turbines to be installed has decreased. The variant approved by the Environmental Decision assumes the construction of 120 wind turbines, while the proposed modifications to the Project assume the construction of 60 turbines and the exclusion of the northwestern corner of the BIII OWF area from development, which will allow the creation of a corridor of about 5 km between the planned BIII OWF and the MWF Baltica project (Balltica 2). Such a solution was also implemented at the level of issuing DSUs for the Baltic offshore wind farm.

Originally, an assessment of the impact on migratory birds in the marine area was performed for a farm consisting of (depending on the variant) 120 to 200 power plants, with different rotor suspension heights. Cumulative impacts were also taken into account and the impact of the planned project on local bird populations and nearby Natura 2000 sites was assessed (Tryjanowski et al. 2016). Table 63 shows a comparison of the Project variant after the requested changes and the OWF BIII specified in the Environmental Decision. The authors of the analysis (ENINA 2022) decided to use for comparison the values calculated on the basis of the avoidance factor recommended for the species based on (Maclean et al., 2009). In addition, Table 63 shows the total projected mortality determined for the Project and for the farms planned for the area.

A factor that must be taken into account when assessing the impact of a wind farm on birds during the operational phase is the risk of collision with operating rotors. Some of the birds moving in the BIII offshore wind farm area at least temporarily use Natura 2000 areas, hence an increase in mortality due to collisions could theoretically affect the status of their populations.

The current collision analysis of migratory birds over the BIII offshore wind farm area in the variant that would be implemented on the basis of the amended Environmental Decision was carried out by ENINA 2022 and was created under the direction of Prof. Dr. Piotr Tryjanowski. The analysis compares and contrasts the projected impacts of the wind farm in the variant determined by the Environmental Decision and the variant that will be implemented after the amendment of this decision on the basis of the Report.

The results of the analyses are presented in more detail in sections 9.2.2. and 9.2.4. and an excerpt is presented in the table below, which also takes into account the cumulative effect. The safe level of acquisition is indicated in Table 12. They confirm that the mortality of migratory birds as a result of collisions with operating OWF BIII power plants after the amendment of the Environmental Decision is lower than in the variant indicated for implementation by the Environmental Decision and will oscillate at a minimum level limited to single individuals of the analyzed species. The mortality rate will not exceed the calculated so-called safe yield level (PBR, see: Table 12). Thus, there will be no significant depletion of migratory populations, and thus no significant negative impact on the object of protection and the coherence of Natura 2000 areas established for the protection of Eurasian migratory bird populations, including the areas considered in this report.

The above opinion applies both to the operation of OWF BIII itself and to the cumulation of its impacts with other farms planned on the northern slope of Slupsk Shoal (cf.: section 9.2.4. above).

Table 62. Parameters characterizing the collisions of selected bird species for OWF BIII and the cumulative effect with other offshore wind farms

WR20	RWU (%)*	WR20 - 60 turbines	Wind farms planned for development in the area of the subject wind farm					∑ (WR20-60)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Alka Alca torda	99.50	0.01	0	0	0.00	0.00	0	**0,0**
Long-tailed duck Clangula hyemalis	99.00	0.04	1	2	0.00	0.75	0	**3,8**
Uhla Melanitta fusca	99.00	0.60	1	2	0.22	0.57	1	**5,4**
Marquise Melanitta nigra	99.00	1.32	2	3	0.77	2.74	0	**9,8**
Nur Gavia sp.	99.50	0.09	0	2	0.26	0.18	2	**4,5**
Anas penelope marmot	99.00	3.00	0	1	4.02	7.74	2	**17,8**
Anserini geese	99.80	6.55	56.0	4.0	21.2	3.0	4	**94,7**
Swans Cygnus sp.	99.50	0.25	0	0	0.00	0.45	0	**0,7**
Cormorant Phalacrocorax carbo	99.00	0.41	0	1	0.40	0.22	1	**3,0**
Golden plover Pluvialis apricaria	98.00	4.87	No data available	No data available	No data available	No data available	No data available	No data availabl e
Lesser gull Larus minutus / Hydrocoleus minutus	99.50	0.09	1	3	1.34	0.13	1	**6,6**
Ridibundus Chroicocephalus ridibundus	99.50	0.13	0	5	0.19	0.44	0	**5,8**
Crane Grus grus	98.00	6.00	107	1	0.63	0.13	14	**128,76**

WR20	RWU (%)*	WR20 - 60 turbines	Wind farms planned for development in the area of the subject wind farm					∑ (WR20-60)
		bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	C-WIND	
Columba palumbus mane	98.00	3.55	lack of data	lack of data	lack of data	lack of data	lack of data	**No data availabl e**

Source: Tryjanowski P, Luczak A., Gawlik A., Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Baltic Central III ("OWF BIII"), 2022.

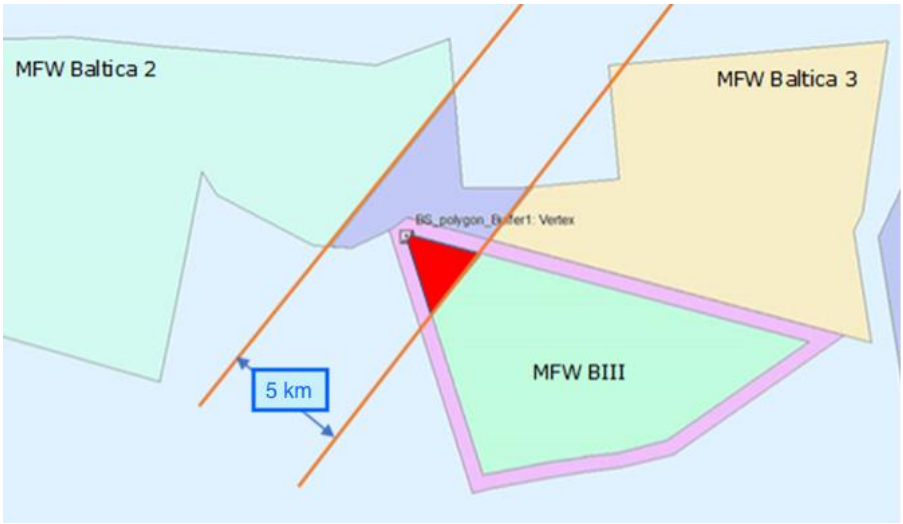
12.2.6. Actions minimizing

The risk of a barrier effect exists in the scenario of three projects on the northeastern slope of Slupsk Shoal: Baltic II offshore wind farm, Baltica offshore wind farm, Central Baltic III offshore wind farm.

In connection with the proposal in the ongoing EIA procedure for the Baltica OWF project, the creation of a migration corridor with a width of 5 km by leaving the BIII OWF area in its northwestern part (corner) undeveloped, which will lead to the extension of the corridor proposed in the Baltica OWF project area.

The location of the conditionally excluded area is shown in the figure below.

Figure 12. Location of conditional exclusion of the OWF area from development



Source: materials provided by the Investor

It should also be emphasized that in addition to the presented reduction of the area taken for the Project, which will be implemented on the basis of the amended Environmental Decision, there will also be a significant reduction in the number of wind power plants, i.e. they will be built 50% less than the variant approved by the Environmental Decision, which will further reduce the barrier effect of the OWF.

12.2.7. The result of the assessment appropriate

The result of the assessment of the proper impact on Natura 2000 areas, should be an unambiguous answer to the question of whether, after the application of minimizing measures, the BIII OWF, alone

or in cumulation with other projects, will significantly affect the integrity, coherence or subject of protection of Natura 2000 areas.

After analyzing the possible impacts that the assessed project may cause, alone and in cumulation with other projects, it should be concluded that:

- The BIII offshore wind farm, on its own, will not significantly affect the integrity of the coherence and object of protection of Natura 2000 areas in any of the considered variants through the impacts it will cause on migratory birds;

- OWF BIII, in combination with other offshore wind farms (OWF BII and OWF Baltica), which may be developed in its immediate vicinity on the northeastern slope of Slupsk Shoal, will not significantly affect the integrity, coherence and object of protection of Natura 2000 areas through impacts on birds migrating to wintering grounds, which are the subject of protection of the Slupsk Shoal area, provided that a minimizing measure is applied, in the form of taking into account in the construction project of OWF BIII the necessity to create an undeveloped wind turbine migration corridor, allowing the migration of long-tailed duck to the Slupsk Shoal area from the northeastern direction during autumn migration and from this area in the northeastern direction during spring migration. As a result, additional measures are proposed to mitigate the barrier effect during bird migration by excluding the northwestern corner of the body of water intended for OWF BIII from wind power development. This solution is consistent with and is a continuation of the development-free corridor implemented in the conditions of the environmental decision issued for the Baltic offshore wind farm - condition II.3.9 of the environmental decision, mark RDOŚ-Gd- WOO.4211.21.2017.MJ.PW.AJ.37.

In addition, the table below shows, in accordance with the EC Guidelines, the scale of the impact of the wind farm on individual species, which was done based on the above criteria.

Table 63. Scale of wind farm impacts on bird species

Species	Habitat displacement	Bird crashes / collisions	Barrier effect	Change in habitat structure
Alka	XX	X		X
Long-tailed duck	XX	X	X	X
Markaczka	X(breeding), XX (wintering)	X (winterization)	X (winterization)	X (winterization)
Red-throated diver	XXX (wintering) X (breeding season)	X (wintering) X (breeding season)	X (breeding season)	
Black-throated diver	X	X	X	
Swistun	XX		X	
Bean goose	X			
Goose				

Species	Habitat displacement	Bird crashes / collisions	Barrier effect	Change in habitat structure
White-fronted goose	XX	X		
Mute swan				
Whooper swan	X	X		
Bewick's swan				
Kormoran	X	X	X	
Lesser Black-backed Gull	X	X		
Crane	X	X	X	
Gold seedling	XX	X	X	

XXX = evidence of significant impact risk, XX = evidence or indications of impact risk, X = potential impact risk, x = low or insignificant impact risk

Source: own elaboration based on Tryjanowski P, Łuczak A. Gawlik A. Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Bałtyk Środkowy III ("OWF BIII"), 2022.

In the assessment of ENINA 2022, the planned project is not expected to have a significant negative impact on its population of the analyzed bird species, and consequently, no significant negative impact of the planned project on the population of any bird species that are protected in the Natura 2000 area is expected.

13. Impacts transboundary

Within the Baltic Sea there are seabirds from local breeding grounds located on the coasts of this sea (silver gull, alka, duck, guillemot and partly uhla) and birds from populations living in northern Europe and Siberia (aurora, long-tailed duck, scoter, uhla) that appear here during the non-breeding season. Significant transboundary impacts may therefore relate to the impact of an offshore wind farm as a barrier along their migration route. Avoiding an extensive obstacle results in a longer flight path. However, both in the case of a single offshore wind farm and in accumulation, the increase in energy expenditure is small and does not affect population survival. Similarly, there will be mortality due to collisions with power plants - it will not significantly affect the size of the population of birds living in other countries and migrating through the BIII OWF basin (and possible neighboring farms). The strong deterrent effect will also keep seabirds out of the area occupied by the power plants, thus excluding the basin from their feeding grounds. The area designated for the BIII offshore wind farm is not the site of significant concentrations of any of the species found during monitoring. The expected impacts of this farm on the bird species considered in the assessment are moderate at best and limited in scope. According to the methodology's definition, this means changes that are significant only locally, not nationally or internationally, and are not important for the preservation of proper conservation status.

A significant impact of a larger group of projects located on the northeastern slope of Slupsk Shoal could be to make it more difficult for those seabird populations for which it is a wintering site to access the

area. The creation of a consistent barrier in the area may also hinder the movement of these populations between the closest similar wintering areas, which are Slupsk Shoal, Central Shoal and Hoburgs Bank. As of today, there is no scientific data on the relevance of the connections of these areas, but they cannot be ruled out.

As a minimizing measure in the design of future developments, it may be necessary to consider the appropriateness of using undeveloped migration corridors with a width of no less than 5 km. The proposed modifications to the Project will not change the nature of the projected impacts or their magnitude, while the impacts may decrease for some types of impacts, including as a result of the proposed mitigation measures.

In conclusion - it is not expected that OWF BIII, both in the parameters approved by the Environmental Decision and after the proposed modifications, will cause transboundary impacts on migratory birds.

14. Proposal monitoring

The proposed modifications to the project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision. The conditions and rules for conducting bird monitoring are specified in the Environmental Decision in section II.2.a at the stage of construction and operation of OWF BIII. However, it is proposed to remove from the wording of this condition the part concerning the deactivation of turbines located along the route of registered bird flocks during migration periods. The provision proposed for repeal does not relate to the scope and conditions of monitoring, i.e. the subject of section II.2.a of the Environmental Decision, and is inconsistent with the condition set forth in sections I.2.31 and I.3.12 of the Environmental Decision regarding the shutdown of turbines, which raises questions of interpretation; at the same time, the amendment does not affect the content of sections I.2.31 and I.3.12 of the Environmental Decision setting forth the rules for shutting down turbines under conditions of intensive bird migration during periods of limited visibility.

15. Summary and conclusions

A summary of the assessment results is presented in the tables below.
The tables are divided according to the stages of investment and the importance of each receptor (species), as defined in Chapter 8:

- small - marmot, mute swan, alka, cormorant, woodpigeon, geese, scoter;
- medium - laughing gull;
- large - black-throated and red-throated diver, whooper swan, black swan, long-tailed duck;
- very large - crane, golden plover, uhla, little gull.

No significant negative impacts on the integrity, coherence and object of protection of Natura 2000 areas are expected.

Due to the lack of significant impacts in terms of a barrier to migrating Eurasian populations, as well as collision mortality affecting the conservation status of these populations, the BIII OWF is not expected to cause transboundary impacts on birds.

The cumulative effect of the barrier was assessed for the four most abundant migratory bird species: long-tailed duck, scoter, crane and goose, using the methodology used in the assessment for the OWF BIII wind farm area. It was assumed that migrating birds changed the route of their flight and circled the IMF at a distance of 1-2 km. The modeling results indicate that even if birds avoid several wind farms, the additional distance they will cover and the increase in the energy cost of migration associated with it will be very small, certainly within the range of differences in the distance covered by different individuals and differences caused by atmospheric factors. With the recommended mitigation measures of leaving a migration corridor that provides access to Slupsk Shoal, an important wintering ground for the long-tailed duck, even the most far-reaching offshore wind development scenario will not cause significant impacts.

The cumulative collision risk calculated for probable scenarios of wind power development in Polish maritime areas also showed no possibility of significant impacts on any of the migratory species in the area.

Due to the lack of significant barrier impacts, already identified at the stage of issuing the Environmental Decision, on migrating Eurasian populations, as well as collision mortality affecting the conservation status of these populations, the BIII OWF is not expected to cause transboundary impacts on migratory birds.

15.1. Swallow, mute swan, alka, cormorant, manee, geese, scoter

Table 64. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on marmot, mute bass, auks, cormorant, woodpigeon, geese, scoter - construction and decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by the presence of ships	Small	No	Insignificant	Skip	No impact
Collisions with ships			Insignificant	Skip	No change

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Explanations:

*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision

Table 65. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on marmot, cormorant, mute swan, alka, geese, woodpigeon, and scoter - operation stage

Impact	Importance of the resource	Minimizing actions*	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by presence of offshore wind farm	Small	Reducing light emissions Temporary shutdown of turbines under severe weather conditions during migration periods Painting the tips of the blades in bright colors The use of towers with a solid structure Use of a minimum of 20 m clearance	Insignificant	Skip	No impact
Collisions with power plants			Insignificant Small (geese)**	Skip	Reducing the impact of

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Explanations:
*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision
** The significance of the impact for the highlighted species has been assessed as low, as the estimates of the energy costs of rerouting show that the barrier effect causes an impact of low significance. In this case, the data and estimates go beyond standard EIA matrices as included in the methodology description and species assessment.

15.2. Gull daredevil

Table 66. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on the black-headed gull - construction and decommissioning phase

Impact	Importance of the resource	Minimizing actions*	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by the presence of ships	Medium	No	Insignificant	Skip	No impact
Collisions with ships			Insignificant	Skip	No change

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Explanations:
*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision

Table 67. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on the black-headed gull - operation stage

Impact	Importance of the resource	Minimizing actions*	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by presence of offshore wind farm	Medium	Reducing light emissions Temporary shutdown of turbines in severe weather conditions during periods of migration Painting the tips of the blades in bright colors	Insignificant	Skip	Reducing the impact
Collisions with power plants			Insignificant	Skip	Reducing the impact

Impact	Importance of the resource	Minimizing actions*	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
		The use of towers with a solid structure Use of a minimum of 20 m clearance			

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Explanations:
*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision

15.3. Black-throated and red-throated diver, whooper swan, black swan and long-tailed duck

Table 68. Assessment of the impact of the Project parameters update on the results of the impact assessment of OWF BIII on black-throated and red-throated diver, whooper swan, whooper swan and long-tailed duck - construction and decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by the presence of ships	Large	No	Insignificant	Small	No impact
Collisions with ships			Insignificant	Small	No change

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Explanations:
*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision

Table 69. Assessment of the impact of the Project parameters update on the results of the impact assessment of OWF BIII on black-throated and red-throated diver, whooper swan, whooper swan and long-tailed duck - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by presence of offshore wind farm		Reducing light emissions Temporary shutdown of turbines under severe weather conditions during migration periods Painting the tips of the blades in bright colors The use of towers with a solid structure Use of a minimum of 20 m clearance	Insignificant	Small	Reduced impact
Collisions with power plants			Insignificant	Small	Reducing the impact

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Explanations:
*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision
**The impact significance for marked species has been assessed as low, as estimates of the energy costs of rerouting show that the barrier effect causes an impact of low significance. In this case, the data and estimates go beyond the standard EIA matrix as included in the methodology description and species assessment

15.4. Crane, golden plover, uhla, gull little

Table 70. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on the crane, golden plover, eagle owl, little gull - construction and decommissioning stages

Impact	Importance of the resource	Minimizing actions*	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by the presence of ships	Very large	No	Insignificant	Small	No impact
Collisions with ships			Insignificant	Small	No change

*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision

Table 71. Assessment of the impact of updating the parameters of the Project on the results of the assessment of the impact of OWF BIII on the crane, golden plover, eagle owl, little gull - operation stage

Impact	Importance of the resource	Minimizing actions*	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Barrier caused by presence of offshore wind farm		Reducing light emissions Temporary shutdown of turbines under severe weather conditions during migration periods Painting the tips of the blades in bright colors The use of towers with a solid structure Use of a minimum of 20 m clearance.	Insignificant	Small	Reducing the impact
Collisions with power plants			Insignificant	Small	Reducing the impact

*taking into account the reduction of the number of wind power plants by 50% in relation to the variant indicated for implementation in the Environmental Decision

16. Shortcomings in technology and gaps in modern knowledge

The following are the difficulties encountered by the authors of the report's sections on the evaluation of migratory birds. It should be noted that further aspects related to shortcomings and gaps in contemporary knowledge are presented in Section 5.1., on seabirds.

1) One of the important obstacles in performing the environmental impact assessment is the lack of prior knowledge about the number of birds stationed in the BIII OWF area and the areas included in the cumulative impact assessment, especially about bird migration in the area of open waters of the Polish Baltic Sea. For this reason, the conducted EIA, had to be based on the results of pre-investment monitoring, with the assumption that the period of monitoring carried out was representative, and the information and data presented can be accepted in view of the results of assessments carried out for other projects that have obtained a decision on environmental conditions.

2) Significant gaps in knowledge relate to the question of how wind turbines respond to microvoiding for virtually all bird species. Due to a lack of knowledge, collision risk is often assessed on a precautionary basis and therefore potential collisions may have been overestimated or underestimated if an overly optimistic or overly pessimistic scenario was used. For some species, i.e. the crane, there is also a lack of knowledge about the macro-avoidance of wind farms. There may also be an attraction of some species (e.g., raptors, probably also cranes and other land birds) to offshore facilities (Skov et al. 2012), but this phenomenon is poorly understood.

3) There is insufficient knowledge to carry out a quantitative assessment of the impact of wind turbine lighting on the risk of collision for nocturnal migratory species. In addition, collision estimates of night-migrating passerines and shorebirds for wind turbines located in the southern Baltic Sea are unknown. There are also no reliable methods to fill the knowledge gaps on collision risk for night migrating birds.

4) There may also be an attraction of some species (e.g., raptors, probably also cranes and other land birds) to offshore facilities (Skov et al. 2012), but this phenomenon is poorly understood.

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17.1. Literature

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 5

Seabird impact assessment

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Abbreviations and definitions

AIC	Akaike's information criterion
AIS	Automatic Identification System (Automatic Identification System)
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
Sediment deposition	The process of sediment accumulation on the seabed (accumulation, deposition)
DSU	Decision on environmental conditions
Birds Directive	Directive of the European Parliament and of the Council 2009/147/EC of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010, p. 7–25)
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.07.1992, p. 7–50)
EEZ	Exclusive Economic Zone (Exclusive Economic Zone)
FEW Baltic II	Baltic II wind farm
ESW	Distance covered by visual observation (Effective Strip Width)
Eutrophication	The process of enriching water bodies with biogenic elements (nitrogen and phosphorus), resulting in an increase in their fertility
GAM	Generalized Additive Model
HELCOM	Helsinki Commission
Habituation	Habit is to the constant presence of a given factor that does not pose an immediate threat
IMO	International Maritime Organization
IUCN	International Union for Conservation of Nature and its Resources
Sea ducks	Ducks of the Mergini tribe
Ducks proper	Ducks of the genus Anas
KIP	Information sheet of the project
MIP-E	Maritime Transmission Infrastructure - eastern part
IMF	Offshore wind farm
IMF Baltica 2	Baltica 2 offshore wind farm
IMF Baltica 3	Offshore wind farm Baltica 3
IMF BII	Offshore wind farm OWF Bałtyk II (originally: Bałtyk Środkowy II and Polenergia Bałtyk II)
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
IMF BP	North Baltic offshore wind farm
Natura 2000	Network of EU nature conservation areas

NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
EIA	Environmental impact assessment
CSO	Natura 2000 Special Bird Protection Area
SCI	Area of Community Importance, protected under the Natura 2000 network
PBR	Potentially Biological Removal (Biosafe level of extraction)
PGE	Polish Energy Group
POM	Polish maritime areas
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Resuspension of the sludge	Movement of insoluble sediment particles into the water depth, caused by external factors (e.g., preparation of the seabed for gravity foundations)
SDF	Standard Data Form of the Natura 2000 site
SPEC	Species of special concern in Europe
EU	European Union

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of updating the conditions for implementation and operation of the Project - BIII OWF, for which the Environmental Decision was issued, on seabirds is included in Section 5.5 of Volume VI of the Report.

2. Introduction

This Section of the Report assesses the potential impacts of changes and updates and conditions of implementation and operation of the Project - OWF BIII on seabirds.

The assessment was based on the characteristics of seabirds in the BIII OWF area (Volume III Section 8) and the characteristics of the Project and the disturbances and emissions it will cause (Volume II).

3. Description of the planned project

3.1. Parameters of the project affecting the scale and type impacts

The parameters of the BII OWF that are relevant to the assessment of the project's impact on seabirds are:

- farm location,
- area of the farm - total and buildable,
- power plants - number and dimensions (including especially clearance height), distances between power plants

All of the above parameters, for the construction, operation and decommissioning phases of the Project, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.2. Other projects in the area investments

There are or are being designed other projects in the project area that could potentially, along with the BII OWF, cause cumulative impacts on the environment, including seabirds.

Projects and activities that may cause cumulative impacts with those of OWF BIII are presented and characterized in Volume II, Section 13 of the Report. The remainder of this section assesses the cumulative impact on seabirds during the construction, operation and decommissioning stages of the BIII OWF.

4. Existing pressures anthropogenic

Helcom (2010a) compiled a list of anthropogenic pressures occurring in the Baltic Sea. For the Arkona Basin and the Bornholm Basin (and to some extent the Gulf of Gdansk), which are the areas closest to

the Slupsk Shoal, the most important anthropogenic pressures (which are not necessarily the most important factors determining the distribution of birds) specific to these areas are:

- fishing by bottom trawling, fishing with gill nets, surface trawling and at medium depths, fishing with inshore stationary fishing gear (standing nets, beetles),
- introduction of nutrients (nitrogen and phosphorus) and heavy metals (lead and cadmium),
- introduction of organic matter from rivers,
- underwater noise generated by ships (coastal areas and open waters).

4.1. Fishing

The most important anthropogenic pressure on birds residing in the area of the proposed OWF BIII is fishing vessel traffic. Some of them appear here in connection with fishing. However, fishing activity, on the one hand, can overfeed the birds, and on the other hand, leads to concentrations of gulls, which take advantage of the waste generated by fish processing and feed on fish that fall out of the trawl when the catch is being picked.

Surveys of ichthyofauna in the area have shown that most pelagic fish (almost 88%), which are the main component of the diet of ichthyophages (divers, alka, dabbler, guillemot, horned grebe, cormorant) were caught in summer and autumn (see - Volume 3 Section 7 of the EIA). However, during this period, bird counts on this body of water are very low. Fishing activity in the area of OWF BIII is not high, especially during the period of more abundant birds, and the currently existing traffic of fishing vessels does not significantly affect the seabirds residing here (see Volume 3 Section 13 of the EIA).

4.2. Eutrophication

All parts of the Baltic Sea, excluding the Gulf of Bothnia and the northeastern Kattegat, are experiencing eutrophication. The Baltic Sea is particularly vulnerable to it, due to the small volume of water exchange that takes place through the Danish Straits relative to the total volume of the body of water. In addition, the catchment area is relatively large and intensively used by humans. Consequently, the concentration levels of nutrients, such as nitrogen and phosphorus, are high in most of the Baltic Sea, including Polish coastal waters (HELCOM, 2009). Efforts by HELCOM countries to reduce nutrient inputs to the Baltic Sea have led to a 30% decrease in nitrogen levels and a 45% decrease in phosphorus concentrations between 1990 and 2006 (HELCOM, 2010a).

A potential effect of the occurrence of eutrophication on waterbird populations is a decrease in the population of species that feed on underwater plants (an increase in plant mortality due to the darkening effect) and an increase in the population of species that feed on macrozoobenthos (as a result of increased availability of zooplankton) (Skov et al., 2011). The Baltic Sea has seen changes related to the long-term reduction in phosphorus inputs observed since 1993.

Detailed information on the potential increase in the amount of nutrients in water as a result of the implementation of OWF BIII is included in the section on impacts on the abiotic environment (Volume IV Section 2 of the report).

4.3. Pollution

During the most recent surveys conducted by HELCOM between 1999 and 2007, most areas of the open waters of the Baltic Sea were found to be contaminated with persistent chemical compounds and heavy metals (HELCOM, 2010b). In the case of fish and mussels, which are the primary source of food for many bird species, threshold values for cadmium and mercury concentrations were exceeded for almost the entire Baltic area (HELCOM, 2010b).

Detailed information on the potential increase in the amount of pollutants due to the stirring up of the bottom sediment layer during the construction of the OWF BIII farm is included in the section on impacts on the abiotic environment (Volume IV Section 2 of the report). It has not been found to contain significant amounts of toxic substances that could potentially be released into the water table during construction activities.

In addition to contamination by various toxic chemicals and heavy metals, all seabird species are potentially threatened by oil pollution released into the water through ship collisions or incidents of illegal sewage discharges. The number of recorded oil spills has decreased since 1995, but oil pollution in the Baltic Sea is still present, and there is even an increase in the Central Baltic (Skov et al., 2011). Intensification of ship traffic in the Baltic Sea is likely to increase (np. Rytkönen et al, 2002). As a result, the likelihood of large-scale oil spills is high and is likely to increase in the future (HELCOM, 2010a).

4.4. Traffic ships

Vessel traffic, even single vessels, can affect the distribution of seabirds by displacing them from locations through which the voyage route passes (Schwemmer et al., 2011). However, different species show a different response to passing ships and take off at distances ranging from a few meters up to 2 kilometers from a passing ship (Schwemmer et al., 2011). There is a stronger crowding effect from fast-flowing vessels (Ronconi and Clair, 2002; Larsen and Laubek, 2005). Sea ducks are able to become accustomed to regular ship traffic along a fixed route, as may be the case with the aforementioned shipping routes. However, ships that do not travel along shipping lanes can cause short-term changes in the distribution of birds in sea areas (Schwemmer et al., 2011).

Detailed data on vessel traffic in the project area are presented in Section 14 of Volume III of the Report.

5. Description of the anticipated effects on the environment if the project is not undertaken

This chapter analyzes the effects on seabirds if the project is not undertaken. In doing so, three scenarios were considered:

- offshore wind energy will not be developed in the Polish maritime areas, and therefore the evaluated BIII OWF project, or similar ones, will not be implemented,
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind power are not being made, but the mining industry is developing.

The results of the analysis are shown in the table below.

Table 1. Effects on seabirds if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy will not be developed	The zero option is to not undertake the investment. In this variant, all basic elements of the natural environment, including seabird avifauna, will remain unchanged from the existing state. Any changes in the abundance and distribution of birds in this basin will be determined by natural factors or the impact of investments located in neighboring basins. This variant preserves the low impact of boat skimming on birds residing in the area. A detailed description of the status quo can be found in the study "Monitoring of seabirds of the area intended for the construction of the OWF Central Baltic III. Final Report with Study Results" (Volume III Section 8 of the EIA).
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	The case where offshore wind energy will be developed, but OWF BIII will not be implemented, can be compared to the situation of cumulative impact with other farms. It was evaluated in Chapter 9.
3.	Offshore wind power will not develop, but mining industry will grow	If wind energy is not developed in Polish maritime areas, but the mining industry is, there will be bird scaring and displacement caused by ship traffic and mining operations. Mining activities will cause the destruction of benthic communities, which will result in a reduction of food resources for benthic-feeding seabirds (benthophagous) in the immediate vicinity of the works. In addition, the work will cause bottom sediments to float and increase the concentration of suspended solids in the water. It will also affect the benthos and cause temporary turbidity in the water. Reduced visibility can adversely affect benthic-eating sea ducks, divers and auks. The extent and significance of these impacts will depend on the specific areas to be mined, their size, the intensity of mining operations, the type of sediment covering the seabed and the species of birds.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

6. Methodology for assessing the impact on environmental

The project's impact assessment was conducted in accordance with the framework methodology adopted by the project, as described in Section 5 of Volume I of the Report, with certain modifications or refinements, as discussed below.

6.1. Modifications or refinements to the framework methodology evaluation

6.1.1. Determine the vulnerability of seabirds to the impacts of the OWF

Following the methodology adopted in the 2015 Report, the study modifies the framework methodology when determining the sensitivity of individual seabird species to OWF impacts.

The sensitivity of individual seabird species to the impact of offshore wind farms is taken from the publication of Garthe & Hüppop (2004), where nine components affect the final score:

1) The ability to maneuver efficiently in the air (Man), where 1 indicates a very high ability to maneuver in a small space, which translates into collision avoidance, and 5 indicates a low ability to avoid obstacles (Garthe & Hüppop, 2004).

2) Height of displacement above water (Wp) - the value for each species was taken after the work of Garthe & Hüppop (2004), for species not mentioned in this work (e.g., long-tailed duck) the values given in Table 1 of the Furness et al. publication were considered. (2013) and translated them into a scale of 1 to 5, along the lines described by Garthe & Hüppop (2004).

3) Share of time spent in the air (UCz), based on Garthe & Hüppop (2004) and Furness et al. (2013).

4) Presence in typical night flight behavior (PN), based on Garthe & Hüppop (2004) and Furness et al. (2013).

5) Degree of fouling by offshore wind farms and vessel traffic associated with their operation (SP[3]), based on Garthe & Hüppop (2004) and Furness et al. (2013).

6) Ecological amplitude of the species (specialization in habitat selection (AE), based on Garthe & Hüppop (2004) and Furness et al. (2013).

7) Biogeographic population size (Pop), based on Garthe & Hüppop (2004).

8) Annual survival of adults (Prz), based on Garthe & Hüppop (2004).

9) Protection Priority (PO), based on Garthe & Hüppop (2004).

Table 2. Definitions of individual component values of waterbird species sensitivity assessments to the presence of an offshore wind farm

Component	1	2	3	4	5
Ability to maneuver efficiently in the air (Man)	The values for each species determined from literature sources were taken from Garthe & Hüppop (2004) and the electronic appendix of Furness et al. (2013). They depend primarily on the morphology of the bird. A value of 1 indicates very efficient and 5 indicates very poor maneuvering in flight.				
Height of displacement above water (Wp)	Values for individual species were taken from Garthe & Hüppop (2004) or from Table 1 in Furness et al. (2013). A value of 1 indicates a very low displacement ceiling, always below the range of the working rotors, and a value of 5 applies to species that frequently stay within the range of the rotors.				

Component	1	2	3	4	5
Share of time spent in the air (UCz)	0-20% of the time a species spends in flight	21-40% of the time a species spends in flight	41-60% of the time a species spends in flight	61-80% of a species' time is spent in flight	81-100% of the time a species spends in flight
Presence in typical night flight behavior (PN)	Values for individual species were taken from Garthe & Hüppop (2004) and from the electronic appendix of Furness et al. (2013). A value of 1 indicates little nocturnal activity, while 5 is assigned to species that are mainly active at night.				
Degree of crowding by offshore wind farms and vessel traffic associated with their operation (Sp^3)	Values for individual species were taken from Garthe & Hüppop (2004) and from the electronic appendix of Furness et al. (2013). A value of 1 indicates a weak response and avoiding obstacles at a short distance, while a value of 5 is assigned to species that respond strongly to the presence of wind farms, avoiding them at a considerable distance and making long flights after being panicked by vessels.				
Ecological amplitude of the species (AE)	Values for individual species were taken from Garthe & Hüppop (2004) and from the electronic appendix of Furness et al. (2013). A value of 1 indicates a tendency to reside over wide areas in many different habitats, while a value of 5 is assigned to highly specialized species that are mainly associated with a single habitat.				
Biogeographic population size (Pop)	More than 3 million individuals	1-3 million individuals	0.5-1 million individuals	0.1-0.5 million individuals	less than 0.1 million individuals
Annual survival rate of adults (Prz)	less than 0.76	0,75-0,80	0,81-0,85	0,86-0,90	above 0.90
Protection Priority (PO)	Non-threatened species, no special concern status (SPEC)	Species not endangered, with special concern status SPEC=4	Species not endangered, with special concern status SPEC=3	A species with declining abundance	Species with a status of vulnerable (VU) or endangered (EN)

Source: Meissner W. "Ornithological monitoring of the OWF Central Baltic III area. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015.

The species' sensitivity index (WWG) was calculated from the formula of Garthe & Hüppop (2004):

$$\mathrm{WWG} = \frac{\mathrm{Man} + \mathrm{Wp} + \mathrm{UCz} + \mathrm{PN}}{4} \times \frac{\mathrm{SP}^3 + \mathrm{AE}}{2} \times \frac{\mathrm{Pop} + \mathrm{Prz} + \mathrm{PO}}{3}$$

A recent study of long-tailed ducks and sea urchins wintering in the Baltic Sea showed a very sharp decline in their numbers (Skov et al., 2011), resulting in an increase in the IUCN threat category for both

species. For this reason, when calculating the sensitivity index, the highest value of the component describing protective priority (PO=5) was assumed.

6.1.2. Displacement of seabirds from the basin investments

Similar levels of bird displacement from the wind farm basin were assumed for the construction, operation and decommissioning stages.

Sensitive species of seabirds will partially move out of the wind farm's area of influence, and their numbers will also decrease in the immediate vicinity of the wind farm due to disturbances caused by the wind farm's structures, ship traffic and activities related to the wind farm's construction, operation and decommissioning.

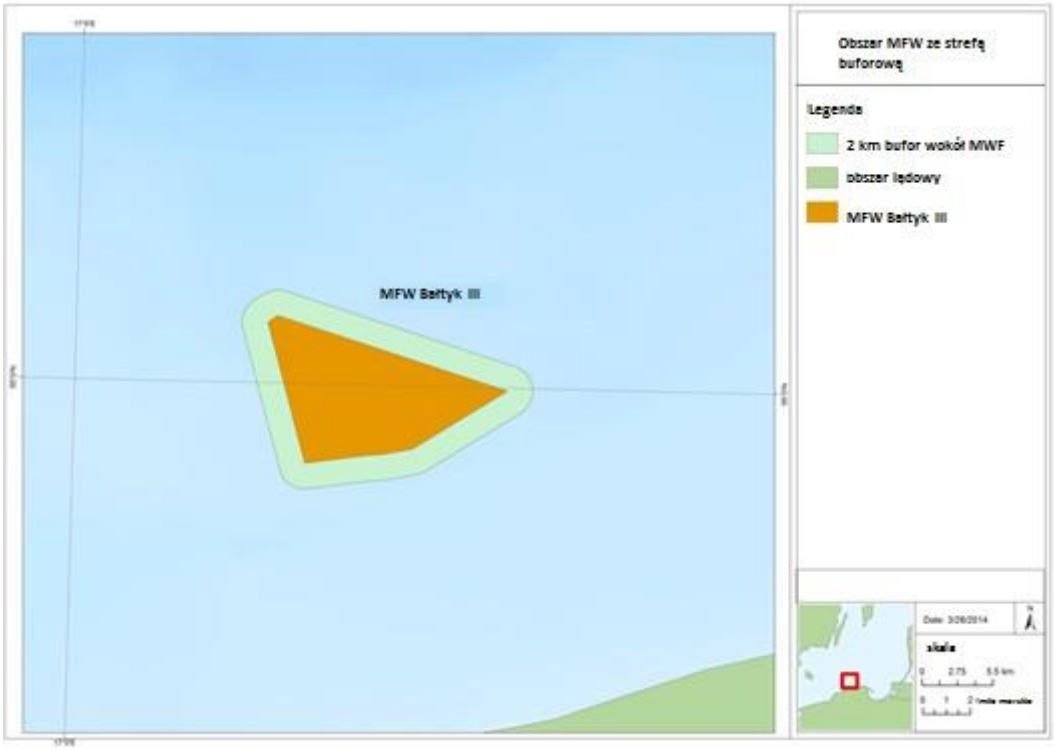
The number of displaced birds was assessed for two zones: the body of water within the boundaries of the wind farm and the 2 km buffer around the body of water. The two-kilometer buffer was selected as a potential impact area based on the observed seabird displacement effect at existing wind farms (Petersen et al. 2006, 2014, Petersen and Fox 2007, Leopold 2011, Vanermen et al. 2013). It was assumed that the displacement effect does not apply to areas more than 2 km from the boundaries of the wind farm, although in this case this assumption is not necessarily correct (Petersen et al. 2006, 2011, 2014).

The number of displaced birds was assessed for two zones: the body of water within the boundaries of the wind farm and the 2 km buffer around the body of water, as shown in the map below.

When considering the displacement of birds from the farm area, the location of the turbines was not taken into account, as the current state of knowledge on the reaction of birds to the layout of the wind farm does not allow it to be taken into account.

The two-kilometer buffer was selected as a potential impact area based on the observed seabird displacement effect at existing wind farms (Petersen et al, 2006, 2014;; Petersen and Fox, 2007; Leopold, 2011,; Vanermen et al, 2013). It has been assumed that the displacement effect does not apply to areas more than 2 km from the boundaries of the wind farm, although this assumption is not necessarily correct in this case (Petersen et al., 2006, 2011, 2014).

Figure 1. The area of OWF BIII, together with the surrounding 2 km buffer zone, which is a potential displacement zone for sensitive bird species



MFW Bałtyk III	OWF Baltic III
Obszar MFW ze strefą buforową	OWF area with buffer zone
Legenda	Legend
2 km bufor wokół MWF	2 km buffer around MWF
Obszar lądowy	Land area
MFW Bałtyk III	OWF Baltic III
Data	Date
Skala	Scale
Mile morskie	Sea miles

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

The number of potentially displaced birds was calculated based on the results of a monitoring campaign for seabirds conducted by Pomarinus in the area of OWF BIII and other areas in the Polish EEZ (Slupsk Shoal, OWF BII and the suspended project titled. North Baltic offshore wind farm), conducted from June 2012 to June 2013.

For the long-tailed duck species most frequently observed in the above-mentioned areas: the long-tailed duck and the long-tailed duck, models of their distribution were created based on the data collected during the survey campaign. The model's assumptions are described below. The modeling results allowed us to create maps of the predicted distribution of species, which were used to determine the number of potentially displaced birds. The maps created were superimposed on the polygons of the wind farm area and the 2-km buffer zone, and then bird numbers were calculated for both areas based on the average density of birds.

For less abundant waterbird species and birds for which reliable distribution models were not obtained, the abundance of potentially displaced birds was estimated based on the average densities recorded in the BIII OWF area during the monitoring campaign conducted by Pomarinus (see Section 8 Volume III of the EIA).

Seabirds differ in their sensitivity to the displacement effect caused by the IMF. Taking into account the results of the post-implementation analyses, different percentages of movement of different taxonomic groups inside the wind farm area and buffer zone were used (see table below). The assumed values are quite uncertain, as few post-implementation monitoring analyses are available so far, and the reported results are often uncertain (not very accurate in the quantitative sense), as the short periods of measurements do not allow for clear conclusions (see post-implementation monitoring power tests for Vanermen et al., 2013). In addition to these shortcomings, the analysis is also complicated by the probable seabird colonization of offshore structures (Petersen et al., 2006).

Given these gaps in knowledge, it seems obvious that there are differences in the sensitivity of species to impacts: cormorants, gulls and terns show low sensitivity, while almost all pelagic species like divers and auks show relatively high sensitivity. Birds of the second group do not completely avoid the wind farm area. Individuals are sometimes observed in offshore wind farm areas and regularly fly into the 2 km buffer zone.

Table 3. Estimated percentage of birds moving from the wind farm area and 2 km buffer zone for each taxonomic group

Taxonomic group	Estimated percentage of birds moving from the wind farm area	Estimated percentage of birds moving from the 2 km buffer zone area	Comparative materials
Nury	90%	70%	Petersen et al, 2006, 2014; Niras, 2013
Alki	80%	60%	Leopold et al, 2011; Petersen et al, 2006, 2014; Vanermen et al, 2013
Sea ducks	75%	50%	Petersen et al, 2006, 2011, 2014; Petersen and Fox, 2007
Seagulls	0%	0%	Leopold et al, 2011; Petersen et al, 2006, 2014; Vanermen et al, 2013

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

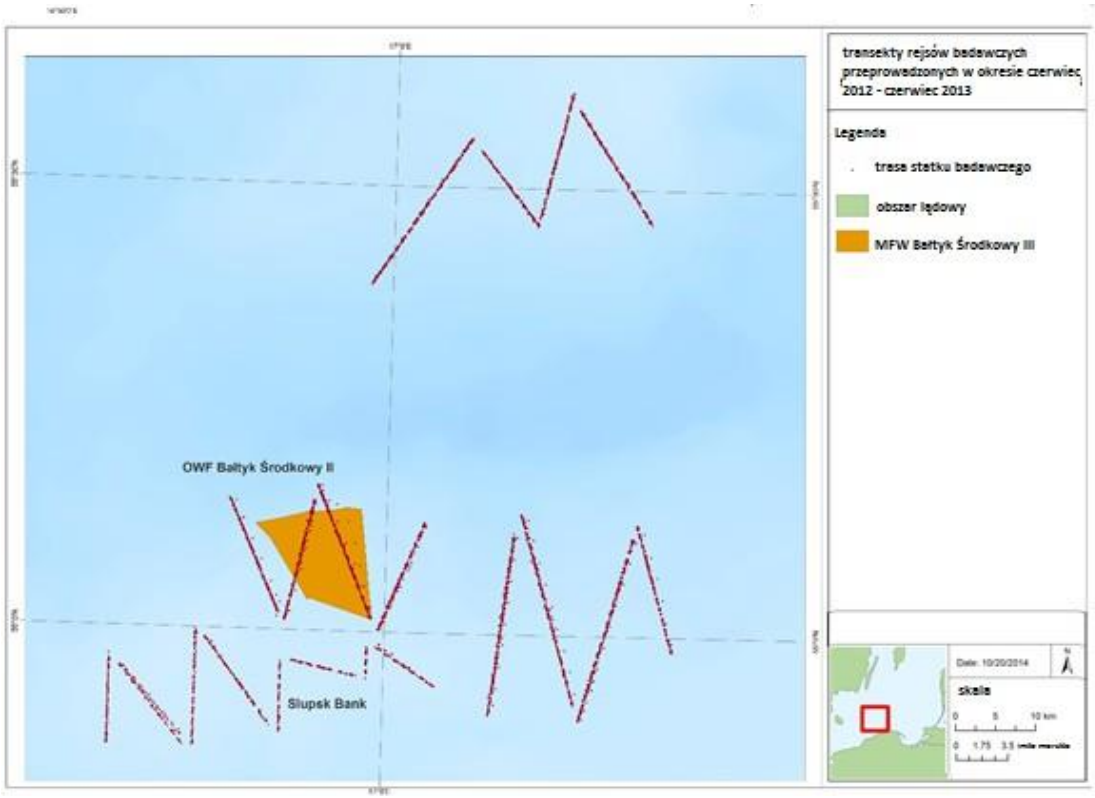
6.1.3. Modeling the distribution of seabirds

Distribution modeling was applied to the two most common species of long-tailed ducks in the Polish EEZ: the long-tailed duck and the long-tailed duck. The input data was collected by Pomarinus during research cruises from June 2012 to June 2013 and between November 2013 and February 2014 in the

BII offshore wind farm area, as well as in the areas of Slupsk Shoal and other offshore developments in the Polish EEZ (see figure below). The modeling was done by DHI. Observations were carried out in the study area twice a month (with a few exceptions when observations were made only once a month), following the standard methodology for monitoring seabirds from a ship at sea (Camphuysen et al.,2004).

By using data collected in the BIII OWF area and from other marine areas in the Polish EEZ, it is possible to better characterize the distribution of species at sea, as the sample size increases and more environmental indicators are covered. There is no basis for assuming that benthic-feeding species have different habitat use preferences for different study areas. The research was conducted evenly in all areas, so it was assumed that combining all the collected data was justified and allowed to achieve more reliable results than separate analysis of individual areas.

Figure 2. Range of surveys conducted with ships, representing the spatial extent of the data that was used to model the distribution of species



OFW Bałtyk Środkowy III	OFW Central Baltic III
Transekty rejsów badawczych przeprowadzonych w okresie czerwiec 2012 – czerwiec 2013	Transects of research cruises conducted between June 2012 and June 2013
Legenda	Legend
Trasa statku badawczego	Route of the research vessel
Obszar lądowy	Land area
MWF Bałtyk Środkowy III	MWF Central Baltic III
Data: 10/20/2014	Date: 10/20/2014
Skala	Scale
Mile morskie	Sea miles

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." DHI Poland, Warsaw, 2015.

The recorded abundance of other seabird species (divers, alk, gulls and terns) was small and insufficient to calibrate the distribution model. For the silver-backed gull, such calibration was not possible even despite a significant number of observations. This is most likely due to the fact that the distribution of the silver-backed gull is closely related to the activity of the fishing vessels that these birds follow (see Section 8, Volume III of the EIA), and at the same time, the study area may not have sufficient spatial coverage to make a distribution model for such a mobile species.

The long-tailed duck was the most numerous species. Separate models were prepared for each month in which individuals of this species were observed, from November 2012 to April 2013 and from November 2013 to February 2014. There were too few observations in October 2012 and May 2013 to be used for modeling, and no individuals of this species were observed in the other months (see Section 8, Volume III of the EIA).

To obtain seasonal values of long-tailed duck abundance and distribution, forecasts were averaged for the months of December, January and February (the wintering season).

The period of occurrence of the long-tailed duck is longer than that of the frigatebird, so the modeling included data collected from October 2012 to April 2013, however, since the abundance of the long-tailed duck was lower than that of the frigatebird, only one distribution model was fitted for the entire winter period, taking into account variables to account any difference between the months.

Based on the experience of modeling the distribution of waterbirds in other parts of the Baltic Sea, seven potentially relevant environmental variables were included in the analysis: speed of sea currents (from the hydrodynamic model, Lech-Surowiec, 2015), water temperature (from the hydrodynamic model, Lech-Surowiec, 2015), salinity (from the hydrodynamic model, Lech- Surowiec, 2015), filter organism index (Skov et al, 2011), water depth (Gdansk Maritime Institute), bottom slope (obtained from raster bathymetric data), distance to shipping routes (Euclidean distance to major shipping routes in the Baltic Sea). AIS data on the density of representative vessels for a typical month (August 2010) was obtained from the Danish Maritime Authority.

The index of filter organisms corresponds to the modeled filtration capacity, which describes the average filtration capacity based on the hydrodynamic and geobiochemical complex DHI BANSAI 3 model. Filtering capacity is used as an indicator of bivalve biomass and combines a growth model based on the physiology of a standard individual supplemented by the food consumed by the filtering organism. On a larger scale, this indicator depends on local primary production, and on a smaller scale, the speed of ocean currents is more important. Water depth and bottom slope are factors that have a relatively strong influence on the distribution of benthic-feeding waterbirds. The distance from shipping routes reflects the significant pressures at sea from ship traffic, so it negatively affects the distribution of waterbirds. Hydrodynamic properties of water masses can indicate marine areas of high productivity (strength of ocean currents) or indicate water properties that can affect the physiology of birds (or organisms that are their food) and energy balance (water temperature and salinity).

Birdwatching data were linked to environmental parameters using a custom-built data integration tool designed to obtain, based on spatial and temporal attributes, data from a numerical hydrodynamic model (geographic coordinates and date-time fields). Values from static environmental data layers (e.g., bathymetry, bottom slope, distance from shipping routes) were obtained using the Interpolate Raster

Values to Point tool available in the Marine Geospatial Ecology Tools package for ArcGIS (Roberts et al., 2010).

Bird observations were converted to density, and correction factors were introduced to account for the decrease in bird detection with increasing distance from the ship's side according to the standard methodology for observations made from the ship (Thomas et al., 2010). We applied correction factors based on the parameter determining the distance covered by the visual observation (effective strip width = ESW), which tells at what distance from the transect an individual was observed, and thus what area was actually surveyed, estimated for the same dataset in Section 8 of Volume III of the EIA. The ESW for the long-tailed duck is 169.29 meters, and for the uhla is 152.76 meters. Given the width of the transects of 300 meters, for these ESW values the correction factor was 1.77 and 1.96, respectively. The ESW defines the distance for which the number of detections outside this area equals the number of individuals inside the ESW that were missed. Correction factors for birds sitting on the water were applied and, along with birds in the air counted using the snap-shot technique, were taken into account in calculating densities (see Section 8, Volume III of the EIA - Field Control Run).

Finally, the observation data and associated environmental attributes were aggregated to a 500 x 500 m grid for each month by averaging the observation values and environmental data if there was more than one point in the mesh. The resulting dataset used for analysis included observed bird density, zero values if no individual of a species was recorded along the transect route, and environmental parameters for all point data.

A generalized mixed model (GAM) was used to account for zero inflation (disproportionately large numbers of zeros) in the measured data and a potential nonlinear relationship to environmental variables (Stefansson, 1993). First, the binomial model (presence/absence) was calibrated. Then, all zeros were removed and the gamma model was calibrated (with a log link) with long-tailed duck and uhla densities as dependent variables (response variables) and the environmental variables listed above as predictor variables. In addition to environmental variables, the interaction between the X and Y coordinates was also taken into account as predictor variables to account for variables unexplained by other variables and increase the predictive ability of the models. The predictions from both parts of the model were combined (multiplied) to obtain the final compaction. The models were calibrated using the "mgcv" package R. The maximum degree of smoothing for the predictor variables was assumed at 5 (k=5), up to 10 (k=10) for the interaction between the X and Y coordinates, in order to reduce the risk of over-fitting "response curves."

Before calibrating the model, the correspondence between the predictor variables was checked, since a strong correlation between them can result in an inaccurate parameterization of the model and lower its predictive accuracy (Dormann et al., 2012). There was a high correlation (r = 0.9) between depth and the index of filter organisms, so these variables were not included in the same model, they were tested as alternatives.

All uncorrelated variables were included in the initial global models, while insignificant variables were excluded by automatic model selection. A theoretical approach was used for model selection, followed by multi-model inference (Burnham and Anderson, 2002). AICc - Akaike Information Criterion (AIC) improved for small sample sizes was used as the main model selection criterion. Models with ΔAICc (the difference between the value of AICc in the considered model and the most favorable model with the smallest value of AICc) less than 2 was retained in the models' default settings. Their coefficients were

also used to model the mean, and their AICc (ω) weights were used to compare and assess the relative quality of the predictor variables. The choice of model was based on the drawing model made in the "MuMIn" R package (Barton, 2013). The same procedure was used for both models, two-dimensional and gamma (as described above).

Calibration was assessed based on the adjusted R2 values of the separate parts of the model and a comparison of observed and predicted values. "Model residuals" for spatial autocorrelation (defining nearest neighbor as 1500 m in measured data) were also evaluated. If a strong spatial autocorrelation in the "model residuals" were noted, this could result in an increase in the number of modeling procedures under consideration related to model recalibration through a mixed model GAMM, which allows the inclusion of correlation structures and the resolution of spatial autocorrelation.

6.1.4. Seabird collision risk assessment performed by DHI

The widely used Band collision risk model (Band, 2012) was used to determine the collision risk of individual bird species. "The "basic" Band model (Band, 2000; Band et al., 2007), created for onshore wind farms, was developed in 2012 to better fit seabird analyses for offshore wind farms. The updated model has been dubbed the "extended Banda model." In this study, an extended version of the model was applied to three species of sea ducks for which there is sufficient data to determine the frequency distribution of flight heights at 1 m intervals. For the remaining species, the "basic Band model" was used, and both models were calibrated according to guidelines (Band, 2012) and spreadsheets available at: http://www.bto.org/science/wetland-and-marine/soss/projects.

Estimating the risk of bird collisions requires quantitative data on birds, as well as information on individual turbines and wind farm parameters. Next, collision risk estimation relies on a series of assumptions. First, it is assumed that the probability of collision with the rotor depends only on the size of the bird (wingspan and area), the range and angle of the blade, the speed of the rotor and the speed of the bird. To facilitate calculations, it was assumed that the bird has a simplified cruciform shape, with wings halfway from beak to tail, the rotor blade has a width and blade angle, but no thickness, and the bird's flight will not be affected by potentially hazardous events (so-called "near misses"), despite the airflow around the rotor blades. It was further assumed that birds fly through the turbine at 90 degrees, even if they approach the rotor diagonally. This is justified by the fact that the reduction in the area crossed and the increase in the time required for the bird to cross the rotor plane during oblique flight probably cancel each other out (Band, 2012).

Band (2012) describes the model in six stages:

- Stage A - collects data on the number of migrating birds that have not moved from the wind farm area, are not avoiding it, or have been attracted to the wind farm area by curiosity and are potentially at risk of collision,
- Stage B - uses bird activity data to estimate the potential number of birds flying through the wind farm's rotors,
- Stage C - calculates the risk of collision for the passage through the rotor of a single individual,

- Stage D - multiplies the above to obtain the potential collision mortality rate for bird species, taking proportional account of the time the turbines are not operating, assuming current use and no avoidance,
- Stage E - allows consideration of the contribution of birds that are most likely to avoid the wind farm or turbines, for the reason that they have moved out of the area or will be wiped out; takes into account the attraction of birds by the wind farm, e.g. due to habitat change,
- Stage F - expresses the uncertainty of the collision risk analysis carried out in this way.

Collision risk estimation results from combining the first 5 steps and verifying them by the uncertainty from the last step (F). Stage A defines bird flights, which, in Stage B, makes it possible to estimate the "stream" of birds passing through the rotor based on density (stationary birds) or flight rate (migratory birds). In Stage C, the probability of collision for a single flight is calculated based on the characteristics of the wind turbine and the bird. Stages B and C are then combined by multiplying the number of overflights with the collision risk for a single overflight and the operational time of the wind farm, resulting in the number of collisions per month under the assumption of no avoidance. The extended model used for the three species of sea ducks allows for variation in bird flux and collision probability within the rotor cross section, so these results must be summed for the entire rotor cross section area. The extended model is based on the assumption that bird flight density increases at lower altitudes, and the risk of collisions is lower at the ends of the rotor blades and higher closer to the nacelle. For the remaining species, a baseline model based on the proportional number of birds in the rotor rotation zone was used. In Stage E, avoidance responses are added to obtain a final estimate of the number of collisions per month. The default avoidance rates included in Banda's model were used: 95%, 98%, 99% and 99.5% (Band, 2012).

At the last stage (F), the uncertainties associated with subsequent stages are expressed. There are uncertainties associated with each step of the collision risk calculation (e.g., bird density/shooting rates, nocturnal activity, the contribution of turbine height, size and operating time, and collision model simplifications). Uncertainty for each stage was based on expert judgment in this study and should therefore be used as the indicated uncertainty range. In the absence of more accurate data, the same uncertainty value was used for all species. Errors result from aiming for a 95% confidence interval. The uncertainty of the compaction/shot ratios is at least 50% ($_{e1=0}$.50). Due to the small amount of information on nighttime activity, an uncertainty of 25% was assumed ($_{e2=0}$.25). Uncertainty for birds flying at rotor height is at least 25% ($_{e3=0}$.25, Band et al., 2012), and operational time is at least 10% ($_{e4=0}$.10). Finally, the uncertainty due to model simplifications is 25% ($_{e5=0}$.25, Band et al., 2012). The various components of uncertainty are summarized by the following formula (Band et al., 2012).

$$E=\mathrm{sqrt}(^{e12} + ^{e22} + ^{e32} + ^{e42} + ^{e52}) \ (\pm 67\%)$$

The uncertainty assumption made, ± 67%, should be linked to collision risk estimates for all species.

6.1.4.1. Data and calculations collision

Collision calculations for the preparation of the 2015 Report were carried out for four different types of turbines: for the rational alternative from the 2015 Report, for which the assumption of construction of 200 turbines and rotor diameter of 200 (in two options that differ in the height of the turbine tower - 120 m and 175 m) and in the parameters of the Project approved in the Environmental Decision, i.e.

120 turbines and a rotor diameter of 250 m (with two options that differ in the height of the turbine tower -145 m or 175 m). The most important difference between the two options adopted for the two analyzed variants is the amount of clearance between the bottom position of the blade and sea level, which is 20 and 75 meters, respectively, for turbines with tower heights of 120 meters and 175 meters for the rational alternative of the 2015 Report, and 20 meters and 50 meters for turbines with tower heights of 145 meters and 175 meters for the Project in the parameters approved in the Environmental Decision. Detailed characteristics of each wind turbine variant used in the collision calculations are shown in the table below.

Table 4. Turbine data for the two designs of the wind farm variant selected for implementation and the rational alternative variant that were used in the Banda (2012) bird collision model (DHI)

Parameter	Variant selected for implementation - in the parameters approved by the Environmental Decision		Rational alternative - NIS 2015
	Minimum tower height 120 m	Maximum height of the tower 175 m	
Number of blades (pcs.)	3	3	3
Speed (rpm)	10	10	10
Rotor radius (m)	100	100	96.3
Tower height (m)	120	175	116.3
Operating time (%)	90	90	90
Maximum blade width (m)	5.4	5.4	5.0
Blade angle (degrees)	0	30	30
Tidal magnitude (m)	0	0	0
Latitude (degrees)	55	55	55
Number of turbines	120	120	200
Width of the wind farm (km)	10.8	10.8	10.8

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Species characteristics: individual length, wingspan, flight speed, nocturnal activity (1- 5) and flight type included in the collision risk models are presented in the next table. The monthly bird densities (modeled from cruise data) used to calculate collision risks for seabirds residing in the farm's basin and passage rates (number of birds/month) are described in the report of study results (see Section 9, Volume III of the EIA), and the densities and values used are included in the next table in this chapter.

Table 5. Ornithological data that were used in collision analyses (DHI)

Species	Characteristics of the species					Seabirds	
	Body length (m)	Wingspan (m)	Flight speed (m/sec)	Night activity factor (1-5)	Flight type, active (A) or slippery (S)	Percentage of flights at rotor height (%)	Percentage of flights against the wind (%)
Alka	0.41	0.65	16,[11)]	1	A	-	-
Long-tailed duck	0.49	0.76	22.0	1	A	Expanded	50,0%
Nury	0.60	1.18	19.0	1	A		
Silver gull	0.60	1.44	12.8	2	S	34,0%2[)]	50,0%
Lesser Black-backed Gull	0.28	0.74	11.5	1	A		
Uhla	0.55	0.95	20.1	1	A	Expanded	50,0%
Markaczka	0.49	0.85	22.1	1	A	Expanded	50,0%

[1Pennycuick]1990

[2Average]percentages reported by Furness et al. 2013

Source: expert study by DHI (Appendix 1 to the second part of Chapter 5 Volume IV of the EIA with an assessment of the impact on migratory birds bird body length and span taken from the online database (DOF, 2014)

Unless otherwise indicated in the table, data on body length and wingspan were obtained from the DOF database, flight speed from Alerstam 2007, data on night activity and flight type were determined from expert knowledge, the percentage of flights made during migration at rotor height and upwind was obtained from monitoring data. Information on the percentage of flights of stationary birds is conjectural.

Table 6. Summary of average monthly densities of long-tailed duck, silvery gull, and scops in flight ([individuals/km2])

Month	Long-tailed duck	Silver gull	Uhla
January	0.425	0.75	0.005
February	0.527	0.75	0.0062
March	0.417	0.75	0.003
April	0.209	0.75	0.0068
May		0.75	
June		0.75	
July		0.75	

Month	Long-tailed duck	Silver gull	Uhla
August		0.75	
September		0.75	0
October	0.107	0.75	0.0038
November	0.213	0.75	0.0066
December	0.031	0.75	0.0052

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the OWF Central Baltic III area. Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

6.1.5. Seabird collision risk assessment by ENINA

ENINA in 2022 performed collision analyses for migratory birds for the Project's modified implementation and operation conditions. Nevertheless, the results of collision analyses can be used helpfully to determine the risk of seabird collisions.

6.2. The most far-reaching scenario venture

The EIA for the Project within the parameters approved by the Environmental Decision began by identifying the investment scenario that will potentially have the greatest impact on seabirds - the most far-reaching scenario - NIS 2015. It was considered to be the construction of 200 wind power plants with associated infrastructure (7 offshore substations and 1 additional platform), i.e. the maximum number of power plants allowed to be installed in the BII offshore wind farm area according to the location decision (PSZW), with a minimum clearance of 20 m and rotor diameter of 192.5 m.

The Project in the parameters approved in the Environmental Decision will cause impacts equal to or less than the set of parameters of the Project constituting the 2015 NIS. It consists of 120 power plants, i.e. about 40% less than in the 2015 NIS. It has a larger rotor diameter ie. 250 m, but the total rotor area is smaller than that of the 2015 NIS, and the minimum clearance used in it is also 20 m.

The Project after the update will consist of 60 power plants, i.e. about 70% less than the set of Project parameters constituting the 2015 NIS and 50% less than the Project in the parameters approved in the Environmental Decision. The diameter of the rotor is increased to 250 m, however, the maximum total area occupied by the rotors in the event of changes in the parameters of the project will be 78% in relation to the parameters of the Project approved by the Environmental Decision, and 50% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015. Since it is the number of power plants and the total entrustment occupied by the rotors that is the source of the potentially most significant impacts, thus the Project in the modified parameters will potentially be a significantly less significant source of impacts both compared to the set of Project parameters constituting the 2015 NIS, as well as the Project in the parameters approved by the Environmental Decision.

7. Potential impacts of offshore wind farms offshore wind farms

The following description of the potential impacts of OWFs on seabirds is based on scientific publications and reports of pre- and post-investment surveys conducted in the area of existing wind farms (Erickson et al., 2001; Christensen et al., 2003; Christensen et al, 2004; Kahlert et al., 2004 a, b; Petersen et al., 2004; Desholm & Kahlert, 2005; Fox et al., 2006; Hüppop et al., 2006; Petersen et al., 2006; Everaert & Stienen, 2007; Blew et al., 2008; Drewitt & Langston, 2008; Krijgsveld et al., 2011; Leopold et al., 2011; Cook et al., 2012).

It should be noted that in addition to typical OWF emissions and environmental disturbances (which can be planned), unplanned emissions may occur at any stage of the project, such as contamination of the water body and bottom sediments with petroleum substances (during normal operation and in an emergency), antifouling agents, accidentally released municipal waste or domestic sewage, chemicals and waste from the construction, operation or decommissioning of the farm, UXO explosions. **They will indirectly affect living organisms, including seabirds.**

7.1. Stage construction

During the construction phase, birds can be expected to be flown from the work site. The extent of this impact depends on both the species of bird and the level of noise and frequency of movement of vessels. The impact of the wind farm during the construction phase will change as more structures are erected. Initially it will be small with a local character, and later the area from which birds will be deterred will gradually increase. The exceptions to this are gulls, including the most abundant species - the silver-backed gull, which show a higher incidence of occurrence in the area during the construction of the offshore wind farm than in the pre-construction period. They use structures protruding from the water, including non-working wind turbines, as a resting place.

Table 7. Potential impacts of OWF on seabirds - construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Traffic of vessels and helicopters	Ship traffic during the construction phase will cause bird scaring. The most important parameters affecting the level of impact are the number of power plants being built and the length of cables being laid and the associated number of vessels being used.
Noise and vibration emissions	Noise and vibration emissions in the water body affected by the construction work will cause birds to frighten and displace them from the project water body. The most important parameters affecting the level of impact are the number of power plants being built and the length of cables being laid and the associated number of vessels being used.
Lighting of the project site	Lighting a construction site with strong lights can attract birds that are active at night. However, this mainly applies to piping plovers, which are not found in the Baltic Sea. There are no data

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	on the impact of strong lighting on other species residing in the project area. Light sources can attract migratory birds, significantly increasing the risk of their collisions with power plants. The most important parameters affecting the level of impact are the number of power plants being built and the length of cables being laid and the associated intensity of construction lighting.
Creation of a barrier for birds (caused by the presence of power plants, risk of collisions with power plants, exclusion of feeding grounds)	Power plant and substation structures, gradually appearing during the construction phase, will deter birds. The impact of this impact on birds depends on the pace of construction of the farm. At first, individual power plants will have a small impact, but gradually the deterrent effect will increase. The most important parameters affecting the level of impact are the number of power plants and associated infrastructure under construction.
The formation of a barrier for birds (caused by the presence of ships)	The presence of a large number of vessels used in the construction of the wind farm may result in a barrier effect, reducing the possibility of birds moving between stopover areas during migration. The scale of the impact will depend on the number of vessels involved during the construction phase, their size, the duration of the construction phase and the season in which the work will be carried out.
Collisions with ships	There may be collisions between birds and vessels used for wind farm construction, mainly during nighttime hours, when birds are attracted by the light they emit. The scale of the impact will depend on the number of vessels involved during the construction phase, their size, the configuration of the lights and their intensity, the duration of the construction phase and the season in which the work will be carried out.
Destruction of benthic habitats	Local destruction of benthic communities will occur during the construction phase. This periodic depletion of the food base is not expected to affect birds, as they will mostly be chased away from construction sites. The most important parameters affecting the level of impact are: • the type, dimensions and number of foundations to be built and the length of cables to be laid, • a type of rock material that forms the seabed.
Increase in the concentration of suspended solids in water	Direct sediment transfer as well as resuspension of disturbed sediment will reduce water clarity. When the reduction in water clarity exceeds the baseline, it can result in an impairment of the

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	hunting ability of birds that use their eyesight for this purpose, and consequently lead to the displacement of birds that prefer clear waters. The magnitude of the impact will depend on the amount of sediment to be moved, the composition of the sediment, and the season in which the main construction work will take place, causing disturbance of the bottom sediments.
Deposition of agitated sediment	Sediment deposition associated with the preparation of the farm's bottom has the potential to affect benthic communities in and near the area. This phenomenon may lead to the impairment of fish and benthos (reduction in biomass, growth and productivity) and thus affect the food base of seabirds in the area. The magnitude of the impact will depend on the season in which the main sediment transfer work will take place.
Pollution of water bodies and bottom sediments with petroleum substances	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. From this source, about 33% of the oil entering the environment enters the waterways (mainly due to increased ship traffic in the Baltic Sea region (Kaptur, 1999). By comparison, about 37% of the oil going into the sea comes from the river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster). Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. Water and bottom sediment pollution can negatively affect seabirds. The most important parameters affecting the level of impact are: • the type and amount of oil substances released, • weather conditions, • a type of rock material that forms the seabed.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

7.2. Stage operation

The potential impact of wind turbines located in offshore waters on seabirds relates to increased mortality from collisions with turbines and changes in the distribution and behavior of birds. The highest mortality is recorded for wind fields located on feeding grounds and regular flight paths.

Wind turbines cause changes in the way birds use space, which also applies to marine areas. In the vast majority of cases, the turbines act as a deterrent to birds, and passing waterbirds sweep past the wind turbine fields at distances ranging from 100 meters to as much as 3,000 - 4,000 meters (maximum 5,000 meters). As a result, the areas immediately adjacent to the gym are much less used as foraging and resting areas. The area where wind turbine masts stand ceases to be available as a feeding ground for birds, and in some cases noticeably lower bird densities are observed within a radius of up to 2 or even 4 km from the power plant (Petersen et al., 2004). Studies conducted in areas occupied by offshore wind farms show that most species of seabirds avoid the power plant area at a considerable distance, and when they get between the power plants they lower their flight and maintain equal distances from obstacles. Waterbirds' avoidance of the area where wind turbines stand and the low flight ceiling between the power plant poles leads to a reduced risk of collisions, so that mortality from collisions with power plant structures in offshore areas is low. However, with poor visibility due to fog and rainfall, the risk of collision increases. The number of collisions with wind turbines increases markedly when they are located on bodies of water attractive to birds, where their densities are high, and when the power plants stand on regular migration or local migration routes.

The risk of collision also depends on the species of bird. Large species of waterbirds, such as swans, are more likely to collide with turbines because of the difficulty in making sudden maneuvers in the air (Brown et al., 1992). Collision risk assessment should also be based on the results of radar surveys, during which precise data on altitude and direction of overflight are recorded. In addition, the radar data is the only one that covers nighttime hours, when most passerine birds fly over the Baltic Sea.

Most seabird species move low over the water, and when they are between powerhouses they lower their flight and maintain equal distances from obstacles (Desholm & Kahlert, 2005; Hüppop et al., 2006; Petersen et al., 2006). This means that the risk of collision is affected by the clearance between the lower position of the wing and the sea surface. The smaller it is, the greater the chance of a bird colliding with a working rotor.

Table 8. Potential impacts of OWF on seabirds - operation stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Traffic of vessels and helicopters	Vessel traffic at the operational stage will cause bird scaring. The most important parameters affecting the level of impact are the number of power plants, substations in operation, the length of cables and the associated number of vessels used to service them.
Creation of a barrier for birds (exclusion of feeding grounds)	The OWF's physical structure, light and noise emissions may be a source of disturbance for some sensitive bird species and cause them to move fully or partially out of the farm's basin. The level

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	of interference depends on the number of turbines, their size, and the light and noise they emit.
Creation of a barrier for birds (risk of collision with power plants)	Birds migrating through the Baltic Sea and local birds residing in the BII OWF area during their daily flights may experience collisions with the BII OWF wind turbine structures (blades and tower) when they fail to see the obstacle during prevailing severe weather conditions and at night or when they are attracted to their vicinity by the OWF lights. The level of collision risk depends on the number of wind turbines, their size, rotor area, rotor height range, operating time ratio, and night lighting system. The bird deterrent effect of wind farms minimizes the risk of collisions. However, it is more concerned with migrants flying at night and in conditions of limited visibility than with birds residing in the project area. Once the farm is built, most bird species will avoid being near it, so they will lose access to feeding grounds. The most important parameters affecting the level of impact are: • number of power plants, • distances between power plants, • the clearance between the sea surface and the lower level of the wing, • rotor diameter.
The creation of an "artificial reef"	Habitat changes brought about by the creation of the "artificial reef" may have some positive impact on benthic-feeding seabirds by increasing their food base. On the underwater parts of the structure and on the bottom of the body of water occupied by the farm, rich benthic communities will develop, which, however, will be little or even not exploited by birds. The effect of deterring birds by structures protruding high out of the water will prevail here. The most important parameters affecting the level of impact are the shape, base diameter and number of foundations.
Pollution of water bodies and bottom sediments with petroleum substances	See description for construction phase

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

7.3. Stage decommissioning

With the gradual removal of wind turbine masts, the negative impact of scaring birds away from the area occupied by structures that protrude high out of the water will decrease. Increased boat traffic and noise associated with the dismantling of the power plant will still frighten birds. However, it should be expected that after the complete removal of all power plants, the area will attract birds from the group of diving benthophaguses (mainly the species most numerous in this part of the Baltic: long-tailed duck and uhla), because during the period of operation of the power plants, zoobenthic communities will develop on the bottom of the area occupied by the turbines, providing food for these birds. Bentophages exert a very strong influence on the population of their prey leading to a significant reduction in their abundance and biomass (Guillemette et al., 1996; Lewis et al., 2007). The absence of birds in the area occupied by the power plants during their operation will result in high zoobenthic biomass, as their populations will not be exploited by birds. This effect is likely to be periodic, although it is difficult to predict how long the area after the dismantled power plants will be an attractive feeding ground for this group of birds.

Table 9. Potential impacts of OWF on seabirds - decommissioning stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Traffic of vessels and helicopters	Vessel traffic during the decommissioning phase will cause bird scaring. The most important parameters affecting the level of impact are the number of power plants being decommissioned, the length of the cables and the associated number of vessels used.
Noise and vibration emissions	Noise and vibration emissions in the water body affected by the decommissioning work will cause bird scaring. The most important parameters affecting the level of impact are the number of power plants being decommissioned, the length of the cables and the associated number of vessels used.
Lighting of the project site	Illuminating the decommissioning site with a strong light can attract birds that are active at night. The most important parameters affecting the level of impact are the number of power plants being decommissioned, the length of the cables and the associated intensity of lighting of the decommissioning site.
Decommissioning of farm facilities	The gradual removal of power plant and substation structures will result in the disappearance of the barrier blocking access to the rich benthic communities that will develop in the offshore wind farm area during its operation. The most important parameters affecting the level of impact are the number of decommissioned power plants and associated infrastructure.
The formation of a barrier for birds (caused by the presence of ships)	See description for construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Collisions with ships	See description for construction phase
Destruction of benthic habitats	During the decommissioning stage, there will be local destruction of the benthic communities that have developed in the form of an "artificial reef." The most important parameters affecting the level of impact are the type, dimensions and number of foundations to be decommissioned, as well as the length of cables to be decommissioned.
Increase in the concentration of suspended solids in water	See description for construction phase
Deposition of agitated sediment	See description for construction phase

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

8. Species subject to environmental impact assessment environment

8.1. Basic characteristics of seabirds residing in the area of the of the designed farm

The group of seabirds discussed in this study includes species of waterbirds that mostly reside in marine waters during the non-breeding season. Most of them reach their highest numbers in the high seas zone, located more than 1 km from the shore. The exceptions are gulls, which accompany fishing boats on fishing grounds and their occurrence in the open sea is strongly influenced by human activity.

Only the most abundant species of seabirds, whose average density in the investment zone in at least one phenological period exceeded 1 os./km^2, were considered in the environmental impact assessment of the BII OWF. The adopted threshold value does not apply to species listed in Annex I of the EU Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30.11.2009 on the conservation of wild birds) and having an elevated threat category according to the International Union for Conservation of Nature and Natural Resources - IUCN (IUCN Red List of Threatened Species. Version 2013.1). Such species were considered in this assessment regardless of the number of individuals found.

The assessment omits species of birds closely associated with terrestrial environments, the most numerous of which are Passeriformes. Most of them are not allowed to stay on the surface of the water. During the migration period, they move over the sea in a single pass without stopping. The vast majority of these birds cross the Baltic Sea at night, and hence to study the directions, ceilings and intensity of these movements, it is necessary to record flights with radar. Daytime observations also include individuals that don't fit into the typical pattern of behavior, so their flight over the sea doesn't necessarily follow the same pattern as at night. Migration of passerines over the sea depends largely on weather conditions, and these birds first concentrate on land and undertake flight when there is a breeze blowing in the direction of migration, good visibility, no heavy precipitation, and a suitable weather front (decrease in temperature and increase in pressure in autumn and increase in

temperature and decrease in pressure in spring) (Åkesson & Hedenström, 2000; Åkesson et al., 2002). A comparison of the flight heights of passerines in the area of the Nysted (western Baltic) and Horns Rev (eastern North Sea) offshore wind farms showed that although most of them fly at heights above 300 m, the number of birds recorded at the collision ceiling is large enough to be an important point in formulating an environmental impact assessment (Blew et al., 2008; Poot et al., 2011).

A factor that strongly affects such strays is the strong pressure from gulls actively hunting small birds that have found themselves over bodies of water, where they have no chance to take refuge from predators. Such birds are very eager to sit on ships, which protects them from seagulls and strongly influences their flight ceiling. It is likely that some portion of such individuals are birds in poor condition that, lacking the opportunity to rest on vessels, would not make it to shore. This study lists the number of birds found belonging to species associated with terrestrial environments and includes them in the flight ceiling analysis. A full characterization of their migration over the area of the planned project is presented in a separate Section describing the results of radar surveys (Volume III, Section 9).

8.1.1. Species considered in the environmental impact assessment environment

A total of 13 seabird species were considered in the assessment:

- long-tailed duck;
- silver gull;
- marker;
- uhla;
- alka;
- nurzyk;
- black-throated diver;
- red-throated diver;
- little gull.

8.1.1.1. Long-tailed duck *(Clangula hyemalis)*

Approximately 1.5 million individuals are currently wintering in the Baltic, a decrease of as much as 65% from the abundance recorded in the late 1980s and early 1990s. (Skov et al., 2011). The wintering population within the Baltic Sea is about 30% of the global population, estimated at about 5 million birds (Wetlands International, 2014). The long-tailed duck is one of the species that have been clearly declining in the Baltic Sea recently (Skov et al., 2011), hence it has been listed as a vulnerable species (IUCN Red List of Threatened Species. Version 2013.1) and should always be considered in environmental impact assessments.

It was the most abundant species of sea duck in the area. Very high concentrations of long-tailed ducks were observed in the study area in winter, when their average abundance was estimated at about 12100 individuals in the investment zone and about 18200 in the buffer zone. Very high densities in excess of 1,000 s.e./km2 were recorded on 13/12/2012 in the southwestern part of the investment zone, and the area of these densities slightly overlapped the buffer zone.

The estimated number of long-tailed ducks during this cruise was about 36,800 in the targeted zone and 31,100 in the buffer zone. In total, this gives a concentration of the species of about 70,000 birds,

which is no less than 4% of the total wintering population in the Baltic (Skov et al., 2011). At the next inspection (20/12/2012), long-tailed duck abundance and density were about half as high, although they still remained high. In the remaining months of the winter period and in autumn and spring, the species were no longer as numerous as in December. In the following year, such high concentrations of the species were no longer encountered, but it is noteworthy that in both seasons the maximum numbers were recorded in the same month - December. Maximum long-tailed duck abundances falling within the same period in two seasons, as well as large fluctuations in abundance during successive inspections in winter, indicate that the study basin is most likely an alternative habitat for birds wintering on the bordering Slupsk Shoal. Birds move here either as a result of overfishing, or use part of the BII OWF area as a feeding ground when the feeding grounds on the Slupsk Shoal are unable to meet the energy needs of very large flocks of birds. The lack of data on the movements of long-tailed ducks wintering within the Baltic makes it impossible to address both hypotheses.

Table 10. Average long-tailed duck abundances and densities by phenological period in the investment zone and the buffer zone

Phenological period	The average number of		Average density (individuals/km2)	
	investment zone	buffer zone	investment zone	buffer zone
Summer	0	0	0	0
Autumn hike	60	132	0.5	0.6
Winterizing	1071	1586	9.2	7.2
Spring hike	368	875	3.2	3.9

Source: Meissner W., Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results, Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

Observed flights of long-tailed ducks over the study area took place mainly at very low altitudes (up to 15 m above the water). Only 0.3% of the displacements took place in the zone above 15m.

Table 11. Abundance of long-tailed ducks flying in each phenological period in the study area in the distinguished altitude zones

Phenological period	1-15m	15-60m	60-200m	+ 200m	Total
Summer	0	0	0	0	**0**
Autumn hike	261	0	0	0	**261**
Winterizing	374	2	2	0	**378**
Spring hike	589	0	0	0	**589**
Total	**1224**	**2**	**2**	**0**	**1228**

Source: Meissner W., Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results, Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

Long-tailed ducks travel low over the water, clearly reducing the risk of collisions with power plant rotors. The average height of their flights in the area of offshore wind farms located off the coast of North America was only 1.9 m (Cook et al. 2012). This was also confirmed during surveys conducted in

the area of the planned project. A much more serious impact of wind turbines on this species is the reduction of the feeding area. Long-tailed ducks avoid bodies of water occupied by wind turbines, and their density is noticeably lower within a radius of up to 2 km from the farm boundaries (Christensen et al. 2006, Petersen et al. 2006). These investments therefore limit long-tailed ducks' access to feeding grounds. In the case of the BIII offshore wind farm area, this effect can be considered insignificant for the wintering population in this part of the Baltic, as the bird abundance of this species was low here, and there are rich feeding grounds located nearby in Natura 2000 network areas (Slupsk Bank, Baltic Coastal Waters). Long-tailed ducks displaced from the site of the planned development will be able to move to other bodies of water. While the construction of a single wind farm will not significantly increase the flight routes of birds avoiding the area, several farms located very close to each other may increase the energy expenditure that long-tailed ducks incur for migration-related flights, as well as for movements between feeding grounds. For this reason, it is necessary to maintain sufficiently wide corridors between adjacent areas occupied by neighboring offshore wind farms.

8.1.1.2. Silver gull *(Larus argentatus)*

Approximately 310,000 individuals winter in the Baltic Sea outside the coastal zone (Durinck et al., 1994), but the highest concentrations of silver-backed gulls are observed in winter near fishing ports and on municipal landfills (Meissner et al., 2007; Neubauer, 2011). The wintering population in Europe is currently estimated at about 4 million birds (Wetlands International, 2014).

The silver-backed gull is the most numerous gull species and one of the two most abundant waterbird species found in the study area. Outside the winter period, the abundance of silver-backed gulls in the study area was low, and in winter, when their average abundance was estimated at about 520 individuals in the investment zone and about 1,850 in the buffer zone, these birds formed a large grouping in the northeastern part of the study area, where they accompanied fishing boats. During the other phenological periods, these gulls were widely dispersed and the maximum densities in the project zone and the buffer zone did not exceed the value of 10 os./km^2. The species forms concentrations of thousands in the coastal zone, especially around fishing ports (Meissner et al., 2007), and their presence in the open sea, away from the shore, is strongly influenced by the presence of fishing boats catching fish. The silvery gull is not a species of high conservation priority, but due to its high proportion in the waterbird grouping, it should be considered in the environmental impact assessment.

Table 12. Average estimated abundances and densities of the silver-backed gull in each phenological period in the project zone and the buffer zone

Phenological period	The average number of		Average density (individuals/km^2)	
	investment zone	buffer zone	investment zone	buffer zone
Summer	66	174	0.6	0.8
Autumn hike	262	526	2.2	2.4
Winterizing	197	315	1.7	1.4
Spring hike	567	919	4.9	4.1

Source: Meissner W., Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results, Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

The silver-backed gull has a high risk of collision with offshore wind turbines, as observations in Western Europe have shown that 28.4% of displacements occurred within the range of 130-m diameter rotors, with a clearance of 20 m between the water surface and the lowest rotor position (Cook et al. 2012). Studies done in other locations show considerable variability in flight ceilings (from 1 to 300 m), with an average of 33 m (Walls et al. 2004, Parnell et al. 2005, Sadoti et al. 2005). These results were confirmed in studies conducted in the area of the planned project, where as much as 42% of the species' movements were recorded within the range of the rotors. Silver-backed gulls are more common during the construction of an offshore wind farm than during the pre-construction period (Christensen et al. 2003). Once construction is complete, interest in offshore wind farms declines (Petersen et al. 2006, Petersen & Fox 2007). Silver-backed gulls use structures protruding from the water, including non-working wind turbines, as a resting place (Petersen et al. 2006). However, the factor that most strongly reduces the occurrence of this species in the area occupied by the turbines is a reduction in the activity of vessels associated with fishing in the neighboring basin (Leopold et al. 2011). This means that during the operational phase, the presence of silver gulls will be determined primarily by the amount of fishing effort in the area of the wind farm, and at this stage it will be difficult to estimate how this factor will change after the construction of the power plant.

Table 13. The number of silver-backed gulls flying in particular phenological periods in the study area in the distinguished altitude zones

Phenological period	1-15m	15-60m	60-200m	+ 200m	Total
Summer	51	20	4	0	**75**
Autumn hike	223	150	2	0	**375**
Winterizing	374	213	51	0	**638**
Spring hike	150	117	23	1	**291**
Total	**798**	**500**	**80**	**1**	**1379**

Source: Meissner W., Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results, Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

8.1.1.3. Markaczka *(Melanitta nigra)*

Approximately 412,000 individuals are currently wintering in the Baltic, down 47.5% from the abundance recorded in the late 1980s and early 1990s. (Skov et al., 2011). The wintering population within the Baltic Sea is about 26% of the global population, estimated at 1.6 million birds (Wetlands International, 2014). By far the most important body of water for scoters is the northern part of the Kattegat Strait, where about 46% of all birds wintering in the Baltic Sea reside (Skov et al., 2011). In winter, this species prefers shallow marine areas with depths of 15 m or less (Durinck et al., 1994; Meissner, 2010). Scoters' moults are located in the western part of the Baltic Sea. After breeding, males first migrate to these areas, followed by females and young birds. This migration begins in late July and continues through October. Spring migration occurs in April and May (Meissner, 2011; Skov et al., 2011).

During the 16-month study, 2042 scoters were found, of which as many as 2025 individuals were observed flying over the study area. This means that the BII offshore wind farm area is not an important location for the concentration of scoters, and only in this area is a fairly intense spring migration of this

species observed. In spring, scoters moving over the water accounted for as much as 97% of all birds of the species observed. Due to the potential impact of the offshore wind farm on migrating birds and the strong decline of the wintering population in the Baltic Sea, the scoter was included in the environmental impact assessment, despite the not very large number of birds observed.

A compilation of observations from 18 offshore wind farms located in Western Europe showed that the risk of collisions with rotors for scoters is low. Only 1% of the displacement took place within the propeller range of 130 m in diameter, with a clearance of 20 m between the water surface and the lowest rotor position (Cook et al., 2012). The average flight height of this species reported by literature sources is 9.4 meters (Walls et al., 2004; Parnell et al., 2005; Sadoti et al., 2005). During surveys conducted in the area of the proposed project, it was found that as much as 89% of the displacement took place low over water. This confirms the results obtained in Western Europe and demonstrates the low probability of collisions between flying scoters and powerhouses. The exclusion of feeding grounds by the offshore wind farm will not make a difference for this species, since the studied body of water is a place where it stops occasionally.

Table 14. Number and percentage of scoters flying in highlighted altitude zones

	1-15m	15-60m	60-200m	+ 200m	Total
Numbers	484	48	9	0	**541**
Share	89,4%	8,9%	1,7%	0	**100%**

Source: Meissner W. Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results. Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

8.1.1.4. Uhla *(Melanitta fusca)*

The Baltic Sea is the most important wintering ground of the uhla. The results of surveys conducted in 1992- 1993 showed about 1 million birds here in January, accounting for 90% of the world population (Durinck et al., 1994; Wetlands International, 2014). In the early 1990s, a decline in the number of sea urchins in the Baltic Sea was noticed, and now their numbers are estimated at 373,000 individuals. This represents a decline of as much as 60% (Skov et al., 2011), hence it has been classified as a threatened species (IUCN Red List of Threatened Species. Version 2013.1) and should be considered in environmental impact assessments.

Data on the reaction of this species to the presence of offshore wind farms is very sparse, as sea urchins are scarce in parts of the Baltic where power plants are already in operation. Cook et al. (2012) report that out of 20 overflights recorded in the area of 3 farms, all took place at an average height of 1 m, which is below the range of working rotors with a diameter of 130 m and a clearance of 20 m between the water surface and the lowest rotor position. There are no data based on enough observations on changes in the distribution of uhla after the construction of the wind farm. Observations of 458 individuals found during surveys near the Horns Rev farm showed no birds of this species in the area occupied by the turbines (Petersen & Fox, 2007).

A total of 284 urchins were found during the 24 survey cruises, 101 of which were in the area encompassing the planned development and buffer zone. The flights of this species recorded during the survey were also few, involving 169 individuals, 77% of which moved at the lowest altitude, below 15

meters. The data indicate that, like other species of sea ducks, sea urchins will not be at a higher risk of collisions with powerhouses. It is also likely that the species avoids the area occupied by offshore wind farms, further reducing the risk of collisions. The very low numbers of uhla recorded during the survey indicate that the area of the planned project is not an important feeding ground for this species, and exclusion will not have a negative impact on the populations wintering in the Baltic.

Table 15. Number of urchins flying over the study area in successive phenological periods at distinguished ceilings

Phenological period	1-15m	15-60m	60-200m	+ 200m	Total
Summer	0	0	0	0	**0**
Autumn hike	37	35	0	0	**72**
Winterizing	37	2	0	0	**39**
Spring hike	56	2	0	0	**58**
Total	**130**	**39**	**0**	**0**	**169**

Source: Meissner W. Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results. Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

8.1.1.5. Alka *(Alca torda)* and nurzyk *(Uria aalge)*

There are about 150-160,000 alkas and about 90,000 individuals of the booby overwintering in the Baltic Sea (Durinck et al., 1994). The European populations of these species are estimated at around 0.9-1.5 million adults for the alka and around 4-5.5 million for the bole (BirdLife International, 2004).

Because of the difficulty in distinguishing between alkali and nucleus, they are discussed together in most studies. In the case of surveys conducted in the area of the BII offshore wind farm plot, 16% of the 440 individuals were not marked as to species, 64% were alkali, and 20% were nules. The common occurrence characteristics of alkali and borers are justified because the species are closely related and have very similar habitat requirements (Cramp & Simmons, 1983). Also, their reactions to the appearance of a wind farm are very similar (Cook et al., 2012).

Alki and nurzyki taken together were the fourth most abundant taxon found during the survey. A total of 440 individuals of these species were observed, of which 158 were in the study area, while the rest flew over it. Due to their high proportion in the grouping of waterbirds occurring in the area of the planned project, alka and noctule should be taken into account in the environmental impact assessment.

Data from 22 offshore wind farms located in the waters of the UK, Belgium and the Netherlands show that only 0.4% of al and 0.01% of passing nuthatches came within collision distance of the rotors (20-150 m), indicating little threat to these species from such structures (Cook et al., 2012). Similar results were obtained during surveys conducted in the area of the BII offshore wind farm surface, where as many as 99.6% of these birds moved less than 15 m above water (Table 16). Alcids and bores also clearly avoid the area occupied by wind farms (Petersen, 2005; Fox & Petersen, 2006), hence these structures reduce the area of feeding grounds available to these birds. Both species are ichthyophages and their distribution in marine areas is determined by the availability of a food base. In the area of the planned project, the stocks of pelagic fish, which are the main component of the diet of alka and boar, were

assessed as low, except for a short period in July, when herring and sprat moved through the study area for feeding (Chapter 7 Volume III of the EIA). During summer, the abundance of both alk species is very low, hence the exclusion of the OWF BIII wind farm area as a feeding ground should therefore not have a negative impact on the Baltic populations of these species, as the birds should easily find alternative feeding grounds.

Table 16. The number of alcids and nules flying over the studied water body in successive phenological periods at distinguished ceilings

Phenological period	1-15m	15-60m	60-200m	+ 200m	Total
Summer	2	0	0	0	**2**
Autumn hike	73	2	0	0	**75**
Winterizing	225	0	0	0	**225**
Spring hike	155	0	0	0	**155**
Total	**455**	**2**	**0**	**0**	**457**

Source: Meissner W. Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results. Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

8.1.1.6. Black-throated diver *(Gavia arctica)* and red-throated diver *(Gavia stellata)*

The Baltic Sea is home to 0.9 - 2.1% of the European black-throated and red-throated populations (Skov et al., 2011), indicating the low importance of this body of water for these species. According to recent estimates, the Baltic gathers about 50,000-60,000 divers in winter, and this result indicates a serious, more than 80%, decline in their numbers compared to the late 1980s and early 1990s (Skov et al., 2011). However, it is not known whether this decline affects the entire European population or is local in nature (Skov et al., 2011).

Both species of divers are listed in Annex I of the EU Birds Directive and should be taken into account in environmental impact assessments regardless of the stated abundance in a given body of water. As in the case of alka and boar, statements of black-throated and red-throated divers are treated together. The two burrows are closely related and have very similar habitat requirements (Cramp & Simmons, 1977), hence their reactions to the appearance of a wind farm should be the same. The combined discussion of the two species also results in the inclusion in later analyses of divers individuals not marked as to species, which can account for a significant percentage of the birds observed. During the surveys conducted in the BII OWF area, individuals not marked as to species numbered 31, accounting for 36% of all divers observed.

Divers are marked by avoidance of the area occupied by offshore wind farms even within a radius of up to 4 km, and the closest these birds have been found was 1.6 km from power plants (Petersen et al., 2006; Petersen & Fox, 2007; Leopold et al., 2011). It has also been noted that during the migration period, divers change their flight route after spotting a wind farm and avoid it (Peterson, 2005). This behavior of divers makes them little affected by collisions with power plants, and the potential negative impact of building an offshore wind farm could be the exclusion of part of the feeding grounds. The divers' avoidance of areas occupied by power plants means that there is little data on the flight height of these birds in the vicinity of such structures. Data on flight heights collected in the area of 6 offshore

wind farms are based on observations of only 126 birds of the species. Almost all individuals (99.9%) moved low over the water, out of reach of the rotors (Cook et al. 2012). In the case of the BIII offshore wind farm area, the share of birds flying at heights above 15 meters was noticeably higher, reaching as much as 26%. However, this result should be treated with caution, as it is based on observations of only 27 individuals.

Table 17. Number of black-throated and red-throated divers flying over the study area in successive phenological periods at the distinguished ceilings

Phenological period	1-15m	15-60m	60-200m	+ 200m	Total
Summer	0	0	0	0	**0**
Autumn hike	3	1	0	0	**4**
Winterizing	1	3	0	0	**4**
Spring hike	16	3	0	0	**19**
Total	**20**	**7**	**0**	**0**	**27**

Source: Meissner W. Ornithological monitoring of the area of the OWF Baltic Central III. Final report with research results. Pomarinus, Gdansk, 2015. (Volume III, Section 8 of the report)

A total of 45 birds of both species were found in the area during the 13-month survey. Of this number, 30 were found during the spring migration period, and only 3 were in the water body designated for the project or in the buffer zone. These data show that the BIII OWF area is not an important diver concentration site. Nor does the route of their intensive migration pass through here. Both species are ichthyophages and their distribution in marine areas is determined by the availability of a food base. In the area of the planned project, the stocks of pelagic fish, which are the main component of the diet of divers, were assessed as low, except for a short period in July, when herring and sprat moved through the study area to feeding grounds (Monitoring of the ichthyofauna of the offshore wind farm area of OWF BIII. Final report with survey results, Volume III Chapter 7 of the report). During summer, the abundance of both species is very low, hence the exclusion of the OWF BIII wind farm area as a feeding ground should therefore not have a negative impact on the Baltic populations of these species, as the birds should easily find alternative feeding grounds.

8.1.1.7. Lesser Black-backed Gull *(Hydrocoloeus minutus)*

Lesser Black-backed Gull is listed in Annex I of the EU Birds Directive and should be taken into account in environmental impact assessments regardless of the stated abundance in a given body of water. Surveys conducted throughout the Baltic Sea between 1988 and 1993 showed about 2,000 birds of this species wintering in a wide dispersal (Durinck et al. 1994). In the study area, the largest number of Lesser Black-backed Gulls was found during the autumn migration period, when a total of 27 individuals of this species were recorded during 6 research cruises. The BIII offshore wind farm area is therefore not on the route of intensive migration of lesser black-backed gulls. In winter and spring, only single individuals were found, while in summer the species was not observed. Most of the observations were of birds moving over the study area, and only 5 individuals of the 39 found throughout the study period were sitting on the water. These results show that the area of the planned project is not an important site for

Lesser Black-backed Gulls, and about 60% of the observations were of birds flying over the area during autumn migration.

8.1.2. Species omitted from the environmental impact assessment environmental

The remaining 21 species of waterbirds that were found in the study area during the seventeen months of observations were not considered in the formulation of the environmental impact assessment,

Table 18. List of seabird species omitted from the environmental impact assessment

Species	The reason for the omission from the assessment
Edredon *Somateria mollisima*	Only individuals of this species were found. Therefore, it can be assumed that eider occur on the surface of OWF BIII sporadically and the planned investment will not have a negative impact on the population of this species.
Yellow-legged gull *Larus fuscus*	Low abundance - only 85 individuals of this species were found. The results indicate that the area of OWF BIII does not lie on their migration route and the species appears here in small numbers. Due to the low abundance of birds in the study area, the planned investment will therefore not have a negative impact on the population of yellow-legged gulls.
Grey-headed Gull *Larus canus*	Low abundance - only 79 individuals of this species were found. The results indicate that the area of OWF BIII does not lie on their migration route and the species appears here in small numbers. Due to the low abundance of birds in the study area, the planned investment will therefore not have a negative impact on the population of gray gulls.
Saddleback gull *Larus marinus*	Low abundance - only 32 individuals of this species were found. The results indicate that the area of OWF BIII does not lie on their migration route and the species appears here in small numbers. Due to the low abundance of birds in the study area, the planned project will therefore not have a negative impact on the population of saddle-backed gulls.
Triceps *Rissa tridactyla*	Only 3 individuals of this species were found. Therefore, it can be assumed that triploids appear on the surface of OWF BIII sporadically and the planned investment will not have a negative impact on this species, which occurs very rarely in the Polish part of the Baltic Sea.
Sharp-tailed otter *Stercorarius parasiticus*	Only 2 individuals of this species were found. Therefore, it can be assumed that sharp-tailed otters appear on the surface of OWF BIII sporadically and the planned investment will not have a negative impact on this species.

Species	The reason for the omission from the assessment
Diver *Cepphus grylle*	Very low abundance - only 19 individuals of this species were found. The results indicate that the area of OWF BIII does not lie on their migration route and the species appears here in small numbers. Due to the low abundance of birds in the study area, the planned project will therefore not have a negative impact on the population of guillemots.
Kormoran *Phalacrocorax carbo*	Low abundance - only 36 individuals of this species were found. The results indicate that the area of OWF BIII does not lie on their migration route and the species appears here in small numbers. Due to the low abundance of birds in the study area, the planned investment will therefore not have a negative impact on the cormorant population.

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015.

8.2. Sensitivity of seabirds to potential impacts project

Of the 9 species considered in the environmental impact assessment, both species of divers show the highest sensitivity to the presence of the offshore wind farm. They are characterized by very poor maneuverability in the air (Man=5), high skittishness (Spł=4) and are assigned a high protective priority (PO=5). Fairly high sensitivity index values (higher than the average of 22.2) were also obtained by the long-tailed duck and uhla. In the case of the uhla, this is primarily due to the high conservation priority of Baltic populations (PO=5), high sensitivity to grazing (SPł=5), and the narrow spectrum of occupied habitat during the non-breeding season (Ae=4). The long-tailed duck, compared to the uhla, is less susceptible to scaring (SPł=3), hence its sensitivity to the presence of wind farms is lower. Other species show a markedly lower degree of sensitivity to the presence of offshore wind farms. The assessment of the sensitivity of the studied species is contained in the following table

Table 19. List of seabird species considered in the environmental impact assessment with an assessment of their sensitivity (WWG) to the presence of an offshore wind farm (OWF)

Species	Man	Wp	UCz	Pn	SP³	Ae	Pop	Prz	PO	WW G
Black-throated diver *Gavia arctica*	5	2	3	1	4	4	4	3	5	44.0
Red-throated diver *Gavia stellata*	5	2	2	1	4	4	4	3	5	43.3
Uhla *Melanitta fusca*	3	1	2	3	5	4	3	2	5	33.8
Long-tailed duck *Clangula hyemalis*	3	3	2	3	3	4	2	2	5	28.9

Species	Man	Wp	UCz	Pn	SP[3]	Ae	Pop	Prz	PO	WW G
Markaczka *Melanitta nigra*	3	1	2	3	5	4	2	2	1	16.9
Alka *Alca torda*	4	1	1	1	3	3	2	5	2	15.8
Lesser Black-backed Gull *Hydrocoloeus minutus*	1	1	3	2	1	3	5	2	4	12.8
Nurzyk *Uria aalge*	4	1	1	2	3	3	1	4	1	12.0
Silver gull *Larus argentatus*	2	4	2	3	2	1	2	5	1	11.0

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015.

Assessment components:
Man - Ability to maneuver efficiently in the air
Wp - Height of displacement above water
UCz - Share of time spent in the air
Pn - Presence in typical night flight behavior
Spł - Degree of scaring by offshore wind farms and vessel traffic associated with their operation
Ae - Ecological amplitude of the species
Pop - Biogeographic population size
Prz - Annual survival rate of adults
PO - Protection Priority

Seabirds are primarily exposed to three types of impacts associated with the construction, operation or decommissioning of an offshore wind farm: habitat loss/change, collision risk and barrier effect. Impacts associated with the construction and decommissioning phases are similar.

In addition to the above sensitivity index, based on the publication of Garthe & Hüppop (2004) and Furness (2013), a sensitivity index of stationary birds taken from Langston (2010) and the European Commission's guidelines "Wind Energy Developments and Natura 2000" (2011) is additionally presented.

Table 20. Sensitivity of assessed seabird species to potential impacts of OWFs

Species	Wind farm vulnerability index (WWG)	Overall risk index (Langston 2010)*	Sensitivity to wind farms (EC Guidelines, 2011)			
			Displacement from the habitat	Collision	Barrier effect	Change in habitat structure
Black-throated diver *Gavia arctica*	44.0	***	X	X		
Pollack diver *Gavia stellate*	43.3	***	XXX	X		
Uhla *Melanitta fusca*	33.8	**	XX	X	X	X
Long-tailed duck *Clangula hyemalis*	28.9	**	XX	X	X	X
Common Scoter *Melanitta nigra*	16.9	**	XX	X	X	X
Alka *Alca torda*	15.8	**	XX	X		X
Lesser Black-backed Gull *Larus minutus*	12.8	?				
Nurzyk *Uria aalge*	12.0	**	XX	X		
Silver gull *Larus argentatus*	11.0	**		x	x	

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

In Langston's overall risk index, * means low risk, ** - moderate risk *** - high risk.

In the EC Guidelines, XXX means there is evidence of a significant impact risk, XX - evidence or indication of an impact risk, X - potential impact risk, x - low or insignificant impact risk.

8.3. The importance of resources environment

The importance of the seabird species considered in the EIA is defined in the table below.

Table 21. Importance of seabird species considered in the EIA

Species	Meaning	Justification
Black-throated diver *Gavia arctica* Pollack diver *Gavia stellata*	Large	Populations of both of these species wintering within the Baltic Sea are sparse, accounting for less than 3% of their European populations (Skov et al. 2011). Both species are under species protection, are not included in the endangered species, but have the status of species of special concern and are listed in Annex I of the EU Birds Directive (Directive 2009/147/EC of the

Species	Meaning	Justification
		European Parliament and of the Council of 30.11.2009 on the conservation of wild birds. In addition, strong declines in the Baltic wintering populations of both divers are indicated.
Uhla *Melanitta fusca*	Large	The Uhla has shown a significant decline in wintering abundance in the Baltic Sea (Skov et al. 2011), hence the International Union for Conservation of Nature and Natural Resources (IUCN) has elevated the species' endangered status to the endangered species (EN) category. The reasons for this decline are not fully understood, and high mortality from birds drowning in set fishing nets is considered one of the most important factors (Skov et al. 2011). Uhleas, presumably like other species of sea ducks, avoid the body of water occupied by offshore wind farms, although data on this relate to observations of a small number of individuals (Petersen & Fox 2007). Thus, it cannot be ruled out that locating wind farms on rich feeding grounds could have a significant detrimental effect on this species.
Long-tailed duck *Clangula hyemalis*	Large	The long-tailed duck has shown a significant decline in wintering abundance in the Baltic Sea (Skov et al. 2011), hence the International Union for Conservation of Nature and Natural Resources (IUCN) has elevated the species' endangered status to Vulnerable (VU). The reasons for this decline are not fully understood, and high mortality from birds drowning in set fishing nets is considered one of the most important factors (Skov et al. 2011). Long-tailed ducks avoid the body of water occupied by offshore wind farms and their abundance decreases markedly within 2 km (Christensen et al. 2006, Petersen et al. 2006). Hence, locating wind farms on rich feeding grounds can have a significant detrimental effect on this species.
Marquise *Melanitta nigra*	Medium	The wintering population within the Baltic Sea of about 412,000 individuals is about 26% of the world population, estimated at 1.6 million birds (Wetlands International 2006). By far the most important body of water for scoters is the northern part of the Kattegat Strait, where about 46% of all birds wintering in the Baltic Sea reside (Skov et al. 2011). This species in winter prefers shallow bodies of water with depths not exceeding 15 m (Durinck et al. 1994, Meissner 2010),

Species	Meaning	Justification
		hence in the area of the OWF BIII surface mainly passerine birds were observed (Ornithological monitoring of the area intended for the construction of the OWF BIII offshore wind farm. Final report with research results). The marquise is under species protection, but is not an endangered species.
Alka *Alca torda* Nurzyk *Uria aalge*	Medium	The populations of both of these species, wintering within the Baltic Sea, consist mainly of local individuals (Cramp & SImmons 1985). The most important Baltic wintering site for alk and boar is the Kattegat Strait region, where 55-85% of individuals congregate (Durinck et al. 1994). Both species are under species protection, but are not included in either the endangered species or the special concern group. Their populations are numerically stable.
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Surveys conducted throughout the Baltic Sea between 1988 and 1993 showed only about 2,000 birds of this species overwintering in a wide dispersal (Durinck et al. 1994). The importance of the Baltic Sea for Lesser Black-backed Gulls as a wintering ground is low. During the migration period, it forms larger concentrations on the coast. In Poland, most birds are observed in the Vistula estuary region and at the Szczecin Lagoon (Neubauer 2011). Lesser Black-backed Gull is under species protection, is not included in the endangered species, but has the status of a species of special concern and is listed in Appendix I of the EU Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30.11.2009 on the conservation of wild birds). Based on data from surveys conducted in the area of 16 offshore wind farms located in the western part of Europe, it was found that Lesser Black-backed Gulls tended to fly at low altitudes and only 5.5% of the birds observed were within range of the rotors (Cook et al. 2012). Other literature sources show a very high variability in the displacement height of Lesser Black-backed Gulls ranging from 4 to 250 m (average 67 m) (Walls et al. 2004, Parnell et al. 2005). This species usually avoids the area occupied by offshore wind farms (Petersen & Fox 2007, Leopold et al. 2011), but some studies indicate that gulls prefer

Species	Meaning	Justification
		small bodies of water with wind turbines, without giving reasons for this phenomenon (Petersen et al. 2006).
Silver gull *Larus argentatus*	Small	The species is widely distributed throughout the Baltic basin. On the coasts, near fishing ports and municipal garbage dumps, it forms large concentrations of thousands in winter. On the high seas it appears almost exclusively in fishing grounds, where it accompanies fishing boats. Between 1970 and 1990. there was a rapid increase in the number of silver-backed gulls in Europe as a result of their adaptation to the use of abundant anthropogenic food sources (Pons 1992). During the breeding season, it poses a threat to other species, including terns and plovers, and for this reason, breeding reductions of this gull are being carried out in Europe, as well as in Poland, mainly in bird sanctuaries (Hario et al. 2009). In Poland, it is under partial protection.

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015.

9. Assessment of the impact of OWF BIII on birds marine

This chapter analyzes and evaluates the impact of OWF BIII on seabirds. In the report forming the basis for conducting the environmental impact assessment resulting in the issuance of the Environmental Decision for the Project - Report 2015, the impact caused by the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015 - was assessed (see Section 3.1). In the case of the assessment conducted for this Report, its subject is the effect of the proposed changes on changes in the nature, spatial extent and magnitude of impacts identified and assessed in the course of obtaining the Environmental Decision. Since, in the 2015 Report, the benchmark for evaluating the variant proposed for implementation, which was ultimately the Project variant in the parameters approved by the Environmental Decision, is the set of Project parameters likely to cause the most far-reaching impacts referred to as the most far-reaching scenario - NIS 2015, thus NIS 2015 is the benchmark for evaluating changes in impacts caused by the modified Project parameters.

The literature lacks results of studies on bird behavior in the vicinity of offshore wind farms with parameters similar to the BIII OWF. Existing data are for developments that are much smaller in area and have distances between turbines of less than 1,000 meters (e.g., Horns Rev, Nysted and Egmond aan Zee). In all of these cases, seabirds were clearly recorded avoiding the area occupied by wind turbines and declining in numbers within a radius of up to 2 and even up to 4 km (Christensen et al., 2003; Petersen et al., 2006; Leopold et al., 2011). For this reason, the 2015 Report assumes that the BIII offshore wind farm variant (both the planned variant and the variant constituting the 2015 NIS) will not change the assessment of the significance of impacts on seabirds in most cases. This is because the

deterrent effect is greater than the projected distances between the turbines, and the area occupied by the wind farm will be avoided in each of the cases analyzed by the majority of individuals of species that show avoidance of this type of construction. The exception to this would be gulls, which use the elements protruding from the water as a resting place, and also congregate near vessels that support the operation of the farm (Christensen et al., 2003). Thus, the choice of the variant should not affect the number of gulls residing in the farm area, since the factor that most strongly affects the presence of these birds in marine areas is the activity of vessels. The number of turbines in operation is likely to have only a small effect on the frequency of maintenance. For these reasons, it was considered that the impact of OWF BIII on seabirds will mostly be very similar, regardless of the analyzed variant. In the currently proposed modified parameters of the Project, the number of power plants is significantly changed - constituting, respectively, 30% of the number of power plants considered within the set of Project parameters constituting the 2015 NIS, and 50% of the power plants in the Project parameters approved by the Environmental Decision, and the total rotor zone will be approximately 22% smaller in the case of the modified Project parameters compared to the Project parameters approved by the Environmental Decision - this assumption still seems valid.

Most of the considered offshore wind farm impacts on seabirds are negative in nature due to the displacement of birds and restriction of their access to the food base. It is worth noting that the strong deterrent effect significantly reduces the risk of collisions with powerhouses. The avoidance by seabirds of the area occupied by the working farm also means that impacts of a positive nature at the operation stage will be of minor significance. Only after the decommissioning of the power plant will these water bodies be fully accessible to birds, which will find rich feeding grounds there.

Table 22. Nature and type of impacts

Impact	Nature	Type of impact	Comments
Traffic of vessels and helicopters	negative	direct	The magnitude of this impact will be greater during the construction and decommissioning phases, when several vessels are in the water body in question at the same time. During normal operations, the frequency of helicopters and ships will be much lower.
Noise and vibration emissions	negative	direct	The impact mainly concerns the construction and decommissioning phases. The noise and vibration of operating turbines will not affect avifauna due to its low level and the rapid habituation (habituation) of birds to sources of constant noise.
Lighting of the project site	negative	direct	Strong lights attract birds that are active at night. This is mainly true of piping plover birds, which are not found in the Baltic Sea. There are no

Impact	Nature	Type of impact	Comments
			data on the impact of strong lighting on other species residing in the project area. Light sources can attract migratory birds, significantly increasing the risk of their collisions with power plants.
The formation of a barrier to birds (caused by the presence of power plants)	negative	direct	The impact of this impact on birds depends on the stage of construction of the farm. At first, individual power plants will have little effect on birds, but gradually the deterrent effect will increase.
Risk of collision with power plants	negative	direct	The impact of this impact on birds depends on the stage of construction of the farm. The bird deterrent effect of wind farms minimizes the risk of collisions. However, migrants flying at night and in conditions of limited visibility are at greater risk of collision, than birds residing in the project area.
Exclusion of feeding grounds	negative	direct	Once the farm is built, most bird species will avoid being near the farm, so they will lose access to feeding grounds.
The formation of a barrier for birds (caused by the presence of ships)	negative	direct	The presence of a large number of ships used in the construction of the farm may result in a barrier effect and restrict the movement of birds between their areas of residence. The scale of the impact will depend on the number of vessels used in the construction phase, their size and the duration of the construction work, as well as the season in which the work will be carried out.
Collisions with ships	negative	direct	During nighttime hours when special weather conditions prevail, birds may be attracted to lights emitted from ships, increasing the risk of collisions. However, the impact will be limited

Impact	Nature	Type of impact	Comments
			to a relatively small area and will be limited in time.
Destruction of benthic habitat (construction phase)	negative	intermediate	Local destruction of benthic communities will occur during the construction phase. The significance of this periodic depletion of the food base will not affect birds, as they will mostly be driven away from construction sites.
Increase in the concentration of suspended solids in water	negative	intermediate	During the construction of the farm, there will be an agitation of the bottom sediments and an increase in the concentration of suspended solids in the water, which will result in a decrease in transparency water. Lower water clarity makes it more difficult for birds using their eyes to find food. However, the local decrease in water clarity will be short-lived.
Deposition of agitated sediment	negative	intermediate	After a period of increased concentration of suspended solids in the water, there will be a sinking of sediment to the bottom, which can have a negative impact on benthic organisms that birds feed on.
The formation of the "artificial reef" (operational stage)	positive	intermediate	On the underwater parts of the structure and on the bottom of the body of water occupied by the farm, rich benthic communities will develop, but they will be little or even not exploited by birds. The effect of deterring birds by structures protruding high out of the water will prevail here

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015.

9.1. Stage construction

During the construction phase of the farm, increased boat traffic is to be expected, as well as periodically increased noise levels. Both of these factors should not alter the flight path of those waterbird species that do not use the area, but only fly over it (whooper swan, terns, scoter). However, it cannot be ruled out that such an impact will be marked at night, especially if the construction site is heavily lit.

Skittish species, which are characterized by a long escape distance (burrows, uhla), will be driven to a distance of up to about 2 km from the site. The reaction distance to an emerging wind farm will be smaller in species with a lower degree of skittishness (long-tailed duck, alka, nuthatch). The presence of ships and immovable structures protruding from the water will result in more numerous seagulls (mainly silverbacked gulls), which use these elements as resting places and seek food near the ships. In the case of 4 species, the magnitude and significance of the wind farm's impact on the populations of these birds during the construction phase was determined to be moderate, and in the remaining species, it was determined to be small and moderate or negligible. The destruction of benthic communities during the construction of the farm will be temporary, as the bottom is expected to be recolonized by zoobenthos after about a year. The presence of rich feeding grounds nearby (e.g., the Slupsk Shoal area) causes the significance of this impact to be assessed as moderate or low.

The following emissions and environmental disturbances are expected to affect ornithofauna at the construction stage of OWF BIII:

1) vessel traffic,
2) noise and vibration emissions,
3) investment site lighting,
4) the formation of a mechanical barrier,
5) a barrier caused by the presence of ships,
6) collisions with ships,
7) destruction of benthic habitats,
8) an increase in the concentration of suspended solids in water,
9) sedimentation of agitated sediment.

There may also be unplanned impacts during the construction of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the construction of the farm. Unplanned impacts are assessed in Chapter 11.

The magnitude of the impacts discussed here will depend on the time over which the structures are built. With a short-term construction phase, their magnitude will quickly reach moderate levels, with a long-term construction process, the magnitude of the impacts will be small in the initial phase and later transition to moderate. At first, individual power plants will have little effect on birds, but gradually the deterrent effect will increase. In the case of simultaneous construction of power plants in remote locations, bird deterrence will affect a large body of water from the start. On the other hand, installing power plants in a systematic manner, gradually filling the basin with neighboring structures, will cause this effect to gradually build up and gradually displace birds from the area designated for the project. However, the adoption of this second option for development of the area will delay the displacement of birds from the body of water occupied by the power plants to a small extent, depending on the pace of construction.

Emerging structures and increased ship traffic will have a moderating effect on two species of divers, the uhla and the long-tailed duck. Of these four species, the long-tailed duck is moderately abundant in the area of the project, but the overcrowding of birds from the area of OWF BIII will not be significant for the population of this species due to the presence of nearby rich feeding grounds in shallower waters in the area of Slupsk Shoal. The other three species resided in the basin in low numbers, and the impact on their populations was determined to be moderate only due to their high conservation priority.

No minimization measures are proposed during the construction phase. Impacts occurring during the construction phase can be reduced by:

- building more power plants starting from one place, so that the body of water intended for the investment is filled with structures gradually, expanding the area of the farm with neighboring power plants,
- maximizing the pace of construction work during the months of May-September, when bird abundance in the basin is at its lowest, but taking into account any restrictions related to the lighting of structures at night during the fall migration period,
- limiting sources of strong light at night.

9.1.1. The movement of vessels and helicopters

Construction work (as well as demolition) will require the presence of various types of vessels, which will disturb seabirds through physical presence, noise (including noise generated by pile driving, if such foundations are chosen) and light emissions. The first two factors should not affect changes in the flight path of those waterbird species that do not use the area, but only fly over it (e.g., scoters). However, it cannot be ruled out that such an impact will be marked at night, especially if the construction site is heavily lit. This is because birds navigate during migration relative to natural light sources, such as stars and the sun. They have also been observed heading toward lighthouses, drilling rigs and other structures illuminated by artificial light at night (Wiese et al. 2001). The scale of the impact will depend on the number of vessels involved, their size, the duration of the construction phase and, most importantly, the period during which the work will take place, as many species of seabirds (including the long-tailed duck, which is the most valuable in the area) occur in the BIII OWF area only seasonally.

Since the schedule of construction work is currently unknown, the level of displacement of seabirds from the area of the proposed farm has been estimated on the basis of the values found during the periods of occurrence of their highest annual numbers (i.e., the winter months) and assuming that the work will take place in the entire area of the wind farm simultaneously.

It was also assumed that the displacement of sensitive species would be, both during construction and during the operation stage, greater from the actual wind farm area and less from the 2 km buffer zone around the project (cf: Table 4 in section 6.2.3 above).

In the assessment carried out in the 2015 Report, the same degree of disturbance (and displacement of birds) was assumed for both variants under consideration, i.e., the 2015 NIS and the variant approved by the Environmental Decision, which was due to the fact that existing knowledge of birds' behavioral responses does not allow to distinguish their behavior related to the use of different types of wind turbines and/or the density of turbines in the wind farm area. Such an assumption is also legitimate at the stage of the proposed modifications to the Project.

The presence and movement of construction vessels will be a major source of disturbance for birds sensitive to such impacts. This interference will mask the effects of associated pressures, such as underwater noise. Skittish species, which are characterized by a long escape distance (burrows, uhla), will be driven to a distance of up to about 2 - 4 km from the site. The reaction distance to an emerging wind farm will be smaller in species with a lower degree of skittishness (long-tailed duck, alka, nuthatch). Bird monitoring during construction work on the Egmond aan Zee offshore wind farm in the Netherlands showed no discernible response to piling by bird species insensitive to disturbance from the presence of ships, mainly gulls and terns (Leopold & Camphuysen 2009).

9.1.1.1. Red-throated diver and black-throated diver *(Gavia stellata and Gavia arctica)*

Since red-throated and black-throated divers were often not labeled as to species, they were included in the study together. Both species have similar biology, are found in the same marine environments, and are highly sensitive to impacts associated with ship traffic (Schwemmer et al 2011, Furness at al. 2013).

During pre-investment monitoring in 2012 - 2013, very few divers were recorded in the BIII OWF basin, only 35 individuals, including 11 sitting on the water (see Chapter 8 Volume III of the EIA). This indicates that the BIII OWF area is not an important habitat for these species, and the small number of observations did not allow estimating their density. From this it can be concluded that during the construction phase of the farm only single individuals of two species of divers may experience disturbance, due to which they will react by moving to another area. The impact will therefore affect a minimal portion of the regional population of these birds (N Red-throated Nurse = 150,000, N Black-throated Nurse =250,000, Wetlands International 2014).

9.1.1.2. Long-tailed duck

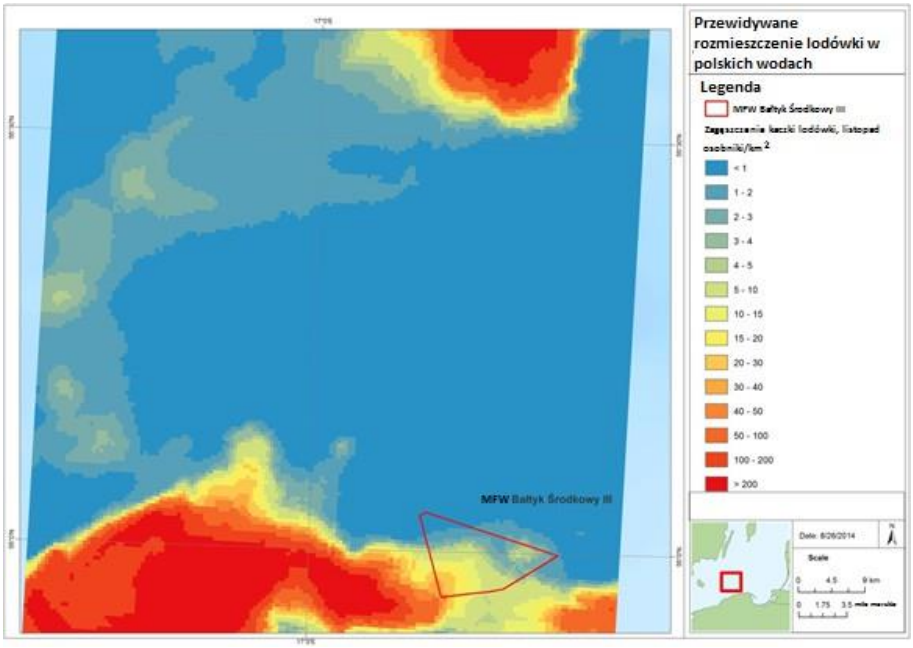
Long-tailed ducks were the most abundant seabird species recorded in OWF Area BIII. The species was observed during the wintering period between October and May, with the highest abundance recorded in November-April.

A calibration of the distribution model for the species was performed separately for each of the months during the periods of the birds' most numerous occurrence. Satisfactory calibration results were not obtained for October and April, probably due to the large number of migratory birds. The modeling results for the other months were characterized by good model fit and reasonable predictions that corresponded well with the observations made.

The density of long-tailed ducks in the BIII OWF area was low compared to the larger open water area of the Polish EEZ (see Figure 4 below). The average predicted density inside the BIII OWF area varied between 1.02 and 17.55 $^{individuals/km2}$ in different months to 17.93 individuals/km2 in the two-kilometer buffer zone. Based on the predicted density, the size of the wind farm area (116.62 km2) and the buffer zone (109 ^{km2}), and the assumed value of 75% movement of birds out of the wind farm area and 50% out of the buffer zone area, it was estimated that between 151 and 2443 long-tailed ducks will move out of the wind farm area due to disturbance caused by construction activities (primarily ship traffic). The highest estimated number of birds represents 0.15% of the regional population of the species (N=1,600,000, Wetlands International 2014).

The choice of habitat by birds moving as a result of disturbance is unknown, but it is most likely that long-tailed ducks from the BIII offshore wind farm area will move to the Slupsk Shoal area or the areas surrounding it, as these are the closest suitable habitat used by other birds of the species. The theory is that higher densities of birds in relocation areas can affect their health and thus their survival and reproduction through increased competition for food resources, overexploitation of the food base, behavioral interactions, etc. However, the relationship between the density of sea ducks and other seabird species and the capacity of their habitat is very rarely the subject of research, and is therefore poorly recognized. Applying the precautionary principle in environmental impact assessment, it is often assumed that habitats are used to their full capacity and the loss of habitat for a species is equivalent to removing the number of birds using that habitat from the number of birds belonging to a population.

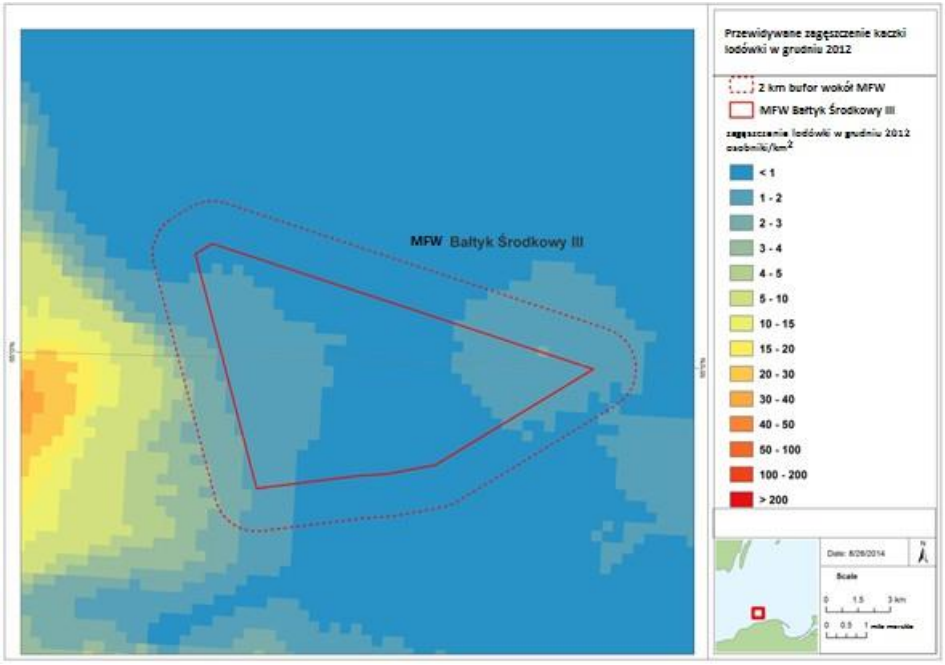
Figure 3. Example of long-tailed duck distribution in Polish open waters in November 2012 - modeling done on the basis of data collected during research cruises and data collected by Pomarinus in the area of planned OWF BIII, BII, BP and Slupsk Shoal in 2012-2013 long-tailed duck distribution in Polish marine waters in winter 2012/2013.



Przewidywane rozmieszczenie lodówki w polskich wodach	Predicted long-tailed duck distribution in Polish waters
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie kaczki lodówki, listopad osobniki/km^2	Long-tailed duck density, November individuals/km2
Mile morskie	Sea miles

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with impact assessment of the variant selected for implementation and a rational alternative variant", DHI Poland, Warsaw, 2015. The model was made on the basis of aggregated data collected during Pomarinus research cruises in the area of planned OWF BII, BSIII, Northern Baltic and Slupsk Shoal in 2012-2013.

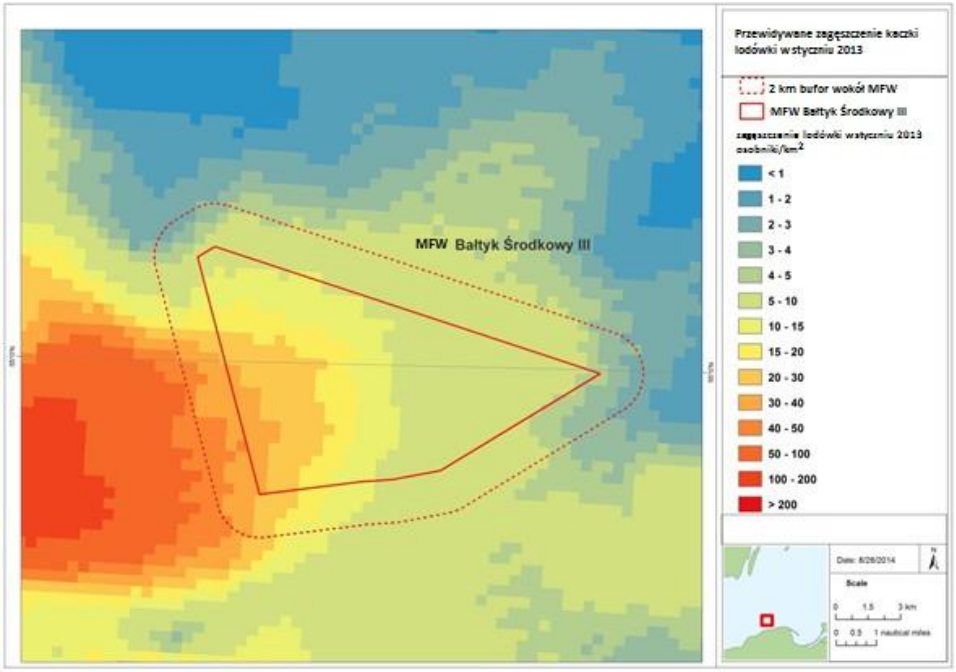
Figure 4. Predicted distribution of long-tailed ducks in the BIII OWF area by month of the species' wintering period - December 2012.



Przewidywane zagęszczenie kaczki lodówki w grudniu 2012	Predicted long-tailed duck density in December 2012
2 km bufor wokół MFW	2 km buffer around the OWF
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie lodówki w grudniu 2012 osobniki/km^2	Long-tailed duck density in December 2012 individuals/km2
Mile morskie	Sea miles

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with impact assessment of the variant selected for implementation and a rational alternative variant", DHI Poland, Warsaw, 2015. The model was made on the basis of aggregated data collected during Pomarinus research cruises in the area of planned OWF BII, BSIII, Northern Baltic and Slupsk Shoal in 2012-2013.

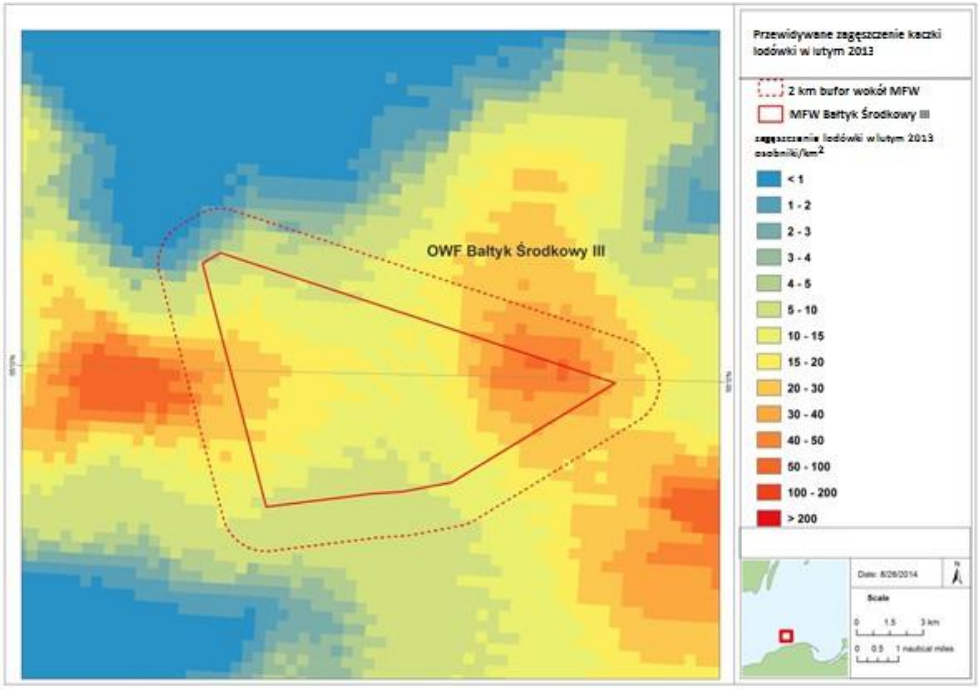
Figure 5. Predicted distribution of long-tailed ducks in the BIII OWF area by month of the species' wintering period - January 2013.



Przewidywane zagęszczenie kaczki lodówki w styczniu 2013	Predicted long-tailed duck density in January 2013
2 km bufor wokół MFW	2 km buffer around the OWF
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie lodówki w styczniu 2013 osobniki/km^2	Long-tailed duck density in January 2013 individuals/km2

Source: Žydelis R., Skov H., Holst H., M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with impact assessment of the variant selected for implementation and a rational alternative variant", DHI Poland, Warsaw, 2015. The model was made on the basis of aggregated data collected during Pomarinus research cruises in the area of planned OWF BII, BSIII, Northern Baltic and Slupsk Shoal in 2012-2013.

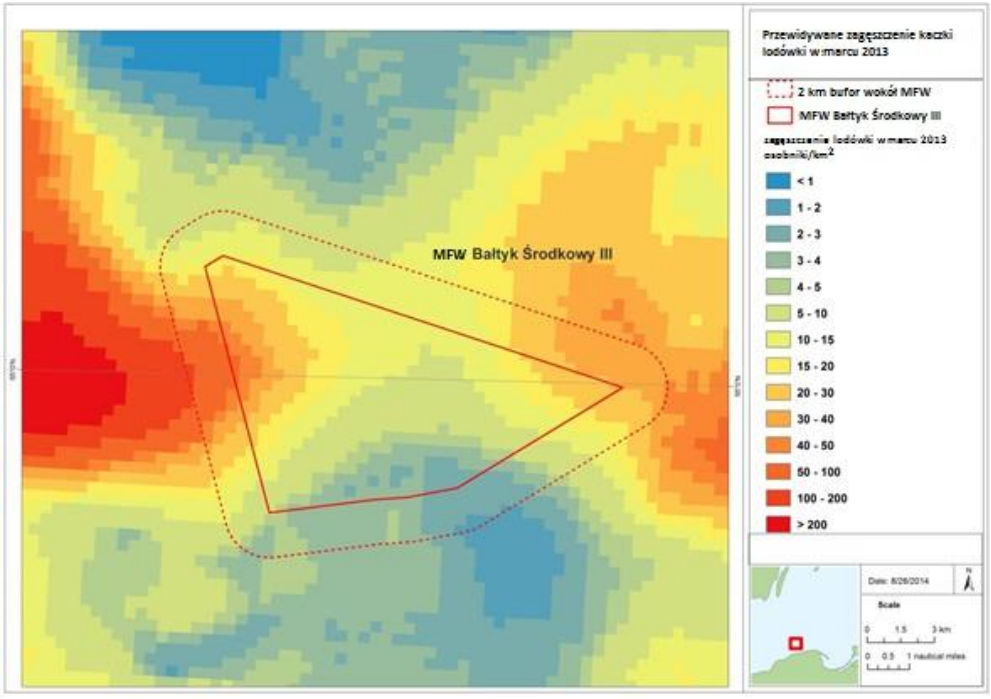
Figure 6. Predicted distribution of long-tailed ducks in the BIII OWF area by month of the species' wintering period - February 2013.



Przewidywane zagęszczenie kaczki lodówki w lutym 2013	Predicted long-tailed duck density in February 2013
2 km bufor wokół MFW	2 km buffer around the OWF
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie lodówki w lutym 2013 osobniki/km^2	Long-tailed duck density in February 2013 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with impact assessment of the variant selected for implementation and a rational alternative variant", DHI Poland, Warsaw, 2015. The model was made on the basis of aggregated data collected during Pomarinus research cruises in the area of planned OWF BII, BSIII, Northern Baltic and Slupsk Shoal in 2012-2013.

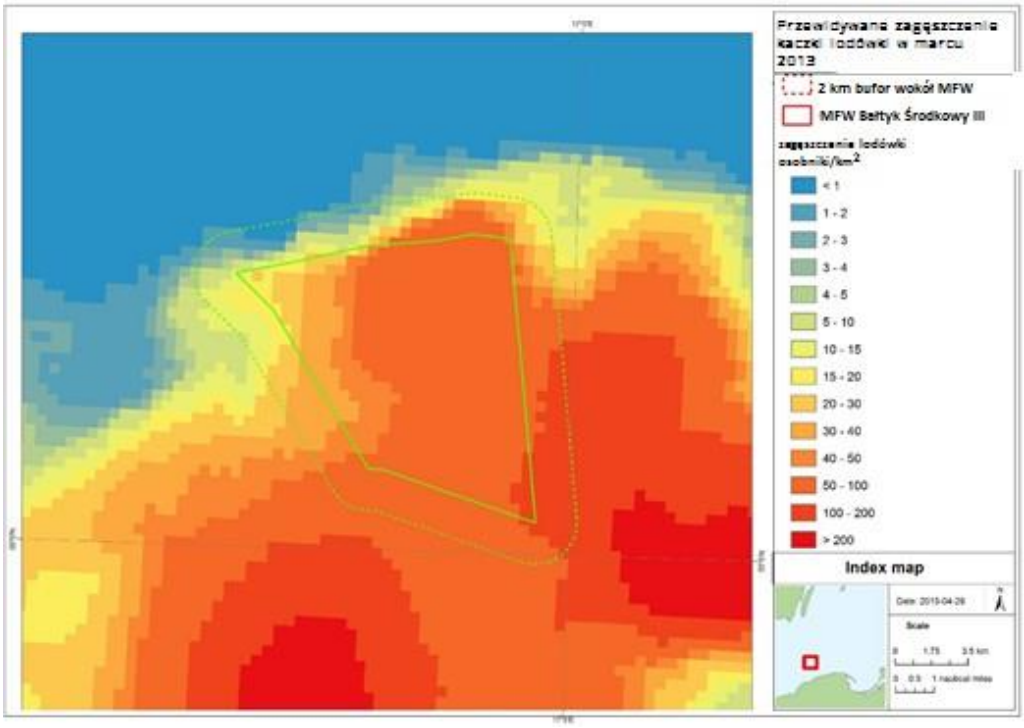
Figure 7. Predicted distribution of long-tailed ducks in the BIII OWF area by month of the species' wintering period - March 2013.



Przewidywane zagęszczenie kaczki lodówki w marcu 2013	Predicted long-tailed duck density in March 2013
2 km bufor wokół MFW	2 km buffer around the OWF
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie lodówki w marcu 2013 osobniki/km^2	Long-tailed duck density in March 2013 individuals/km2

Source: Žydelis R., Skov H., Holst H.M., Heinänen S. "Pre-investment monitoring of birds flying over the area of the OWF "Central Baltic III". Final report with impact assessment of the variant selected for implementation and a rational alternative variant", DHI Poland, Warsaw, 2015. The model was made on the basis of aggregated data collected during Pomarinus research cruises in the area of planned OWF BII, BSIII, Northern Baltic and Slupsk Shoal in 2012-2013.

Figure 8. Visualization of projected long-tailed duck distribution and densities in March 2013.



Przewidywane zagęszczenie kaczki lodówki w marcu 2013	Predicted long-tailed duck density in March 2013
2 km bufor wokół MFW	2 km buffer around the OWF
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie lodówki osobniki/km^2	Long-tailed duck density individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with impact assessment of the variant selected for implementation and a rational alternative variant", DHI Poland, Warsaw, 2015. The model was made on the basis of aggregated data collected during Pomarinus research cruises in the area of planned OWF BII, BSIII, Northern Baltic and Slupsk Shoal in 2012-2013.

Table 23. Potential number of long-tailed ducks that will move to another area due to disturbance from the presence of vessels used for construction in the BIII OWF area and within the 2 km buffer zone (estimates for each month of the year)

Month	Inside IMF BIII		2 km buffer area		Total number of birds that will move due to disturbance
	Bird density (individual / km2) Mean (±SD)	Number of birds that will move as a result of disturbance (75% displacement)	Bird density (individuals / km2) Mean (±SD)	Number of birds that move as a result of disturbance (50% displacement)	
June	0	0	0	0	0
July	0	0	0	0	0
August	0	0	0	0	0

Month	Inside IMF BIII		2 km buffer area		Total number of birds that will move due to disturbance
	Bird density (individual / km2) Mean (±SD)	Number of birds that will move as a result of disturbance (75% displacement)	Bird density (individuals / km2) Mean (±SD)	Number of birds that move as a result of disturbance (50% displacement)	
September	0	0	0	0	0
October*		311		206	517
November	7,11 (±7,36)	622	7,54 (±12,30)	411	1033
December	1,02 (±0,36)	89	1,13 (±0,64)	61	151
January	14,17 (±7,62)	1240	12,64 (±11,95)	689	1928
February	17,55 (±9,26)	1535	16,67 (±11,26)	908	2443
March	13,91 (±9,63)	1217	18,59 (±17,93)	1013	2230
April**		609		507	1016
May	0	0	0	0	0

* estimated displacement corresponding to 50% of the calculated number in the month of November

** estimated displacement corresponding to 50% of the calculated number in the month of March

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final Report with Impact Assessment of the Option Selected for Implementation and a Reasonable Alternative," DHI Poland, Warsaw, 2015. Displacement was calculated using spatial distribution models, based on data collected during Pomarinus research cruises.

9.1.1.3. Markaczka *(Melanitta nigra)*

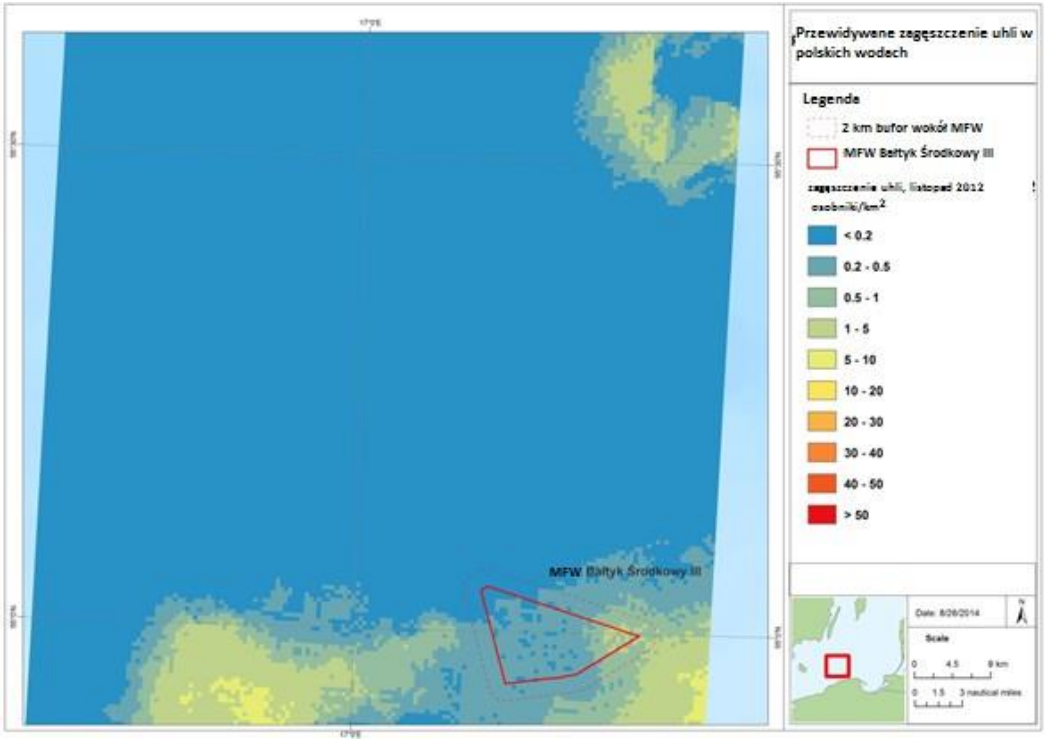
During the 2012-2013 monitoring campaign, few scoters (only 10 individuals) were recorded sitting on the water in the BIII OWF area. At the same time, hundreds of individuals were found flying over the farm area (Chapter 8 and 9 Volume III of the EIA). The area of OWF BIII is not used by scoters as a residence area for the species, the few observations recorded did not allow to calculate the density of birds. Construction work in the farm area may cause the movement of only single individuals. The potential impact relates to a negligible portion of the species' regional population (N=550,000, Wetlands International 2014).

9.1.1.4. Uhla *(Melanitta fusca)*

Uhleas were the second most abundant seabird species recorded in the BIII OWF area. The species was observed during the wintering period between October and May, with the highest numbers recorded in November-April. Due to the relatively small number of observations, it was not possible to create separate distribution models for each month, so a single model was fitted for the entire wintering period. However, it was possible to estimate the incidence of uhla in each month based on the average values of environmental variables for that month. The modeling results were characterized by good model fit and reasonable predictions that corresponded well with the observations made.

The density of uhla in the BIII OWF area was very low compared to the larger open water area of the Polish EEZ (see Figure 10). The average predicted density inside the farm basin varied between 0.15 and 0.33 individuals/km2 (in different months) and up to 0.39 individuals/km2 in the two-kilometer buffer zone (in different months). Based on the predicted density, the area of the wind farm basin (116.62 km2) and the 2 km buffer zone (109 km2), and the assumed value of 75% of bird movement within the wind farm and 50% in the buffer zone, **it was estimated that between 23 and 51 uhla individuals will move from the wind farm area due to crowing during construction activities.** The highest estimated number of birds represents 0.01% of the species' biogeographic population (N= 450,000, Wetlands International 2014).

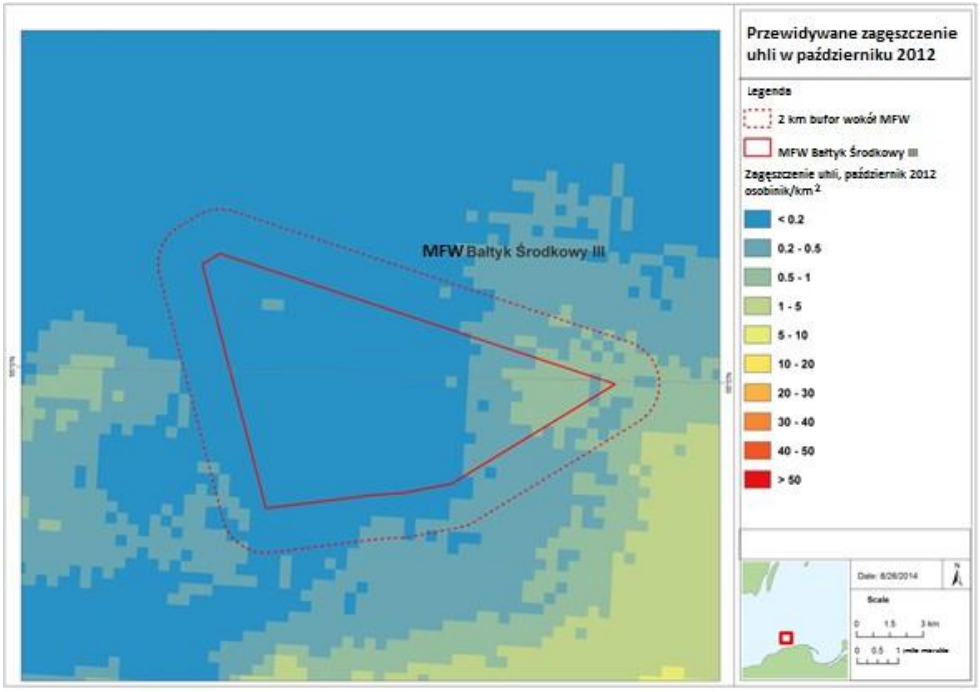
Figure 9 Sample distribution of sea urchins in Polish open waters in November 2012. - modeling was done based on data collected during research cruises and data collected by Pomarinus in the area of planned OWF BIII, BII, BP and Slupsk Shoal in 2012-2013



Przewidywane zagęszczenie uhli w polskich wodach	Predicted density of uhla in Polish waters
2 km bufor wokół MFW	2 km buffer around the OWF
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie uhli, listopad 2012 osobniki/km2	Density of uhla, November 2012 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with impact assessment of the variant selected for implementation and rational alternative variant", DHI Poland, Warsaw, 2015. Model made on the basis of aggregated data collected during Pomarinus research cruises in the area of planned OWF BII, BSIII, Northern Baltic and Slupsk Shoal in 2012-2013.

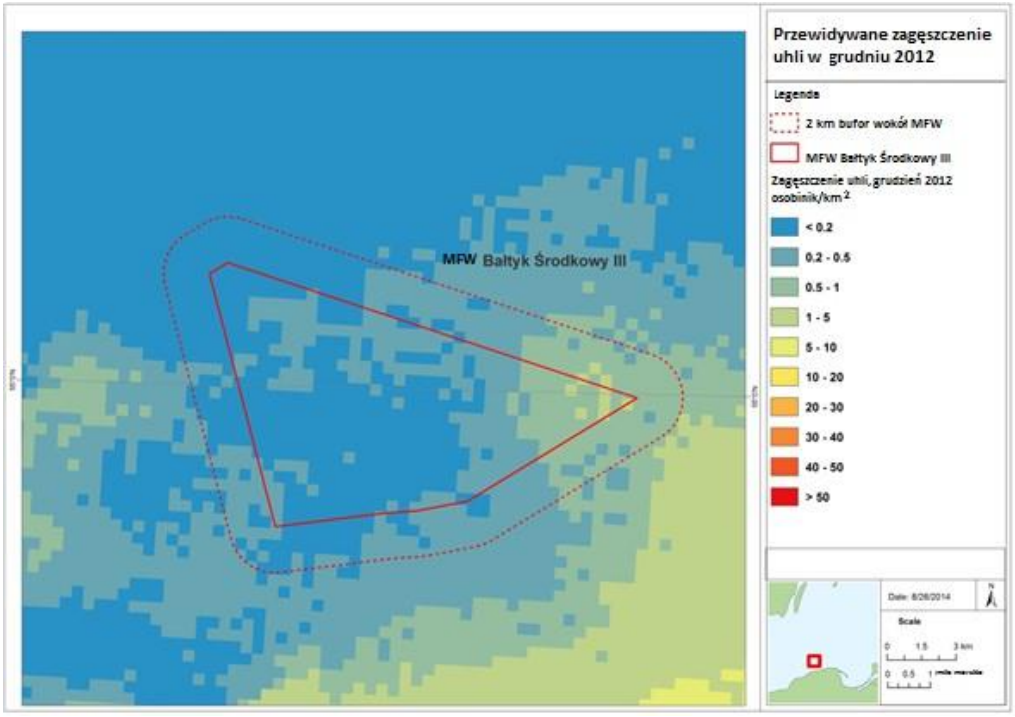
Figure 10 Predicted distribution of uhla in the BIII OWF area by month of the species' wintering period - October 2012.



Przewidywane zagęszczenie uhli w październiku 2012	Predicted densities of the uhla in October 2012
2 km bufor wokół MFW	2 km buffer around the OWF
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie uhli, październik 2012 osobniki/km^2	Density of uhla, October 2012 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

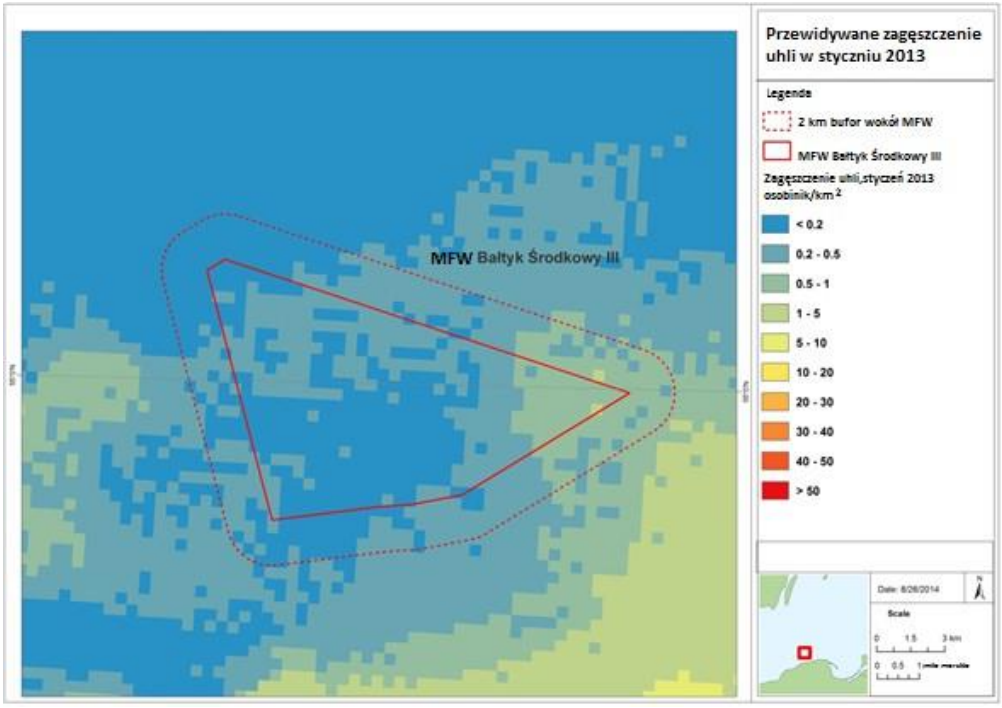
Figure 11 Predicted distribution of uhla in the BIII OWF area by month of the species' wintering period - December 2012.



Przewidywane zagęszczenie uhli w grudniu 2012	Predicted densities of the uhla in December 2012
2 km bufor wokół MFW	2 km buffer around the OWF
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie uhli, grudzień 2012 osobniki/km^2	Density of uhla, December 2012 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

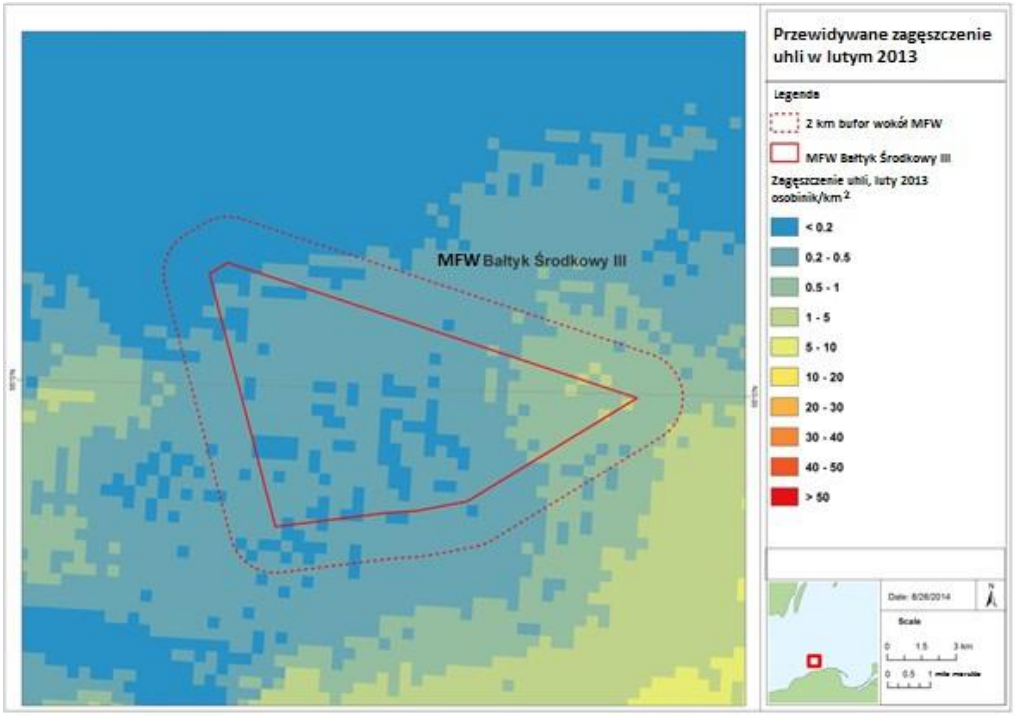
Figure 12 Predicted distribution of uhla in the BIII OWF area by month of the species' wintering period - January 2013.



Przewidywane zagęszczenie uhli w styczniu 2013	Predicted densities of the uhla in January 2013
2 km bufor wokół MFW	2 km buffer around the OWF
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie uhli, styczeń 2013 osobniki/km^2	Density of uhla, January 2013 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

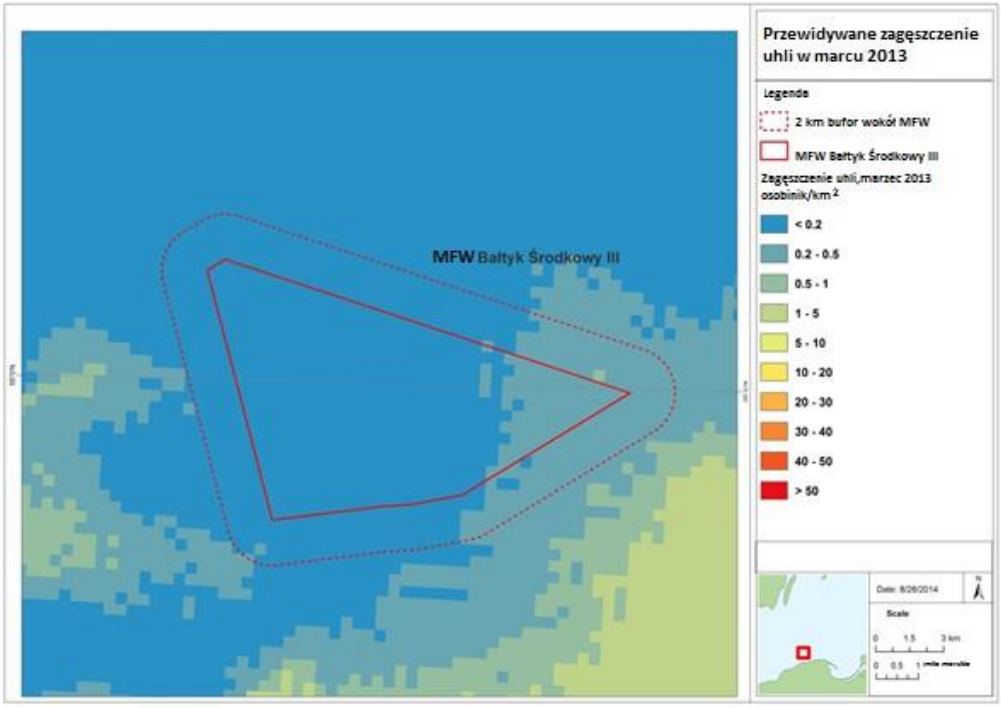
Figure 13 Predicted distribution of uhla in the BIII OWF area by month of the species' wintering period - February 2013.



Przewidywane zagęszczenie uhli w lutym 2013	Predicted densities of the uhla in February 2013
2 km bufor wokół MFW	2 km buffer around the OWF
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie uhli, luty 2013 osobniki/km^2	Density of uhla, February 2013 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

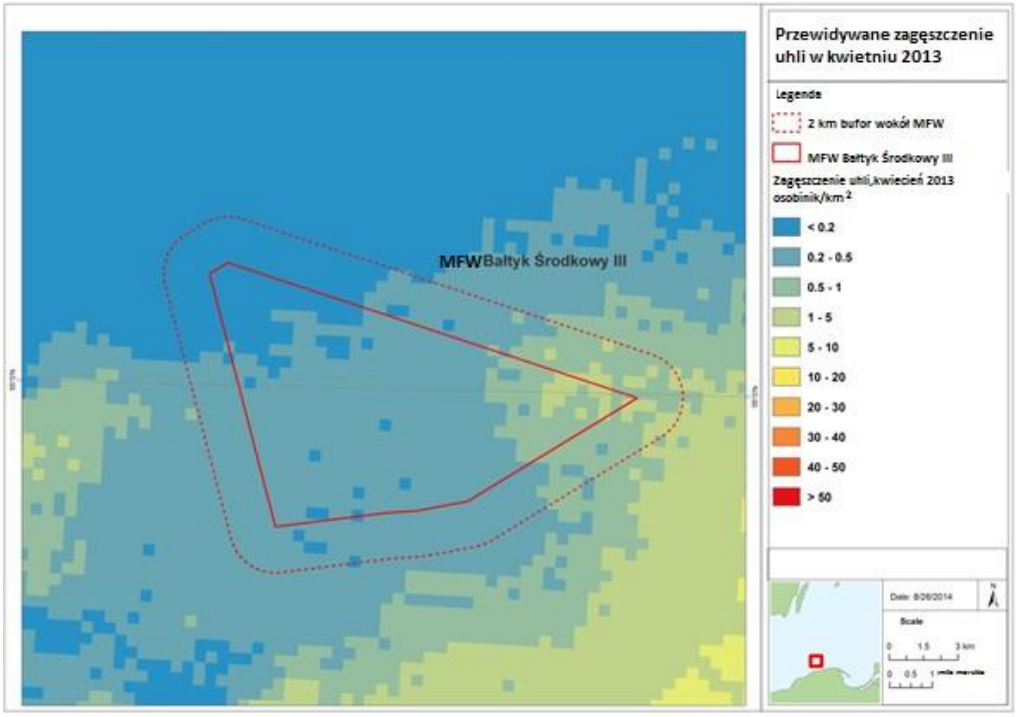
Figure 14 Predicted distribution of uhla in the BIII OWF area by month of the species' wintering period - March 2013.



Przewidywane zagęszczenie uhli w marcu 2013	Forecasted density of uhla in March 2013
2 km bufor wokół MFW	2 km buffer around the OWF
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie uhli, marzec 2013 osobniki/km^2	Density of uhla, March 2013 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Figure 15 Predicted distribution of uhla in the BIII OWF area by month of the species' wintering period - April 2013.



Przewidywane zagęszczenie uhli w kwietniu 2013	Predicted densities of the uhla in April 2013
2 km bufor wokół MFW	2 km buffer around the OWF
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Zagęszczenie uhli, kwiecień 2013 osobniki/km^2	Density of uhls, April 2013 individuals/km2

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Table 24 Potential number of uhla that will move to another area due to disturbance from the presence of vessels used for construction in the BIII OWF area and within the 2 km buffer zone, estimates for each month of the year

Month	Inside IMF BIII		2 km buffer area		Total number of birds that will move due to disturbance
	Bird density (individuals/km2) Mean (±SD)	Number of birds that will move due to disturbance (75% displacement)	Bird density (individuals/km2) Mean (±SD)	Number of birds that will move due to disturbance (50% displacement)	
June	0	0	0	0	0
July	0	0	0	0	0
August	0	0	0	0	0
September	0	0	0	0	0

Month	Inside IMF BIII		2 km buffer area		Total number of birds that will move due to disturbance
	Bird density (individuals/km2) Mean (±SD)	Number of birds that will move due to disturbance (75% displacement)	Bird density (individuals/km2) Mean (±SD)	Number of birds that will move due to disturbance (50% displacement)	
October	0,19 (±0,14)	17	0,24 (±0,17)	13	30
November	0,33 (±0,22)	29	0,39 (±0,28)	21	50
December	0,26 (±0,19)	22	0,31 (±0,21)	17	39
January	0,25 (±0,16)	22	0,30 (±0,19)	16	39
February	0,31 (±0,18)	27	0,36 (±0,23)	20	46
March	0,15 (±0,07)	13	0,18 (±0,10)	10	23
April	0,34 (±0,21)	30	0,38 (±0,28)	21	51
May	0	0	0	0	0

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

9.1.1.5. Silver gull *(Larus argentatus)*

Silver-backed gulls were the second most abundant bird species recorded in the BIII OWF area. Despite the relatively low value of average density equal to 5 individuals/km2 (see Chapter 8 Volume III of the EIA), the total number of birds using the wind farm area is 500 birds, and with the inclusion of the 2 km buffer zone, more than 1,000 individuals. Although the BIII offshore wind farm area most likely provides suitable habitat for the species, it is well known that the distribution of Lesser Black-backed Gulls is closely related to fishing activity, which was also found during the monitoring campaign conducted in the BIII offshore wind farm area (Chapter 8 Volume III of the ROOŚ). Hence, the wind farm construction work will result in the displacement of ongoing fishing activities and the silver-backed gulls will most likely follow the fishing vessels. Like other gull species, the silvery gull can only be slightly buoyed by the presence of ships (Garthe and Hüppop 2004, Furness et al. 2013), therefore, it is expected that the movement of the species due to scaring due to the presence of ships used during the construction phase of the wind farm will be very small.

9.1.1.6. Lesser Black-backed Gull *(Larus minutus)*

Lesser Black-backed Gulls were regularly observed in the monitoring area, but in small numbers - 39 individuals were recorded, with only 5 of them sitting on the water surface (Chapter 8 Volume III of the EIA). Observations of Lesser Black-backed Gulls were most frequent during the bird migration period in autumn, with only occasional sightings during winter and spring. Although most of the observed birds flew over the study area, it cannot be ruled out that some of them stayed in the area for at least a short period of time during the migration and wintering seasons.

Like other species of gulls, Lesser Black-backed Gulls are only marginally likely to be displaced from the area by the presence of ships (Garthe and Hüppop 2004), so given the very low abundance and low sensitivity of the species to the pressures associated with the presence of ships, it is expected that the displacement of the species due to the presence of ships used in the construction of the wind farm will affect only a small number of individuals, and the scale of the phenomenon will be very small.

9.1.1.7. Alka *(Alca torda)*

During the 24 survey cruises conducted in 2012-2013, the presence of 422 alkas was recorded in the BIII OWF monitoring area (taking into account parts of the transects beyond the area of the planned wind farm). It is possible that the actual abundance of birds was higher, as in some cases it was very difficult to distinguish between alcids and nules (Chapter 8 Volume III of the EIA). The occurrence of the species was observed throughout the year, the highest density of individuals was recorded during wintering. The constant presence of alkas in the BIII offshore wind farm area indicates that this is a typical habitat for this species, although birds were observed in small numbers. Based on the results of the monitoring conducted, it can be assumed that the density of alkas never exceeded 1 $^{individual/km2}$.

Following a conservative approach and using the value of alk density equal to 1 $^{individual/km2}$ during the wintering period and 0.5 $^{individual/km2}$ during the rest of the period, taking into account the size of the wind farm area equal to 116.62 ^{km2} and a 2 km buffer zone of 109 ^{km2}, and assuming the movement of 80% of individuals from the wind farm area and 60% from the buffer zone (see: Table 8) it was estimated that **the disturbance of birds by construction works (especially the presence of ships) of the farm will cause the movement of 159 alk** during the period of their most numerous occurrence - during wintering. The value obtained represents about 0.03% of the species' biogeographic population (N>500 000, BirdLife International 2004).

Table 25. Potential number of alkas that will move to another area due to disturbance from the presence of vessels used for construction in the BIII offshore wind farm area and within the 2 km buffer zone, estimates for each month of the year

Month	Inside the OWF BIII area		2 km buffer zone		Total number of birds that will move due to disturbance
	Bird density ($^{individuals/km2}$)	Number of birds that will move due to disturbance (80% displacement)	Bird density (individuals / ^{km2})	Number of birds that will move due to disturbance (60% displacement)	
June	0.5	47	0.5	33	79
Lipec	0.5	47	0.5	33	79
August	0.5	47	0.5	33	79
September	0.5	47	0.5	33	79
October	1.0	117	1.0	65	159
November	1.0	117	1.0	65	159
December	1.0	117	1.0	65	159

Month	Inside the OWF BIII area		2 km buffer zone		Total number of birds that will move due to disturbance
	Bird density (individuals/km2)	Number of birds that will move due to disturbance (80% displacement)	Bird density (individuals / km2)	Number of birds that will move due to disturbance (60% displacement)	
January	1.0	117	1.0	65	159
February	1.0	117	1.0	65	159
March	1.0	117	1.0	65	159
April	1.0	117	1.0	65	159
May	0.5	47	0.5	33	79

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

9.1.1.8. Nurzyk *(Uria aalge)*

During all 24 survey cruises in the BIII offshore wind farm area where monitoring was conducted, a relatively low number of bores was recorded - a total of 97 individuals (Chapter 8 Volume III of the EIA). The species was observed during all seasons. The low abundance of the species indicates very low densities of bores in the BIII offshore wind farm area, hence only single individuals may move to another area due to the disturbance associated with the presence of ships used in the construction of the wind farm. The movement of a very small number of individuals will have a negligible impact on the population of this species (>2,000000 breeding pairs, BirdLife International 2004).

9.1.1.9. Summary

The movement of vessels and helicopters during the construction phase will result in direct negative impacts on seabirds that are local in scope (except for the long-tailed duck, where the range is regional), reversible, medium-term, repeatable during the construction period, with intensity depending on the species. Similar impacts will occur during the eventual decommissioning of the farm.

An assessment of the significance of this impact for the Project in the parameters approved in the Environmental Decision, but also for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. The lack of difference in the assessed magnitude of the impact is due to the fact that the impact is caused by the movement of watercraft ferrying birds from the site.

When analyzing the impact of the Project update on the possibility and magnitude of the impact, it should be considered that it will be at the same level as was assessed for the Project during the impact assessment conducted in the 2015 Report. Although the number of power plants will be dramatically reduced, by about 70% in relation to the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, from the point of view of the generated impacts, the most relevant is the area

of the body of water intended for the construction of the power plants, and this will not change. The change in the number of wind turbines will significantly translate into a reduction in the time associated with the implementation of the construction phase of the BIII OWF, but due to the impossibility of determining such a detailed schedule at this stage of preparation of the Project, it is not possible to prejudge whether, in connection with the reduction in the number of power plants under construction, there will be changes in the number of winter seasons (as the most significant from the point of view of use by birds) predicted for the construction of the farm.

Table 26. Traffic of vessels and helicopters associated with the construction and decommissioning of the wind farm - analysis of impacts on individual seabird species (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing, no data on sensitivity to noise)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowing)	High protection priority. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing)	Low protection priority, not very many passerines and occasional sitters in the project area. No noticeable reactions of passing individuals to the ships.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowing)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowing)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowing)	High conservation priority, rare occurrences of migratory birds in the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Small (magnitude of impact - insignificant; importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding	Negligible (scale of exposure - local; duration - medium-term; intensity - medium	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			from the water that provide resting places for gulls.		

Source: Žydelis R., Skov H., Holst H. M., Heinänen S., "Pre-investment monitoring of birds flying over the Central Baltic III offshore wind farm area." Final report with an assessment of the impact of the variant selected for implementation and a reasonable alternative variant", DHI Poland, Warsaw, 2015.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.2. Noise and vibration emissions vibrations

The presence and movement of construction vessels (described in the previous section) will be a major cause of seabird disturbance in the BIII OWF construction area. This impact will be far greater than other construction stage-related pressures, such as underwater noise emissions. Bird monitoring during construction work on the Egmond aan Zee offshore wind farm in the Netherlands showed no discernible response to piling by bird species insensitive to disturbance from the presence of ships, mainly gulls and terns (Leopold & Camphuysen 2009). The underwater noise environmental impact assessment for the BIII OWF wind farm area found no significant impact on fish (DHI 2014c), hence no impact on the food base of fish-eating birds is expected.

Noise and vibration during the construction phase are direct, negative impacts on seabirds that are local in scope, medium-term, reversible, repeatable during the construction period, with very high intensity. Similar impacts on seabirds will occur during the eventual decommissioning of the farm.

An assessment of the significance of this impact for the Project in the parameters approved in the Environmental Decision, but also for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. The lack of difference in the assessed magnitude of the impact is due to the fact that the impact is caused by increased noise levels associated with the movement of vessels ferrying birds from the site.

Analyzing the impact of updating the parameters of the Project on the possibility and magnitude of the impact, it should be considered that it will be at an analogous level to that assessed for the Project during the impact assessment conducted in the 2015 Report. Although the number of power plants will be dramatically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, from the point of view of the generated impacts, the most relevant is the area of the basin where elevated noise levels associated with the construction of the power plants will be recorded, and this will not change. The change in the number of wind turbines will significantly translate into a reduction in the time associated with the implementation of the construction phase of

the BIII OWF, but due to the impossibility of determining such a detailed schedule at this stage of preparation of the Project, it is not possible to prejudge whether, in connection with the reduction in the number of power plants under construction, there will be changes in the number of winter seasons (as the most significant from the point of view of use by birds) predicted for the construction of the farm.

Table 27. Noise and vibration emissions - analysis of impacts on individual seabird species during construction and decommissioning (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing; no data on sensitivity to noise)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing; no data on sensitivity to noise)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing; no data on sensitivity to noise)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowding; no data on sensitivity to noise)	High protection priority. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of the resource - high)
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing; no	Low protection priority, not very many passerines and	Moderate (scale of exposure -	Small (magnitude of impact -

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
		data on sensitivity to noise)	occasional sitters in the project area. No noticeable reactions of passing individuals to the ships.	local; duration - medium-term; intensity - very high)	moderate; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowding; no data on sensitivity to noise)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowding; no data on sensitivity to noise)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowding; no data on sensitivity to noise)	High conservation priority, rare occurrences of migratory birds in the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Malee (magnitude of impact - insignificant; importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing; significant resistance to noise that is not accompanied by a real threat)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding from the water that provide resting places for gulls.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.3. Lighting of the site investment

Birds navigate during migration relative to natural light sources, such as stars and the sun. They have also been observed heading toward lighthouses, drilling rigs and other structures illuminated by artificial light at night (Wiese et al., 2001). During studies of bird behavior near oil rigs, it was noted that lighting causes seabirds to congregate around these structures not only during the migration period. This mostly involved piping plovers (Procellariformes), which mostly exhibit nocturnal activity, but concentrations of auks (Alle alle) of several thousand were also observed (Wiese et al., 2001), which are closely related to the auks and boobies found in the area of the planned project. However, for most species of typically seabirds (sea ducks, divers), the impact of artificial lighting on birds residing near and far from light sources remains very poorly understood.

Lighting of the project site during the construction phase will result in direct, negative impacts on seabirds with a local range (except for the long-tailed duck, where the range is regional), medium-term, reversible, repeatable during the construction period, with intensity depending on the species. Similar impacts will occur during the eventual decommissioning of the farm.

An assessment of the significance of this impact for the Project in the parameters approved in the Environmental Decision, but also for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. The lack of difference in the assessed magnitude of the impact is due to the fact that the impact caused is primarily related to the air of the body of water where the power plants will be built, and to the movement of vessels ferrying birds from the site.

Analyzing the impact of changing the parameters of the Project on the possibility and magnitude of the impact, it should be considered that it will be at an analogous level to that assessed for the Project during the impact assessment conducted in the 2015 Report. Although the number of power plants will be dramatically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, from the point of view of the generated impacts, the most relevant is the area of the body of water where the impacts associated with the lighting of the power plant sites will occur, and this will not change. The change in the number of wind turbines will significantly translate into a reduction in the time associated with the implementation of the construction phase of the BIII OWF, but due to the impossibility of determining such a detailed schedule at this stage of preparation of the Project, it is not possible to prejudge whether, in connection with the reduction in the number of power plants under construction, there will be changes in the number of winter seasons (as the most significant from the point of view of use by birds) predicted for the construction of the farm.

Table 28. Site lighting - analysis of impacts on individual seabird species during construction and decommissioning (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing; no data on sensitivity to artificial lighting)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing, no data on sensitivity to artificial lighting)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing, no data on sensitivity to noise artificial lighting)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowding, no data on sensitivity to artificial lighting)	High protection priority. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing; no data on sensitivity to artificial lighting)	Low protection priority, not very many passerines and occasional sitters in the project area. No noticeable reactions of passing individuals to the ships.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowding; no data on sensitivity to artificial lighting)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowding Table 19; no data on sensitivity to artificial lighting)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowding Table 19; no data on sensitivity to artificial lighting)	High conservation priority, rare occurrences of migratory birds in the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Small (magnitude of impact - insignificant; importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing Table 19; artificial lighting may make it easier for this gull to forage at night)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding from the water that provide resting places for gulls.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.4. The formation of a barrier mechanical

The structures of subsequent wind turbines and substations built during the construction phase will gradually occupy more and more of the farm's basin, creating a mechanical barrier for seabirds moving locally between feeding and/or resting areas, which are reluctant to fly over obstacles. The scale of the barrier effect will depend on the number of turbines erected, their size, and the light and noise they emit. The number of wind turbines and their parameters in a given wind farm area do not significantly affect the magnitude and significance of the investment's impact on seabirds. Indeed, it is noted that seabirds clearly avoid the area occupied by wind turbines and their numbers decrease within a radius of up to 2 and even up to 4 km (Christensen et al. 2003, Petersen et al. 2006, Leopold et al. 2011). For this reason, the 2015 Report assessed that the impacts that the Project's impacts in the parameters approved in the Environmental Decision will not significantly deviate from the impacts determined for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS.

An assessment of the significance of this impact for the most far-reaching scenario - NIS 2015 is presented in the table below.

Analyzing the impact of updating the parameters of the Project on the possibility and magnitude of the impact, it should be considered that it will be at an analogous level to that assessed for the Project during the impact assessment conducted in the 2015 Report. Although the number of power plants will be dramatically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, from the point of view of the generated impacts, the most relevant is the area of the body of water where the construction of the power plant will take place, and this will not change.

Table 29. The formation of a barrier to birds (caused by the presence of the power plant) - analysis of the impact on individual species of seabirds during the construction phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing Table 20)	High conservation priority and high sensitivity to crowing, but rarely found in the study area. With the installation of more power plants, the	Moderate (scale of exposure - local; duration - medium-term, gradually increasing	Moderate (magnitude of impact - moderate; importance of resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			impact will gradually increase.	within moderate impact; intensity - very high)	
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing Table 20)	High conservation priority and high sensitivity to crowing, but rarely found in the study area. With the installation of more power plants, the impact will gradually increase.	Moderate (scale of exposure - local; duration - medium-term, gradually increasing within moderate impact; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing Table 20)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site. With the installation of more power plants, the impact will gradually increase.	Moderate (scale of exposure - local; duration - medium-term, gradually increasing within moderate impact; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowing Table 20)	High protection priority. Moderate sensitivity of the species to crowding. With the installation of more power plants, the impact will gradually increase.	Moderate (scale of exposure - local; duration - medium-term, gradually increasing within	Moderate (magnitude of impact - moderate; importance of resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
				moderate impact; intensity - very high)	
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing 20)	Low protection priority, not very many passerines and occasional sitters in the project area. No noticeable reactions of passing individuals to the emerging structures at sea.	Moderate (scale of exposure - local; duration - medium-term, gradually increasing within moderate impact; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowing 20)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding. With the installation of more power plants, the impact will gradually increase.	Moderate (scale of exposure - local; duration - medium-term, gradually increasing within moderate impact; intensity - very high)	Small (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowing Table 20)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding. With the installation of more power plants, the impact will gradually increase.	Moderate (scale of exposure - local; duration - medium-term, gradually increasing within moderate	Small (magnitude of impact - moderate; importance of the resource - medium)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
				impact; intensity - very high)	
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowing Table 20)	High conservation priority, rare occurrences of migratory birds in the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Small (magnitude of impact - insignificant; importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing Table 20)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding from the water that provide resting places for gulls.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.5. The barrier caused by the presence of ships

The presence of a large number of ships used in the construction of the farm may result in a barrier effect and restrict the movement of birds between their areas of residence. The scale of the impact will depend on the number of vessels used in the construction phase, their size and the duration of the construction work, and the season in which the work will be carried out.

During construction work, ships will most likely perform tasks in designated areas of the wind farm, and thus the resulting barrier will be smaller than the entire area of the planned BIII OWF. Seabirds taking local flights most often respond to obstacles they encounter by vertically or horizontally avoiding them,

hence it is expected that they will alter their flight path to avoid ships by flying over the area. Bypassing will increase the energy cost of flight, but the increase is not expected to be large, as the energy cost of daily flights, even doubling their distance, will only account for a small portion of the birds' daily activity.

For example, using heart rate loggers, it has been calculated that eiders only fly for 10 minutes per day outside the migration period (Pelletier et al. 2008). Similar results can be expected for other water ducks, divers and alk. Pelagic bird species such as gulls spend most of the day taking flight in natural conditions and the additional bypassing of an obstacle, in this case the wind farm's construction work, will not cause any measurable effect on their daily activity or energy balance.

The presence of ships during the construction phase will create a barrier to bird movement, causing direct negative impacts on seabirds that are local in scope, short-term, reversible, repeatable during the construction period, and of low intensity. Similar impacts will occur at the stage of eventual decommissioning.

An assessment of the significance of this impact for the Project in the parameters approved in the Environmental Decision, but also the set of parameters for the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below.

Analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which should translate into the total time associated with the construction of the power plant, and thus the time of construction vessel operations in the Project area. A factor that can significantly affect the total construction time is weather conditions, however, given that the amount of power plants under construction in relation to the parameters resulting from the 2015 NIS has been reduced to 30%, and thus even assuming unfavorable weather conditions, the total construction time of the project will be shorter.

Table 30 Barrier caused by the presence of ships - analysis of impacts on individual seabird species during the construction / decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing Table 20)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing Table 20)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing Table 20)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowing Table 20)	High protection priority. Moderate sensitivity of the species to crowding.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing Table 20)	Low protection priority, not very many passerines and occasional sitters in the project area.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowing Table 20)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to	Low protection priority, not very numerous occurrence in the project area. Moderate	Negligible (scale of exposure - local; duration -	Negligible (magnitude of impact - moderate;

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
		crowing Table 20)	sensitivity of the species to crowding.	short-term; intensity - low)	importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowing Table 20)	High conservation priority, rare occurrences of migratory birds in the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing Table 20)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding from the water that provide resting places for gulls.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.6. Collisions with ships

During nighttime hours when special weather conditions prevail, birds may be attracted to lights emitted from ships. Collisions between waterbirds and ships at night have been documented in southwestern Grendland, and were closely linked to poor visibility (Merkel and Johansen 2011). In the case of attracting birds due to light emissions, the risk is expected that the level of collisions will not be related to the height of vessels. However, existing knowledge on the subject does not indicate that this is a significant problem, hence it is assessed that the impact of construction vessels will be limited to a

relatively small area at any time and the expected number of collisions will be low, hence the impact is assessed from negligible to moderate depending on the category of importance of the species.

Collisions between birds and construction vessels are direct, negative impacts that are local in scope, short-term, irreversible, repeatable during the construction period, and of low intensity. Similar impacts will occur at the stage of eventual decommissioning of the farm.

An assessment of the significance of this impact for the Project in the parameters approved in the Environmental Decision, but also the set of parameters for the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below.

Analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which should translate into the total time associated with the construction of the power plant, and thus the time of construction vessel operations in the Project area. A factor that can significantly affect the total construction time is weather conditions, however, given that the amount of power plants under construction in relation to the parameters resulting from the 2015 NIS has been reduced to 30%, and thus even assuming unfavorable weather conditions, the total construction time of the project will be shorter.

Table 31 Bird-vessel collisions associated with wind farm construction and decommissioning - analysis of impacts on individual seabird species (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing Table 20; no data on sensitivity to noise)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing Table 20)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing Table 20)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowing Table 20)	High protection priority. Moderate sensitivity of the species to crowding.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing Table 20)	Low protection priority, not very many passerines and occasional sitters in the project area. No noticeable reactions of passing individuals to the ships.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowing Table 20)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowing Table 20)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Lesser Black-backed Gull	Large	Medium (poor sensitivity to	High conservation priority, rare occurrences of	Negligible (scale of exposure - local; duration -	Small (magnitude of impact -

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Hydrocoloeus minutus		crowing Table 20)	migratory birds in the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	short-term; intensity - low)	insignificant; importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing Table 20)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding from the water that provide resting places for gulls.	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.7. Destruction of habitats benthos

The construction of foundations (especially if gravity foundations are chosen) and the laying of internal power cables will cause numerous disturbances to the benthic communities at the project site, which are extensively described in the chapter on the assessment of the project's impact on benthos.

Some of the habitat used by seabirds and stopovers during migration will be lost due to the foundation. This process will directly affect the seabed and affect the water column. Natural benthic habitats will be lost, but new ones will most likely develop in their place (the "artificial reef" effect). Benthic habitats will also be destroyed in areas of ditches dug for the laying of submarine cables, but will most likely be restored within a few years after construction work is completed. The scale of the impact will mainly depend on the number of wind turbine foundations, their type and size, and the scale of bottom dredging work to lay the cable network.

Bird species vulnerable to impacts associated with loss of bottom habitat due to space occupation are mainly benthic-eating sea ducks. However, these species are highly sensitive to disturbance by the presence of boats and other human activities at sea, hence it is estimated that the impact from disturbance due to the presence of construction vessels will be the main impact in the area, thus resulting in the displacement of sensitive species. Therefore, these birds will not experience additional impacts related to space occupation during the construction phase. In addition, the loss of habitat due to the occupation of space by the turbines will be very small, amounting to less than 1% of the designated area for OWF BIII for each of the wind farm alternatives considered.

Destruction of benthic habitat during construction activities is an indirect, negative impact on some seabirds (primarily bentophagous) of local range, medium-term, reversible, repeatable during the construction period, with very high intensity. Similar impacts will occur during eventual decommissioning.

An assessment of the significance of this impact for the Project in the parameters approved in the Environmental Decision, but also for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. The Project's impacts in the parameters approved in the Environmental Decision in relation to the furthest-reaching NIS 2015 scenario will not differ significantly, which is primarily due to minor differences in the size of the area where benthic habitat destruction will occur, in terms of the significance of this type of project's impact on seabirds.

Analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be less than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. The use of gravity foundations for wind turbines has also been abandoned. The total area occupied for the foundations of the power plant will be significantly reduced. However, taking into account the area occupied for the construction of the power plant in relation to the total area of the basin intended for the construction of the BIII OWF, as well as the area of the basin with favorable conditions for the development of benthic habitats, it should be considered that the changes described surface changes will not significantly affect the nature and magnitude of impacts.

Table 32 Destruction of benthic habitat - analysis of impacts on individual seabird species during the construction / decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	No	The species feeds exclusively on fish. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - high)
Red-throated diver *Gavia stellata*	Large	No	The species feeds exclusively on fish. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - high
Uhla *Melanitta fusca*	Large	Tall (a species that feeds on benthic organisms)	High protection priority. High sensitivity of the species to the reduction of the food base.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Tall (a species that feeds on benthic organisms)	High protection priority. High sensitivity of the species to the reduction of the food base.	Moderate (scale of exposure - local; duration - medium-term; intensity - very high)	Moderate (magnitude of impact - moderate; importance of resource - high)
Markaczka *Melanitta nigra*	Medium	Tall (a species that feeds on	High protection priority. High sensitivity of the	Moderate (scale of	Small (magnitude of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
		benthic organisms)	species to the reduction of the food base.	exposure - local; duration - medium-term; intensity - very high)	impact - insignificant; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	No	The species feeds exclusively on fish. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)
Alka *Alca torda*	Medium	No	The species feeds exclusively on fish. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	No	The species does not feed on benthic organisms. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - high)
Silver gull *Larus argentatus*	Small	No	The species does not feed on benthic organisms. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure,	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			ichthyophages will not be affected		

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.8. An increase in the concentration of suspended solids in water water

During the construction of the farm, there will be an agitation of bottom sediments and an increase in the concentration of suspended solids in the water. This phenomenon will be most intense when gravity foundations are used, which require prior preparation of the seabed.

Direct sediment transport and resuspension will result in reduced water clarity. If it exceeded naturally occurring levels, then it could cause difficulties for birds that use their eyes to hunt while searching for food, and thus result in the displacement of birds that prefer clear waters.

However, as can be seen from the suspended solids flow model (see Volume II, Chapter 11 of the EIA), the suspended solids concentration in the furthest scenario (i.e., using the largest gravity foundations considered) will not exceed 20mg/l within the boundaries of the wind farm and 10 mg/l outside its boundaries, the latter value being within the range of the natural state in the area.

The local decrease in water clarity inside the farm will be short-lived, and its impact will be "covered" by birds leaving the area due to other, more intense disturbances. However, since the turbidity of water due to construction activities will parallel natural processes, and due to the impossibility of estimating when such a phenomenon may occur, this impact is assessed to be small to negligible for birds that obtain food by diving in the depths and using their sense of sight for this purpose (divers, ducks, auks). No impact on birds feeding on the water surface (gulls) is expected.

An increase in the concentration of suspended solids in water during construction activities is an indirect, negative impact on some seabirds (primarily benthophagous) of local extent, short-term, reversible, repeatable during the construction period, with low intensity. Similar impacts will occur during the eventual decommissioning of the farm.

An assessment of the significance of this impact for the Project in the parameters approved in the Environmental Decision, but the set of parameters for the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below.

When analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of the impact, it should be considered that it will

be smaller than the impact of the Project in the parameters approved by the Environmental Decision. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, the use of gravity foundations for power plants (the installation of which causes the greatest agitation of bottom sediments) has also been abandoned, and as a consequence the number of operations constituting the source of agitation of suspended solids, the extent of interference with the seabed surface (as a result of abandoning the use of gravity foundations for power plants) and the total time of generating disturbance will be changed.

Table 33 Increase in suspended solids concentration in water - analysis of impacts on individual seabird species during construction / decommissioning (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	No	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Red-throated diver *Gavia stellata*	Large	No	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Uhla *Melanitta fusca*	Large	Tall (a species that feeds on benthic organisms)	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Tall (a species that feeds on benthic organisms)	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Markaczka *Melanitta nigra*	Medium	Tall (a species that feeds on benthic organisms)	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	No	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	No	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	No	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - high)
Silver gull *Larus argentatus*	Small	No	An increase in the concentration of suspended solids in the water can cause difficulties for birds using their eyes when searching for food	No change (No loss of the resource, no impact on the structure and operation of the resource	No change (magnitude of impact - no change, importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be slightly smaller than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.9. Deposition of agitated sediment

Sediment deposition will be less than 3.5 mm within the project basin, which will not affect clam survival. Sediment deposition will be an additional factor in changing the natural habitat conditions within the BIII OWF basin. The duration of this pressure is unknown. The impact was assessed as low for birds that obtain food by diving in the water depths and feeding on benthos (divers, ducks, alcids). No impact on birds feeding on the water surface (gulls) is expected.

Deposition of disturbed sediment during construction activities is an indirect, negative impact on some seabirds (primarily benthophagous) of local extent, short-term, reversible, repeatable during the construction period, with low intensity. Similar impacts may occur during decommissioning of the farm.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which forms the basis of the impact assessment in the 2015 Report, is presented in the table below.

Analyzing the impact of the proposed modifications to the Project's implementation and operation parameters on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be less than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. The use of gravity foundations for power plants, whose installation causes the greatest agitation of bottom sediments, has also been abandoned. The number of operations related to the installation of the power plant foundations and the scale of seabed intervention during this installation will be significantly reduced, and this translates into the amount of agitated sediment and, most importantly, the total time during which this subsidence will take place.

Table 34. Sedimentation of disturbed sediment - analysis of impacts on individual seabird species during the construction / decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	No	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			the water and feeding on benthos		
Red-throated diver *Gavia stellata*	Large	No	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Uhla *Melanitta fusca*	Large	Tall (a species that feeds on benthic organisms)	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Tall (a species that feeds on benthic organisms)	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Markaczka *Melanitta nigra*	Medium	Tall (a species that feeds on benthic organisms)	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Nurzyk *Uria aalge*	Medium	No	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Alka *Alca torda*	Medium	No	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	Negligible (scale of exposure - local; duration - short-term; intensity - low)	Negligible (magnitude of impact - moderate; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	No	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - high)
Silver gull *Larus argentatus*	Small	No	Deposition of disturbed sediment on the seabed in the water can cause difficulties for birds that obtain food by diving in the depths of the water and feeding on benthos	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final report with impact assessment", Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b, own observations

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be significantly smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.10. Summary and proposed minimization measures at the stage of construction

The magnitude of the impacts discussed here will depend on the time over which the structures are built. With a short-term construction phase, they will quickly reach moderate levels, with a long-term construction process, the magnitude of impacts will be small in the initial phase and later transition to moderate. At first, individual power plants will have little effect on birds, but gradually the deterrent effect will increase. In the case of simultaneous construction of power plants in remote locations, bird deterrence will affect a large body of water from the start. On the other hand, installing power plants in a systematic manner, gradually filling the basin with neighboring structures, will cause this effect to gradually build up and gradually displace birds from the area designated for the project. Adoption of this second option for development of the area will delay the displacement of birds from the body of water occupied by the power plants to a small extent, depending on the pace of construction.

In the content of the Environmental Decision, a number of conditions were imposed to minimize impacts on seabirds at the stage of construction of OWF BIII. The conditions imposed resulted from the impact assessment carried out on the basis of the 2015 Report and were proposed in the report in question as measures to reduce anticipated impacts. These are the following conditions:

- Adopt in the detailed design a schedule for the implementation of the farm, assuming the construction of successive, adjacent power plants, starting from one site, so that the body of water intended for the investment is filled with structures gradually, expanding the area of the farm with neighboring power plants - condition II.B.2 of the Environmental Decision;
- Schedule the work so that the activities that cause the greatest impact on the natural environment (i.e., driving foundation piles) are carried out in May-September-condition II.B.3;
- During the bird migration period, i.e., from early July to mid-November and from early March to mid-May, on ships and farm structures, limit the use of strong light sources (e.g., floodlights) at night and do not direct light upward. Use small, weak and pulsating light sources. - Condition II.B.4

The above actions have been considered to reduce the significance of impacts on seabirds associated with the construction of the power plant under the BIII OWF, as to their nature and magnitude to the extent that the Project can be implemented within the parameters approved by the Environmental Decision, and thus not causing significant negative impacts on birds.

On the other hand, the first of the conditions related to the need to reduce the impact on birds specified by the Environmental Decision is condition II.B.1, which refers to certain parameters of the power plant, i.e. it indicates a maximum number of 120 power plants, a minimum clearance between the bottom position of the rotor wing and the sea surface of not less than 20 m, a rotor diameter of not more than 200 m and the height of the total structure of not more than 275 m above sea level. This report proposes and evaluates changing the condition on the number of power plants to a maximum of 60 power plants,

leaving the minimum clearance between the bottom position of the rotor wing and the sea surface unchanged, i.e. not less than 20 m, and changing the rotor diameter to not more than 250 and changing the overall height of the structure to not more than 310

m. As demonstrated earlier, the parameter that can affect the impacts generated by wind turbines is the rotor diameter (the total height of the structure is actually derived from the diameter of the rotor used). The key size is, depending on the diameter of a single rotor (rotor), the maximum total rotor zone, a size that also depends on the number of power plants comprising the OWF. As a result of the proposed changes, the maximum average of a single rotor is increased from 31,400^{m2} to 49,088^{m2}, but no less as a result of the simultaneous halving of the number of power plants, the maximum total rotor zone is reduced from 3,768,000^{m2} to 2,945,244^{m2} - i.e. by about 22% in relation to the parameters of the Project approved by the Environmental Decision.

Consequently, it should be considered that the proposed changes to the conditions for implementation and operation of the Project affect the conditions for implementation of the Project specified in the Environmental Decision, that leading to a reduction in potential negative impacts on the seabird population. Other conditions introduced due to limitations on the impact on birds during the construction phase remain unchanged.

9.1.11. Impacts cumulative

Assumptions for analyses of cumulative impacts of OWF BIII and other projects on seabirds are presented in Section 13 of Volume II of the EIA.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for wind farm development in the POM for cumulative impact analyses presented below:

Between 2019 and 2021, power plants with a total capacity of 900 MW will be built, including 600 MW under the BSII offshore wind farm and 300 MW under the Baltica 3 offshore wind farm. Assuming an average power plant of 6 MW, 150 will be built. Associated infrastructure (e.g., substations, additional platforms, such as social) will also be built. It can be assumed that 158 foundations and about 158 km of internal cables will be installed on the seabed in this connection.

To these 2 farms, onshore export cables will be built with an estimated length of 95 km and 45 km, respectively. However, export cables will be built only for very short distances near the farm, and then, as they approach the shore - at a distance that causes no or negligible accumulation. In 2019-2021, geotechnical drilling may also take place in the areas of the Gaz South and Slupsk E concessions, but these impacts should also be considered negligible, due to the vastness of the concession areas and only minor overlaps with the areas of wind farms planned in the area. Export cables and geotechnical surveys in hydrocarbon concession areas were therefore not taken into account in further cumulative impact analyses.

In addition, there is a heavily used shipping route near the farm, as well as another hydrocarbon exploration and appraisal concessions - Gaz South and Slupsk-W, which will result in increased ship traffic and thus increase the risk of oil spills.

It was also assumed that more power plants will be built between 2023 and 2026, with a total capacity of 1,350 MW, including 600 MW under OWF BIII and 750 MW under OWF Baltica 3. Assuming an

average power plant of 6 MW, 225 will be built. Associated infrastructure (e.g., substations, additional platforms, such as social) will also be built. It was assumed that 232 foundations and about 232 km of internal cables would be installed on the seabed in this connection.

In the second scenario related to the construction phase, it was assumed that in 2023 - 2026, that the above quantities of power plants and infrastructure will be built not in the areas of OWF BIII and OWF Baltica 3, but as OWF BSII and OWF Baltica 2 (PSZWs belong to the same owners). However, such an alternative scenario will not significantly change the level of impacts.

In the case of simultaneous construction of OWF BIII and OWF Baltica 3, which was considered the most likely scenario, the magnitude of cumulative impacts was assessed as moderate for seven of the nine seabird species. Wind turbines built over a large area of the two farms will displace these birds from the vast body of water, limiting their access to feeding grounds. However, the high skittishness of these species translates into a reduced risk of collisions with powerhouses. The impact on both species of gulls was determined to be low. The silvery gull has a low conservation status and is a common species whose appearance in the open sea is strongly linked to the presence of fishing boats. Lesser black-backed gulls appear sparsely in this part of the Baltic, so no significant negative impact of the two wind farms being built simultaneously on their populations is expected. The results of the evaluation are presented in the table below.

Table 35. Potential cumulative impacts at the stage of construction of OWF BIII with simultaneous construction of neighboring OWF Baltica 3 (NIS 2015)

Species	Cumulative impacts
Black-throated diver *Gavia arctica*	Moderate - a short distance between farms increases the deterrent effect and creates a barrier for passing birds.
Pollack diver *Gavia stellata*	Moderate - a short distance between farms increases the deterrent effect and creates a barrier for passing birds.
Uhla *Melanitta fusca*	Moderate - a short distance between farms increases the deterrent effect and creates a barrier for passing birds.
Long-tailed duck *Clangula hyemalis*	Moderate - a short distance between farms increases the deterrent effect and creates a barrier for passing birds.
Marquise *Melanitta nigra*	Moderate - a short distance between farms increases the deterrent effect and creates a barrier for passing birds.
Nurzyk *Uria aalge*	Moderate - a short distance between farms increases the deterrent effect and creates a barrier for passing birds.
Alka *Alca torda*	Moderate - a short distance between farms increases the deterrent effect and creates a barrier for passing birds.
Lesser Black-backed Gull *Hydrocoloeus minutus*	Small - a small distance between farms increases the deterrent effect, but the species is not very sensitive to scaring. This gull appears sparsely in the project area.
Silver gull *Larus argentatus*	Small - a small distance between farms increases the deterrent effect, but the species is not very sensitive to scaring. Silver gull on

Species	Cumulative impacts
	low conservation status and is a common species, in the open sea it accompanies mainly fishing boats.

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

The 2015 Report also analyzed another scenario, the emergence at the same time as the above-mentioned farms also of three additional OWFs that are planned nearby, have valid PSZWs but at the time of the assessment did not have grid connection conditions. These include farms: FEW Baltic II, as well as Baltic Power and C-Wind (located east of OWF BIII and Baltica 3).

Taking into account the scenario of the establishment of all the above seven wind farms at the same time and the conduct of intensive exploration or exploitation of gas fields at that time, it was estimated that the magnitude of cumulative impacts would depend on the species. For shy species with high conservation priority (both species of divers and uhla), this would be a significant impact. Nearby noise sources and heavy vessel traffic would displace these birds from the large area encompassing the wind farms considered in this assessment. In the initial phase of construction of the BIII OWF, the several kilometers of free space between this farm and the BSII, Baltica 3, Baltic Power and C-Wind farms would not only allow birds to avoid the two bodies of water occupied by these investments, but also in this area seabirds could congregate and feed. However, the simultaneous establishment of all farms would result in a barrier of considerable size (east-west length of about 80 km), and in addition, the entire basin would be excluded as a feeding ground. Such a barrier would also be an obstacle for migratory birds. With the gradual, highly staggered construction of more wind farms (the more likely scenario), this effect will build up gradually depending on the timing of work in all these areas. As a minimizing measure in the design of these subsequent developments, it was pointed out that consideration should be given to the appropriateness of undeveloped migration corridors with a width of no less than 4 km.

Table 36 Potential cumulative impacts at the construction stage of the BSII offshore wind farm (NIS 2015) under the furthest-reaching scenario of building all investments in unison

Species	IMF BSII	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Concessions* for gas production	Cumulative impact
Black-necked diver *Gavia arctica*	Small - there remains a free space between the two wind farms of considerable width allowing	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Small - there remains a free space between the two farms of considerable width that allows birds to	Small to moderate, depending on the number of drilling rigs.	Large - the emergence of several relatively close sites of noise generation and the presence of watercraft; a species of

Species	IMF BSII	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Concessions* for gas production	Cumulative impact
	birds to avoid the work regions.				avoid the work areas.		high conservation priority and high skittishness.
Rusty-necked diver *Gavia stellata*	Small - there remains a free space between the two wind farms of considerable width allowing birds to avoid the work regions.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Small - there remains a free space between the two farms of considerable width that allows birds to avoid the work areas.	Small to moderate, depending on the number of drilling rigs.	Large - the emergence of several relatively close sites of noise generation and the presence of watercraft; a species of high conservation priority and high skittishness.
Uhla *Melanitta fusca*	Small - there remains a free space between the two wind farms of considerable width allowing birds to avoid the work regions.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Small - there remains a free space between the two farms of considerable width that allows birds to avoid the work areas.	Small to moderate, depending on the number of drilling rigs.	Large - the emergence of several relatively close sites of noise generation and the presence of watercraft; a species of high conservation priority and high skittishness.

Species	IMF BSII	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Concessions* for gas production	Cumulative impact
Long-tailed duck *Clangula hyemalis*	Small - there remains a free space between the two wind farms of considerable width allowing birds to avoid the work regions.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Small - there remains a free space between the two farms of considerable width that allows birds to avoid the work areas.	Small to moderate, depending on the number of drilling rigs.	Moderate - the emergence of several relatively close sites of noise generation and the presence of watercraft; a species of high conservation priority, but with moderate skittishness.
Markaczka *Melanitta nigra*	Small - there remains a free space between the two wind farms of considerable width allowing birds to avoid the work regions.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Small - there remains a free space between the two farms of considerable width that allows birds to avoid the work areas.	Small to moderate, depending on the number of drilling rigs.	Moderate - the emergence of several relatively close sites of noise generation and the presence of watercraft; a species of low conservation priority, although sensitive to crowding.
Nurzyk *Uria aalge*	Small - there remains a	Moderate - a short distance	Moderate - a short distance	Moderate - a short distance	Small - there remains a	Small to moderate, depending	Moderate - the emergence

Species	IMF BSII	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Concessions* for gas production	Cumulative impact
	free space between the two wind farms of considerable width allowing birds to avoid the work regions.	between farms increases the deterrent effect.	between farms increases the deterrent effect.	between farms increases the deterrent effect.	free space between the two farms of considerable width that allows birds to avoid the work areas.	on the number of drilling rigs.	of several relatively close sites of noise generation and the presence of watercraft; a species of low conservation priority, not very sensitive to crowding.
Alka *Alca torda*	Small - there remains a free space between the two wind farms of considerable width allowing birds to avoid the work regions.	Moderate - a short distance between farms increases the deterrent effect.	Moderate - a small distance between farms increases the deterrent effect.	Moderate - a short distance between farms increases the deterrent effect.	Small - there remains a free space between the two farms of considerable width that allows birds to avoid the work areas.	Small to moderate, depending on the number of drilling rigs.	Moderate - the emergence of several relatively close sites of noise generation and the presence of watercraft; a species of low conservation priority, not very sensitive to crowding.
Lesser Black-backed Gull *Hydrocoloeus*minutus	Small - there remains a free space between the two wind farms	Small - a small distance between farms increases the	Small - a small distance between farms increases the	Small - a small distance between farms increases the	Small - there remains a free space between the two farms of	Small regardless of the number of drilling rigs. The species is not very	Small - the emergence of several relatively close sites of noise generation

Species	IMF BSII	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Concessions* for gas production	Cumulative impact
	of considerable width allowing birds to avoid the work regions.	deterrent effect, but the species is not very sensitive to scaring.	deterrent effect, but the species is not very sensitive to scaring.	deterrent effect, but the species is not very sensitive to scaring.	considerable width that allows birds to avoid the work areas.	sensitive to crowding.	and the presence of watercraft; a species of fairly high conservation priority, but not very sensitive to crowding.
Silver gull *Larus argentatus*	Small - there remains a free space between the two wind farms of considerable width allowing birds to avoid the work regions.	Small - a small distance between farms increases the deterrent effect, but the species is not very sensitive to scaring.	Small - a small distance between farms increases the deterrent effect, but the species is not very sensitive to scaring.	Small - a small distance between farms increases the deterrent effect, but the species is not very sensitive to scaring.	Small - there remains a free space between the two farms of considerable width that allows birds to avoid the work areas.	Small regardless of the number of drilling rigs. The species is not very sensitive to crowding.	Small - the emergence of several relatively close sites of noise generation and the presence of watercraft; a species of low conservation priority, not sensitive to crowding.

* These licenses were analyzed as a potential source of accumulation in the 2015 Report, but due to their expiration and the lack of new licenses in their place or in their vicinity, they are not the subject of evaluation in this Report.

Source: Meissner W., "Ornithological monitoring of the area of the OWF Baltic Central II. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Compared to the assumptions of the scenarios adopted in the 2015 Report, the timing of all planned projects has changed, and they have all been delayed. Compared to the cumulative impacts considered for analysis, the status of gas concession projects has changed. Issued licenses have expired and new licenses for gas exploration and production have not been issued, either to replace expired licenses or for new, different areas. Since the issuance of the Environmental Decision, preparations for other OWF projects have advanced. An environmental decision has been issued for the BII OWF projects, and a

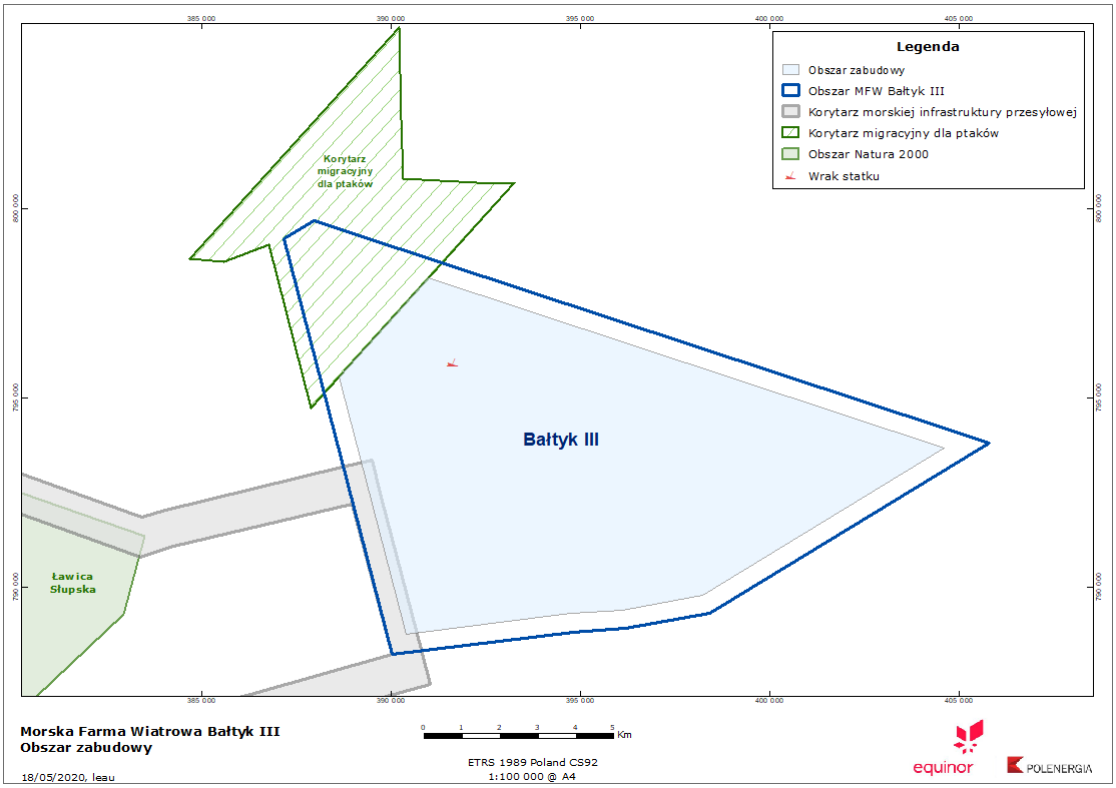
joint environmental decision has been issued for the Baltica 2 and Baltica 3 OWF projects, as well as environmental decisions for the Baltic Power and FEW Baltic II OWF projects, and a decision for the C-Wind OWF is under procedure. All the indicated projects, both those for which a decision on environmental conditions has been obtained, as well as the project for which a decision on environmental conditions is pending, provide for minimization measures to limit the impact of the planned projects, especially from the point of view of cumulative impacts.

The primary measure to reduce cumulative impacts associated with OWF projects is to leave areas between OWF projects free of power plant development. This type of action is intended to mitigate the impacts associated with the creation of barrier effects and displacement, including during the construction phase of individual projects. The effectiveness of this solution depends on the provision of a sufficiently wide development-free strip. This type of solution was implemented in the terms of the environmental conditions decision issued for the Baltica OWF, and it provides for leaving a 5 km corridor free of power plant development between the Baltica 2 and Baltica 3 areas - condition II.3.9 of the environmental conditions decision, mark RDOŚ- Gd-WOO.4211.21.2017.MJ.PW.AJ.37.

Similar solutions are proposed in the project impact report for the Baltic Power project, they assume leaving an additional area between the Baltica 3 offshore wind farm and the Baltic Power offshore wind farm free of power plant development, and supporting the above-described 5 km corridor, and they also assume leaving a 4 km wide free area east of the area planned for development within the Baltic Power project.

Taking into account the analysis of the potential environmental impacts of the project, and taking into account the need to continue the corridor designated in the decision on environmental conditions for the Baltic offshore wind farm, at the stage of work on this EIA Report, the Investor has made additional restrictions on the use of the offshore wind farm development area due to the possibility of a negative impact of the investment on seabirds. In the course of design work, a decision was made to leave the area located in the western-northern corner of the farm undeveloped with power plants, in such a way as to create an unobstructed 5 km wide corridor undeveloped with power plants, crossing the areas of the OWF Baltic Central III and OWF Baltica 2 and OWF Baltica 3 farms in the SW-NE direction - the figure below illustrates the location of the planned exclusion from development.

Figure 16 Location of the area of additional exclusion of development to create a migration corridor



Korytarz migracyjny dla ptaków	Migration corridor for birds
Ławica Słupska	Slupsk Shoal
Bałtyk III	Baltic III
Legenda	Legend
Obszar zabudowy	Development area
Obszar MFW Bałtyk III	Baltic III offshore wind farm area
Korytarz morskiej infrastruktury przesyłowej	Offshore transmission infrastructure corridor
Korytarz migracyjny dla ptaków	Migration corridor for birds
Obszar Natura 2000	Natura 2000 area
Wrak statku	Shipwreck
Morska Farma Wiatrowa Bałtyk III Obszar zabudowy	Offshore Wind Farm Baltic III Development area

source: provided by the Contracting Authority

The above-described minimization measure creating a 5 km corridor between the Baltica 2 and Baltica 3 areas was considered in the course of the completed environmental decision proceedings as a measure that effectively reduces the cumulative impacts of the planned projects to a level that will not cause significant negative impacts on seabirds. Similarly, in environmental impact reports for other OWFs, measures to keep corridors free of development have been assessed as effectively reducing cumulative impacts.

The proposed modification of the parameters of the Project's execution and operation conditions significantly reduces the number of power plants planned for construction in relation to the parameters of the Project approved in the Environmental Decision - by 50%, and by 70% in relation to the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015. In addition, an additional measure to further mitigate the impact of cumulative impacts that may arise is the proposal to designate a power plant-free corridor between the Project and the Baltic offshore wind farm.

Modifying the parameters of the Project in accordance with this concept would ensure that a corridor with a minimum width of 5 km would remain free of power plant development.

Taking into account that the possibility of simultaneous implementation of all the OWF projects described above is unrealistic, if only due to the level of preparation for the implementation of individual projects (the C- Wind project has not yet received a decision on environmental conditions), and also taking into account that the Project update does not lead to a change in the nature or magnitude of the impact of any of the construction phase impacts on seabirds, it should be considered that the proposed change in the conditions of implementation of the Project will not affect the nature and magnitude of cumulative impacts. The introduction of the proposed modifications, due to the reduction of the time of occurrence of some impacts and the proposed mitigation measures, will contribute to the reduction of potential cumulative impacts.

9.2. Stage operation

The two most important factors associated with an operating OWF that could have a negative impact on birds are the deterrent effect resulting in the exclusion of some feeding grounds and the risk of collisions with turbines. These factors are interrelated, as species with a higher degree of skittishness will not approach the area occupied by the wind turbines, making them less likely to collide with the rotors. However, in the case of birds that are not very skittish and reside in close proximity to the farm, the risk of collision clearly increases. Due to the interdependence of the two factors in this evaluation, they were analyzed together.

During the operation of the wind farm, changes in the way birds use space are expected. In the vast majority of cases, the turbines act as a deterrent to the birds and passing waterbirds evade the wind turbine fields at distances ranging from 100 to as much as 3,000-4,000 meters (Christensen et al. 2004, Kahlert et al. 2004a, Drewitt & Langston 2006). The water bodies immediately adjacent to the gym are much less used as foraging and resting areas (Drewitt & Langston 2006). The area where wind turbine masts will be erected ceases to be available as a feeding ground for birds, and in some cases noticeably lower bird densities are observed within a radius of up to 2 or even 4 km from the power plant (Petersen et al. 2004). Waterbirds' avoidance of the area where wind turbines stand leads to a reduced risk of collisions, so that mortality from collisions with power plant structures is significantly lower. The exceptions to this are gulls, such as the silver-backed gull considered in the environmental assessment, which use structures protruding from the water, including non-working wind turbines, as a resting place (Petersen et al. 2006) and show a higher incidence in the area during the construction phase of an offshore wind farm than in an earlier period (Christensen et al. 2003). During the operational phase, the interest of seagulls in offshore wind farms decreases markedly (Petersen et al. 2006, Petersen & Fox 2007).

1) vessel traffic,
2) frightening and displacement from habitats,
3) the formation of a mechanical barrier,
4) collision risk,
5) creation of an "artificial reef"

6) the creation of a closed body of water,

7) changes in the regime of sea currents.

There may also be unplanned impacts during the operation of the farm, particularly pollution of the water table and bottom sediments:

1) petroleum substances,

2) antifouling agents,

3) accidentally released municipal waste or domestic sewage,

4) accidentally released chemicals and waste from the operation of the farm. Unplanned impacts are assessed in Chapter 11.

9.2.1. The movement of vessels and helicopters

The operation of the BIII OWF will involve the movement of various types of vessels, as well as helicopters operating the farm. Since it is difficult to separate their impacts (the number of helicopters that can be used is unknown), these impacts are evaluated together.

Of the nine species considered, for seven, the significance of the BIII OWF's impact during the operation phase of increasing vessel traffic and creating a barrier was assessed as low. This is primarily due to the high conservation priority of these species and their high or medium susceptibility to scaring. For the remaining species, the significance of the impact is negligible (2 species).

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS (NIS), which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

The 2015 Report considered that the Project's impacts under the parameters approved by the Environmental Decision and the parameters defined by the furthest-reaching 2015 NIS scenario would be characterized by similar magnitude and significance of impacts on birds. Admittedly, the variants differed in the number of electors, which affects the number or dwell time of service units appearing in the farm area. Nevertheless, given the apparent avoidance by seabirds of the area occupied by the wind turbines and the decrease in their numbers within a radius of up to 2 or even 4 km (Christensen et al., 2003; Petersen et al., 2006; Leopold et al. 2011), the magnitude and significance of this impact will not be significantly affected.

In analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the Project's implementation will be comparable to those specified for the Project in the parameters approved by the Environmental Decision. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. Undoubtedly, this will also result in a significant reduction in the time or units required to perform maintenance work, but nevertheless the total area of the basin designated for the

farm will not change. In contrast, it is the presence of power plants on a given body of water that is the significant source of impact.

Table 37. Traffic of vessels and helicopters associated with the operation of the wind farm - analysis of the impact on individual species of seabirds (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing Table 19)	High conservation priority and high sensitivity to crowding, but rarely found in the study area	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing Table 19)	High conservation priority and high sensitivity to crowding, but rarely found in the study area	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing Table 19)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowing Table 19)	High protection priority. Moderate sensitivity of the species to crowding	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing Table 19)	Low protection priority, not very many passerines and occasional sitters in the project area. No noticeable reactions of passing individuals to ships	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate	Low protection priority, not very	Small (scale of exposure - local;	Small (magnitude of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
		sensitivity to crowing Table 19)	numerous occurrence in the project area. Moderate sensitivity of the species to crowding	duration - long-term; intensity - medium)	impact - low; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowing Table 19)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowing Table 19)	High conservation priority, rare occurrences of migratory birds in the project area. The species appears rarely. Presence of ships may result in more birds in the area	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - moderate; importance of resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing Table 19)	Common species of low conservation priority Low shyness of the species. It gathers in the open sea by ships and structures protruding from the water, which provide gulls with resting places	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2. The presence of above-water structures

The crowding and displacement of habitat caused by the presence of surface structures depends primarily on the area in which the power plants are located. Current knowledge does not allow to determine differences in the impact of displacement from the habitat depending on the size of wind turbines, their density and distribution. In addition, it is not known whether the birds residing in the BIII OWF area will not adapt to the presence of the wind farm over time, so the same effect is assumed for the entire duration of the operation stage.

9.2.2.1. Red-throated diver and black-throated diver *(Gavia stellata and Gavia arctica)*

During pre-investment monitoring in 2012 - 2013, very few divers were recorded in the BIII OWF basin, only 35 individuals, including 11 sitting on the water. This shows that the BIII OWF area is not an important habitat for these species. Hence, it can be concluded that after the completion of the construction phase of OWF BIII, the movement of birds due to the presence of the wind farm will involve single individuals of red-throated and black-throated divers. The crowding and displacement of habitats during the operation stage will affect a negligible portion of the regional populations of both species (N Red-throated Nurse = 150,000, N Black-throated Nurse = 250,000, Wetlands International 2014).

9.2.2.2. Long-tailed duck *(Clangula hyemalis)*

Long-tailed ducks were the most abundant species recorded during monitoring conducted in the farm area. Section 9.1.1.2 above estimated that between 151 and 2,443 long-tailed ducks will move from the wind farm area due to disturbance associated with the construction phase. It is estimated that similar impacts will occur as a result of crowding and displacement from habitats during the operational phase. However, the highest estimated number of birds represents only 0.15% of the regional population of this species (N=1,600,000, Wetlands International 2014).

9.2.2.3. Markaczka *(Melanitta nigra)*

During the 2012-2013 monitoring campaign, only 10 individuals of scoters were recorded sitting on the water in the BIII OWF area. Thus, crowding and displacement from habitats during the exploitation stage refers to a negligible portion of the species' regional population (N=550,000, Wetlands International 2014).

9.2.2.4. Uhla *(Melanitta fusca)*

Uhleas were the second most abundant seabird species recorded in the BIII OWF area. In Section 9.1.1.4 above, it was estimated that between 23 and 51 uhla individuals will move from the wind farm area due to disturbances associated with the construction phase. It is estimated that similar impacts will occur as a result of crowding and displacement from habitats during the operational phase. The highest estimated number of birds represents only 0.01% of the species' biogeographic population (N= 450,000, Wetlands International 2014).

9.2.2.5. Silver gull *(Larus argentatus)*

Silver-backed gulls were the second most abundant bird species recorded in the BIII OWF area. Despite the relatively low value of the average density of 5 $^{individuals/km2}$ (Meissner 2014a,b), the total number of birds using the wind farm area is 500 birds, and with the inclusion of the 2 km buffer zone, more than 1,000 individuals. Although the BIII offshore wind farm area most likely provides suitable habitat for the species, it is well known that the distribution of gulls is closely related to fishing activity, which was also found during the ongoing monitoring campaign in the BIII offshore wind farm area. Like other gull species, the silver-backed gull does not avoid offshore wind farm areas and may even be attracted by them, as the turbine towers may provide a resting place for them, however, the elimination of fishing activity from the wind farm area may mean that the birds will also leave the area following the fishing vessels (Petersen et al. 2006, 2014, Petersen & Fox 2007, Leopold et al. 2011, Venermen et al. 2013). It is estimated that crowding and displacement from habitats due to the operation of the wind farm will not have any impact on the species.

9.2.2.6. Lesser Black-backed Gull *(Larus minutus)*

Lesser Black-backed Gulls were regularly observed in the monitoring area, but in small numbers - 39 individuals were recorded, with only 5 of them sitting on the water surface. Available information on the response of Lesser Black-backed Gulls to the presence of offshore wind farms is conflicting, with some studies indicating an avoidance response to wind farms by these birds (Petersen & Fox 2007, Leopold et al. 2011), with others reporting that Lesser Black-backed Gulls are attracted to wind farms (Petersen et al. 2006, Vanermen et al. 2013). Based on the available information, it is estimated that Lesser Black-backed Gulls will not move out of the BIII OWF area after the construction work is completed. Hence, crowding and displacement from habitats during the operation stage of the farm will not cause any changes for this species.

9.2.2.7. Alka *(Alca torda)*

During the 24 survey cruises conducted in 2012-2013, the presence of 422 alkas was recorded in the BIII OWF monitoring area (taking into account parts of the transects beyond the area of the planned wind farm). It is possible that the actual number of birds was higher, as in some cases it was very difficult to distinguish between alcids and nules.

In section 9.1.1.7 above, it was estimated that 159 alkas will migrate from the wind farm area due to disturbances associated with the construction phase during their most numerous period - wintering. It is estimated that similar impacts will occur as a result of crowding and displacement from habitats during the operational phase. The value obtained represents only about 0.03% of the species' biogeographic population (N>500 000, BirdLife International 2004).

9.2.2.8. Nurzyk *(Uria aalge)*

During all 24 survey cruises in the BIII OWF area where monitoring was carried out, a relatively low number of bores was recorded - a total of 97. The movement of a very small number of individuals due to crowding and displacement from habitats during the operation stage will have a negligible impact on the population of this species (>2,000000 breeding pairs, BirdLife International 2004).

9.2.2.9. Summary

Scaring and displacement from habitat during the operational phase is a direct, negative impact on seabirds that is local in scope, long-term, reversible, permanent during the operational period, and of low to medium intensity (except for gulls, which will not be displaced from habitat).

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

The 2015 Report concluded that the impacts of the two Project variants analyzed at the time, including the variant approved by the Environmental Decision, would be characterized by similar magnitude and significance of impacts on birds. Although these variants differed in the number of power plants (120 and 200 units, respectively), nevertheless, given the apparent avoidance by seabirds of the area occupied by wind turbines and the decrease in their numbers within a radius of up to 2 or even 4 km (Christensen et al., 2003; Petersen et al., 2006; Leopold et al. 2011), the magnitude and significance of this impact will not be significantly affected.

Analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be comparable to those specified for the Project in the parameters approved by the Environmental Decision. The number of power plants will be drastically reduced - by 50% in relation to the parameters of the Project approved by the Environmental Decision. On the other hand, it is the presence of the power plant on a given body of water that is the significant source of impact, and this will not change from the parameters of the project approved by the Environmental Decision.

Table 38. Crowding and displacement of habitats during the operation stage - analysis of impacts on individual seabird species (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing Table 19; no data on sensitivity to noise)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Small (magnitude of impact - low; importance of resource - high)
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing Table 19)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Small (magnitude of impact - low; importance of resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing Table 19)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site.	Small (scale of exposure - local; duration - long-term ; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowing Table 19)	High protection priority. Moderate sensitivity of the species to crowding.	Small (scale of exposure - local; duration - long-term ; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing Table 19)	Low protection priority, not very many passerines and occasional sitters in the project area. No noticeable reactions of passing individuals to the ships.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowing Table 19)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowing Table 19)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowing Table 19)	High conservation priority, rare occurrences of migratory birds in	No change (No loss of the resource, no impact on the	No change (magnitude of impact - no change,

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	structure and operation of the resource)	importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing Table 19)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding from the water that provide resting places for gulls.	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - low)

Sources: Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b, own observations

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2.10. The formation of a barrier mechanical

Located over water, wind farm facilities can be a barrier to seabirds moving locally between feeding and/or resting areas, which are reluctant to fly over obstacles. The scale of the barrier effect will depend on the number of turbines created, their size, and the light and noise they emit.

When taking local flights, sensitive seabird species respond to the presence of an obstacle in their path by changing their flight path in a horizontal or vertical direction, hence they are expected to avoid the wind farm area. The length of the route required to avoid the obstacle will increase the energy cost of the flight being made, but this will not be a large change, and the energy cost of the birds' daily flights, even if doubled, will still be a small part of their daily activity and energy consumed. For example, using heart rate loggers, it has been calculated that eiders only fly for 10 minutes during the day outside the migration period (Pelletier et al. 2007, 2008). Similar results can be expected for other sea duck species as well as for divers and alk. Pelagic bird species such as gulls spend most of the day taking flights in the wild and the additional bypassing of an obstacle, in this case the presence of a wind farm, will not cause any measurable effect on their daily activity or energy balance.

Due to the lack of detailed information on the behavioral responses of birds to the presence of wind farms, the effects for both considered variants of the variant approved by the Environmental Decision and in the variant in the parameters constituting the 2015 NIS are considered equal.

The mechanical barrier in the form of the operating BIII OWF will be a source of direct, negative impacts on seabirds of local extent, long-term, reversible, permanent during the period of operation, of low (for gulls) or medium intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

In analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the Project's implementation will be comparable to those specified for the Project in the parameters approved by the Environmental Decision. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. Nevertheless, the total area of the body of water intended for the construction of the farm will not change, while it is the presence of the power plant on a given area of the body of water that is a significant source of impact.

Table 39. Creation of a mechanical barrier for birds at the stage of operation - analysis of impacts on individual species of seabirds (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver *Gavia arctica*	Large	High (high sensitivity to crowing Table 19)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Red-throated diver *Gavia stellata*	Large	High (high sensitivity to crowing Table 19)	High conservation priority and high sensitivity to crowing, but rarely found in the study area.	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Uhla *Melanitta fusca*	Large	High (high sensitivity to crowing Table 19)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site.	Small (scale of exposure - local; duration - long-term;	Small (magnitude of impact - low; importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
				intensity - medium)	resource - high)
Long-tailed duck *Clangula hyemalis*	Large	Medium (moderate sensitivity to crowing Table 19)	High protection priority. Moderate sensitivity of the species to crowding.	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of resource - high)
Markaczka *Melanitta nigra*	Medium	High (high sensitivity to crowing Table 19)	Low protection priority, not very many passerines and occasional sitters in the project area. No noticeable reactions of passing individuals to the ships.	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of the resource - medium)
Nurzyk *Uria aalge*	Medium	Medium (moderate sensitivity to crowing Table 19)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of the resource - medium)
Alka *Alca torda*	Medium	Medium (moderate sensitivity to crowing Table 19)	Low protection priority, not very numerous occurrence in the project area. Moderate sensitivity of the species to crowding.	Small (scale of exposure - local; duration - long-term; intensity - medium)	Small (magnitude of impact - low; importance of the resource - medium)
Lesser Black-backed Gull *Hydrocoloeus minutus*	Large	Medium (poor sensitivity to crowing Table 19)	High conservation priority, rare occurrences of migratory birds in the project area. The species appears rarely. The presence of ships may result in more numerous birds in the area.	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Silver gull *Larus argentatus*	Small	Medium (poor sensitivity to crowing Table 19)	Common species of low conservation priority Low shyness of the species. It congregates in the open	Negligible (scale of exposure - local; duration	Negligible (magnitude of impact - insignificant;

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			sea near ships and structures protruding from the water that provide resting places for gulls.	- long-term; intensity - low)	importance of the resource - low)

Sources: Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b, own observations

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2.11. Collisions with power plants

Seabirds residing in the BIII offshore wind farm area will inevitably face the risk of collision with the wind farm structures built in their environment. The probability of a collision depends on the density of the species in the area, the time it spends taking flight, the avoidance response, the flight altitude and the parameters of the wind farm (number and size of turbines). Collision risk was determined using the widely used Band risk model (Band et al. 2012), in a version dedicated to offshore wind farms. The calculation methodology is described in Chapter 6 above. All the worksheets of the Banda model calculation results (the worksheet named "General Collision Risk") are presented in Appendix B of DHI's expert study, which is attached as Appendix P to the report. Collision rates were calculated for all relevant seabird species, where calculations could be made.

The values presented in the tables with the estimated number of collisions of individual species are presented for the Project in the parameters approved by the Environmental Decision and for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 and 4 different theoretical avoidance indicators. A degree of uncertainty of ±67% should be assumed for each calculation.

It should be clearly emphasized that the following calculations are based on the results of pre-investment studies, when there were no significant factors that could frighten birds in the area of the proposed farm. Once construction and later operation of the project begins, seabirds (except for gulls) will be largely displaced from the project area, which will translate into a reduction in the calculated number of potential collisions.

The predicted collision rate was calculated by two independent teams - DHI and ENINA. The analysis performed by the ENINA team was based on the parameters of the project after the proposed changes, particularly those related to the maximum diameter of the rotor and the maximum overall height of the power plant. This analysis is in the nature of a comparison between the Project's conflicts of interest in

its parameters approved by the Environmental Decision and in the parameters after the changes evaluated in this Report.

9.2.2.12. Red-throated diver and black-throated diver (Gavia stellata and Gavia arctica)

Since red-throated and black-throated divers were often not labeled as to species they were included in the study together. Both species have similar biology, occur in the same marine environments, and respond similarly to the presence of wind farms (Furness at al. 2013). During pre-investment monitoring in 2012 - 2013, very few divers were recorded in the BIII OWF basin, only 35 individuals, including 11 sitting on the water. This shows that the BIII OWF area is not an important habitat for these species. Due to the above fact and the high rate of avoidance of operated wind farms by diver species, it can be deduced that only very occasionally red-throated and black-throated divers may collide with turbines. Exact calculations are not feasible due to the small number of individuals recorded in the BIII OWF area. The impact will affect a negligible portion of the regional populations of the species (N Red-throated Burrowing Owl = 150,000, N Black-throated Burrowing Owl = 250,000, Wetlands International 2014), hence it is estimated that the impact in the form of collision risk on the burrowing owls residing in the project basin will be small.

9.2.2.13. Long-tailed duck (Clangula hyemalis)

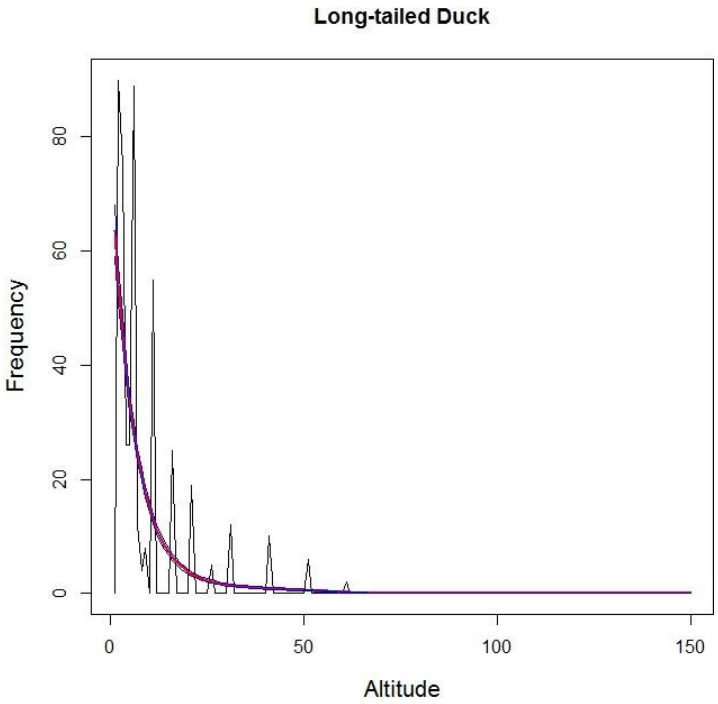
Like all seabird species, long-tailed ducks residing in Area BIII will also be vulnerable to collisions with the wind farm's turbines when taking local flights.

According to data collected during pre-investment monitoring, most long-tailed ducks flew at altitudes below 20 meters above sea level (Chapter 9 Volume III of the EIA). Altitude frequency modeling was done using GAM (see the description of the method in Section 6.2.3), which allowed the use of the extended Band model. Long-tailed ducks generally spend little time taking flight, for example, a study conducted from a ship in the North Sea found that only 1% of all long-tailed ducks recorded during the study took flight (Skov et al. 2012). Other studies on eider using heart-rate loggers showed that the birds took flight for no more than 10 minutes during a single day in the off-season of migration (Pelletier et al. 2007, 2008). Since this kind of data is not available for the long-tailed duck, and these birds may be more mobile than other sea ducks, it is assumed that long-tailed ducks spend 3% of their time per day taking flights (equivalent to about 15 minutes in an 8-hour day). Using Band's extended model, the annual collision rate for long-tailed ducks was determined for four hypothetical avoidance rates - implicit in the model setting (Band 2012), including the most conservative scenario assuming 95% avoidance and the most optimistic scenario assuming 99.5% avoidance (Band et al. 2012, Cook et al. 2012). Calculations indicate that a greater number of birds would experience collisions with the wind farm in the rational alternative compared to the selected alternative, and that wind turbines with tall towers (175 m) would be safer than lower towers (120 m) in the selected alternative. Sea ducks show a very strong avoidance response, such as an avoidance rate of 99.3% (Kriejgsveld et al. 2011) and even higher

>99.9% (Smartwind 2013). Hence, a 99.5% avoidance rate can be taken as a suitable scenario resulting in 0 - 9 collisions per year, depending on the selected variant for the wind farm.

The largest calculated number of collisions represents less than 0.01% of the species' biogeographic population size (population size of 1,600,000 birds, Wetlands International 2014). Hence, the impact in the form of collisions on long-tailed ducks residing in the IMF BIII basin is assessed as low.

Figure 17. GAM model calibrated with observed long-tailed duck height frequency distribution as dependent variable and height as predictor variable



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

The result, in the form of frequency distributions of average height at 1-m intervals, was used in the extended Band model. The observed cruising altitude is indicated in the figure above by the black line, the predictions by the red line, and the SE resulting from the model by the blue line.

Table 40. Estimated potential collisions of long-tailed ducks residing in the OWF BIII area

Long-tailed duck	Option selected for implementation		Rational alternative
	120 m tower	175 m tower	
Risk of collision (95% avoidance), number of birds involved in collision	60	0	94
Risk of collision (98% avoidance), number of birds involved in collision	24	0	38
Risk of collision (99% avoidance), number of birds involved in collision	12	0	19

Long-tailed duck	Option selected for implementation		Rational alternative
	120 m tower	175 m tower	
Risk of collision (99.5% avoidance), number of birds involved in collision	6	0	9

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

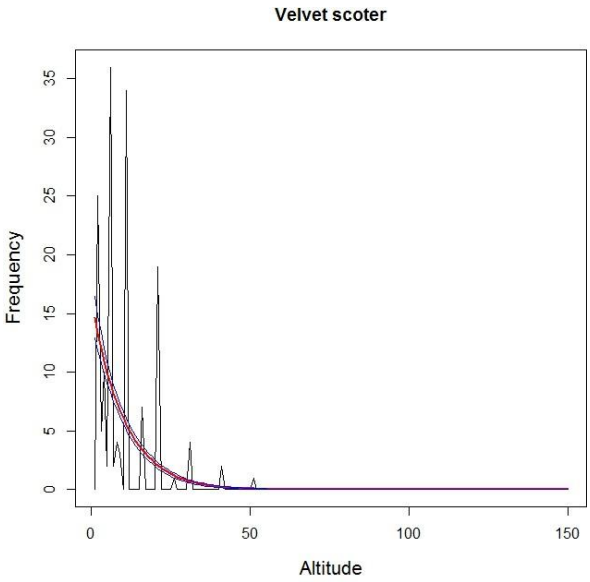
9.2.2.14. Marquise (Melanitta nigra)

During the 2012-2013 monitoring campaign in the BIII OWF area, only 10 individuals of scoters were recorded sitting on the water, during the 2012-2013 monitoring campaign very few scoters were recorded, only 10 individuals sitting on the water during all field work, while hundreds of these birds were found in flight (Meissner 2014, DHI 2014b). Our own observations in the Polish EEZ showed that most scoters flew below the potential rotor height of 20 meters above sea level. Only 7% of the observed birds flew at higher altitudes (DHI 2014b). Taking into account the very low density of scoters residing in the area of OWF BIII, their very strong avoidance response to wind farms, and the fact that most individuals fly at altitudes below the typical rotor height of an offshore wind farm, it is concluded that the collision of these birds is of negligible importance.

9.2.2.15. Uhla (Melanitta fusca)

The urchins residing in the BIII offshore wind farm area will be exposed to the risk of collisions with wind turbines when taking local flights. Potential collision calculations were estimated using modeled pre-investment bird density values and using Band's extended model (Band et al. 2012), described in Chapter 6. Altitude frequency modeling was done using GAM (see the description of the method in Chapter 6) which allowed the use of the extended Band model. Long-tailed ducks generally spend little time taking flight; for example, a study conducted from a ship in the North Sea found that only 1% of all long-tailed ducks recorded during the study took flight (Skov et al. 2012). Other studies on eider using heart-rate loggers indicated that the birds took flight for no more than 10 minutes during a single day at times outside migration seasons (Pelletier et al. 2007, 2008). Since this kind of data is not available for uhls and the birds of this species are quite sizable, similar to the eider, it is assumed that uhls spend 2% of their time during the day taking flight (equivalent to about 10 minutes in an 8-hour day). Using Band's extended model, the annual collision rate for uhla was determined for four hypothetical avoidance rates - the implicit setting in the model (Band 2012), including the most conservative scenario assuming 95% avoidance and the most optimistic scenario assuming 99.5% avoidance (Band et al. 2012, Cook et al. 2012). Sea ducks show a very strong avoidance response, e.g.,: an avoidance rate of 99.3% (Kriejgsveld et al. 2011) and even higher >99.9% (Smartwind 2013). Hence, a 99.5% avoidance rate can be taken as a suitable scenario for the resident individuals of this species in the BIII offshore wind farm area for each of the wind farm variants considered. However, occasional collisions cannot be ignored, hence the significance of the impact is assessed as negligible.

Figure 18. GAM model calibrated with the observed frequency distribution of uhla heights as the dependent variable and height as the predictor variable



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

The result, in the form of frequency distributions of average height at 1-m intervals, was used in the extended Band model. The observed cruising altitude is indicated in the figure above by the black line, the predictions by the red line, and the SE resulting from the model by the blue line.

Table 41. Estimated potential collisions of uhls residing in the BIII OWF area

Uhla	Option selected for implementation		Rational alternative
	120 m tower	175 m tower	
Risk of collision (95% avoidance), number of birds involved in collision	1	0	2
Risk of collision (98% avoidance), number of birds involved in collision	0	0	1
Risk of collision (99% avoidance), number of birds involved in collision	0	0	0
Risk of collision(99.5% avoidance), number of birds undergoing collision	0	0	0

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

9.2.2.16. Silver gull (Larus argentatus)

Silver-backed gulls were the second most abundant bird species recorded in the BIII OWF area. Despite the relatively low value of the average density of 5 $^{individuals/km2}$ (Meissner 2014a,b), the total number of birds using the wind farm area is 500 birds, and with the inclusion of the 2 km buffer zone, more than 1,000 individuals. Although the BIII offshore wind farm area most likely provides suitable habitat for the species, it is well known that the distribution of gulls is closely related to fishing activity, which was also found during the ongoing monitoring campaign in the BIII offshore wind farm area. Like other gull species, the silverbacked gull does not avoid offshore wind farm areas and may even be attracted by them because turbine towers may provide a resting place for it, however, the elimination of fishing activity from the wind farm area may mean that the birds will also leave the area to follow fishing vessels (Petersen et al. 2006, 2014, Petersen & Fox 2007, Leopold et al. 2011, Venermen et al. 2013). Therefore, it was assumed that the density of silverbacked gulls residing in the BIII OWF area would decrease by 50% after the construction of the offshore wind farm due to the exclusion of commercial fishing activity from the area.

Taking into account the assumed reduction in the number of silver-backed gulls due to the change in the location of fishing activities after the completion of the wind farm, the value of the average density of birds residing in the basin equal to 2.5 $^{units/km2}$ of which 30% took flight was used in the calculation of potential collisions (according to Furness et al. 2013). Silver-backed gulls take flight at fairly high altitudes. Available research results indicate that about 34% of birds fly above 20 meters above sea level, an altitude that corresponds to the potential height of the rotor (Furness et al. 2013).

Estimates indicate that a greater number of birds will collide with the wind farm in the variant indicated as NIS 2015 than in the variant selected for implementation at the 2015 Report stage, with turbines with tall towers (175 m) being safer for birds than lower turbines (120 m) for this variant.

It has been shown that gulls exhibit a high degree of avoidance. Krijgsveld et al. (2011) indicates a 98% avoidance rate, other studies a higher value (>99.9%) (Smartwind 2013). An avoidance rate value of 99% was adopted as the most appropriate, in line with new recommendations on bird avoidance rates (Cook et al. 2014). The result of applying a coefficient with this value is an estimate of the annual number of bird collisions of 109 - 1,407, depending on the wind farm variant.

The estimated number of collisions accounts for less than 0.1% of the regional population of the silver-backed gull (N > 1,300,000 birds, Wetlands International 2014) hence the significance of the impact on this species is assessed as low.

Table 42. Estimated potential collisions of silverback gulls residing in the BIII OWF area

Silver gull	Option selected for implementation		Rational alternative
	120 m tower	175 m tower	
Risk of collision (95% avoidance), number of birds involved in collision	4.764	544	7.009

Silver gull	Option selected for implementation		Rational alternative
	120 m tower	175 m tower	
Risk of collision (98% avoidance), number of birds involved in collision	1.906	218	2.811
Risk of collision (99% avoidance), number of birds involved in collision	953	109	1.407
Risk of collision (99.5% avoidance), number of birds involved in collision	476	54	704

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

9.2.2.17. Lesser Black-backed Gull (Larus minutus)

Lesser Black-backed Gulls were regularly observed in the monitoring area, but in low numbers - 39 individuals were recorded, with only 5 of them sitting on the water surface. Observations of Lesser Black-backed Gulls were most frequent during autumn migration, with only occasional sightings during winter and spring. Although most of the observed birds flew over the study area, it cannot be ruled out that some of them stayed in the area for at least a short period of time during the migration and wintering seasons.

Due to the very low density of Lesser Black-backed Gulls residing in the BIII OWF area and the fact that only 11% of the birds of this species flew at heights above 20 m, the potential height of a wind turbine rotor (DHI 2014b), it is estimated that only single individuals of Lesser Black-backed Gulls residing in the farm area may occasionally collide with BIII OWF turbines after its construction. For the regional population of this species, the impact will be insignificant (N = 72,000, Wetlands International 2014), and the significance of the impact on this species is assessed as low.

9.2.2.18. Alka (Alca torda)

During the 24 survey cruises conducted in 2012-2013, the presence of 422 alkas was recorded in the BIII OWF monitoring area (taking into account parts of the transects beyond the area of the planned wind farm). It is possible that the actual number of birds was higher, as in some cases it was very difficult to distinguish between alcids and nules. The species was recorded during all seasons, the highest density of individuals was recorded during wintering.

The constant presence of alkas in the BIII offshore wind farm area indicates that this is a typical habitat for this species, although birds were observed in small numbers. Based on the results of the monitoring conducted, Meissner (2014b) suggested that alk density never exceeded 1 $^{individual/km2}$.

None of the alkas observed in Polish open waters flew at heights corresponding to a potential rotor height of 20 m (DHI 2014b). These findings are in line with those of other studies (Furness 2013). Hence,

given the low density of birds of this species, the high avoidance rate of offshore wind farms by alkas, and the low flight altitude of these birds, it is not expected that any of the resident alkas could collide with OWF BIII. However, occasional collisions cannot be completely ruled out. The significance of the impact on this species is assessed as negligible.

9.2.2.19. Nurzyk (Uria aalge)

During all 24 survey cruises in the BIII OWF area where monitoring was carried out, a relatively low number of bores was recorded - a total of 97. The species was observed during all seasons. The low abundance of the species indicates that very few borers use the BIII OWF area. In Polish open waters, no nuisances have been recorded taking flight at heights corresponding to the potential height of a wind turbine rotor of 20 m (DHI 2014b, Meissner 2014). These results are in line with those obtained in other studies (Furness 2013). Moreover, considering the low density of birds of this species, the high rate of avoidance of offshore wind farms by nuthatches, and the low flight altitude of these birds, it is not expected that any of the nuthatches residing in the OWF BIII area could collide with the farm. However, occasional collisions cannot be completely ruled out. Therefore, the significance of the impact on this species is assessed as negligible.

9.2.2.20. Enina analysis 2022

For the purpose of preparing the non-significant report, collision analyses were conducted again taking into account the changed parameters of the Project, i.e. the change in the number of power plants, the change in the total maximum height of the power plants and the change in the maximum diameter of the rotor. For all analyzed species, equal or lower mortality from collisions with power plants is expected as a result of the Project's parameter changes than for the variant under the parameters approved by the Environmental Decision.

Table 43 Comparison of the implementation variant for which the decision on environmental conditions was issued (WR20 - 120 wind turbines) and the current implementation variant (WR20 - 60 turbines and minimum clearance between the bottom position of the wing and the sea surface of 20m)

WR20	RWU (%)*	WR20 - 120 turbines	WR20 - 60 turbines
		bird/year	bird/year
Alka Alca torda	99.50	0.02	0.01
Long-tailed duck Clangula hyemalis	99.00	0.09	0.04
Uhla Melanitta fusca	99.00	1.93	0.60
Marquise Melanitta nigra	99.00	2.57	1.32
Nur Gavia sp.	99.50	0.32	0.09
Lesser gull *Larus minutus / Hydrocoleus minutus*	99.50	0.21	0.09

*RWU (%) - real avoidance rate

[a] - earlier Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III (Tryjanowski P., Jankowiak Ł. I Łuczak A. 2015) was carried out based on a real avoidance rate of 99% for geese, and the collision rate for this rate was 61.22 wasps/year; currently, according to Table 1, the avoidance rate for geese is 99.8, and this rate was used for calculations for the old $_{WR120}$ variant (for a more complete comparison) and the current implementation variant of the various offshore wind farm variants of the Baltic III offshore wind farm within the range defined by the envelope (depending on the clearance size): $_{WR20}$ - 60 turbines and $_{WR60}$ -60 turbines.

[b] - earlier Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III (Tryjanowski P., Jankowiak Ł. I Łuczak A. 2015) was carried out based on an avoidance rate of 98% for swans, and the collision rate for this rate was 3.14 os/year; currently, according to Table 1, the avoidance rate for geese is 99.5, and this rate was used for calculations for the old $_{WR120}$ variant (for a more complete comparison) and for the current implementation variant of the various offshore wind farm variants of the Baltic III offshore wind farm within the range defined by the envelope (depending on the clearance size): $_{WR20}$ - 60 turbines and $_{WR60}$ - 60 turbines.

Source: Tryjanowski P., Łuczak A., Gawlik, A. Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm OWF Bałtyk III ("OWF BIII"), ENINA 2022

9.2.2.21. Summary

Collisions at the operational stage are direct, negative impacts on seabirds of local extent, long-term, irreversible, repeatable during the operational period, of low or high intensity.

An assessment of the significance of this impact for the most far-reaching scenario that could occur under the reasonable alternative is presented in the table below.

Vulnerability of individual species to collisions with farms (column 3) was determined based on the European Commission's 2011 guide "Wind energy development and Natura 2000", where XXX means there is evidence of a significant risk of impact, XX - evidence or indication of risk of impact, X - potential risk of impact, x = low or insignificant risk of impact. Most of the analyzed species are characterized only by potential (i.e. "X") risk of collision. The exception is the Lesser Black-backed Gull, which shows no such risk.

Analyzing the impact of the proposed modifications to the Project on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be less than the impacts specified for the Project in the parameters approved by the Environmental Decision. The number of power plants will be drastically reduced - by 50% less than the parameters of the Project approved by the Environmental Decision, and by 70% less than the 2015 NIS, and the total rotor zone will be about 22% less than the parameters of the Project approved by the Environmental Decision if the parameters of the Project are changed. Thus, the Project's collision-related impacts will be correspondingly less (compare the results presented in the section on migratory birds).

An additional measure that is mitigating in nature, although its main significance relates to impacts on migratory birds, is the proposal to create an additional power plant-free corridor between the Project and the planned offshore Baltica project. Modifying the parameters of the Project in accordance with this concept (see Section 9.1.1.1 and Section 1 of Volume II of the Report) would ensure that a corridor with a minimum width of 5 km would remain free of power plant development. The above-mentioned minimization measure creating a 5 km corridor between the Baltica 2 and Baltica 3 areas was considered

in the course of the completed environmental decision proceedings as a measure that effectively reduces the cumulative impacts of the planned projects to a level that will not cause significant negative impacts on seabirds.

Table 44. Collisions at the stage of operation - analysis of the impact on individual species of seabirds (NIS 2015 and the variant in the parameters approved by the Environmental Decision)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver Gavia arctica	Large	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Red-throated diver Gavia stellata	Large	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Uhla Melanitta fusca	Large	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Long-tailed duck Clangula hyemalis	Large	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Small (magnitude of impact - insignificant; importance of the resource - high)
Markaczka Melanitta nigra	Medium	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
					the resource - medium)
Nurzyk Uria aalge	Medium	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Alka Alca torda	Medium	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local; duration - long-term; intensity - low)	Negligible (magnitude of impact - insignificant; importance of the resource - medium)
Lesser Black-backed Gull Hydrocoloeus minutus	Large	No risk	During the operation of the farm, there may be collisions between seabirds and operating power plants	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Silver gull Larus argentatus	Small	There is a potential risk of collision	During the operation of the farm, there may be collisions between seabirds and operating power plants	Moderate (scale of exposure - regional, duration - long-term, intensity - high)	Small (magnitude of impact - moderate, importance of the resource - low)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change, and the scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.3. The creation of an "artificial reef"

Benthic habitats used by seabirds will already be lost during the construction phase due to the foundation of the OWF, but the new underwater structures will provide additional hard substrate on the seabed and in the water column. These structures will be colonized by zoobenthic communities that can attract fish and some birds. The scale of the impact will depend on the number of wind turbine foundations, their type and size. In addition, the area will see a decrease in the traffic of non-service vessels, including fishing boats. The scale of the phenomenon is described in the benthos impact assessment (Volume IV Chapter 3 of the EIA)

However, the deterrent effect of working power plants will mean that birds will not commonly use this feeding ground and the body of water occupied by the farm. The significance of this impact was therefore determined to be moderate or low, and for species that do not feed on benthos, the impact will not exist.

The development of the "artificial reef" will be a source of direct or indirect positive impacts on some seabirds (primarily bentophagous) of local extent, long-term, reversible, permanent during the period of operation, with low intensity. For some birds, the creation of an "artificial reef" will make no difference.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

The project in the parameters approved by the Environmental Decision is associated with the construction of about 80 less power plants, and thus the impact in the form of an "artificial reef" on birds will be less.

Analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be less than the impacts of the Project in the parameters approved by the Environmental Decision. The number of power plants will be drastically reduced, by about 70% in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which means fewer structures that can be colonized by zoobenthic communities.

Table 45. Creation of an "artificial reef" - analysis of impacts on individual seabird species (operational phase, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver Gavia arctica	Large	No	The species feeds exclusively on fish. Disturbance of benthic communities may indirectly affect ichthyofauna, but at	No change (No loss of the resource, no impact on the structure and	No change (magnitude of impact - no change, importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			the local scale of exposure, ichthyophages will not be affected	functioning of the resource)	the resource - high)
Red-throated diver Gavia stellata	Large	No	The species feeds exclusively on fish. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and functioning of the resource)	No change (magnitude of impact - no change, importance of the resource - high)
Uhla Melanitta fusca	Large	Tall (a species that feeds on benthic organisms)	High protection priority. High sensitivity of the species to the reduction of the food base.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Small (magnitude of impact - moderate; importance of resource - high)
Long-tailed duck Clangula hyemalis	Large	Tall (a species that feeds on benthic organisms)	High protection priority. High sensitivity of the species to the reduction of the food base.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Small (magnitude of impact - moderate; importance of resource - high)
Markaczka Melanitta nigra	Medium	Tall (a species that feeds on benthic organisms)	High protection priority. High sensitivity of the species to the reduction of the food base.	Negligible (scale of exposure - local; duration - long-term ; intensity - low)	Small (magnitude of impact - moderate; importance of the resource - medium)
Nurzyk Uria aalge	Medium	No	The species feeds exclusively on fish. Disturbance of benthic communities may	No change (No loss of the resource, no impact on the	No change (magnitude of impact - no change,

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	structure and operation of the resource)	importance of the resource - medium)
Alka Alca torda	Medium	No	The species feeds exclusively on fish. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)
Lesser Black-backed Gull Hydrocoloeus minutus	Large	No	The species does not feed on benthic organisms. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - high)
Silver gull Larus argentatus	Small	No	The species does not feed on benthic organisms. Disturbance of benthic communities may indirectly affect ichthyofauna, but at the local scale of exposure, ichthyophages will not be affected	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained. Although in this case it is referred to the impact, positive in nature, no less changes in the magnitude of the positive impact, due to at least simultaneous impacts associated with the avoidance of the farm area by birds, will not affect in this case a significant assessment of the overall impact of OWF BIII on birds.

9.2.4. Changes in the regime of sea currents

The presence of underwater structures of the wind farm will cause minor changes in hydrographic conditions in the project area, described in detail in the chapter of the EIA on impacts on the abiotic environment (Volume IV Chapter 2 of the EIA).

Modeling of hydrographic changes that may take place as a result of the construction of the BIII OWF has been performed (Volume II Chapter 11 of the EIA). Modeling results indicate that the predicted impact on hydrodynamic conditions is negligible.

From the perspective of seabirds, potentially the most significant impacts could be related to changes in the regime of sea currents. However, a decrease in current velocity greater than 2% compared to current conditions will be limited to the wind farm area only. Average velocity changes are estimated to be very small near the surface for each of the options considered (about 0.001 m/s). Hence, no noticeable impact is expected on birds that may forage in the wind farm area.

Analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be less than the impacts of the Project in the parameters approved by the Environmental Decision. The number of power plants will be sharply reduced, by about 70% in the set of parameters of the Undertaking representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the result of the environmental impact assessment carried out in the proceedings during which the Environmental Decision was obtained - after the implementation of the proposed changes, the Project will not cause a noticeable impact on birds due to a change in the regime of sea currents.

9.2.5. Summary and proposed minimization measures at the stage of operation

During the operation of the wind farm, changes in the way birds use space are expected. In the vast majority of cases, turbines act as a deterrent to birds and passing waterbirds sweep the wind turbine fields at distances ranging from 100 m to as much as 3,000 - 4,000 m (Christensen et al., 2004; Kahlert

et al., 2004a; Drewitt & Langston, 2006). The water bodies immediately adjacent to the gym are much less used as foraging and resting areas (Drewitt & Langston, 2006). The area where wind turbine masts will be erected ceases to be available as a feeding ground for birds, and in some cases noticeably lower bird densities are observed within a radius of up to 2 or even 4 km from the power plant (Petersen et al., 2004). Waterbirds' avoidance of the area where wind turbines stand leads to a reduced risk of collisions, so that mortality from collisions with power plant structures is significantly lower. The exceptions to this are gulls, such as the silver-backed gull considered in the environmental assessment, which use structures protruding from the water, including non-working wind turbines, as a resting place (Petersen et al., 2006) and show a higher incidence in the offshore wind farm construction phase than in the earlier period (Christensen et al., 2003). During the operational phase, the interest of seagulls in offshore wind farms decreases markedly (Petersen et al., 2006; Petersen & Fox, 2007).

In the content of the Environmental Decision, a number of conditions were imposed to minimize impacts on seabirds at the stage of operation of OWF BIII. The conditions imposed resulted from the impact assessment carried out on the basis of the 2015 Report and were proposed in the report in question as measures to reduce anticipated impacts. These are the following conditions:

- A maximum of 120 power plants with a minimum clearance between the bottom position of the rotor wing and the sea surface (mean sea level) of not less than 20 m, a rotor diameter of not more than 200 m, and a total height of the structure of not more than 275 m above sea level is allowed - condition II.B.1

- Include in the design of the farm a system that allows short-term shutdown of wind turbines in particularly severe weather conditions causing limited visibility during the period of the most intense bird migration, i.e., from March 15 to April 30 and from September 1 to October 15. The system is to ensure constant observation and recording of the stream of birds migrating through the farm area and immediate shutdown of turbines along the route of the anticipated passage of registered birds through the farm - condition I.3.12 of the Environmental Decision;

- During the bird migration period, i.e., from early July to mid-November and from early March to mid-May, on ships and farm structures, limit the use of strong light sources (e.g., floodlights) at night and do not direct light upward - condition II.B.1;

The proposed amendment to the terms of the Environmental Decision involves modifying the condition set forth in paragraph. II.B.1 and the waiver of the condition specified in paragraph. I.3.12.

The first of the conditions related to the need to reduce the impact on birds specified by the Environmental Decision, i.e. condition II.B.1, refers to certain parameters of the power plant, i.e. it indicates a maximum number of 120 power plants, a minimum clearance between the bottom position of the rotor wing and the sea surface of not less than 20 m, a rotor diameter of not more than 200 m and the height of the total structure of not more than 275 m above sea level. This report proposes and evaluates changing the condition on the number of power plants to a maximum of 60 power plants, leaving the minimum clearance between the bottom position of the rotor wing and the sea surface unchanged, i.e. not less than 20 m, and changing the rotor diameter to not more than 250 and changing the overall height of the structure to not more than 310

m. As demonstrated earlier, the parameter that can affect the impacts generated by wind turbines is the rotor diameter (the total height of the structure is actually derived from the diameter of the rotor

used). The key size is, depending on the diameter of a single rotor (rotor), the maximum total rotor zone, a size that also depends on the number of power plants comprising the OWF. As a result of the proposed changes, the maximum diameter of a single rotor is increased from 31,400^{m2} to 49,088^{m2}, but no less as a result of the simultaneous halving of the number of power plants, the maximum total rotor zone is reduced from 3,768,000^{m2} to 2,945,244^{m2} - i.e. by about 22% compared to the parameters of the Project approved by the Environmental Decision.

In addition, the 2015 Report indicated as one of the minimization measures at the operation stage of the Project the equipping of the farm with a system allowing the turbines to be briefly stopped at night during periods of migration during heavy haze (in case the results of radar surveys show that there is intense night migration over the area of the planned project). Nevertheless, it should be pointed out that the proceedings under which the Environmental Decision was issued was the first of the proceedings on the decision on environmental conditions for the OWF project in Poland. In the current situation, in which several environmental decision proceedings for offshore wind projects have been completed with the issuance of a decision, and others are pending, the experience gained allows for the abandonment of this condition.

In the presence of extremely unfavorable meteorological conditions, and thus potentially with the highest collision rate, seabirds practically do not undertake frequent movements. This is due to the fact that flights under such conditions involve too much energy expenditure, so the birds simply - saving energy - rest in safe, quiet places rather than move between points (Shamoun-Baranes, J., Liechti, F., & Vansteelant, W. M. (2017). Atmospheric conditions create freeways, detours and tailbacks for migrating birds. Journal of Comparative Physiology A, 203(6), 509-529).

Analyzing the potential obligations arising from this condition, it should be noted that limited visibility (0.5-2 nautical miles) occurs in the Polish part of the Baltic Sea on about 5-9% of days in October-April and 3-4% of days in May-September (Rokicinski, 2007). This means that a maximum of about 6 days with visibility limited to 0.5 - 2 nautical miles (i.e., from about 0.9 km to about 3.6 km) is recorded during the period when the condition in question would apply. Visibility limited to 3.6 kilometers can hardly be considered a limiting parameter that makes it necessary to activate the system in question, while the limitation to half of this parameter (taking into account the decrease in the frequency of days with limited visibility with the shortening of the visibility range) will mean the fulfillment of the rationale for applying the condition 1-2 times a year. Comparing the above values with the number of birds flying during the 9 months from March to November, this means that of the 276 days, the 2 days on which the system in question would be activated represent less than 0.75% of the total of the above period, with about one-fifth of all bird flights taking place in the range up to 300 meters, which means about 0.15% of the total recorded nighttime flights. However, taking into account the studies cited above on the failure of birds to undertake movements under extremely unfavorable meteorological conditions, the above value should be considered exorbitant and it should be assumed that the real rate will be even much lower.

It should also be noted that none of the OWF projects for which the decision on environmental conditions was issued after the Environmental Decision contains an analogous condition or proposal for a relevant measure. In a situation in which for the farms neighboring the BIII OWF analogous conditions have not been determined for the exploitation phase of the OWF, and there is no indication in the collected material from the pre-execution monitoring for these farms indicating the different nature and manner of movement of birds over the areas intended for their implementation, there is no

substantive basis for treating the body of water intended for the implementation of the BIII OWF in a different manner

In the situation where the OWF projects are planned along the east-west axis in the area of the Polish EEZ, i.e. in relatively similar environmental conditions, and taking into account the migration directions of birds in the area covered by the planned OWF projects, maintaining the condition in question for one OWF project will be meaningless from the point of view of achieving the purpose of the planned minimization measure. Undertaking this type of action in a relatively narrow section of a larger body of water with relatively homogeneous conditions will not allow the effectiveness of the measures taken. In addition, it should be emphasized that the condition in question is formulated in such a vague manner that it raises doubts about the possibility of its practical implementation. The condition is formulated using vague phrases or terms subject to subjective evaluation - "short-term exclusion," "particularly severe weather conditions," "limited visibility," "anticipated overflight by the farm." The lack of precise guidelines on the conditions for triggering the measure in question and how it will be implemented will create a huge potential for uncertainty regarding the compliance of BIII OWF operation with the terms of the Environmental Decision. Accordingly, it is proposed to waive the condition in question as part of the proceedings to amend the Environmental Decision.

9.2.6. Impacts cumulative

Assumptions for analyses of cumulative impacts of the BIII OWF and other projects on the environment are presented in Chapter 3.2. On the other hand, a broad description regarding this issue is provided in Section 13 of Volume II of the EIA report.

The impact assessment carried out in the 2015 Report adopted possible scenarios for wind farm development in the POM for cumulative impact analyses presented below:

Between 2021 and 2025, a total of 150 power plants and associated infrastructure will be operated under the BIII o Baltica 3 OWF projects. The 2015 Report indicates that such a scenario means that the level of cumulative impacts on abiotic environmental elements will be 75% of the level analyzed in the report as the 2015 NIS.

Between 2023 and 2026, a further 225 power plants will be built as part of the OWF BIII and OWF Baltica 3 projects, or alternatively, on the surfaces of OWF BII and OWF Baltica 2.This means that from 2026, a total of 375 power plants with infrastructure will be operated, in close proximity, near the northeastern end of the Slupsk Shoal, i.e. 87.5% more than in the rational alternative option evaluated in Chapter 9 of the study.

In the case of simultaneous operation of several projects, vessel traffic in adjacent areas also increases, with an increased risk of collisions and emergency oil spills. In the vicinity of the farm is a heavily used shipping route (Traffic Separation Scheme (TSS)), in the area of which the risk of oil spills increases. However, this type of impact is described in the chapter on potential cumulative unplanned impacts.

In assessing cumulative impacts in the 2015 Report, a variant was adopted when all the investments taken into account in the Report are fully implemented and in the operational phase. Not only those farms were taken into account, whose owners at that time had conditions for connection to the grid (OWF BII, OWF Baltica 2, OWF Baltica 3), but also two farms planned in their vicinity, which at that time

do not have such conditions, i.e. the OWF BII, OWF Baltica 2, OWF Baltica 3. C-Wind OWF and Baltic Power OWF.

The 2015 Report indicated that the body of water designated for the construction of the BII offshore wind farm is located at a distance of about 17 km from the border of the BIII offshore wind farm. This distance is quite sufficient for the birds to have a sufficiently large feeding area between these investments, as well as leaving a wide strip to avoid both power plants during the migration period. For this reason, the cumulative impact on waterbirds from offshore wind farms OWF BIII and OWF BII, which are located at a considerable distance from each other, was considered low. The offshore wind farms Baltica 2 and Baltica 3 are directly adjacent to the offshore wind farm BIII area. The cumulative impact from them was assessed to be greater, and for 8 species it was rated moderate. It has been pointed out that once all six farms are built, there will be a significant reduction in the availability of feeding grounds, resulting in major changes in the distribution of birds in this part of the Baltic. There will also be an extensive barrier along the birds' flight path, the bypassing of which will significantly increase flight time. An additional important aspect, is the location of the barrier so created in relation to marine Natura 2000 areas. In particular, the close proximity of Slupsk Shoal, which is a significant long-tailed duck wintering ground in the Baltic, may cause intensive movements of birds in the area. Hence, the total cumulative impact on waterbirds of all six wind farms was assessed as high for both species of divers, long-tailed duck, and uhla. These species have a high conservation priority and are highly sensitive to the presence of offshore wind farms. The impact on those farm species that will enter the operation phase earliest will be moderate, and in the case of the first farm, the BIII OWF, low. The mutual location of successively emerging wind farms is also significant here. For example, after the construction of OWF BIII, the construction of OWF BII and OWF C- Wind will not have such a large cumulative impact due to the presence of gaps of several kilometers between the areas occupied by the power plants. There will be no such large interruptions in the case of the Baltica 2 and Baltic Power OWF projects in their maximum variants. In view of this, the 2015 Report stated that the construction of the first of the wind farms under consideration will strongly affect the magnitude of the impact of the farms that follow. Subsequent developments bordering the BIII offshore wind farm will have to take into account the risk of significant negative impacts on marine avifauna, which is unlikely to allow their maximum variants. As a minimizing measure in the design of these, subsequent developments have indicated that it may be necessary to consider the appropriateness of using undeveloped migration corridors with a width of no less than 4 km.

Cumulative impacts from gas extraction investments were considered difficult to assess due to the lack of data on potential projects. It was pointed out that the magnitude of these impacts would depend on the number of mining towers operating on the two licensed surfaces - it was considered that in the case of the operation of one platform, the impact would be minimal and could be ignored.

A summary of the cumulative impacts on seabirds, at the operational stage assessed in the 2015 Report is provided in the table below.

Table 46 Potential cumulative impacts at the stage of operation of OWF BIII (NIS 2015)

Species	IMF BS II	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Gas production licenses	Cumulative impact
Black-throated diver *Gavia arctica*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Large - formation of an extensive barrier; species of high conservation priority and high skittishness.
Red-throated diver *Gavia stellata*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Large - formation of an extensive barrier; species of high conservation priority and high skittishness.
Uhla *Melanitta fusca*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Large - formation of an extensive barrier; species of high conservation priority and high skittishness.
Long-tailed duck *Clangula hyemalis*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Large - formation of an extensive barrier; species of high conservation priority and

Species	IMF BS II	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Gas production licenses	Cumulative impact
							high skittishness.
Markaczka *Melanitta nigra*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Moderate - formation of an extensive barrier; species of low conservation priority and high skittishness. However, its abundance in the area in question is very low.
Nurzyk *Uria aalge*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Moderate - formation of an extensive barrier; species of low conservation priority and moderate skittishness. However, its abundance in the area in question is low.
Alka *Alca torda*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Moderate - formation of an extensive barrier; species of low conservation priority and

Species	IMF BS II	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Gas production licenses	Cumulative impact
							moderate skittishness. However, its abundance in the area in question is low.
Lesser Black-backed Gull *Hydrocoloeus minutus*	Small	Small	Small	Small	Small	Small to moderate, depending on the number of drilling rigs.	Small - very low abundance of this species.
Silver gull *Larus argentatus*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Moderate - formation of an extensive barrier; species of low conservation priority and low skittishness. Its presence in the area in question depends on fishing activity (the birds accompany fishing hens).

Source: Meissner W., "Ornithological monitoring of the area of the OWF Central Baltic III. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b

At the time of the cumulative impact assessment, the relevant technical parameters of most of the OWF projects under consideration were not known. Hence, in order to assess cumulative impacts, the assumptions described above were made.

As a result of the assessment, it was concluded, based on the above calculations and analyses, that there will be no significant collision, and the barrier effect with the application of minimization measures will not significantly affect seabirds residing in the area of the farm.

Compared to the assumptions of the scenarios adopted in the 2015 Report, the timing of all planned projects has changed, and they have all been delayed. Compared to the cumulative impacts considered for analysis, the status of gas concession projects has changed. Issued licenses have expired and new licenses for gas exploration and production have not been issued, either to replace expired licenses or for new, different areas. Since the issuance of the Environmental Decision, preparations for other OWF projects have advanced. An environmental decision has been issued for the BIII offshore wind farm projects, and a joint environmental decision has been issued for the Baltica 2 and Baltica 3 offshore wind farm projects, as well as environmental decisions for the Baltic Power and FEW Baltic II projects, while proceedings are underway for an environmental decision for the C-Wind offshore wind farm project. All of the indicated projects, both those for which an environmental decision has been obtained, as well as the project for which proceedings for an environmental decision are underway, provide for minimization measures to limit the impact of the planned projects, especially from the point of view of cumulative impacts. The main two impact mitigation solutions provided by the OWF projects are to move the area planned for the construction of the power plant away from the border of the Slupsk Shoal Natura 2000 area by a distance of no less than 2 km for projects in the immediate vicinity of the area. As the areas around Slupsk Shoal are important for use by birds during the winter season, especially by long-tailed ducks, these measures are expected to reduce the displacement effect of the emerging power plant infrastructure. An additional minimizing measure that is being adopted for projects in the vicinity of Slupsk Shoal is the prohibition of influence on the Slupsk Shoal area by units involved in the project from November 1 to April 30.

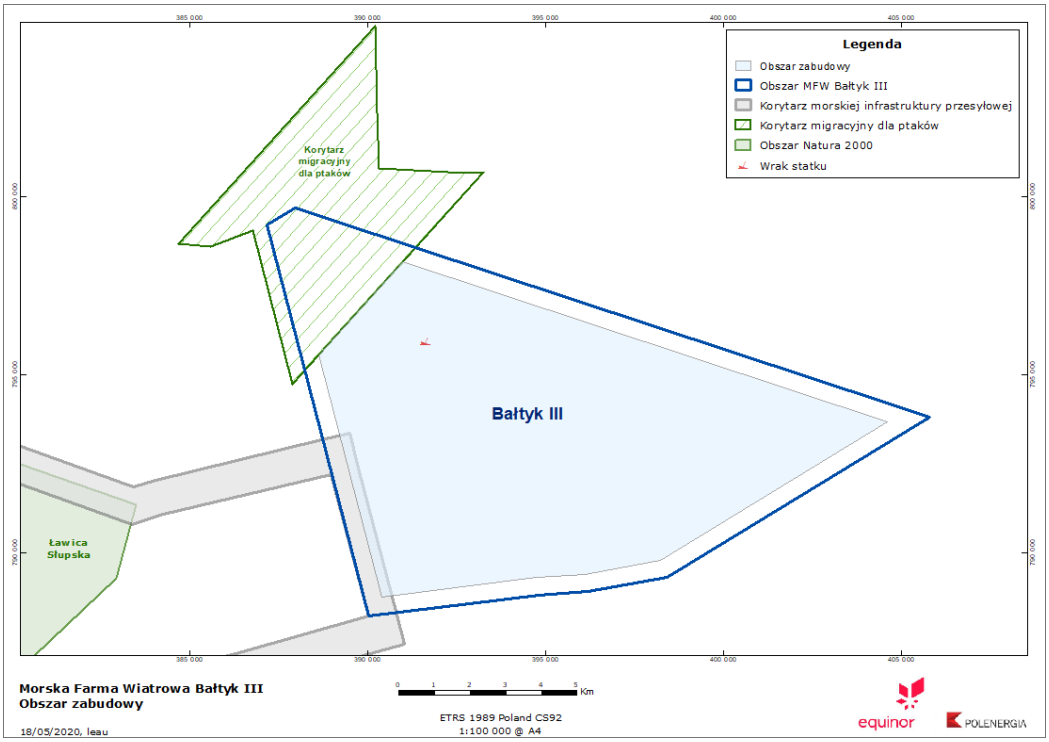
Another measure to reduce cumulative impacts associated with OWF projects is to leave areas between OWF projects free of power plant development. This type of action is intended to mitigate the impacts associated with the creation of barrier effects and displacement, including during the construction phase of individual projects. The effectiveness of this solution depends on the provision of a sufficiently wide development-free strip. This type of solution was implemented in the terms of the environmental conditions decision issued for the Baltica OWF, and it provides for leaving a 5 km corridor free of power plant development between the Baltica 2 and Baltica 3 areas - condition II.3.9 of the environmental conditions decision, mark RDOŚ- Gd-WOO.4211.21.2017.MJ.PW.AJ.37.

Similar solutions were proposed in the project impact report for the Baltic Power project, they assumed leaving an additional area between the Baltica 3 offshore wind farm and the Baltic Power offshore wind farm free of power plant development, and supporting the above-described 5 km corridor, and also assumed leaving a 4 km wide free area east of the area planned for development within the Baltic Power project.

Taking into account the analysis of the potential environmental impacts of the project, and taking into account the need to continue the corridor designated in the decision on environmental conditions for the Baltic offshore wind farm, at the stage of work on this EIA Report, the Investor has made additional restrictions on the use of the offshore wind farm development area due to the possibility of a negative impact of the investment on seabirds. In the course of design work, a decision was made to leave the area located in the west-north corner of the farm undeveloped with power plants, in such a way as to create an unobstructed 5 km wide corridor undeveloped with power plants, crossing the areas of the

Baltic III OWF and Baltica 2 and Baltica 3 OWF farms in the SW-NE direction - the figure below illustrates the locations of the planned exclusion from development.

Figure 47 Location of the area of additional exclusion from development to create a migration corridor



Korytarz migracyjny dla ptaków	Migration corridor for birds
Ławica Słupska	Slupsk Shoal
Bałtyk III	Baltic III
Morska Farma Wiatrowa Bałtyk III Obszar zabudowy	Offshore Wind Farm Baltic III Development area
Legenda	Legend
Obszar zabudowy	Development area
Obszar MFW Bałtyk III	Baltic III offshore wind farm area
Korytarz morskiej infrastruktury przesyłowej	Offshore transmission infrastructure corridor
Korytarz migracyjny dla ptaków	Migration corridor for birds
Obszar Natura 2000	Natura 2000 area
Wrak statku	Shipwreck

source: provided by the Contracting Authority

The above-described minimization measure creating a 5 km corridor between the Baltica 2 and Baltica 3 areas was considered in the course of the completed environmental decision proceedings as a measure that effectively reduces the cumulative impacts of the planned projects to a level that will not cause significant negative impacts on seabirds. Similarly, in environmental impact reports for other OWFs, measures to keep corridors free of development have been assessed as effectively reducing cumulative impacts.

The proposed modification of the parameters of the Project's execution and operation conditions significantly reduces the number of power plants planned for construction in relation to the parameters of the Project approved in the Environmental Decision - by 50%, and by 70% in relation to the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015. In addition, an

additional measure to further mitigate the impact of cumulative impacts that may arise is the proposal to designate a power plant-free corridor between the Project and the Baltic offshore wind farm. Modifying the parameters of the Project in accordance with this concept would ensure that a corridor with a minimum width of 5 km would remain free of power plant development.

Given that the proposed changes to the Project's implementation and operation conditions do not lead to a change in the nature or magnitude of the impact of any of the construction phase's impacts on seabirds, it should be concluded that the proposed change to the Project's implementation conditions will not affect the nature and magnitude of cumulative impacts. The implementation of the proposed modifications, due to the reduction in the number of power plants and the proposed mitigation measures, will help reduce potential cumulative impacts.

9.3. Stage decommissioning

Assessing the impact of the BIII offshore wind farm on individual bird species during the decommissioning phase is hampered by the lack of data on similar projects, as no offshore wind farm has yet entered this stage. It was assumed that the impact would be medium-term, admittedly, for the Project under the revised parameters, the number of power plants (60) would be 50% less than the parameters approved in the Environmental Decision and 70% less than the set of parameters for the Project representing the most far-reaching scenario - NIS 2015. In the case of wind farm decommissioning under modified parameters, the time for decommissioning activities will be significantly reduced, but it cannot be ruled out that, especially in the case of unfavorable weather conditions in the autumn-winter-spring period, it will be longer than 1 year. A factor that will negatively affect birds may be their crowding by vessels operating in the area. Gradually dismantling the powerhouses will expose the birds to a body of water that can become an attractive feeding ground for benthophagous birds such as long-tailed duck and uhla. It is expected that zoobenthic communities will develop on the bottom of the area occupied by the turbines during the period of the power plant's operation. Thus, it can be assumed that the decommissioning of the offshore wind farm of the BIII OWF will result in at least a periodic positive effect, where the abundance of feeding grounds in the body of water released from the power plant will be higher than before the construction of the power plant. For all species, the impact of the offshore wind farm during its decommissioning phase was assessed as small or negligible for individual populations.

The analysis of individual types of offshore wind farm impacts on seabirds at the decommissioning stage is presented in Chapter 9.1. (on the construction stage). In the case of the proposed modification of the Project's parameters, it was assumed that the medium-term impacts of the Project during the construction and decommissioning phases in the case of vessel and helicopter traffic, increased noise levels, lighting of the demolition site and disturbance to the benthic communities would be similar in nature or in some cases less than for the Project in the parameters approved by the Environmental Decision, and in particular to the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015. This is primarily due to the smaller number of powerhouses, which in the first place translates into a smaller total time of occurrence of each type of impact. In any case, the impacts for the Project in the modified parameters will not change their nature, and the magnitude of the impact will never be greater than that assessed for both the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

The specific impacts of the decommissioning stage are the gradual disappearance of tall structures resulting in the disappearance of the barrier blocking access to the rich benthic communities that will develop in the area of the offshore wind farm during its operation. They are analyzed below.

9.3.1. Removal of structures power plants

The specific impacts of the decommissioning stage are the gradual disappearance of tall structures resulting in the disappearance of the barrier blocking access to the rich benthic communities that will develop in the area of the offshore wind farm during its operation. The significance of this impact for all species considered was assessed as low or negligible.

The gradual removal of BIII OWF structures will be a source of direct or indirect, negative or positive impacts on seabirds of local extent, medium-term, reversible, repeatable during the decommissioning period, with intensity depending on the species.

The 2015 Report considered that the impacts of the Project in the parameters approved by the Environmental Decision and the parameters defined by the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, would be characterized by similar magnitude and significance of impacts on birds. Although these variants differed in the number of electors (120 and 200 respectively), nevertheless, given the apparent avoidance of seabirds of the area occupied by wind turbines and the decrease in their numbers within a radius of up to 2 or even 4 km (Christensen et al., 2003; Petersen et al., 2006; Leopold et al. 2011), the magnitude and significance of this impact will not be significantly affected.

Analyzing the impact of the proposed modifications to the Project on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be comparable to or slightly less than those specified for the Project in the parameters approved by the Environmental Decision. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. The change in the number of wind power plants will significantly translate into a reduction in the time associated with the decommissioning stage of the BIII OWF, but due to the impossibility of determining the decommissioning schedule, it is not possible to determine whether, due to the reduction in the number of power plants under construction, there will be changes in the number of seasons during which the decommissioning process will be carried out, and thus determine the actual scale of impact reduction.

Table 48. Removal of power plant structures - analysis of impacts on individual seabird species during decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Black-throated diver Gavia arctica	Large	High (high sensitivity to crowing Table 20)	High conservation priority and high sensitivity to crowing, but rarely found in the	Small (scale of exposure - local; duration - medium-term, gradually	Small (magnitude of impact - low; importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			study area. As more power plants are removed, the impact will gradually decrease.	decreasing; intensity - high)	resource - high)
Red-throated diver Gavia stellata	Large	High (high sensitivity to crowing Table 20)	High conservation priority and high sensitivity to crowing, but rarely found in the study area. As more power plants are removed, the impact will gradually decrease.	Small (scale of exposure - local; duration - medium-term, gradually decreasing; intensity - high)	Small (magnitude of impact - low; importance of resource - high)
Uhla Melanitta fusca	Large	High (high sensitivity to crowing Table 20)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site. As more power plants are dismantled, the impact will gradually decrease.	Small (scale of exposure - local; duration - medium-term, gradually decreasing; intensity high)	Small (magnitude of impact - low; importance of resource - high)
Long-tailed duck Clangula hyemalis	Large	Medium (moderate sensitivity to crowing Table 20)	High protection priority. High sensitivity of the species to crowding, but low abundance at the project site. As more power plants are dismantled, the impact will gradually decrease.	Small (scale of exposure - local; duration - medium-term, gradually decreasing; intensity high)	Small (magnitude of impact - low; importance of resource - high)
Markaczka Melanitta nigra	Medium	High (high sensitivity to crowing Table 20)	Low protection priority, low incidence of individuals sitting on the water in the project area. As more	Small (scale of exposure - local; duration - medium-term, gradually	Small (magnitude of impact - low; importance of

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			power plants are dismantled, the impact will gradually decrease.	decreasing; intensity high)	the resource - medium)
Nurzyk Uria aalge	Medium	Medium (moderate sensitivity to crowing Table 20)	Low protection priority, low incidence of individuals sitting on the water in the project area. As more power plants are dismantled, the impact will gradually decrease.	Small (scale of exposure - local; duration - medium-term, gradually decreasing; intensity high)	Small (magnitude of impact - low; importance of the resource - medium)
Alka Alca torda	Medium	Medium (moderate sensitivity to crowing Table 20)	Low protection priority, low incidence of individuals sitting on the water in the project area. As more power plants are dismantled, the impact will gradually decrease.	Small (scale of exposure - local; duration - medium-term, gradually decreasing; intensity high)	Small (magnitude of impact - low; importance of the resource - medium)
Lesser Black-backed Gull Hydrocoloeus minutus	Large	Medium (poor sensitivity to crowing Table 20)	High conservation priority, but rare bird appearances in the project area. The presence of ships may result in more numerous birds in the area.	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Small (magnitude of impact - moderate; importance of resource - high)
Silver gull Larus argentatus	Small	Medium (poor sensitivity to crowing Table 20)	Common species of low conservation priority Low shyness of the species. It congregates in the open sea near ships and structures protruding from the water that provide	Negligible (scale of exposure - local; duration - medium-term; intensity - medium)	Negligible (magnitude of impact - insignificant; importance of the resource - low)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			resting places for gulls.		

Source: Meissner W. "Ornithological monitoring of the OWF Central Baltic III area. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

The proposed modifications to the conditions for implementation and operation of the Project do not affect the conditions for implementation of the Project specified in the Environmental Decision, and introduced due to limitations on the impact on birds during the decommissioning phase of the Project. Nor is it the subject of this Report to change these conditions.

9.3.2. Impacts cumulative

None of the Baltic wind farms has yet entered the decommissioning stage, and therefore it is difficult to predict how numerous bird groupings will be in a zone freed from wind power. When assessing the magnitude of cumulative impacts during decommissioning of the BIII OWF, it was assumed that at that time the other, neighboring investments will still be at the operational stage. It is expected that with the gradual removal of wind turbine masts, the negative impact of scaring birds away from the area occupied by structures high up out of the water will decrease. The body of water freed from the power plant will most likely become, at least temporarily, an attractive feeding ground for sea ducks (mainly long-tailed duck), because during the period of operation of the power plant, zoobenthic communities will develop on the bottom of the area occupied by the turbines, providing food for these birds. The Baltica 2 and Baltic Power offshore wind farms adjacent to the BIII offshore wind farm area will certainly act as a deterrent, hence the cumulative impact from it for the four high conservation priority species has been assessed as moderate, which translates into the same impact assessment for all investments. The density of birds in the foraging area newly created after the decommissioning of OWF BII will vary. Low densities are to be expected along the border of the subject basin and the neighboring wind farm. The deterrent effect should also reduce the risk of collisions, although even here there may be concerns about, for example, possible restrictions on the movement of birds to the new feeding ground from eastern directions, which will lead through areas occupied by other offshore wind farms.

The changes introduced by the proposed amendment to the Environmental Decision in no way alter the nature, spatial extent or magnitude of the impacts generated.

Table 49 Potential cumulative impacts at the decommissioning stage of OWF BIII (NIS 2015)

Species	OWF Baltic Central II	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Gas production licenses	Cumulative impact
Black-throated diver *Gavia arctica*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Moderate - species of high conservation priority high skittishness.
Red-throated diver *Gavia stellata*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Moderate - a species of high conservation priority and high skittishness.
Uhla *Melanitta fusca*	Small	Moderate	Moderate	Moderate	Moderate	Small to moderate, depending on the number of drilling rigs.	Moderate - a species of high conservation priority and high skittishness.
Long-tailed duck *Clangula hyemalis*	Small	Moderate	Moderate	Moderate	Moderate	Small or moderate, depending on the number of towers	Moderate- species of high conservation priority
						drilling.	and high skittishness.
Markaczka *Melanitta nigra*	Small	Small	Small	Small	Small	Small to moderate, depending on the number of drilling rigs.	Small - a species of low conservation priority and high skittishness. However, its abundance

Species	OWF Baltic Central II	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Gas production licenses	Cumulative impact
							in the area in question is very low.
Nurzyk *Uria aalge*	Small	Small	Small	Small	Small	Small to moderate, depending on the number of drilling rigs.	Small - a species of low conservation priority and average skittishness. Its abundance in the area in question is low.
Alka *Alca torda*	Small	Small	Small	Small	Small	Small to moderate, depending on the number of drilling rigs.	Small - a species of low conservation priority and average skittishness. Its abundance in the area in question is low.

Species	OWF Baltic Central II	IMF Baltica 2	IMF Baltica 3	Baltic Power OWF	IMF C-Wind	Gas production licenses	Cumulative impact
Lesser Black-backed Gull *Hydrocoloeus minutus*	Small	Small	Small	Small	Small	Small to moderate, depending on the number of drilling rigs.	Small - very low abundance of this species.
Silver gull *Larus argentatus*	Small	Small	Small	Small	Small	Small or moderate, depending on the number of drilling rigs.	Small - a species of low conservation priority and average skittishness. Its abundance in the area in question depends on fishing activity (the birds accompany fishing boats).

Source: Meissner W. "Ornithological monitoring of the OWF Central Baltic III area. Final Report with Impact Assessment," Pomarinus, Gdansk, 2015, based on Christensen et al. 2003, 2006, Furness et al. 2013, Garthe & Hüppop 2004, Kahlert et al. 2004b.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental

Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

10. Impacts related

The considered asset - seabirds - may be indirectly affected during the implementation of the planned project by impacts from several factors. The type of seabed and sediment largely determines the formation of zoobenthic communities, which are the food of long-tailed ducks (long-tailed duck, scoters, scoters). During the construction and decommissioning phases, the bottom will be disturbed at wind turbine foundation sites. The effect of the destruction of the benthic communities will be temporary, as they will recover spontaneously after about a year. The noise generated by the construction and demolition of the farm acts as a deterrent to birds, especially when it occurs in conjunction with increased boat traffic. This effect will occur only at the stage of construction and decommissioning of the power plant, because the noise generated by wind turbines is of little importance to birds due to the fairly rapid process of habituation (getting used to the constant presence of a given factor that does not cause immediate danger). High noise levels generated during military operations (military ships and aircraft) negatively affect birds, driving them out of the vast area. However, in the vicinity of the offshore wind farm, this factor is not expected to be of any importance, as military activity will not take place here for security reasons. Fishing causes gulls to congregate near fishing boats and provides these birds with food in the form of fish scraps. This factor can be considered positive for these birds.

The predicted associated impacts for waterbirds are of marginal significance and will not become a source of significant negative impact. Hence, ratings for individual waterbird species were omitted.

Table 50 Matrix of interrelationships between waterbird impact receptors

	Hydrology and	Seabed	Sediments	Mineral resources	Acoustic environment	Atmosphere	Bentos	Fish	Marine mammals	Birds	Bats	Fishing	Shipping and navigation	Military operations	Military aviation	Civil aviation	Radar systems	Landscape	Tourism and recreation	Material goods	Maritime industry	Health and life of people	Cultural heritage
Hydrology and hydrochemistry																							
Seabed							X																
Sediments							X																
Mineral resources																							
Acoustic environment										X													

Atmosphere																						
Bentos										X												
Fish										X												
Marine mammals																						
Birds																						
Bats																						
Fishing										X												
Shipping and navigation					X					X												
Military operations					X					X												
Military aviation					X					X												
Civil aviation																						
Radar systems																						
Landscape																						
Tourism and recreation																						
Material goods																						
Maritime industry																						
Health and life of people																						
Cultural heritage																						

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Explanations: Along the vertical axis, first-order receptors are listed, representing a potential source of impacts on receptors listed along the horizontal (second-order) axis. "X" indicates the existence of a potential direct relationship between the receptors in question.

11. Impacts unplanned

Unplanned impacts result from sudden unplanned events or failures that are not related to activities included in the project schedule (e.g., leakage of toxic substances into the water due to a collision between two vessels).

In assessing the significance of unplanned impacts, additional factors were taken into account, i.e. the probability of an event that will be the source of the impact and its potential consequences.

Based on data from other OWF projects and from similar projects, as well as on the knowledge and experience of the study's authors, the following potential **unplanned events** that could become a source of **unplanned environmental impacts of offshore wind farms** were selected:

- leakage of petroleum substances as a result of a collision, accident or construction disaster (during normal operation or in an emergency),
- accidental release of municipal waste or domestic sewage,
- accidental release of construction materials or chemicals,
- contamination of the water tone and bottom sediments with antifouling agents.

It should be noted that as a result of unplanned events, the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. On the other hand, indirectly, these events can also affect living organisms that inhabit or otherwise use the seabed, the water table and the sea surface.

A full description of potential unplanned events can be found in Chapter 12 of Volume II. In contrast, indirect impacts of unplanned events on seabirds are assessed below, based on this description.

11.1. Spill of petroleum substances (during normal operation of the vessels)

TW During the normal operation of ships, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) can occur. It should be assumed that these spills will be small (stage I), up to 20^{m3}.

Oil spills for seabirds are the biggest threat (Meissner 2005), and other unplanned events are of little concern.

It is important to remember that the key issue here is not so much the size of the spill, but where it originated. Indeed, there are known cases of high bird mortality with small oil spills at sea. Extensive oil patches drifting away from the coasts, in bodies of water with very low bird counts, do not involve as much population loss as a small spill at the site of numerous concentrations of marine avifauna (Meissner 2005). In the area of the planned OWF BIII wind farm, bird densities were not high, and the estimated average abundance of the entire grouping did not exceed 1,000 individuals in the entire area designated for the project (cf: Ornithological monitoring of the area designated for the construction of offshore wind farm OWF BIII.

Final Report with Study Results, Volume III, Chapter 8 of the EIA). Analysis of the rate and direction of spread of the oil spill in the area of the wind farm in question indicates that only at wind strengths above 3°B can the spill be expected to reach the eastern part of the "Slupsk Shoal" Natura 2000 area. Taking into account the average wind distribution for the Southern Baltic, the drifting pollution patch will not reach nearby marine Natura 2000 areas after 24 hours. With the predicted maximum extent of the spill arising at the border of the wind farm area, it could reach the borders of one of the two Natura 2000 areas after 18 to 24 hours:

"Slupsk Shoal" or "Baltic Coastal Waters"(Pawelec et al. 2014). However, assuming the rate of movement of the stain at 30 cm/s, it should undergo an emulsification process and disappear after 12-18 hours of drifting on the surface (Pawelec et al. 2014). Thus, it can be assumed that oil spills due to accidents will not entail high losses among seabirds.

Measures to prevent and minimize oil spills are described in Chapter 12 Volume II of the EIA.

The Project in the parameters approved in the Environmental Decision was considered to have a lower impact than the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, which entails 40% fewer power plants compared to NIS 2015. This is because a smaller number of power plants involves the use of a correspondingly smaller number of vessels and shorter time required for investment, operation or decommissioning. Thus, the number of potential leaks will decrease proportionally.

In analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be recognized that the impacts associated with the Project's implementation will be less than those determined for the Project in the parameters approved by the Environmental Decision, and less than the set of parameters for the Project representing the most far-reaching scenario - the 2015 NIS. The number of power plants will be sharply reduced, by about 70% compared to the furthest-reaching NIS 2015 scenario and 50% compared to the parameters of the Project approved by the Environmental Decision. As in the case of comparing the impacts of the Project in the parameters approved by the Environmental Decision to the 2015 NIS, the number of vessels used during the construction, operation and decommissioning phases of the farm also affects the possibility of such impacts.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.2. Spill of petroleum substances (in an emergency situation emergency)

During the construction, operation or decommissioning of the farm, a shipwreck or collision or construction disaster of one of the farm facilities may occur. Such an event could entail a spill of petroleum substances, resulting in significant pollution of the water table and bottom sediments. Such leakage can also occur during maintenance work.

In the event of a collision or ship collision, a Grade III spill, i.e., more than 50^{m3}, can be expected, and the maximum possible volume of such a spill is estimated at about $200^{m3\ of}$ petroleum substance (Pawelec et al., 2014). Large oil spills can cause significant losses in seabird populations (Meissner, 2005), but in the case of the BIII offshore wind farm, this will depend on wind strength and direction, as discussed above.

It has been calculated that the probability of serious accidents is very low, on the order of $^{10-5}$ - $^{10-4}$. For the Southeast Baltic, which may include the BIII offshore wind farm area, the risk of collision was estimated at 1 case per 1060 years. In such a case, there are organizational structures, plans of conduct

in carrying out actions to combat hazards and pollution, and effective methods of cleaning up pollution (see the chapter on unplanned events, Section 12 Volume II of the EIA).

The assessment of the impact on seabirds of the proposed change in the Project does not differ from the assessment presented in the section above.

11.3. Accidental release of municipal waste or wastewater domestic

During the construction of the wind farm, waste, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage, will be generated on vessels as well as at the construction facilities located on land (at the port serving the project). Their expected types of quantities, as well as how they will be handled, are presented in Chapter 10 of Volume II of the EIA. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident, causing a local increase in nutrient concentrations and deterioration of water and sediment quality.

The Project in the parameters approved in the Environmental Decision was considered to have a lower impact than the set of parameters of the Project representing the most far-reaching scenario - NIS 2015), which entails 40% fewer power plants compared to NIS 2015. This is because a smaller number of power plants involves the use of a correspondingly smaller number of vessels and shorter time required for investment, operation or decommissioning. Thus, the potential possibility of releasing municipal waste or domestic sewage into the water will decrease proportionally.

In analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be recognized that the impacts associated with the Project's implementation will be less than those determined for the Project in the parameters approved by the Environmental Decision, and less than the set of parameters for the Project representing the most far-reaching scenario - the 2015 NIS. The number of power plants will be drastically reduced, by about 70% compared to the furthest-reaching NIS 2015 scenario and 50% compared to the parameters of the Project approved by the Environmental Decision. As in the case of comparing the impacts of the Project in the parameters approved by the Environmental Decision to the 2015 NIS, the number of vessels used during the construction, operation and decommissioning phases of the farm, as well as the time required to carry out operations related to these phases, also affects the possibility of such impacts.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.4. Accidental release of chemicals and waste from the construction, operation or decommissioning of a farm

During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at

the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that about $5^{m3\ of}$ product could sink during handling. Grouts, mortars and other binders often contain hazardous substances. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 $^{g\text{-}cm\text{-}1}$, they sink and are deposited on the bottom. These substances are considered a serious threat because they cannot be easily removed from the bottom and are toxic to marine organisms.

During the operation of the farm, maintenance of its facilities will be carried out. Accidental release of small amounts of waste or operating fluids into the sea cannot be ruled out.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out this work (cf. description of the decommissioning stage), and the greatest contamination may occur if gravity foundations have to be crushed.

The amount of these substances accidentally released into the environment does not appear to be large, herds it is estimated that the possible occurrence of the above emergency events will not affect the structure and functioning of the seabird grouping in the project area or cause mortality.

The Project in the parameters approved in the Environmental Decision was considered to have a lower impact than the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, which entails 40% fewer power plants compared to NIS 2015. Thus, the potential possibility of releasing chemicals and waste from the construction, operation or decommissioning of the farm into the water will be reduced proportionately.

In analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be recognized that the impacts associated with the Project's implementation will be less than those determined for the Project in the parameters approved by the Environmental Decision, and less than the set of parameters for the Project representing the most far-reaching scenario - the 2015 NIS. The number of power plants will be drastically reduced, by about 70% compared to the furthest-reaching NIS 2015 scenario and 50% compared to the parameters of the Project approved by the Environmental Decision. Thus, the potential possibility of releasing waste or chemicals into the water will decrease proportionally.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.5. Contamination of water depths and bottom sediments with agents antifouling

To protect the hulls of ships from overgrowth, biocidal substances are used, which may include, for example, copper compounds, mercury compounds, organotin compounds. These substances can pass

into the water's depths and eventually be retained in the sediment. It should be assumed that the emission of these compounds will be limited by dilution in the water depths. Tributyltin (TBT), which is the most harmful substance in antifouling paints, is currently banned, but the presence of this compound in the coating of the hulls of older vessels cannot be ruled out.

Due to the small number of vessels in the project area, it is estimated that the possible occurrence of the above emergency events will not affect the structure and functioning of the seabird grouping in the project area or cause mortality.

The Project in the parameters approved in the Environmental Decision was considered to have a lower impact than the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, which entails 40% fewer power plants compared to NIS 2015. This is because a smaller number of power plants entails the use of a correspondingly smaller number of vessels and the time required to carry out the operations necessary for investment, operation or decommissioning. Thus, the potential for antifouling agents to contaminate the water tone and bottom sediments will decrease proportionately.

In analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the Project's implementation will be less than those specified for the Project in the parameters approved by the Environmental Decision, and less than the 2015 NIS. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. As in the case of comparing the impacts of the Project in the parameters approved by the Environmental Decision to the 2015 NIS, the number of vessels used during the construction, operation and decommissioning phases of the farm also affects the possibility of such impacts.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.6. Cumulative impacts in emergency situations emergencies

The only unplanned impact that may be cumulative will be potential oil spills resulting from a disaster or collision. In the case of simultaneous operation of several wind farms, vessel traffic in neighboring areas also increases, with an increased risk of such an event. As with individual spills, their impact on seabirds will depend strongly not only on the size of the spill, but also on the strength and direction of the wind. It will be practically possible to determine the actual extent of the spill only during the event, based on current meteorological data and data on the type and amount of pollution.

12. Assessment of the impact on the integrity, coherence and object of protection of Natura

2000 sites

This chapter analyzes the impact of the proposed changes to the Project on the impacts caused by the BIII OWF, individually and in cumulation with other projects, on the integrity, coherence and object of protection of Natura 2000 areas as a result of impacts on seabirds residing, at least seasonally, in the area of the proposed farm.

The assessment was performed in accordance with the methodology described in Section 5 of Volume I, Chapter 4.3.13.

The report also includes the second part of the assessment, on impacts on migratory birds. It can be found in Section 5.2. The two assessments complement each other, so it is recommended that they be analyzed together.

12.1. Initial assessment - screening

Pre-assessment is the process by which the project's likely impacts on Natura 2000 sites are identified (either singly or in conjunction with other projects or plans) and an analysis is made of whether the anticipated impacts are likely to have a significant effect on these sites.

12.1.1. Zone of potential impacts of the OWF BIII

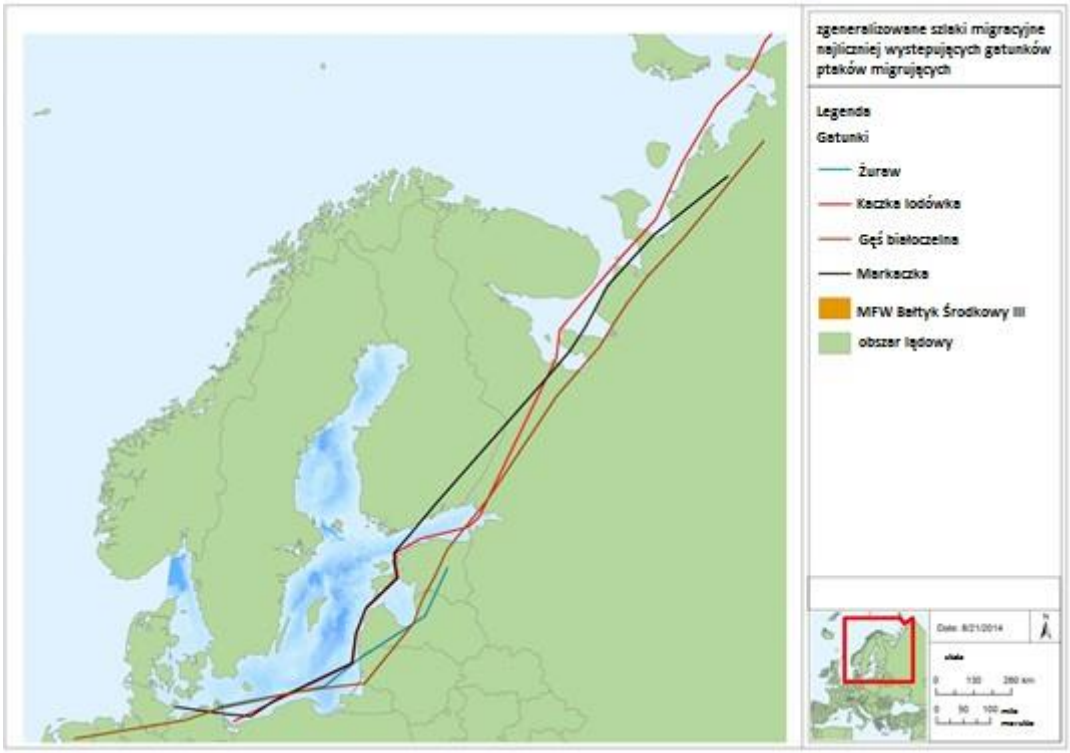
In the case of assessing the impacts of OWF BIII on seabirds, indicating the extent of potential impacts is extremely difficult, especially in the context of assessing the impact on birds wintering in a given sea area. Indeed, this farm, located in close proximity to a marine area that is an important wintering ground for some populations of Eurasian seabirds, may, in combination with other similar projects planned in the immediate vicinity, through a barrier effect or significant mortality from bird-rotor collisions, affect the status of seabird populations migrating to this wintering ground, and thus also affect the ecosystems in the places to which the populations in question migrate for the breeding season. However, since bird migration streams generally follow multiple corridors or are spread over wide areas, the impacts of wind farms on migratory birds, even when cumulative with other projects and anthropopressures, are usually not significant impacts. However, in accordance with the precautionary principle, the assessment of the impact of OWF BIII on seabirds was made in the 2015 Report with an assessment of the impact on migratory populations, including in terms of impacts on the integrity and coherence of Natura 2000 areas (see below and in Chapter 12 of Chapter 5 Part 2 of Volume IV).

This chapter will present an assessment for seabirds.

However, since wintering species are key among seabirds in the BIII offshore wind farm area, the impact assessment must be linked to aspects of migration to and from wintering grounds. The literature indicates that seabirds show a strong attachment to their wintering site (Iverson & Esler 2006, Kirk et al. 2008, Oppel et al. 2008), hence it is unlikely that after the construction of OWF BIII, birds wintering in the study area would change their fall migration destinations to locations farther than 20 km. During the migration period, passing birds mostly avoid offshore wind farms, and the maximum observed radius of such obstacle passing is 5 km (Petersen et al. 2006). The construction of a wind turbine field on a body of water at sea is therefore not expected to shift the flight paths of birds over a distance of tens of kilometers. Taking into account the above statements and the existing practice in the already

performed assessments of the impact of offshore wind farms on birds in both the Baltic and the North Sea, there is no basis for considering the impact of the investment in question on Natura 2000 areas lying at a greater distance than 20 km.

Figure 19 Migration routes of the four bird species/groups analyzed



zgeneralizowane szlaki migracyjne najliczniej występujących gatunków ptaków migrujących	generalized migration routes of the most abundant migratory bird species
Legenda	Legend
Gatunki	Species
Żuraw	Crane
Kaczka lodówka	Long-tailed duck
Gęś białoczelna	White-fronted goose
Markaczka	Markaczka
MFW Bałtyk Środkowy III	OWF Central Baltic III
Obszar lądowy	Land area
Mile morskie	Sea miles
Skala	Scale
Data	Date

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Apart from wintering birds, as shown in Chapter 8 of Volume III, presenting the results of seabird monitoring, the BIII offshore wind farm area and its immediate vicinity does not harbor any species of seabirds on a permanent, intensive basis, and does not provide habitat of importance to their biology and ecology.

12.1.2. Natura 2000 areas in the impact zone of the OWF BIII

The planned project will not be located in any Natura 2000 special bird protection area. There are also no plans to create new areas of this type in the area. However, the following SPAs are located within 20 km of the area of the planned project:

- Coastal waters of the Baltic PLB990002 - about 8 km in a southerly direction from OWF BIII;
- Slupsk Shoal PLC990001 - about 5.5 km westward from OWF BIII.

These areas are described below.

Special Bird Protection Area Natura 2000 "Coastal waters of the Baltic Sea" PLB990002

The Przybrzeżne wody Bałtyckie PLB990002 Natura 2000 site, which is also an IBA PLM2 site and a bird sanctuary of European rank E 80, is located to the south at a distance of about 8 km from the BIII Wind Farm. It covers the coastal waters of the Baltic Sea with a depth of 0 to 20 meters. Its boundaries stretch for 200 kilometers, starting from the base of the Hel Peninsula and ending at the Pomeranian Bay. The seabed is uneven, with denivelations reaching 3 meters. The area is wintered in significant numbers by 2 species of birds from Annex I of Council Directive 79/409/EEC: black-throated diver and red-throated diver (C7). During the winter there is more than 1% of the long-tailed duck's migratory path (C3) population, at least 1% of the guillemot and uhla. The benthic fauna is dominated by small crustaceans. Large marine mammals - gray seals Halichoerus grypus and ringed seals Phoca hispida and porpoises Phocaena phocaena - are rarely observed.

Special Bird Protection Area Natura 2000 "Slupsk Shoal" PLC990001

Slupsk Shoal Natura 2000 site PLC990001, which is also an IBA refuge PLM1, is located to the west at a distance of about 5.5 km from OWF BIII. It is a bird sanctuary of European rank E 79.

Slupsk Shoal is a body of water in the southern Baltic Sea, encompassing an area with a highly varied bottom with numerous hills and depressions with depths ranging from about 8.0 to about 35.0 meters. The shallowest parts of the bottom include elevations within the so-called "boulder pit" in the northern and western parts of the area (minimum depth of about 8.0 m) and parts of the sandy bottom of the central part of the area (minimum depth of about 12.0 m). The deepest parts of the bottom (up to 35 m) are located in the southeastern part of the area. The dominant plants are macroalgae, with many species already disappearing in the Gulf of Gdansk. There are no bird species from Annex I of Council Directive 79/409/EEC. During the winter, at least 1% of the long-tailed duck (C3) population of the following species occurs here: long-tailed duck, guillemot, and uhla. Wetland birds occur in concentrations of more than 20000 individuals (C4). Isolated are the sites - habitat 1170 (marine bivalve shoals) in Polish marine waters. The shallows are inhabited by numerous invertebrates, providing a rich food base for the flocks of wetland birds that stop in autumn and winter here. It is the site of the crayfish Delesseria sanguinea, which is considered lost in the Baltic Proper.

12.1.3. The object of protection of Natura 2000 areas in the zone impacts

The object of protection of the two Natura 2000 areas described above is shown in the following tables.

Table 51 Przybrzeżne Wody Bałtyckie PLB990002 - species covered by Article 4 of Directive 2009/147/EC and species listed in Annex II to Directive 92/43/EEC and the assessment of the importance of the area for these species

Code	Scientific name	Species	Population				Assessment of the importance of the area			
			Settled	Migrating			Population	State of the west	Insulation	Overall
				Reproductive	Overwintering	Transient				
BIRDS										
A200	*Alca torda*	alka			500-1000		C	C	C	C
A202	*Cepphus grylle*	plunger			1500		B	B	C	B
A064	*Clangula hyemalis***	long-tailed duck			90 (90 000 - 12 000)		B	C	C	B
A002	*Gavia arctica**	black-throated diver			200-500		D			
A001	*Gavia stellata**	red-throated diver			100-500		D			
A184	*Larus argentatus*	silvery gull			8000-15000		C	C	C	C
A182	*Larus canus**	common gull			1000		D			
A066	*Melanitta fusca***	uhla			14		C	C	C	C
A065	*Melanitta nigra*	scotch				3000	C	B	C	C
A655	*Melanitta nigra*	scotch			5000-8000 (14 000-20 000)		C	B	C	C

* population assessment D (the species is not a subject of protection of the area)

** - the SDF form incorrectly states the population size. The values quoted in parentheses are from BirdLife International (http://datazone.birdlife.org/site/factsheet/central-polish-coastal-waters-iba-poland/details, accessed 05.2022) containing data provided for the SDF form.

Source: Standard Data Form

Table 52. Slupsk Shoal PLC990001 - types of natural habitats found in the area and assessment of the importance of the area for these habitats:

Code	Name of habitat	Coverage [ha]	The degree of reprezen.	Relative area.	Preserv ation status.	Overall assess ment
1110	submarine sandbanks	30926.65	A	A	A	A
1170	reefs	13814.64	A	A	A	A

Source: Standard Data Form

Table 53. Slupsk Shoal PLC990001 - species covered by Article 4 of Directive 2009/147/EC and species listed in Annex II to Directive 92/43/EEC, as well as an assessment of the importance of the area for these species

Code	Scientific name	Species	Population				Assessment of the importance of the area			
			Settled	Migrating			Populatio n	Wester n conditi on.	Insulati on	Overall
				Reproduct ive	Overwinteri ng	Transient				
BIRDS										
A001	*Gavia stellata*	red-throated diver			28-66		D			
A002	*Gavia artica*	black-throated diver			93-173		D			
A064	*Clangula hyemalis*	long-tailed duck			101 148 - 231 180		B	A	C	B
A064	*Clangula hyemalis*	long-tailed duck				76 440 - 214 373	B	A	C	B
A202	*Cepphus grylle*	plunger			98-556		C	A	C	C
A202	*Cepphus grylle*	plunger				72-461	C	A	C	C
A066	*Melanitta fusca*	uhla			5 565 - 23 611		B	A	C	B
A066	*Melanitta fusca*	uhla				910 - 1 789	C	A	C	C

Source: Standard Data Form

Seabird species listed in Annex I of Directive 2009/147/EC of the European Parliament and of the Council

Of the 4 species of seabirds from Annex I of the Birds Directive found in Natura 2000 areas located within 20 km of the boundaries of the planned project, three were found during pre-investment monitoring. Their abundance in the Natura 2000 areas considered here is so low that they are not a

subject of protection. On this basis, the impact of the planned project on the integrity and cohesion of the Natura 2000 network can be determined as insignificant.

Table 54. Species of seabirds listed in Annex I of the Directive of the European Parliament and of the Council 2009/147/EC occurring in Natura 2000 areas and found during ornithological monitoring in the area of the surface of OWF BIII

Species name	Slupsk Shoal	Baltic Coastal Waters	Pobrzeże Słowińskie	IMF area
Black-throated diver *Gavia arctica*	+	+		+
Pollack diver *Gavia stellata*	+	+		+
Horned grebe *Podiceps auritus*		+		
Lesser Black-backed Gull *Hydrocoloeus minutus*		+	+	+

Explanations:

- The gray line denotes a species that was found during monitoring and is on the list of species found in at least one Natura 2000 site.

Sources: SDF forms of Natura 2000 sites, results of unpublished own observations

Regularly occurring species included those whose average density in the project zone at least in one phenological period exceeded 1 per sq. ^{km}, or were seen during at least half of the survey cruises made in one of the highlighted phenological periods. Of the seven seabird species that met the criteria, five are protected in at least one nearby Natura 2000 site. Of these, only in the case of the long-tailed duck and the silver-backed gull did the total abundance recorded during the 24 research cruises exceed 2,000 individuals (long-tailed duck - 3163 individuals, silver-backed gull - 2294 individuals). Per trip made during the winter period (December-February), 417 long-tailed ducks and 188 silver-backed gulls were found (Chapter 8 Volume III of the EIA). Compared to other bodies of water lying in the Polish Baltic zone, these abundances can be considered very low. During one cruise of similar length of trasects, made in the winter period, an average of 4600 long-tailed ducks are encountered on Slupsk Shoal (Ornithological monitoring of the NATURA 2000 area "Slupsk Shoal". Final report with survey results - see Chapter 8 Volume III) and about 1,800 in the Baltic Coastal Waters (Monitoring of Wintering Seabirds - unpublished data from 2013). Thus, the area designated for the construction of OWF BIII is not a place of significant concentrations of long-tailed ducks, but it is located in close proximity to one of the most important wintering grounds in the Baltic Sea - the Slupsk Shoal Natura 2000 area, so at this stage it is not possible to unequivocally state the lack of impact of the project on the integrity and cohesion of this area, in terms of potential impacts on the long-tailed duck. The silver-backed gull congregates in the coastal zone in the greatest numbers, and in the open sea it primarily congregates in areas where fishing vessels operate. In January 2013, an average of 260 silver-backed gulls were encountered during a one-day cruise within the "Coastal Baltic Waters" area (Monitoring of Wintering Seabirds - 2013 unpublished data). After the construction of the wind farm, fishing activity in the area will decrease and the number of gulls in the area can be expected to be even lower.

Table 55. Seabird species not listed in Annex I of the Directive 2009/147/EC of the European Parliament and of the Council regularly occurring during ornithological monitoring of the BIII OWF area

Species name	Slupsk Shoal	Baltic Coastal Waters	Pobrzeże Słowińskie	IMF area
Long-tailed duck *Clangula hyemalis*	+	+	+	+!
Uhla *Melanitta fusca*	+	+	+	+!
Marquise *Melanitta nigra*	+	+	+	+!
Silver gull *Larus argentatus*	+	+	+	+!
Saddleback gull *Larus marinus*	+	+	+	+
Yellow-legged gull *Larus fuscus*	+	+	+	+
Cepphus grylle diver	+	+		+!

Explanations:

- The gray line denotes a species that was found during monitoring and is on the list of species found in at least one Natura 2000 site.
- Species that are the subject of protection in one of the Natura 2000 areas are marked in red.
- The symbol +! denotes a species found during monitoring at the project site, which is also the subject of protection of one of the Natura 2000 areas.

Sources: SDF forms of Natura 2000 sites, results of unpublished own observations

In addition to seabirds residing in and adjacent to the BIII OWF area, all species of migratory birds were analyzed. During the ornithological monitoring conducted for this project, 126 species of migratory birds were recorded in the area of the planned project. Their list is juxtaposed in the table below with the bird species found in the special bird protection areas described above.

Seabird species that were found during monitoring and are on the list of species occurring, in at least one Natura 2000 area, are highlighted in grey inthe tables.

The species that are the subject of protection of the Natura 2000 area, on the other hand, are highlighted in red.

The most relevant situation from the point of view of assessment is when the species found during monitoring at the project site is at the same time the subject of protection of one of the surrounding SPAs. This situation is marked in Table 56 with an(x!).

Table 56. Bird species covered by Article 4 of Directive 2009/147/EC occurring in the Natura 2000 area and found during monitoring

Lp.	Latin name	Species	Baltic Coastal Waters	Slupsk Shoal	Monitoring
1	*Accipiter nisus*	sparrowhawk			x
2	*Acrocephalus indet.*	reed sp.			x

Lp.	Latin name	Species	Baltic Coastal Waters	Slupsk Shoal	Monitoring
3	*Actitis hypoleucos*	screech-owl			x
4	*Aegithalos caudatus*	raniuszek			x
5	*Alauda arvensis*	lark			x
6	*Alca torda*	alka	X		x!
7	*Alca torda / Uria aalge*	alka/nurzyk			x
8	*Alcidae indet.*	alki sp.			x
9	*Anas acuta*	antler			x
10	*Anas clypeata*	platypus			x
11	*Anas crecca*	cyranid			x
12	*Anas penelope*	gopher			x
13	*Anas platyrhynchos*	crossword			x
14	*Anas strepera*	krakwa			x
15	*Anatinae indet.*	ducks sp.			x
16	*Anser albifrons*	white-fronted goose			x
17	*Anser anser*	goose			x
18	*Anser fabalis*	bean goose			x
19	*Anserini indet.*	goosebumps sp.			x
20	*Anthus pratensis*	meadow pipit			x
21	*Anthus trivialis*	wood pipit			x
22	*Apus apus*	swift			x
23	*Ardea cinerea*	grey heron			x
24	*Asio flammeus*	marshmallow			x
25	*Asio otus*	earwig			x
26	*Asio sp.*	owls sp.			x
27	*Aves spec.*	unidentified bird			x
28	*Bucephala clangula*	goldeneye			x
29	*Buteo buteo*	buzzard			x
30	*Calcarius lapponicus*	chirp			x
31	*Calidris canutus*	redheaded diarrhea			x
32	*Carduelis cannabina*	macaw			x

Lp.	Latin name	Species	Baltic Coastal Waters	Slupsk Shoal	Monitoring
33	*Carduelis carduelis*	pinkie			x
34	*Carduelis chloris*	bellwether			x
35	*Carduelis flavirostris*	turnip			x
36	*Carduelis spinus*	whether			x
37	*Cepphus grylle*	plunger	X	x	x!
38	*Chlidonias hybrida*	tern			x
39	*Chlidonias niger*	black tern			x
40	*Circus aeruginosus*	harrier			x
41	*Clangula hyemalis*	long-tailed duck	X	x	x!
42	*Columba livia*	city pigeon			x
43	*Columba oenas*	bruise			x
44	*Columba palumbus*	mane			x
45	*Corvus corone*	blackbird			x
46	*Corvus frugilegus*	rook			x
47	*Cygnidae indet.*	swans sp.			x
48	*Cygnus columbianus*	bewick's swan			x
49	*Cygnus cygnus*	whooper swan			x
50	*Cygnus olor*	mute swan			x
51	*Delichon urbica*	eyepiece			x
52	*Emberiza citrinella*	trznadel			x
53	*Emberiza schoeniclus*	potrzos			x
54	*Erithacus rubecula*	redhead			x
55	*Falco indet.*	falcon sp.			x
56	*Falco subbuteo*	hobo			x
57	*Falco tinnunculus*	kestrel			x
58	*Ficedula hypoleuca*	mourning flycatcher			x
59	*Ficedula parva*	small flycatcher			x
60	*Fringilla coelebs*	chaffinch			x
61	*Fringilla montifringilla*	jer			x
62	*Gallinago gallinago*	snipe			x

Lp.	Latin name	Species	Baltic Coastal Waters	Slupsk Shoal	Monitoring
63	*Gavia arctica*	black-throated diver	X	x	x
64	*Gavia sp.*	nury sp.			x
65	*Gavia stellata*	red-throated diver	X	x	x
66	*Grus grus*	crane			x
67	*Hirundo rustica*	spring onion			x
68	*Larus argentatus*	silvery gull	X		
69	*Larus canus*	common gull	X		x
70	*Larus fuscus*	yellow-legged gull			x
71	*Larus indet.*	gull sp.			x
72	*Larus minutus*	little gull			x
73	*Larus ridibundus*	laughingstock			x
74	*Limicolae indet.*	biegus sp.			x
75	*Locustella naevia*	cricket			x
76	*Lullula arborea*	lerka			x
77	*Melanitta fusca*	uhla	X	X	x!
78	*Melanitta indet.*	melanitta sp.			x
79	*Melanitta nigra*	scotch	X		x!
80	*Mergus merganser*	partridge			x
81	*Mergus serrator*	szlachar			x
82	*Motacilla alba*	grey wagtail			x
83	*Motacilla flava*	yellow wagtail			x
84	*Motacillidae indet.*	pliszki sp.			x
85	*Numenius arquata*	curlew			x
86	*Numenius phaeopus*	curlew			x
87	*Oenanthe oenanthe*	whitetail			x
88	*Pandion haliaetus*	osprey			x
89	*Parus caeruleus*	large praying mantis			x
90	*Parus major*	richard			x
91	*Passer montanus*	mazurka			x
92	*Passeriformes indet.*	sparrows			x

Lp.	Latin name	Species	Baltic Coastal Waters	Slupsk Shoal	Monitoring
93	*Phalacrocorax carbo*	cormorant			x
94	*Philomachus pugnax*	battalion			x
95	*Phoenicurus ochruros*	cinderella			x
96	*Phoenicurus phoenicurus*	pleonasm			x
97	*Phylloscopus collybita*	primrose			x
98	*Phylloscopus sibilatrix*	woodland marmot			x
99	*Pluvialis apricaria*	golden plover			x
100	*Podiceps cristatus*	great crested grebe			x
101	*Prunella modularis*	nettle			x
102	*Regulus ignicapillus*	zniczek			x
103	*Regulus regulus*	mice			x
104	*Riparia riparia*	shorebird			x
105	*Scolopax rusticola*	elephant			x
106	*Somateria mollissima*	edredon			x
107	*Stercorariidae indet.*	otters sp.			x
108	*Stercorarius parasiticus*	sharp-tailed otter			x
109	*Stercorarius parasiticus / pomarinus*	sharp-eyed otter/ blunt-eyed otter			x
110	*Sterna hirundo*	tern			x
111	*Sterna hirundo / paradisaea*	common tern/aspirate tern			x
112	*Sterninae indet.*	terns sp.			x
113	*Sturnus vulgaris*	spike			x
114	*Sylvia atricapilla*	hood			x
115	*Sylvia curruca*	freckle			x
116	*Tadorna tadorna*	ohar			x
117	*Tringa totanus*	bloodroot			x
118	*Troglodytes troglodytes*	shrike			x
119	*Turdidae indet.*	thrushes sp.			x
120	*Turdus iliacus*	thrush			x
121	*Turdus merula*	blackbird			x

Lp.	Latin name	Species	Baltic Coastal Waters	Slupsk Shoal	Monitoring
122	*Turdus philomelos*	singer			x
123	*Turdus pilaris*	quack			x
124	*Uria aalge*	nurzyk			x
125	*Vanellus vanellus*	lapwing			x

Sources: SDF forms of Natura 2000 sites, results of unpublished own observations

As part of the preliminary assessment, a potential negative impact of the BIII OWF on the Natura 2000 bird areas in the vicinity of the farm was identified, through impacts on the bird species listed below.

As can be seen from the above summaries, the potential negative impact of the project may affect 5 species of seabirds that are the objects of protection of at least one of the above-mentioned Natura 2000 areas:

1. Alka - a species included in the regularly occurring migratory birds not listed in Annex I of the Birds Directive;
2. Diver - a species classified as a regularly occurring migratory bird not listed in Annex I of the Birds Directive;
3. Long-tailed duck - a species classified as a regularly occurring migratory bird not listed in Annex I of the Birds Directive;
4. Uhla - a species included in the regularly occurring migratory birds not listed in Annex I of the Birds Directive;
5. Marquise - a species included in the regularly occurring migratory birds not listed in Annex I of the Birds Directive.

Only seabirds that may be present in the study area are included in this Chapter. In contrast, species of waterbirds associated with terrestrial environments were omitted, as well as typically terrestrial birds that cannot stay on the surface of the water, hence they have to move over the sea in one non-stop flight during the migration period. In addition, all of the above species have been subjected to the impact assessment of the BIII OWF for their migratory populations over the farm area, also in the context of the Natura 2000 impact assessment in Chapter 5 Part 2 of Volume IV.

A description of the above species, including their sensitivity to potential impacts from offshore wind farms, is described in Chapter 8 above.

12.1.4. Impacts of OWF BIII on the object of protection, integrity, coherence of Natura 2000 areas

The assessment used data from ornithological monitoring, the SDF of nearby SPAs, and the recommendations of the European Commission's guide "Wind Energy Development and Natura 2000."

Annex II to this guide provides a list of bird species identified by EC experts as particularly sensitive to the impact of wind farms. It considers three types of potential negative impacts of wind farms on avifauna, through:

- habitat loss,
- mortality from collisions with the gym,
- creating a barrier effect,

according to the following risk scale: significant, medium, potential, negligible.

The above impacts are described in detail in Chapter 7 above. An assessment of the impacts on individual seabird species is presented in Chapter 9 above.

12.1.5. Zone of potential impacts cumulative

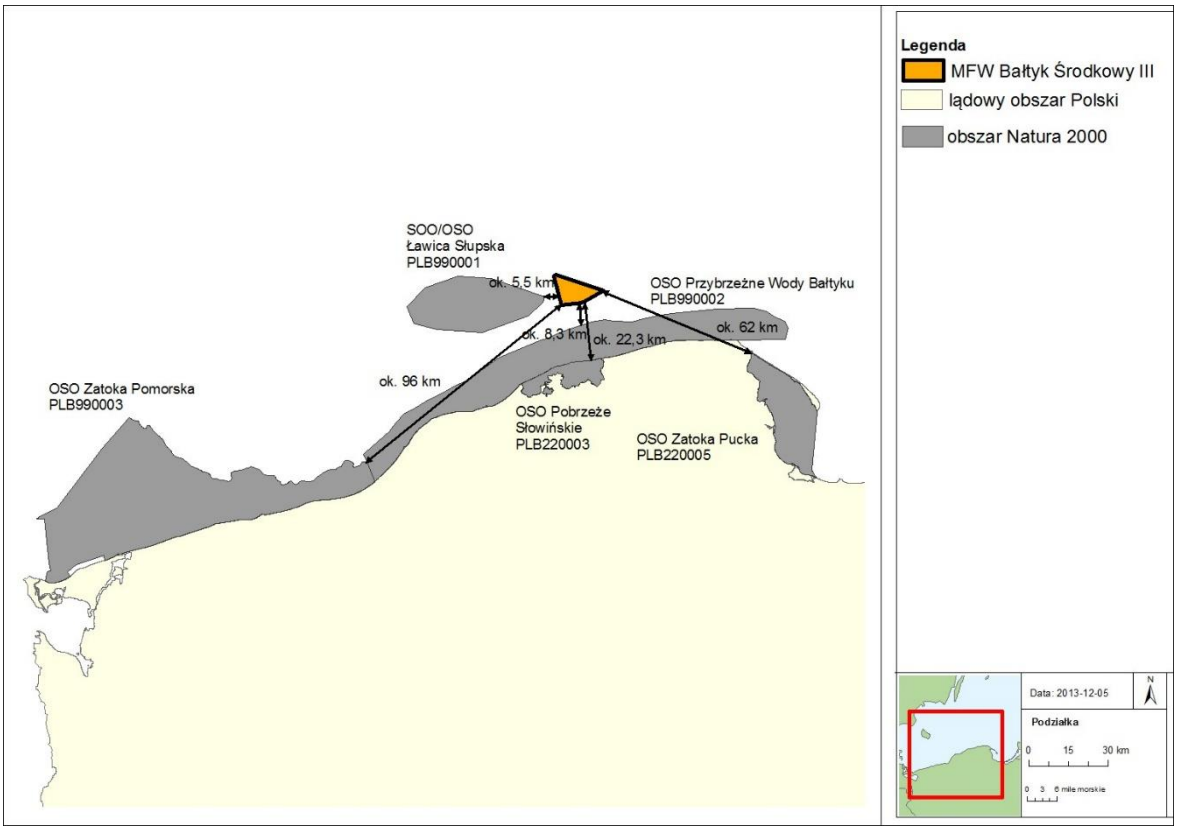
There are other offshore wind farm projects planned in the immediate vicinity of the BIII OWF (described extensively in Section 3.2 above), the cumulative cumulative impact of which on seabirds is described for the various stages of project development in Sections 9.1.10., 9.2.7. and 9.3.2. above. The 2015 Report stated that an analysis of cumulative impacts indicates that the BIII OWF, in cumulation with other projects, may affect birds more than individually.

As can be seen from the analysis of the potential barrier effect on the stream of migratory birds in the study area (see Section 9.2.3), the cumulative impacts will not significantly increase the extent of this impact.

The literature indicates that seabirds show a strong attachment to their wintering site (Iverson & Esler 2006, Kirk et al. 2008, Oppel et al. 2008), hence it is unlikely that after the construction of even a few wind farms in the area, birds wintering in the study area would change their fall migration destinations to locations farther than 50 km. During the migration period, passing birds mostly avoid offshore wind farms, and the maximum observed radius of such obstacle passing is 5 km (Petersen et al. 2006). The construction of a wind turbine field on a body of water at sea is therefore not expected to shift the flight paths of birds over a distance of tens of kilometers. Taking into account the above statements and the existing practice in the already performed assessments of the impact of offshore wind farms on birds both in the Baltic and the North Sea, there is no basis to consider the impact of the investment in question in the context of cumulative impacts on Natura 2000 areas lying at a greater distance than 50 km.

12.1.6. Natura 2000 areas in the potential range of influence of the project

Figure 20. Location of the body of water intended for the construction of the offshore wind farm OWF BIII in relation to the nearest Natura 2000 areas



OSO Zatoka Pomorska	SPA Pomeranian Bay
SOO/OSO Ławica Słupska	SAC/OSO Slupsk Shoal
Ok. 5,5 km	Approximately 5.5 km
OSO Przybrzeżne Wody Bałtyku	SPA Baltic Coastal Waters
Ok. 8,3 km	Approximately 8.3 km
Ok. 22,3 km	Approximately 22.3 km
Ok. 62 km	Approximately 62 km
Ok. 96 km	Approximately 96 km
OSO Pobrzeże Słowińskie	SPA Pobrzeże Słowińskie
OSO Zatoka Pucka	SPA Puck Bay
Legenda	Legend
MFW Bałtyk Środkowy III	OWF Central Baltic III
Lądowy obszar Polski	Land area of Poland
Obszar Natura 2000	Natura 2000 area
Data 2013-12-05	Date 2013-12-05
Podziałka	Pitch
Mile morskie	Sea miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

An additional area considered in the 2015 Report in the context of cumulative impact, the project is the Pobrzeże Słowińskie area (PLB220003). The 21819.43-hectare area protects the landscape and the variety of morphological forms observed on the Gardner-Lebanon Spit, including the two largest

brackish coastal lakes: Lebsko (7140 hectares, max. gl. 6.3 m) and Gardno (2468 ha, max. depth. 2.6 m) along with adjacent meadows, bogs, forests and swamp forests. The area also includes coastal marine waters included in 2004. The area is listed as a Ramsar Convention site. There are at least 28 species of birds from Annex I of Directive 2009/147/EC of the European Parliament and of the Council, most of which are associated with terrestrial environments. During the migration period, there is at least 1% of the migratory path population of three waterbird species: white-tailed eagle, bean goose and partridge. Cormorant, white-fronted goose and marmot occur in relatively high numbers. A large population of silver-backed gulls also nests here.

12.1.7. Object of protection of Natura 2000 areas in the zone of cumulation impacts

Among the numerous bird species under protection in the Pobrzeże Słowińskie area, only two species can be considered marine species, permanently occurring in the study area, and therefore eligible for assessment in this study. These include the silver-backed gull and the yellow-legged gull. However, only the silvery gull has the status of a subject of protection of the Pobrzeże Słowińskie area.

Table 57. Basic information on seabirds covered by Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC contained in the Standard Data Form (SDF) for the Pobrzeże Słowińskie area

Species	Population	Abundance (individuals)	Percentage of the migratory route population
Silver gull *Larus argentatus*	settled	400	Less than 1%
Yellow-legged gull *Larus fuscus*	nesting	2 pairs	Less than 1%

Source: Standard Data Form

Yellow-legged gull Larus fuscus low abundance - only 85 individuals of this species were found. The results indicate that the area of OWF BIII does not lie on their migration route and the species appears here in small numbers. Due to the low abundance of birds in the study area, the planned investment will therefore not have a negative impact on the population of yellow-legged gulls.

Approximately 310,000 individuals winter in the Baltic Sea outside the coastal zone, (Durinck et al. 1994), but the highest concentrations of silver-backed gulls are observed in winter near fishing ports and on municipal landfills (Meissner et al. 2007, Neubauer 2011). The wintering population in Europe is currently estimated at about 4 million birds (Wetlands International 2006).

The silver-backed gull Larus argentatus is the most numerous gull species and one of the two most abundant waterbird species found in the study area. The largest number of silver-backed gulls was in the study area during the spring migration period, when the average abundance was estimated at about 570 individuals in the investment zone and about 900 in the buffer zone. The gulls were widely dispersed, and maximum densities slightly exceeding the value of 5 os./km^2 were recorded in autumn in a small area in the northwestern part of the buffer zone. In the zone of the planned project, the densities were low and never exceeded 5 os./km^2. The number of silver-backed gulls in the study area was low. The species forms concentrations of thousands in the coastal zone, especially around fishing ports (Meissner et al. 2007), and their presence in the open sea, away from the shore, is strongly influenced by the presence of fishing boats catching fish. The silvery gull is not a species of high conservation priority, and its importance as a resource has been described as low.

12.1.8. Results of the evaluation preliminary

Taking into account the types of impacts of offshore wind farms on seabirds, as well as the uncertainty of the scale and effects of these impacts on the quality and abundance of populations that are the subject of protection of Natura 2000 areas, it is not possible to state unequivocally on the basis of the preliminary assessment that OWF BIII will not significantly affect the integrity and object of protection of the areas Słupsk Bank, Przybrzeżne Wody Bałtyckie, as areas protecting wintering populations of seabirds, through the impact in the form of a barrier that impedes access to these wintering grounds. Significant impacts on the coherence of the Natura 2000 network can also not be ruled out, in the context of impacts on some species of Annex 1 of the Birds Directive, which migrate in large numbers to wintering grounds in the study area.

Given the possible cumulation of impacts with other planned offshore wind farms, potential impacts on populations of the silvery gull, which is the subject of protection of the Pobrzeże Słowińskie area, cannot be ruled out either. However, taking into account the low importance of the silvery gull as a natural resource, the prevalence of this species in the region, and the results of the impact assessment carried out for this species (Chapter 9 above), it should be concluded that there is no risk of significant impacts on the integrity, coherence and object of protection of Natura 2000 areas due to the impacts of OWF BIII on this species.

With regard to the Black Guillemot Cepphus grylle and the Yellow-legged Gull Larus fuscus, due to the very low numbers found in the area of OWF BIII (19 individuals of the Black Guillemot and 85 individuals of the Yellow-legged Gull), indicating, that the area of OWF BIII does not lie on their migration route and is not an important habitat for the biology and ecology of these species, it should be considered that there is no threat of significant impacts on the integrity, coherence and object of protection of Natura 2000 areas in the context of the impacts of the assessed project on these species.

Taking the above into account, it was deemed necessary in the 2015 Report to perform a proper assessment of the impacts on:

- coherence of Natura 2000 areas, in the context of the possibility of a barrier effect for seabirds migrating to and from wintering grounds located in the zone of potential impacts of the BIII OWF, which are the subject of protection within the Natura 2000 network,
- the integrity of the areas Slupsk Bank and Baltic Coastal Waters, as destinations for wintering birds and their migration,
- the following species of seabirds, whose wintering populations in these areas are the subject of protection of the Natura 2000 network:
    1. Alka,
    2. Long-tailed duck,
    3. Markaczka,
    4. Uhla.

12.2. A proper assessment of the Natura 2000

A proper assessment is an evaluation of the impact of a project or plan on the integrity of a Natura 2000 site - either individually or in combination with other projects or plans. The following assessment is carried out for wintering populations of 4 seabird species, for the structure of 2 areas, their functions and conservation objectives for seabirds, and the coherence of the Natura 2000 network in the context of the protection of Eurasian wintering bird populations over the South Baltic.

12.2.1. Targets and conservation status of vulnerable species impacts

The first step in a proper assessment should be to find out which of the area's conservation objectives are likely to be significantly disturbed by the BIII OWF, either alone or in cumulation with other projects.

The overall goal for Natura 2000 sites is to maintain or restore the favorable conservation status of habitats and species protected within the site. In the context of protecting seabird populations, important features of the study areas will be:

- their location on the migration route of marine birds of Eurasian populations to wintering grounds located in the area,
- suitable habitat conditions that constitute the attractiveness of these areas as wintering grounds or resting places during the autumn and/or spring migration of seabirds,
- the availability of these areas for wintering populations.

In the context of maintaining the coherence and conservation objectives of migratory birds within the Natura 2000 network, it is further important to preserve the possibility of movement between areas of bird populations, without the threat of significant depletion of population status and/or significant energy inputs that may affect the ecology and biology of these populations.

In its current state, before the construction of OWF BIII and other OWF projects in Polish marine areas, the conservation status of the protection objectives of wintering and migratory birds in the areas Slupsk Bank, Przybrzeżne Wody Bałtyku and Pobrzeże Słowińskie is appropriate.

12.2.2. Potential impacts significant

The assessment used data from ornithological monitoring, the SDF of nearby SPAs, and the recommendations of the European Commission's guide "Wind Energy Development and Natura 2000."

Annex II to this guide provides a list of bird species identified by EC experts as particularly sensitive to the impact of wind farms. It considers three types of potential negative impacts of wind farms on avifauna, through:

- habitat loss,
- creating a barrier effect,
- mortality from collisions with the gym.

The above types of impacts are described in detail in Chapter 7 above, and assessed in Chapter 9. The following is an excerpt and summary of the analyses performed, in terms of potential impacts on the integrity, coherence and object of protection of Natura 2000 sites.

12.2.2.1. Loss of habitat

As shown in Chapters 2,3,4 of Volume IV of the BIII OWF, on its own or in conjunction with other projects, it will not significantly affect the abundance and functionality of habitats in the assessed areas, and thus the food abundance (benthos, fish) of these areas, which constitute the attractiveness of the Slupsk Bank and the Baltic Coastal Waters as a wintering site for seabirds.

The following is a brief description and assessment of any impacts that may cause an impact on the integrity of seabird wintering areas at subsequent stages of the project. The assessment was performed for the furthest-reaching scenario of OWF BIII - NIS 2015, taking into account the cumulative impact of other offshore wind farms, as assumed in Chapter 13 of Volume II.

The variant in the parameters approved by the Environmental Decision involves the construction of 40% fewer power plants and will have fewer impacts than those described below. In contrast, the Project, after the changes that are the subject of this Report, will involve the construction of 70% fewer power plants, and its impact will be less than the variant in the parameters described by the 2015 NIS and in the parameters approved by the Environmental Decision

Construction Phase. At this stage, it is expected that birds will gradually increase in frightening from the construction site. This will cause changes in the distribution of individual species in the area of OWF BIII. The more skittish species, such as divers, alka, long-tailed duck, long-tailed duck and uhla, will move to neighboring bodies of water. It is likely that some of them will stay in the nearby Natura 2000 areas "Slupsk Shoal" and "Baltic Coastal Waters", where there are important Baltic seabird concentration sites. This will lead to a local increase in seabird density in these areas, increasing competition for habitat resources. However, bird counts in the area designated for the construction of OWF BIII were low and the increase will be small. Increased ship traffic and the presence of immovable structures protruding above the water's surface will cause gulls to congregate in greater numbers at the wind farm site. At this stage, the risk of collision with rotors not yet in operation is minimal. Once the power plants are operational, the density of gulls in the body of water occupied by the wind turbines will decrease.

The impact of increased ship traffic on birds residing in the Natura 2000 area "Coastal Baltic Waters", through which ships heading to the area of the installation works will have to pass, is also to be expected. The location of the other Natura 2000 areas practically excludes the possibility that there will be an increase in vessel traffic associated with the construction of the farm.

At the construction stage of OWF BIII, impacts on seabirds residing in the three neighboring Natura 2000 areas will mostly be negligible or cause no change. Only in the case of the Baltic Coastal Waters can an increase in ship traffic be expected, which will result in more frequent bird scaring than before. However, the strength of the impact will depend on the timing of the work.

Table 58. Assessment of potential impacts of OWF BIII at the construction stage on seabirds residing in adjacent Natura 2000 areas

Type of impact	Baltic Coastal Waters	Slupsk Shoal
Movement of vessels	**Small** - ships involved in the construction of the farm will pass through the area. Birds driven from the construction area may move to the Baltic Coastal Waters basin.	**Negligible** - ship traffic associated with the construction of the farm will not take place in the area. Birds chased away from the construction area may move to the Slupsk Shoal reservoir.
Noise and vibration emissions	**Negligible** - the long distance from the construction site limits the impact on the avifauna of the area. Birds driven from the construction area may move to the Baltic Coastal Waters basin.	**Negligible** - the long distance from the construction site limits the impact on the avifauna of the area. Birds chased away from the construction area may move to the Slupsk Shoal reservoir.
Lighting of the project site	**No change** - the long distance from the construction site limits the impact on the avifauna of the area.	**No change** - the long distance from the construction site limits the impact on the avifauna of the area.
The formation of a mechanical barrier	**Negligible** - the long distance from the construction site limits the impact on the avifauna of the area. Birds driven from the construction area may move to the Baltic Coastal Waters basin. Risk of collision with non-working gyms very low.	**Negligible** - the long distance from the construction site limits the impact on the avifauna of the area. Birds chased away from the construction area may move to the Slupsk Shoal reservoir. Risk of collision with non-working gyms very low.
Barrier caused by the presence of ships	**Negligible** - there will be a negligible increase in the energy costs of stationary and migratory birds associated with bypassing the construction area.	**Negligible** - there will be a negligible increase in the energy costs of stationary and migratory birds associated with bypassing the construction area.
Collisions with ships	**Negligible** - collisions of representatives of protected species with ships are extremely unlikely due to the daily activity of protected species and high sensitivity to disturbance.	**Negligible** - collisions of representatives of protected species with ships are extremely unlikely due to the daily activity of protected species and high sensitivity to disturbance.
Destruction of benthic habitats	**Negligible** - the impact directly affects only birds residing in the area of the OWF. A stronger overcrowding effect will cause them to move, probably also to the Baltic Coastal Waters area.	**Negligible** - the impact directly affects only birds residing in the area of the OWF. A stronger overcrowding effect will cause them to move, probably also to the Slupsk Shoal area.

Type of impact	Baltic Coastal Waters	Slupsk Shoal
Increase in the concentration of suspended solids in water	No **change** - no impact, as the reduction in transparency will be small, in terms of natural variability.	No **change** - no impact, as the reduction in transparency will be small, in terms of natural variability.
Deposition of agitated sediment	No **change** - no impact, as sediment deposition will be small, within the range of natural variability.	No **change** - no impact, as sediment deposition will be small, within the range of natural variability.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Operational stage. At this stage, there will be a permanent overpollination of divers, alkas, long-tailed ducks, long-tailed ducks and long-tailed ducks from the IMF BIII area. The effect will also extend to neighboring bodies of water within a radius of up to 4 km. These birds are likely to move to areas where they will find a sufficiently abundant food base. Thus, it can be assumed that some part of them will move to nearby Natura 2000 areas, causing an increase in the number of birds residing there. Due to the low abundance of these species in the area of the BIII OWF project, these movements are not expected to cause a significant increase in competition for food resources in Natura 2000 areas.

A working wind farm poses an obstacle to migratory birds, some of which may be associated with Natura 2000 areas, where they may have their stopover or breeding grounds (silverbacked gull). Avoiding an extensive obstacle results in a longer flight path. Two small wind farms located in the Kalmarsund basin off the coast of Sweden increase the migration distance of eider migrating to wintering grounds in the Danish Straits by 0.2-0.4% (Pettersson 2005). In this case, the increase in energy expenditures is not large, but once more farms are built, the increase may increase enough that the impact on the survival rate of individuals in the population may become significant. Hence the need to perform such assessments when increasing the number of wind farms along migration routes (Petersen et al. 2006). As long as there are only a few remote wind farms in this part of the Baltic, their impact on increasing energy inputs to the passage of these birds through the Baltic will be small and will not disrupt migration.

A factor that must be taken into account when assessing the impact on birds of a wind farm during the operational phase is the risk of collision with operating rotors. Some of the birds moving in the BIII offshore wind farm area at least temporarily use Natura 2000 areas, hence an increase in mortality due to collisions could theoretically affect the status of their populations. Observations made during the day showed that more than half of the recorded overflights took place at a ceiling below 15 meters. Given the strong tendency of migrating birds to avoid the wind farm, the risk of collision with working rotors can be considered low.

New benthic communities will be created in the area occupied by the wind farm. It can also be expected that the exclusion of commercial fishing will result in a local increase in fish populations. However, long-tailed duck (long-tailed duck, scoters, scoters) and ichthyophagous (divers, auks) seabirds avoid staying in areas occupied by wind turbines. Thus, during the operation stage, the farms will not use the newly created feeding grounds. The impacts of the operating BIII OWF on seabirds residing in the three neighboring Natura 2000 areas will be negligible or cause no change.

Table 59. Assessment of potential impacts of OWF BIII at the stage of operation on seabirds residing in adjacent Natura 2000 areas

Type of impact	Baltic Coastal Waters	Slupsk Shoal
Movement of vessels	**Negligible** - ships servicing the farm will pass through the area, which will slightly increase the frequency of bird scaring.	**No change** - the movement of vessels associated with servicing the farm will not take place in this area.
Crowding and displacement from habitats	**Negligible** - the analyzed species are sensitive to disturbance by ships, many of them will move from the construction area and its immediate surroundings. Only single individuals of black-throated diver, red-throated diver, scoter and guillemot will move. The long-tailed duck's movement can reach up to 2443 individuals during the months of peak abundance. The displacement of uhla can be up to 50 individuals during the months of peak abundance. The displacement of alka can be up to 159 individuals during the wintering season. Displacement of the silver-backed gull and common gull is not expected, as the gulls are not sensitive to ships.	**Negligible** - the analyzed species are sensitive to disturbance by ships, many of them will move from the construction area and its immediate surroundings. Only single individuals of black-throated diver, red-throated diver and guillemot will move. The long-tailed duck's movement can reach up to 2443 individuals during the months of peak abundance, and these birds are likely to move to Slupsk Shoal.
The formation of a mechanical barrier	**Negligible** - the large distance from the OWF limits the impact on the avifauna of the area. If displaced, birds may encounter a barrier, limiting their ability to use alternative feeding grounds.	**Negligible** - the large distance from the OWF limits the impact on the avifauna of the area. If displaced, birds may encounter a barrier, limiting their ability to use alternative feeding grounds.
Collisions with power plants	**Negligible** - during the year only single individuals of black-throated diver, red-throated diver, uhla, alka and guillemot may collide. The collision rate per year for the long-tailed duck can reach 9 individuals for both locally stationed and migratory birds. The risk of collision of silver-backed gulls could be quite high: up to 1,407 stationing birds per year	**Negligible** - during the year only single individuals of black-throated diver, red-throated diver and guillemot may collide, but only in exceptional cases. The collision rate per year for the long-tailed duck can reach 9 individuals for both resident and migratory birds on the farm's water body.

Type of impact	Baltic Coastal Waters	Slupsk Shoal
	assuming a 99% avoidance rate and a reasonable alternative. The number is 0.1% of the species' biogeographic population. Given the option selected for implementation, the annual collision rate would be lower, between 106-953 individuals, depending on the height of the turbines selected. The risk of collision of the common gull will affect only single individuals, due to the low abundance of this species. This number will not exceed 0.1% of the species' biogeographic population.	
The creation of an "artificial reef"	**Negligible** - bentophages avoid staying in wind farm areas. It is therefore to be expected that they will use the new feeding grounds sporadically.	**Negligible** - bentophages avoid staying in wind farm areas. It is therefore to be expected that they will use the new feeding grounds sporadically.
The creation of a closed body of water	**Negligible** - ichthyophages avoid staying in wind farm areas. It is therefore to be expected that they will use the new feeding grounds sporadically.	**Negligible** - ichthyophages avoid staying in wind farm areas. It is therefore to be expected that they will use the new feeding grounds sporadically.
Changes in the regime of sea currents	No **change** - no impact, hydrographic changes associated with the sited wind farm will be insignificant.	No **change** - no impact, hydrographic changes associated with the sited wind farm will be insignificant.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Decommissioning stage. Removal of the gyms will gradually change the distribution of the birds. Once the operation of the farm is stopped and boat traffic increases, it is expected that seagulls will be more numerous in this area. The abundance of marine avifauna will gradually increase with the setting of impacts that cause bird scaring. Bentophages (mainly long-tailed duck and uhla) will gain access to a new feeding ground and, most likely, their density will increase in areas where powerhouses are removed and ship traffic ceases. Fish-eating species will also return to the basin. Some of these birds will move here from neighboring Natura 2000 areas. The dismantling of the BIII offshore wind farm will therefore be, at least periodically, a positive impact. As in the construction phase, the risk of bird collisions with non-working powerhouses will be minimal. At the decommissioning stage of OWF BIII, impacts on seabirds residing in the three neighboring Natura 2000 areas will mostly be negligible or cause no change.

Table 60. Assessment of potential impacts of OWF BIII at the decommissioning stage on seabirds residing in adjacent Natura 2000 areas

Type of impact	Baltic Coastal Waters	Slupsk Shoal
Movement of vessels	**Small** - ships involved in dismantling the farm will pass through the area. Birds driven from the construction area may move to the Baltic Coastal Waters basin.	**Negligible** - the movement of ships associated with the dismantling of the farm will not take place in the area. Birds chased away from the construction area may move to the Slupsk Shoal reservoir.
Noise and vibration emissions	**Negligible** - the long distance from the dismantlement site limits the impact on the avifauna of the area. Birds driven from the construction area may move to the Baltic Coastal Waters basin.	**Negligible** - the long distance from the dismantlement site limits the impact on the avifauna of the area. Birds chased away from the construction area may move to the Slupsk Shoal reservoir.
Lighting of the project site	**No change** - the long distance from the dismantling site limits the impact on the avifauna of the area.	**No change** - the long distance from the dismantling site limits the impact on the avifauna of the area
Removal of power plant structures	**Moderate (positive)** - the dismantled gyms will expose a body of water to birds, which may become, at least periodically, an attractive feeding ground for benthophaguses.	**Moderate (positive)** - the dismantled gyms will expose a body of water to birds, which may become, at least periodically, an attractive feeding ground for benthophaguses.
	Negligible (negative) - the long distance from the dismantlement site limits the impact on the avifauna of the area. The strong deterrent effect makes the risk of collisions with non-working gyms very low.	**Negligible (negative)** - the long distance from the dismantlement site limits the impact on the avifauna of the area. The strong deterrent effect makes the risk of collisions with non-working gyms very low.
Barrier caused by the presence of ships	**Negligible** - there will be a negligible increase in the energy costs of stationary and migratory birds associated with bypassing the decommissioning area.	**Negligible** - there will be a negligible increase in the energy costs of stationary and migratory birds associated with bypassing the decommissioning area.
Collisions with ships	**Negligible** - collisions of representatives of protected species with ships are extremely unlikely due to the daily activity of protected	**Negligible** - collisions of representatives of protected species with ships are extremely unlikely due to the daily activity of protected

Type of impact	Baltic Coastal Waters	Slupsk Shoal
	species and high sensitivity to disturbance.	species and high sensitivity to disturbance.
Destruction of benthic habitats	**Negligible** - the impact directly affects only birds residing in the area of the OWF.	**Negligible** - the impact directly affects only birds residing in the area of the OWF.
Increase in the concentration of suspended solids in water	No **change** - no impact, as the reduction in transparency will be small, in terms of natural variability.	No **change** - no impact, as the reduction in transparency will be small, in terms of natural variability.
Deposition of agitated sediment	No **change** - no impact, as sediment deposition will be small, within the range of natural variability.	No **change** - no impact, as sediment deposition will be small, within the range of natural variability.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

The proposed modifications to the conditions of implementation and operation of the Project will in no way contribute to changing the nature or magnitude of impacts on seabirds that are the subject of protection of the Natura 2000 areas analyzed above. In the case of impacts involving habitat loss, after the proposed change in the parameters of the Project, the impact will remain unchanged from the impacts generated by the Project in the parameters approved by the Environmental Decision. This is due to the fact that the size of this impact depends on the size of the body of water occupied by the power plants, and this will not change, while in either case the width of the strip along the border of the Natura 2000 area will be preserved, left without development with power plants.

In conclusion, it should be noted that no significant negative impacts are expected from the BIII OWF as a result of changing the parameters of the Project by causing displacement from the habitats of birds protected within the Natura 2000 areas.

12.2.2.2. Creating the effect of barrier

The barrier effect can occur during both the construction and decommissioning phases, as well as during the operation phase.

Construction and decommissioning stage

The presence of a large number of vessels used in construction and decommissioning may result in a barrier effect, thus affecting the movement of migrating birds. The scale of the impact will depend on the number of vessels used during the construction phase, their size, the duration of the construction work and the season of the work.

Marine migratory birds sensitive to disturbance from the presence of ships will bypass them vertically or horizontally, which may slightly lengthen their migration route and increase the energy cost of passage. However, bypassing will be a small part of the total migration route, and the additional energy expenditure will be negligible (Masden et al. (2009)). Considering the above, the impact of creating a

barrier effect through the presence of construction vessels in the BIII OWF area is assessed as negligible to small for all migratory bird species.

The presence of ships during the construction and decommissioning phases will create a barrier to the movement of birds, causing direct negative impacts on birds migrating over the surface of the farm, of local scope, short-term, reversible, repeatable during the construction period, with low intensity. Similar impacts will occur at the stage of eventual decommissioning.

Analyzing the impact of the proposed modifications to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which should translate into the total time associated with the construction of the power plant, and thus the time of construction vessel operations in the Project area. A factor that can significantly affect the total construction time is weather conditions, however, given that the amount of power plants under construction in relation to the parameters resulting from the 2015 NIS has been reduced to 30%, and thus even assuming unfavorable weather conditions, the total construction time of the project will be shorter.

Operational stage.

Located over water, the wind farm facilities may be a barrier to birds flying over the farm's water body. The scale of the barrier effect will depend on the number of turbines erected, their size, and the light and noise they emit.

Birds respond to the presence of an obstacle in their path by changing their flight path in a horizontal or vertical direction, hence they are expected to avoid the wind farm area. The length of the route required to avoid this obstacle will increase the energy cost of the flight being made, but this will not be a large change, and the energy costs of the birds' daily flights, even when doubled, will still be a small part of their daily activity and energy consumed. Pelagic bird species, such as gulls, spend most of the day taking flight under natural conditions, and the additional bypassing of an obstacle, in this case the presence of a wind farm, will not cause any measurable effect on their daily activity or energy balance. This issue is described and assessed in detail, including with regard to species protected under Natura 2000, in section 9.2.3 above.

The mechanical barrier in the form of the operating BIII OWF will be a source of direct, negative impacts on seabirds of local extent, long-term, reversible, permanent during the period of operation, of low (for gulls) or medium intensity.

Due to the lack of detailed information on the behavioral responses of birds to the presence of wind farms, the effects for both considered options (the option selected for implementation and the rational alternative) are considered equal.

The cumulative effect of the barrier was assessed for the two most abundant migratory and wintering marine bird species that are the subject of Natura 2000 protection: the long-tailed duck and the scoter,

using the methodology used in the assessment for the OWF BIII wind farm area. It was assumed that the migrating birds changed the route of their flight and circled the IMF at a distance of 1-2 km (see figure below). The planned OWFs are located in two areas: southern (OWF BII, OWF BIII, OWF Baltica 2, OWF Baltica 3, OWF Baltic Power) and northern (North Baltic, Baltica 1, Södra Midsjöbanken). Given the migration of birds along the northeast-southwest axis, it is unlikely that birds on their route will encounter obstacles located in the two areas mentioned, so the cumulative effect of the barrier may be only partial and not taking into account all the planned OWFs together. It should be expected that the probable avoidance by birds of the southern area is similar to the northern area due to their similar size. The modeling results indicate that even if the birds avoid several wind farms, the additional distance they will cover and the increase in the energy cost of migration associated with it will be very small, certainly within the range of differences in distance covered by different individuals and differences caused by atmospheric factors.

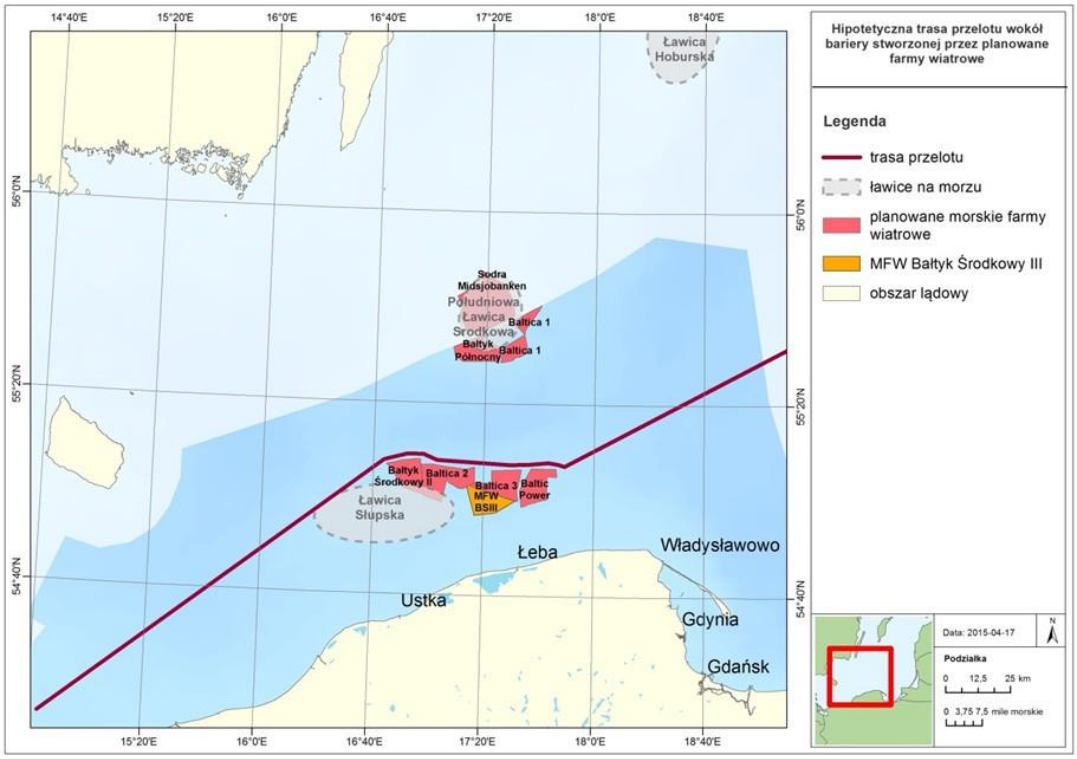
Table 61. Estimated increase in distance covered by birds due to avoidance response caused by the cumulative impact of the occurrence of the barrier effect of wind farms in the southern area of the Polish EEZ (OWF BII, OWF BIII, OWF Baltica 2, OWF Baltica 3, OWF Baltic Power)

Species	Distance traveled during migration (km)	Increase in distance traveled during migration due to barrier effect (km)	Energy cost of migration (kJ)	Increase in energy cost due to barrier effect (kJ)	Weight loss due to increase in energy cost (g)
Long-tailed duck	3.245	22	8.220	50	2 g
Markaczka	2.846	21	9.720	60	2 g

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

A significant impact of a larger group of projects located on the northeastern slope of Slupsk Shoal could be to make it more difficult for those seabird populations for which it is a wintering site to access the area. The creation of a consistent barrier in the area may also hinder the movement of these populations between the closest similar wintering areas, which are Slupsk Shoal, Central Shoal and Hoburgs Bank. As of today, there is no scientific data on the relevance of the connections of these areas, but they cannot be ruled out.

Figure 21. Hypothetical flight route of migratory birds (flying from northeast to southeast) altered due to barrier effect caused by planned wind farms



Hipotetyczna trasa przelotu wokół bariery stworzonej przez planowane farmy wiatrowe	Hypothetical flight route around the barrier created by planned wind farms
Legenda	Legend
Trasa przelot	Route overflight
Ławice na morzu	Shoals at sea
Planowane morskie farmy wiatrowe	Planned offshore wind farms
MFW Bałtyk Środkowy III	OWF Central Baltic III
Obszar lądowy	Land area
Data: 2015-04-17	Date: 2015-04-17
Podziałka	Pitch
Mile morskie	Sea miles
Południowa Ławica Środkowa	South Central Shoal
Bałtyk Północny	North Baltic
Baltica 1	Baltica 1
Baltica II	Baltica II
Baltica 3	Baltica 3
MFW BSIII	IMF BSIII
Bałtyk Środkowy II	Central Baltic II
Ława Hoburska	Hoburgs Bank
Ława Słupska	Slupsk Shoal
Ustka	Ustka
Łeba	Leba
Władysławowo	Wladyslawowo
Gdynia	Gdynia
Gdańsk	Gdansk

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

12.2.2.3. Mortality from collisions

A collision analysis of migratory birds over the BIII OWF area was performed for the 2015 Report independently by two recognized groups of experts. The results of these analyses are described in detail in the chapter with the assessment of impacts on migratory birds (Chapter 5 Part 2 Volume IV). With regard to the species identified during the preliminary assessment that may be at risk of significant impacts, in the context of depletion of significant populations of migratory, wintering or resident seabird species in the area, and thus significant negative impacts on the integrity of the Natura 2000 areas established for the protection of these populations, assessments of these impacts in the various project alternatives considered are presented in Table 62 below, and for the various cumulative impact scenarios in Table 68 below (see the description of the cumulative scenarios in Chapter 9.2.4.2 in Chapter 5 Part 2 of Volume IV of the EIA).

Table 62. Forecasted collision rates of individual bird species for the project variants in the parameters approved by the Environmental Decision and NIS 2015 (for real avoidance rate)

Species	PBR	Analyzed options	
	variant	Environmental Decision	NIS 2015
	number of turbines	120	200
	span of the collision zone	200	192.5
Alka	3140	**0**	0.04
Long-tailed duck	15160	**0,01**	0.19
Markaczka	18607	**0,11**	5.52
Uhla	2719	**0**	2.97

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

The 2015 Report stated that taking into account the numbers of biogeographic populations of migratory birds in the South Baltic region, the above presented potential mortality of individuals of these populations caused by collisions at OWF BIII and other offshore wind farms that may be built in the cumulative zone of this impact, it should be concluded that there is no threat of significant impacts on these populations when juxtaposed with the calculated and presented above values of safe yield of individuals of these populations (PBR indicator).

For the purpose of preparing the non-significant report, collision analyses were conducted again taking into account the changed parameters of the Project, i.e. the change in the number of power plants, the change in the total maximum height of the power plants and the change in the maximum diameter of the rotor. Re-analyses of conflicts have also been performed cumulatively with all OWFs for which an environmental decision has been issued and for OWF C-Wind, for which proceedings are pending. The results are shown in Table 64 below. For all analyzed species, equal or lower mortality from collisions

with power plants is expected as a result of the change in project parameters than for the variant under the parameters approved by the Environmental Decision.

The proposed changes to the conditions for implementation and operation of the Project will in no way change the nature or increase the magnitude of impacts on seabirds that are the subject of protection of the Natura 2000 areas analyzed above. In the case of impact related to collision mortality, the magnitude of the impact depends primarily on the total maximum rotor zone, and this depends on the number of power plants and the maximum rotor diameter. Given that the proposed change to the Project involves the construction of 50% fewer power plants than the Project in the parameters approved by the Environmental Decision, and 70% fewer than the 2015 NIS, and the total rotor zone will be approximately 22% less than the Project parameters approved by the Environmental Decision if the Project parameters are changed. Thus, the Project's collision-related impacts will be correspondingly less (compare the results presented in the section on migratory birds).

In conclusion, it should be stated that no significant negative impacts of OWF BIII are expected to occur as a result of modification of the Project's paramentals related to collision mortality of individuals of bird species that are objects of protection within the Natura 2000 areas.

Table 63. Predicted collision rates of individual bird species for the analyzed cumulative project scenarios

Species	PBR	Highest projected collision rate in a given scenario						Projected collision rate for the real avoidance rate of each species					
scenario		stage. 1	scene 1'	stage. 2	stage. 2'	stage. 3	stage. 3'	stage. 1	scene 1'	stage. 2	stage. 2'	stage. 3	stage. 3'
number of turbines		375	150	295	110	295	110	375	150	295	110	295	110
alka	3140	0.54	0.22	0	0	0.44	0.17	0.05	0.02	0	0	0.04	0.02
long-tailed duck	15160	1.76	0.7	0.07	0.03	1.49	0.56	0.35	0.14	0.01	0.01	0.3	0.11
scotch	18607	51.71	20.68	1.34	0.5	44.08	16.44	10.34	4.14	0.27	0.1	8.82	3.29
uhla	2719	27.8	11.12	0	0	23.78	8.87	5.56	2.22	0	0	4.76	1.77

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015.

Table 64 Comparison of the implementation variant for which the decision on environmental conditions was issued (WR20 - 120 wind turbines) and the current implementation variant (WR20 - 60 turbines and minimum clearance between the lower wing position and the sea surface of 20 m and WR60 - 60 turbines minimum clearance between the lower wing position and the sea surface of 60 m) along with the cumulative impact

WR20	RWU (%)*	WR20 - 120 turbines	WR20 - 60 turbines	WR60 - 60 turbines	Wind farms planned for development in the area of the subject wind farm					∑ (WR20-120)	∑ (WR20-60)	∑ (WR60-60)
		bird/year	bird/year	bird/year	Baltic Power	Baltica 2 and 3	FEW Baltic II	IMF BII	BC-WIND			
Alka *Alca torda*	99.50	0.02	**0,01**	0.01	0	0	0.00	0.00	0	**0,0**	**0,0**	**0,0**
Long-tailed duck *Clangula hyemalis*	99.00	0.09	**0,04**	0.08	1	2	0.00	0.75	0	**3,8**	**3,8**	**3,8**
Uhla *Melanitta fusca*	99.00	1.93	**0,60**	0.00	1	2	0.22	0.57	1	**6,7**	**5,4**	**4,8**
Marquise *Melanitta nigra*	99.00	2.57	**1,32**	0.00	2	3	0.77	2.74	0	**11,1**	**9,8**	**8,5**

*RWU (%) - real avoidance rate

[a] - earlier Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III (Tryjanowski P., Jankowiak Ł. I Łuczak A. 2015) was carried out based on a real avoidance rate of 99% for geese, and the collision rate for this rate was 61.22 wasps/year; currently, according to Table 1, the avoidance rate for geese is 99.8, and this rate was used for calculations for the old $_{WR120}$ variant (for a more complete comparison) and the current implementation variant of the various offshore wind farm variants of the Baltic III offshore wind farm within the range defined by the envelope (depending on the clearance size): $_{WR20}$ - 60 turbines and $_{WR60}$ -60 turbines.

[b] - earlier Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm Bałtyk Środkowy III (Tryjanowski P., Jankowiak Ł. I Łuczak A. 2015) was carried out based on an avoidance rate of 98% for swans, and the collision rate for this rate was 3.14 os/year; currently, according to Table 1, the avoidance rate for geese is 99.5, and this rate was used for calculations for the old $_{WR120}$ variant (for a more complete comparison) and for the current implementation variant of the various offshore wind farm variants of the Baltic III offshore wind farm within the range defined by the envelope (depending on the clearance size): $_{WR20}$ - 60 turbines and $_{WR60}$ - 60 turbines.

Source: Tryjanowski P., Łuczak A., Gawlik, A. Assessment of the impact on migratory birds of the project involving the construction of the offshore wind farm OWF Bałtyk III ("OWF BIII"), ENINA 2022

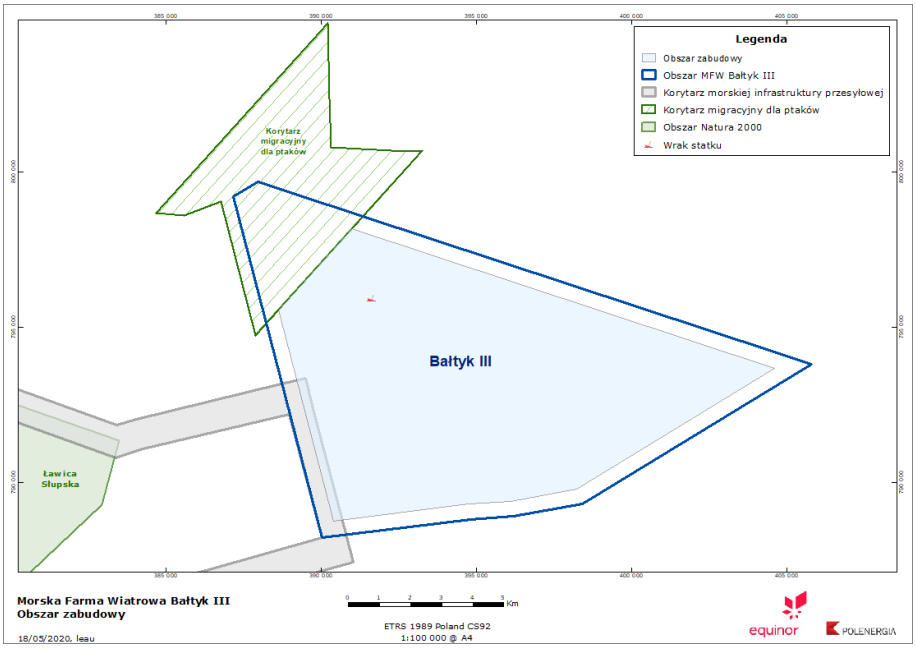
12.2.3. Actions minimizing

A measure to reduce cumulative impacts associated with OWF projects is to leave areas between OWF projects free of power plant development. This type of action is intended to mitigate the impacts associated with the creation of barrier effects and displacement, including during the construction phase of individual projects. The effectiveness of this solution depends on the provision of a sufficiently wide development-free strip. This type of solution was implemented in the terms of the environmental conditions decision issued for the Baltica OWF, and it provides for leaving a 5 km corridor free of power plant development between the Baltica 2 and Baltica 3 areas - condition II.3.9 of the environmental conditions decision, mark RDOŚ- Gd-WOO.4211.21.2017.MJ.PW.AJ.37.

Similar solutions were proposed in the project impact report for the Baltic Power project, they assumed leaving an additional area between the Baltica 3 offshore wind farm and the Baltic Power offshore wind farm free of power plant development, and supporting the above-described 5 km corridor, and also assumed leaving a 4 km wide free area east of the area planned for development within the Baltic Power project.

Taking into account the analysis of the potential environmental impacts of the project, and taking into account the need to continue the corridor designated in the decision on environmental conditions for the Baltic offshore wind farm, at the stage of work on this EIA Report, the Investor has made additional restrictions on the use of the offshore wind farm development area due to the possibility of a negative impact of the investment on seabirds. In the course of design work, a decision was made to leave the area located in the western-northern corner of the farm undeveloped with power plants, in such a way as to create an unobstructed 5 km wide corridor undeveloped with power plants, crossing the areas of the OWF Baltic Central III and OWF Baltica 2 and OWF Baltica 3 farms in the SW-NE direction - the figure below illustrates the location of the planned exclusion from development.

Figure 65 Location of the area of additional excluded development to create a migration corridor



KORYTARZ MIGRACYJNY DLA PTAKÓW	Migration corridor for birds

ŁAWICA SŁUPSKA	Slupsk Shoal
BAŁTYK III	Baltic III
MORSKA FARMA WIATROWA BAŁTYK III OBSZAR ZABUDOWY	Offshore Wind Farm Baltic III Development area
LEGENDA	Legend
OBSZAR ZABUDOWY	Development area
OBSZAR MFW BAŁTYK III	Baltic III offshore wind farm area
KORYTARZ MORSKIEJ INFRASTRUKTURY PRZESYŁOWEJ	Offshore transmission infrastructure corridor
KORYTARZ MIGRACYJNY DLA PTAKÓW	Migration corridor for birds
OBSZAR NATURA 2000	Natura 2000 area
WRAK STATKU	Shipwreck

source: provided by the Contracting Authority

The above-described minimization measure creating a 5 km corridor between the Baltica 2 and Baltica 3 areas was considered in the course of the completed environmental decision proceedings as a measure that effectively reduces the cumulative impacts of the planned projects to a level that will not cause significant negative impacts on seabirds. Similarly, in environmental impact reports for other OWFs, measures to keep corridors free of development have been assessed as effectively reducing cumulative impacts.

12.2.4. The result of the assessment appropriate

The result of the assessment of the proper impact on Natura 2000 areas should be an unambiguous answer to the question of whether, after the application of minimizing measures, the BIII OWF, alone or in cumulation with other projects, will significantly affect the integrity, coherence or subject of protection of Natura 2000 areas.

After analyzing the possible impacts that the Project may cause, alone and in cumulation with other projects, it should be concluded that the Project, after the changes in its parameters presented in this Report:

- The BIII offshore wind farm, on its own, will not significantly affect the integrity of the coherence and the object of protection of Natura 2000 areas in any of the considered variants through the impacts it will cause on seabirds;

- OWF BIII, in combination with other offshore wind farms (OWF BII and OWF Baltica), which may be developed in its immediate vicinity on the northeastern slope of Slupsk Shoal, will not significantly affect the integrity, coherence and object of protection of Natura 2000 areas through impacts on birds migrating to wintering grounds, which are the subject of protection of the Slupsk Shoal area, provided that a minimizing measure is applied, in the form of taking into account in the construction project of OWF BIII the necessity to create an undeveloped wind turbine migration corridor, allowing the migration of long-tailed duck to the Slupsk Shoal area from the northeastern direction during autumn migration and from this area in the northeastern direction during spring migration. As a result, additional measures are proposed to mitigate the barrier effect during bird migration by excluding the northwestern corner of the body of water intended for OWF BIII from wind power development. This solution is consistent with and is a continuation of the development-free corridor implemented in the conditions of the environmental decision issued for the Baltic offshore wind farm - condition II.3.9 of the environmental decision, mark RDOŚ-Gd- WOO.4211.21.2017.MJ.PW.AJ.37.

13. Impacts transboundary

Within the Baltic Sea there are seabirds from local breeding grounds located on the coasts of this sea (silver gull, alka, duck, guillemot and partly uhla) and birds from populations living in northern Europe and Siberia (aurora, long-tailed duck, scoter, uhla) that appear here during the non-breeding season. Significant transboundary impacts may therefore relate to the impact of an offshore wind farm as a barrier along their migration route. Avoiding an extensive obstacle results in a longer flight path. However, for a single offshore wind farm, the increase in energy expenditures is small and does not affect population survival (Pettersson 2005). The strong deterrent effect will also keep seabirds out of the area occupied by the power plants, thus excluding the basin from their feeding grounds. The area designated for the construction of the OWF BIII offshore wind farm is not the site of significant concentrations of any of the species found during monitoring. The expected impacts of this farm on the bird species considered in the assessment are moderate at best and limited in scope. According to the methodology's definition, this means changes that are significant only locally, not nationally or internationally, and are not important for the preservation of proper conservation status. Thus, no transboundary impacts are expected from an investment to build a single BIII offshore wind farm. When assessing the cumulative impact, especially in the context of the presence of the long-tailed duck in the vicinity of Slupsk Shoal, which is one of the most important wintering grounds for the long-tailed duck, it may be necessary to apply measures to minimize the barrier effect, in the scenario of intensive offshore wind development in Polish marine areas. The creation of the migration corridor recommended in the report will result in the absence of transboundary impacts, including by allowing the movement of populations wintering on Slupsk Shoal with other wintering areas, such as Central Shoal, located in the Swedish EEZ.

14. Proposal monitoring

The proposed modifications to the conditions for implementation and operation of the Project do not affect the conditions for monitoring specified in the Environmental Decision. The conditions and rules for conducting bird monitoring are specified in the Environmental Decision in section II.2.a at the stage of construction and operation of OWF BIII. However, it is proposed to delete from the wording of this condition the part concerning the shutdown of turbines located along the route of registered bird flocks during migration periods. The provision proposed for repeal does not relate to the scope and conditions of monitoring, i.e. the subject of section II.2.a of the Environmental Decision, and is inconsistent with the condition set forth in sections I.2.31 and I.3.12 of the Environmental Decision regarding the shutdown of turbines, which raises questions of interpretation; at the same time, the amendment does not affect the content of sections I.2.31 and I.3.12 of the Environmental Decision setting forth the rules for shutting down turbines under conditions of intensive bird migration during periods of limited visibility.

15. Summary and conclusions

A summary of the results of the assessment conducted in the 2015 Report and the assessment of the impact of the changes made to the Project on the significance of the impacts is presented in the tables below.

The tables are divided according to the stages of investment and the importance of each receptor (species), as defined in Chapter 8:

- species of minor importance - Lesser Black-backed Gull and Silver-backed Gull,
- species of medium importance - scotch, alka, and boar,
- long-tailed duck species - black-throated diver, red-throated diver, uhla and long-tailed duck.

It is not expected that there will be significant negative impacts on the integrity, coherence and object of protection of Natura 2000 areas protecting seabirds.

Due to the distances to EEZs of other countries (the nearest one, the EEZ of Sweden, is about 50 km away) and the mostly local scale of impacts, it is not expected that the BIII OWF could cause transboundary impacts on seabirds.

The most important cumulative impacts on seabirds are related to the highly unlikely scenario of simultaneous operation of several farms in the vicinity of Slupsk Shoal. In such a situation, there will be a significant reduction in the availability of feeding grounds, resulting in major changes in the distribution of birds in this part of the Baltic. There will also be a widespread barrier along the birds' flight path, the bypassing of which will significantly increase flight time and result in increased energy expenditure for migration. An additional aspect to consider is the location of the barrier so created in relation to marine Natura 2000 areas. In particular, the close proximity of Slupsk Shoal, which is a significant long-tailed duck wintering ground in the Baltic, may cause intensive movements of birds in the area. Hence, the total cumulative impact on waterbirds of all operated wind farms was assessed as high for both species of divers, long-tailed duck, and uhla. It should be noted that the analyzed scenario is highly unlikely. In addition, the farms will be built gradually, which will allow for the imposition of possible restrictions on subsequent investors.

The establishment of migration corridors provided for in the issued environmental decisions for the OWF and the application of this minimization measure for projects for which the environmental decision procedure is currently underway should effectively reduce the magnitude of impact to levels that do not significantly affect the conservation status of seabird species. The proposed changes to the Project's implementation and operation conditions, including a significant reduction in the number of planned power plants and the creation of an additional corridor excluded from the development of power plants between OWF BIII and OWF Baltica, further mitigate the anticipated cumulative effects associated with the implementation of the OWF.

Consequently, it should be considered that the Project update will reduce the impacts on seabirds of the BIII OWF compared to the parameters of the Project approved by the Environmental Decision.

Potentially, the most significant unplanned impact could be a larger oil spill resulting from an accident or collision. However, it will be practically possible to determine the actual extent of the spill only during the event, based on current meteorological data and data on the type and potential amount of pollution. Therefore, it was not possible to assess this impact on seabirds in more detail at the report stage. Minimization measures are described in detail in Volume II, Chapter 12 of the EIA.

15.1. Gull silvery

Table 66. Assessment of the impact of updating the parameters of the Project on the results of the assessment on the silver gull - construction and decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Movement of vessels	Small		Insignificant	Skip	No change
Noise and vibration emissions			Insignificant	Skip	No change
Lighting of the project site			Insignificant	Skip	No change
Formation of mechanical barrier / removal of power plant structure			Insignificant	Skip	No change
Barrier caused by the presence of ships			Insignificant	Skip	Reducing impacts
Collisions with ships			Insignificant	Skip	Reducing impacts
Destruction of benthic habitats			No change	No change	Reducing impacts
Increase in the concentration of suspended solids in water			No change	No change	Reducing impacts
Deposition of agitated sediment			No change	No change	Reducing impacts

Source: own materials

Table 67. Assessment of the impact of the Project parameter update on the results of the assessment on Lesser Black-backed Gull and Silver-backed Gull - operational phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Movement of vessels	Small	Painting propeller tips in bright colors. Spot lighting, pulsating. Solid construction of power plant towers. Maximize the clearance between the water surface and the operating propeller up to 20 m	Insignificant	Skip	No change
Crowding and displacement from habitats			No change	No change	No change
The formation of a mechanical barrier			Insignificant	Skip	No change
Collisions with power plants			Insignificant (Lesser Black-backed Gull) Moderate (silver gull)	Negligible (Lesser Black-backed Gull) Small (silver gull)	Reducing impacts
The creation of an "artificial reef"			No change	No change	No change
The creation of a closed body of water			No change	No change	No change
Changes in the regime of sea currents			No change	No change	No change

Source: own materials

15.2. Markaczka, alka and nurzyk

Table 68. Summary of the results of the assessment of the impact of OWF BIII on scoters, alka and boobies - construction and decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Movement of vessels	Medium		Moderate	Small	No change
Noise and vibration emissions			Moderate	Small	No change
Lighting of the project site			Moderate	Small	No change
Formation of mechanical barrier / removal of power plant structure			Moderate / Small	Small	No change
Barrier caused by the presence of ships			Insignificant	Skip	Reducing impacts
Collisions with ships			Insignificant	Skip	Reducing impacts
Destruction of benthic habitats			Moderate (brand name) No change (alka and nurzyk)	Small (marquise) No change (alka and nurzyk)	Reducing impacts
Increase in the concentration of suspended solids in water			Insignificant	Skip	Reducing impacts
Deposition of agitated sediment			Insignificant	Skip	Reducing impacts

Source: own materials

Table 69. Assessing the impact of the Project's parameter update on the results of the assessment on scotoma, alka and nuit - operational phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Movement of vessels	Medium	Painting propeller tips in bright colors. Spot lighting, pulsating. Solid construction of power plant towers. Maximize the clearance between the water surface and the operating propeller up to 20 m	Small	Small	No change
Crowding and displacement from habitats			Insignificant	Skip	No change
The formation of a mechanical barrier			Small	Small	No change
Collisions with power plants			Insignificant	Skip	Reducing impacts
The creation of an "artificial reef"			Moderate (brand name) No change (alka and nurzyk)	Small (marquise) No change (alka and nurzyk)	No change
The creation of a closed body of water			Moderate (brand name)	Small (marquise)	No change
			No change (alka and nurzyk)	No change (alka and nurzyk)	
Changes in the regime of sea currents			No change	No change	No change

Source: own materials

15.3. Black-throated diver, red-throated diver, little gull, uhla and long-tailed duck

Table 70. Assessing the impact of the Project's parameter update on the assessment results for black-throated diver, red-throated diver, lesser black-backed gull, long-tailed duck, and long-tailed duck - construction and decommissioning phases

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Movement of vessels	Large		Moderate	Moderate Small (Lesser Black-backed Gull)	No change
Noise and vibration emissions			Moderate	Moderate Small (Lesser Black-backed Gull)	No change
Lighting of the project site			Moderate	Moderate Small (Lesser Black-backed Gull)	No change
Formation of mechanical barrier / removal of power plant structure			Moderate	Moderate Small (Lesser Black-backed Gull)	No change
Barrier caused by the presence of ships			Insignificant	Small	Reducing impacts
Collisions with ships			Insignificant	Small	Reducing impacts
Destruction of benthic habitats			No change (dives) Moderate (uhla and long-tailed duck)	No change (dives) Moderate (uhla and long-tailed duck)	Reducing impacts

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Increase in the concentration of suspended solids in water			Insignificant	Small	Reducing impacts
Deposition of agitated sediment			Insignificant	Small	Reducing impacts

Source: own materials

Table 71. Assessment of the impact of the Project parameter update on the results of the assessment for black-throated diver, red-throated diver, little gull, long-tailed duck and long-tailed duck - operational phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Movement of vessels	Large	Painting propeller tips in bright colors. Spot lighting, pulsating. Solid construction of power plant towers. Maximize the clearance between the water surface and the operating	Small	Small	No change
Crowding and displacement from habitats			Insignificant (divers) Small (uhla and long-tailed duck)	Small No change (little gull)	No change
The formation of a mechanical barrier			Small	Small	No change
Collisions with power plants			Insignificant	Small	Reduce
The creation of an "artificial reef"			No change (dives) Moderate (uhla and long-tailed duck)	No change (divers, little gulls) Small (uhla and long-tailed duck)	No change

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Changes in the regime of sea currents		propeller up to 20 m	No change	No change	No change

Source: own materials

16. Shortcomings in technology and gaps in modern knowledge

The following are the difficulties encountered by the authors of the report's sections regarding the assessment of seabirds residing, at least seasonally, in the area of the farm. It should be noted that further aspects, related to shortcomings and gaps in contemporary knowledge are presented in Section 5.2., on migratory birds.

1) At the current stage of knowledge about seabirds congregating in the Baltic away from the coasts, it is not possible to fully assess the links between the various Natura 2000 sites.

2) Significant gaps in knowledge relate to the issue of micro-avoidance responses to wind turbines (for most bird species, since 2015 studies have appeared on some species only). Due to a lack of knowledge, collision risk is often assessed on a precautionary basis and therefore potential collisions may have been overestimated or underestimated if an overly optimistic or overly pessimistic scenario was used;

3) In addition, it is not known at this time whether bird species considered sensitive to the presence of the wind farm (divers, sea ducks, auks) will adapt (and if so, to what extent) to the offshore wind farm and start using the area again.

4) The fact that the vast majority of passerine birds cross the Baltic at night. In addition, visual estimation of the height of a flight is certainly subject to a large error due to, among other things, the position of the observer in relation to the passing bird and the distance to it, as well as individual predispositions in judging the distance. In addition, birds, especially of small-sized species, are difficult to spot when they fly at considerable heights. Hence, their numbers may be seriously underestimated.

17. Literature and other sources

17.1. Literature and studies expertise

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 6

Assessment of impact on marine mammals

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Abbreviations

AIC	Akaike's information criterion
AIS	Automatic Identification System for Vessels (Automatic Identification System)
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
Sediment deposition	The process of sediment accumulation on the seabed (accumulation, deposition)
DSU	Decision on environmental conditions
Birds Directive	Directive of the European Parliament and of the Council 2009/147/EC of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010, p. 7–25)
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.07.1992, p. 7–50)
EEZ	Exclusive Economic Zone (Exclusive Economic Zone)
ENINA 2020	Assessment of the impact on migratory birds of the project involving the construction of the Offshore Wind Farm Bałtyk Środkowy III ("OWF BII"), ENINA Andrzej Łuczak, Poznań, 2022
ESW	Distance covered by visual observation (Effective Strip Width)
Eutrophication	The process of enriching water bodies with biogenic elements (nitrogen and phosphorus), resulting in an increase in their fertility
GAM	Generalized additive model
Grążyce	ducks of the genus Aythya
HELCOM	Helsinki Commission
Habituation	Habit is to the constant presence of a given factor that does not pose an immediate threat
IUCN	International Union for the Conservation of Nature and Natural Resources
Sea ducks	Ducks of the Mergini tribe
Ducks proper	Ducks of the genus Anas
KE	European Commission
KIP	Information sheet of the project
MIP-E	Maritime Transmission Infrastructure - eastern part
IMF	Offshore wind farm
IMF Baltica 2	Baltica 2 offshore wind farm
IMF Baltica 3	Offshore wind farm Baltica 3
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm

MFW BII/MFW BSII	Offshore wind farm Bałtyk II (originally Bałtyk Środkowy II Offshore Wind Farm)
IMF BP	North Baltic offshore wind farm
Natura 2000	Network of EU nature conservation areas
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings concluded with the issuance of the Environmental Decision
EIA	Environmental impact assessment
CSO	Natura 2000 Special Bird Protection Area
SCI	Area of Community Importance, protected under the Natura 2000 network
PBR	Potentially Biological Removal (PBR) safe level of extraction
PGE	Polish Energy Group
POM	Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22

Definitions

Absorption	Reduction of sound energy, conversion of sound into heat
Audiogram	Chart showing absolute hearing thresholds in relation to frequency
White noise	Noise whose power density spectrum is not frequency-dependent for a specific range
Cycle	Percentage of time the event takes place. A tone lasting 1 s with silence intervals of 1 second has a cycle of 50%
Growth time	Time required to go from zero to maximum sound pressure level
Temporal shift of the hearing threshold (CPPS/TTS)	Temporary Reversible Threshold Shift (TTS) of the hearing threshold
Decibel (dB)	A logarithmic measure of sound/pressure intensity. The value for sound level is 20 log10 (P / P0) where P = current pressure and P0 = reference pressure
Sound of an impulsive nature	Transient signal emitted in short sequences (pulses) of short duration and often high peak sound pressure level
Herc (Hz)	A unit of frequency, where 1 Hz = 1 cycle per second. One kilohertz is 1,000 cycles per second
Impulse	Transient sound of finite duration

Masking	Obscuring of sounds of interest due to interference of sounds of similar frequency
Micropascal (µPa)	Reference pressure for sound under water, 1 µPa = $^{10\text{-}5}$ µbar
Paskal	A unit of pressure, equal to 1 $^{Newton/m2}$
Octave band	The distance between two discrete frequencies whose ratio is equal to two
1/3 octave band	1/3 octave intervals. Three adjacent 1/3 octave bands form an octave
Critical band	Frequency band in which the acoustic background/ambient noise has a strong influence on the sound detection of a given frequency
Sound pressure level	Sound pressure expressed in decibels (dB)
Sound source level	Sound pressure for a standard reference distance of 1 m. Unit is dB re 1 µPa at 1m (sometimes given as: @ 1m)
Hearing/hearing threshold	Minimum sound level that can be perceived by the animal in the absence of background noise
Waveform	Graph showing the oscillation of the sound wave (in Pa or mV/V over time)
Pulse	Transient sound of limited duration
Cylindrical propagation/spreading	Sound propagation of cylindrical waves expressed as 10 log r, where r is the range of
Spherical propagation/spreading	Sound propagation of spherical waves expressed as 20 log r, where r is the range of
Auditory brainstem potentials	A method of measuring hearing that involves placing electrodes on the head and recording the electrical activity of the brain during sound reproduction
Propagation/transmission loss	Decrease in sound power with increasing distance
Bandwidth	The frequency range of a given sound
Acoustic background	Environmental noise background with no distinguishable sources
Suppression	Decrease in sound pressure/energy level
Permanent shift in hearing/hearing threshold (TPPS/PTS)	Permanent shift in the hearing threshold, caused by physical damage to the hair cells (auditory cells) of the ear (Permanent Threshold Shift - PTS)
Ultrasound	Sounds with frequencies too high to be heard by humans (~ > 20 kHz)
Filling factor	The percentage expressed as the ratio of the sound's duration to its duration, e.g., a 1-second sound with 1-second intervals has a fill factor of 50%.

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of the update of the conditions for implementation and operation of the Project - BIII OWF, for which the Environmental Decision was issued on marine mammals, is included in Section 5.6 of Volume VI of the Report.

2. Introduction

This Section of the Report is an assessment of the potential impacts of updating and clarifying the conditions for implementation and operation of the Project - OWF BIII on marine mammals. It is based on the research and analysis and findings made for the impact assessment made in the 2015 Report taking into account changes in the legal status and available environmental information that emerged after the date of the 2015 Report. At the same time, it should be noted that the data on which the 2015 Report is based remains valid for the variant indicated for implementation under the Environmental Decision. In the case of the modified parameters proposed for implementation on the basis of the amendment to the Environmental Decision, they should also be considered adequate, which is due to the fact that the scale of the planned Project changes, where its parameters related to the number of wind power plants are reduced by 50% in relation to the Environmental Decision, a decisive part of the parameters remain the same, and some of the parameters identified as possible in the Environmental Decision are clarified, for example, the method of foundation of the power plant foundations and the maximum rotor diameter are not factors that generate impacts on marine mammals. however, the increased parameters, such as maximum height of the power plant and maximum rotor diameter, are not factors generating impacts on marine mammals.

The assessment was based on the characteristics of marine mammals in the BIII OWF area (Volume III Section 10) and the characteristics of the Project and the disturbances and emissions it will cause (Volume II).

3. Description of the planned project

3.1. Parameters of the project affecting the scale and type impacts

The parameters of the BIII OWF that are relevant to the assessment of the project's impact on marine mammals are:

- farm location,
- area of the farm - total and buildable,
- foundations - types, number, dimensions and seabed area occupied by them, compaction, acoustic power of the pneumatic hammer used to drive pile foundations,
- power cables - their length and the surface of the bottom disturbed during their laying.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.2. Other projects in the area investments

There are or are being designed other projects in the area of the project that could potentially, together with the BIII OWF, cause cumulative impacts on the environment, including marine mammals.

Projects and activities that may cause cumulative impacts with those of OWF BIII are presented and characterized in Volume II, Section 13 of the Report. The remainder of this section assesses the cumulative impact on marine mammals during the construction, operation and decommissioning phases of OWF BIII.

4. Existing pressures anthropogenic

4.1. By-catch

Porpoise bycatch, understood as the incidental catch of these animals, is considered by many experts to be a major threat to the population (Berggren et al., 2002). In the Baltic Sea including the Danish Straits, most incidentally caught porpoises become entangled in bottom nets for catching cod (Koschinski, 2002). According to the Agreement on the Conservation of Small Cetaceans of the Baltic and North Sea (ASCOBANS), animal populations should be restored to at least 80% of environmental capacity. This is possible when the bycatch rate does not exceed two fish per year, but in the Baltic Sea the number is higher and averages 7 (Berggren et al., 2002; ASCOBANS, 2002). Even if the individuals in question are rescued from fishing gear and released back into the sea, they may have trouble continuing to grow and reproduce, which also affects the population size (Wilson et al., 2014). Skóra and Kuklik (2003) studied the issue of porpoise bycatch in Polish waters. Their work shows that 33% of porpoises that fell victim to bycatch were caught in drifting salmon driftnets, and 33.3% died in bottom gillnets used to catch cod.

Common and grey seals actively search for fishing gear, in search of food. This behavior consequently leads to bycatch. The bycatch of common seals along Sweden's west coast has been documented in logbooks covering the years 2001 to 2006. Approximately 150 animals were caught in nets and other fishing gear, with the use of gillnets appearing to be the main cause of bycatch (Lundström et al., 2010). Common seal bycatch has also occurred in fisheries where trawls are used - off the west coast of Sweden (Lunneryd, 2001). In 2001, the estimated number of greys that fell victim to bycatch was 305 within the central Baltic (Lunneryd, 2001). In Poland, seal bycatch is reported by fishermen (voluntarily) to the Marine Station of the Institute of Oceanography of the University of Gdansk, located in Hel. Between 1980 and 2010, 75 such cases were reported, and the most common reason was the use of gillnets. However, as a result of a survey conducted by WWF Poland between 2010 and 2015, 36 seal deaths due to bycatch were discovered on the Polish coast (WWF Poland, 2015).

In 2018, there were a series of more than a dozen cases of dead seals found, possibly killed by humans. The likely cause was just entanglement in fishing nets.

All studies of porpoise bycatch in the Baltic clearly indicate levels above the criteria required to maintain adequate population abundance. Bycatch should, therefore, be considered a significant threat to porpoises in the Baltic Sea (ASCOBANS, 2009). In the case of seals, the numbers are much smaller, and bycatch is not considered a serious factor posing a threat to these animals' populations (Wahlberg and Westerberg, 2005).

4.2. Pollution

Marine pollutants, such as organochlorine compounds and metals, have harmful effects on marine mammals, leading, among other things, to weakened immune responses and thus increasing the risk of contracting various diseases (Beineke A. et al. 2005; Das et al. 2008) (see also - Section 4.7. below). They also result in reproductive problems, bone lesions, abnormal production of thyroid hormone, reduced absorption of vitamin A, and increased absorption of vitamin E as a result of oxidative stress associated with high levels of pollution (Jenssen 1996; Routti et al. 2005). The level of contaminants in the bodies of porpoises in the Baltic is much higher than in the Kattegat and Skagerrak straits, the west coast of Norway, Icelandic and Greenlandic waters (Berggrena et al. 1999; Routti et al. 2005; Huber et al. 2012). The level of dichlorodiphenyltrichloroethane (DDT) among Baltic mammals was 5-12 mg/kg, and the concentration of polychlorinated biphenyls (PCBs) was more than 20 mg/kg (Aguilar et al. 2002). Siebert et al. (1999) found higher levels of mercury among Baltic porpoises (max. 449 µg/gdw, average 39 µg/gdw) than among animals found in Greenland waters (max. 67 µg/gdw, average 20 µg/gdw). Ciesielski et al. (2006) studied the concentration of metals (Al, B, Ba, Cd, Co, Cr, Cu, Fe, Ga, Hg, Li, Mn, Mo, Ni, Pb, Se, Si, Sr, Tl, V, Zn, Ca, K, Mg, Na, and P) in the livers of marine mammals that fell prey to bycatch or stranded on land (on Polish beaches). Metal indices were quite high, but for most metals were at similar or lower levels compared to other areas (e.g. Greenland, Denmark, Germany, North Sea).

The reduction in reproductive capacity of females associated with marine pollution, such as high concentrations of polychlorinated biphenyls (PCBs) (Helle et al. 1976; Addison, 1989), is considered very dangerous to population survival. The tissues of porpoises in the Baltic have been reported to have PCBs concentrations up to 254% higher than those of animals living in the Kattegat and Skagerrak (Berggren et al., 1999, Bruhn et al. 1999), and a significant number of defects and lesions have been found in them (Clausen and Andersen 1988). It is also suspected that neuro- and hepatotoxins produced by certain strains of cyanobacteria, whose mass emergence is highly dependent on the scale of marine eutrophication and climate change, may become a potential threat to porpoises (Pawliczka, 2012).

Overall pollution levels in once heavily polluted areas such as the Baltic Sea have been declining in recent years (Aguilar et al. 2002). This trend has been confirmed for gray seals and porpoises in the Baltic Sea - DDT levels are lower (Nyman et al. 2002; Huber et al. 2012). However, the levels of some pollutant constituents in the Baltic Sea remain unchanged or even increase (Nyman et al. 2002; Huber et al. 2012). Marine pollution through various substances and metals therefore continues to be a significant factor affecting harbor porpoises, common seals and gray seals, hindering the development of their populations (Aguilar et al. 2002).

It should be noted that during the construction of the farm, especially if gravity foundations are used, some amounts of pollutants and heavy metals are released from disturbed bottom sediments, but these will not be amounts that significantly affect the environment (cf. Abiotic Environmental Impact Assessment, Volume IV Section 2 of the EIA). In the case of the Project in the parameters changed according to the waraint evaluated in this report, this type of foundation is envisioned for possible use only for one offshore power station.

4.3. Eutrophication

Eutrophication is one of the greatest threats to the Baltic ecosystem (HELCOM 2009) and can lead to an increase in biomass production, resulting in reduced oxygen in some areas. It can also change the structure of fish populations - species that were previously insignificant and few in number may replace species of greater value to marine predators (HELCOM 2006). Porpoises, common seals and gray seals hunt herring, cod, whitefish, sprats and gobies (Härkönen & Heide- Jørgensen 1991; Lundström K. et al. 2007; Sveegaard et al. 2012). Unfavorable changes in fish populations for these species could therefore affect marine mammals. Porpoises, common seals and gray seals are so-called opportunists in terms of nutrition (Härkönen & Heide-Jørgensen 1991; Hall & Thompson 2009; Sveegaard et al. 2012), so changes in fish populations will not be a significant risk factor for them.

It should be noted that during the construction of the farm, especially if gravity foundations are used, some amounts of nutrients (nitrogen and phosphorus) will be released from the disturbed bottom sediments, but these will not be amounts that significantly affect the environment (cf. Abiotic Environmental Impact Assessment, Volume IV Section 2 of the EIA). In this context, it should be emphasized that the proposed modifications to the Project include eliminating the possibility of using gravity foundations for power plants, only in the case of foundations for associated infrastructure, for the foundation of which the possibility of using monopile, tripod, jacket (truss) or gravity foundations is envisaged. The final decision on the foundation method will be determined in the construction project, based on verified studies of geotechnical conditions adapted to the selected types of generators and stations. However, in the case of associated infrastructure, its amount has been reduced to a level that requires a single foundation.

4.4. Traffic ships

Large ship traffic in the Baltic (AIS data from Søfartsstyrelsen 2013, Denmark) can lead to an increased risk of ship collisions with seals and porpoises. Although such accidents usually involve whalebone vessels, there are data to assume that they are also a cause of mortality among small cetaceans in high-density areas (Van Waerebeek et al. 2007). If high-speed ships (such as high-speed ferries) are in the area, the danger is greater (Carrillo & Ritter 2010). Boat strikes on seals have not been well documented. While the risk exists, it is not great, as porpoises and seals usually have enough time to move out of the way, especially given the speed of the ships (Evans et al. 2011). A key marine mammal issue from the perspective of marine traffic is noise. For more information, see the following sections.

4.5. Tourism and recreation

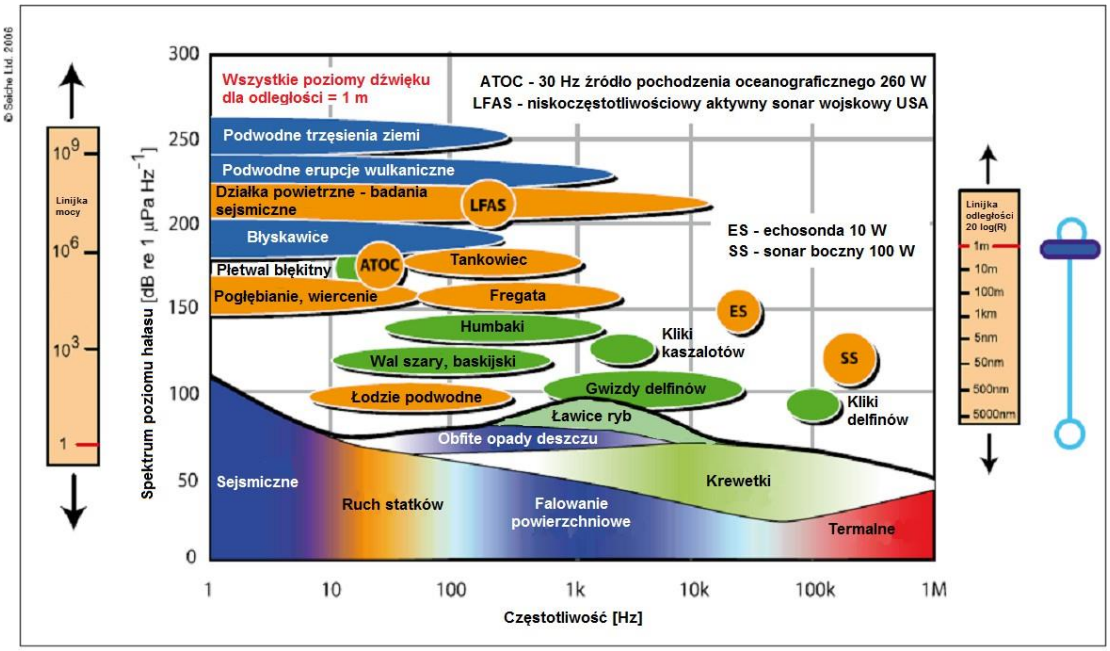
Some disturbances affecting marine mammals may be caused by tourism and recreation. In the case of seals, the disturbance mainly occurs at landings between feeding periods. The biggest problem is the use of water scooters and motorboats. These small boats move at high speeds and do not have a straight, predictable path, making them more likely to collide with marine mammals. These boats can generate higher frequency noise, which is also detrimental to marine mammals (Richardson et al. 1995). There are also various problems of local scale. Although they do not pose as great a threat as bycatch and pollution, neither can they be described as insignificant. Prochnow & Kock 2000 studied the impact

of tourism on porpoises around the island of Sylt (the German part of the North Sea) and found that even a large number of tourism and recreation activities did not have a significant impact on them.

4.6. Noise underwater

The figure below shows anthropogenic and natural sources of sound in the marine environment, illustrating their frequency range (X axis) and the levels of sound they generate (in decibels (dB); Y axis). This figure is very general (see Boyd et al. 2008 and OSPAR 2009 for details) but provides a good basis for understanding anthropogenic pressures related to sound. Typical sources of noise associated with human activities are distant and unidentifiable noise generated by ship traffic, drilling, bottom dredging, closer moving ships and tankers, frigates, air guns used in geophysical surveys (=sound-based seafloor exploration). It can be noted that each source is characterized by its own sound level (normalized to a distance of 1 m), of which seismic surveys generate relatively high sound levels at a distance of 1 m. It can also be seen that, in general, the energy of sounds of anthropogenic origin is concentrated at low frequencies (= below 1 kHz).

Figure 1. Levels and frequencies of anthropogenic and natural sound sources in the marine environment



Linijka mocy	Power ruler
Spektrum poziomu hałasu [dB re 1µPa Hz^{-1}]	Noise level spectrum [dB re 1µPa $^{Hz-1}$]
Wszystkie poziomy dźwięku dla odległości = 1m	All sound levels for distance = 1m
Podwodne trzęsienia ziemi	Underwater earthquakes
Podwodne erupcje wulkaniczne	Underwater volcanic eruptions
Działka powietrzne – badania sejsmiczne	Air plots - seismic surveys
Błyskawice	Lightning
Płetwal błękitny	Blue whale
Pogłębianie, wiercenie	Dredging, drilling
LFAS	LFAS
ATOC	ATOC
Tankowiec	Tanker

Fregata	Frigate
Humbaki	Humbags
Wal szary, baskijski	Wal gray, Basque
Łodzie podwodne	Submarines
ATOC – 30 Hz źródło pochodzenia oceanograficznego 260 W	ATOC - 30 Hz source of oceanographic origin 260 W
LFAS – niskoczęstotliwościowy aktywny sonar wojskowy USA	LFAS - low-frequency active U.S. military sonar
ES – echosonda 10 W	ES - echosounder 10 W
SS – sonar boczny 100 W	SS - side scan sonar 100 W
ES	ES
SS	SS
Kliki kaszalotów	Cliques of sperm whales
Gwizdy delfinów	Whistling dolphins
Kliki delfinów	Dolphin clicks
Ławice ryb	Shoals of fish
Obfite opady deszczu	Heavy rainfall
Krewetki	Shrimp
Sejsmiczne	Seismic
Ruch statków	Ship traffic
Falowanie powierzchniowe	Surface undulation
Termalne	Thermal
Częstotliwość	Frequency
Linijka odległości 20 log (R)	Distance ruler 20 log (R)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, after Seiche Ltd and Boyd et al. 2008

From the cumulative impact assessments conducted in Chapter 9 below, it is clear that the potential sources of noise in the BIII OWF area are ship traffic (low-frequency distant), drilling/piling and seabed dredging. In addition, it is possible to generate sound during seismic work, as geophysical surveys have been conducted for scientific purposes in the area of OWF BIII (Maritime Institute in Gdansk, oral information). However, taking into account various activities, it can be concluded that ship traffic will be the largest contributor to underwater noise generation in the area of the farm.

4.6.1. Noise generated by the movement of of ships

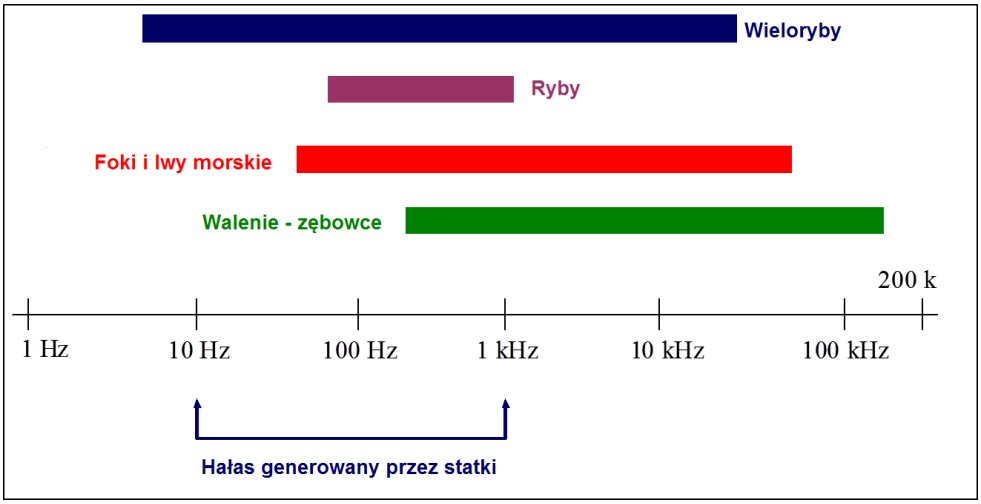
The intensity and frequency of noise generated by ships depends largely on their size and the speed at which they are moving; large, slow-moving ships generate noise at low frequencies, while small and fast vessels emit sounds where most of the energy is contained at higher frequencies. The following breakdown was proposed by OSPAR 2009:

- small rest units: < 50 m; variable output 160-175 dB re 1µPa @1m; <1kHz - > 10 kHz,
- medium-sized ships: 50-100 m; 165-180 dB re 1µPa @1m; < 1 kHz,
- large ships: > 100 m; 180-190 dB re 1µPa @1m; < 200 Hz.

In general, most of the noise energy associated with ship traffic is contained at frequencies below 1 kHz (see also Richardson et al. 1995). However, it should be remembered that some of the energy is also at frequencies above 1 kHz. This could potentially be a problem for porpoises, whose hearing is more sensitive at higher frequencies. Yet ship-generated noise should not affect the sense of echolocation, as the sounds emitted by porpoises and those generated by ships do not overlap much with the sounds used for this purpose by pinnipeds, particularly porpoises (right corner of the scale in Figure 4). Seals'

hearing is relatively more sensitive at low frequencies and the sounds they produce coincide with those generated by ships (cf. figure below, porpoises are among the tooth cetaceans).

Figure 2. Typical frequency ranges of sounds generated by marine mammals and fish compared to nominal low frequency sounds associated with commercial shipping



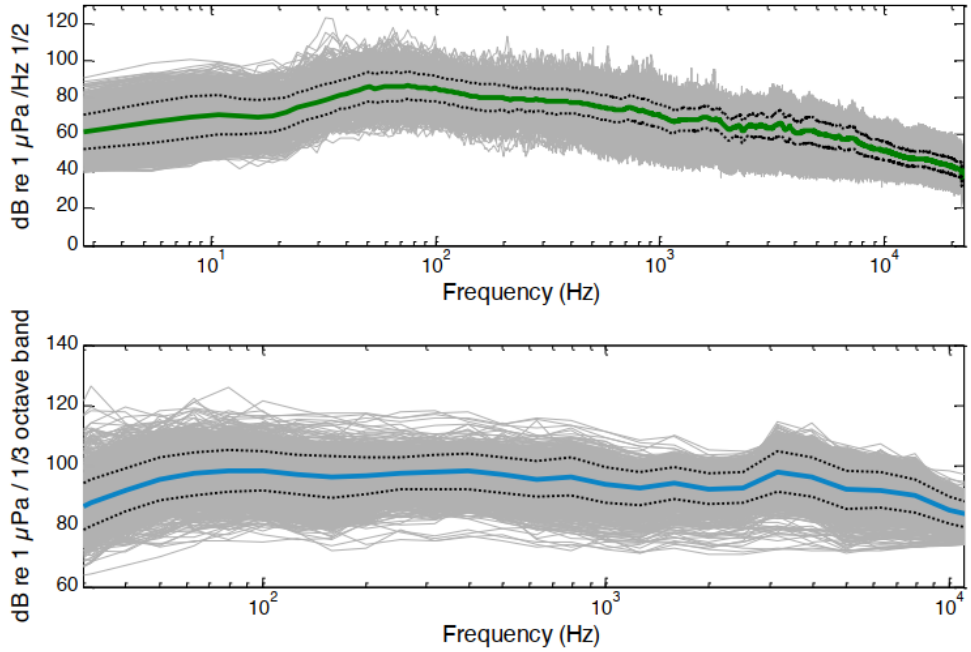
Wieloryby	Whales
Ryby	Fish
Foki i lwy morskie	Seals and sea lions
Walenie – zębowce	Cetaceans - toothfish
Hałas generowany przez statki	Noise generated by ships

Source: Report 2015., per OSPAR 2009

In the IMF area, background sound levels were recorded in the frequency range between 2 Hz and 20 kHz. This range includes all frequencies generated by ship traffic and listed by OSPAR 2009. Noise at different frequencies is presented in the charts below.

The top graph shows the power spectral density for 1 Hz bands for recordings from all seasons (number of samples = 1906). The bottom graph is the power spectral density for 1/3 octave bands for recordings from all seasons. The green line indicates the spectral power density of the individual recordings, the blue line is the average value of the spectral power density, the dashed lines are the standard deviation of the spectral power density.

Figure 3. Acoustic background in the area of OWF BIII throughout the study period

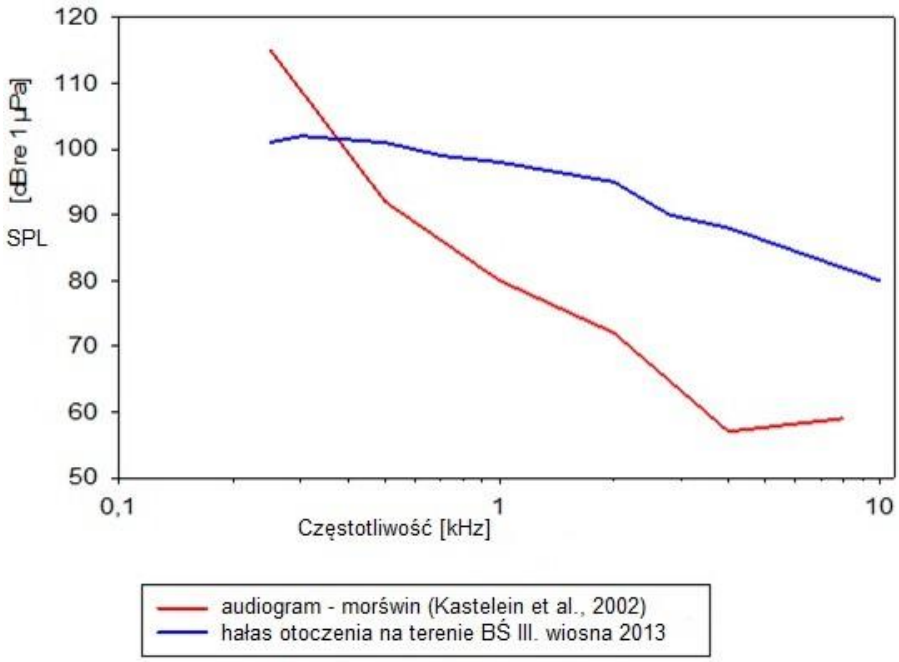


Source: Monitoring of marine mammals in the area of offshore wind farm "Central Baltic III". Impact assessment for the variant chosen for realisation and rational alternative variant, DHI, 2015

The results of the background noise studies are detailed in Section 8 of Volume II of the EIA. Noise levels in other parts of the Baltic and North Sea have also been carefully analyzed. A comparison of the results showed that the noise level measured in the area of the planned project is at an average level.

In order to better understand the acoustic environment of porpoises in the area of OWF BIII, the hearing sensitivity of porpoises (Kastelein et al. 2002) was juxtaposed with the background sound levels recorded in the area of the farm in winter 2013/2014 (the season when the highest sound levels were recorded), (both parameters are presented in 1/3 octave bands for direct comparison; see Figure 6). The audiogram of porpoises extends all the way to ultrasonic frequencies (over 20 kHz), the best hearing sensitivity of these animals is recorded around 130 kHz. It is therefore possible that high-frequency sounds, such as those generated by sonar, also affect porpoises at high frequencies.

Figure 4. Background sound level in the 1/3 octave bands for the OWF BIII area for all seasons of 2013 in relation to the hearing sensitivity of porpoises



SPL	SPL
0,1	0.1
Częstotliwość [kHz]	Frequency [kHz]
[dBre 1µPa]	[dBre 1µPa]
Audiogram – morświn (Kastelein et al., 2002)	Audiogram - porpoise (Kastelein et al., 2002)
Hałas otoczenia na terenie BŚ III. wiosna 2013	Ambient noise on the WB III. spring 2013

Source: modified from Kastelein et al. 2002

It can be noted that the acoustic background curve below 400 Hz is under the porpoise hearing sensitivity curve. Consequently, the acoustic background at low frequencies is not detectable by porpoises. At frequencies above 400 Hz, background sound levels decrease only slightly, while hearing sensitivity increases. At about 4 kHz, the background sound level is about 30 dB higher than the audiogram value. Hence, it can be concluded that porpoises in the BIII OWF area are constantly under the influence of noise, where the potential impact increases with frequency. However, looking at overall levels, it is likely that they are not high enough to lead to any impacts on animal hearing (Kastelein et al. 2012b). The background sound level is high enough that it will be heard by porpoises, but is unlikely to lead to an impact on the animals' hearing under normal conditions.

The presence of ships in the Baltic could potentially cause the movement of porpoises. However, the background noise levels recorded for OWF BIII are lower or comparable to those recorded in areas with the most vessel traffic in Danish waters, and porpoises are very abundant in these areas (Sveegaard et al. 2011). Hence, it is presumed that impacts do not cause permanent displacement or significant behavioral changes in porpoises. In general, seals seem to quickly habituate to underwater noise (Harris et al. 2001; reviewed by Southall et al. 2007).

4.6.2. Research seismoacoustic

Seismoacoustic surveys are conducted in the oil and gas industry, among others, for the purpose of identifying various properties of the seabed prior to drilling operations. Seismic surveys are also often conducted prior to the construction of OWFs in order to properly select the location of the turbines. Such studies were conducted during the preparatory phase of the BIII OWF project (Maritime Institute in Gdansk; information from direct communication).

Seismic surveys most often use a series of air guns that can generate high sound pressure levels in the range of 220 - 255 dB re 1µPa, where most of the energy is contained at low frequencies below 100 Hz (reviewed by Genesis 2011). Most of the acoustic energy is directed vertically downward, but some can also propagate horizontally. Lucke et al. 2009 induced a temporary shift in hearing threshold by 6 dB in porpoise, with a sound exposure level of 164 dB re 1uPa2-s. TTS in seals using air cannons has not yet been studied, but potentially seismic surveys can negatively affect both seals and porpoises over significant distances. It is possible that the amount of seismoacoustic exploration in the Baltic will increase with the number of construction areas associated with oil and gas extraction and also planned wind farms, hence underwater noise from geophysical exploration may pose an increasing problem for marine mammals in the Baltic.

4.7. Diseases

Seal populations in internal Danish waters have repeatedly succumbed to mass deaths caused by outbreaks caused by the phocine distemper virus (PDV). The first recorded epidemic occurred in 1988, when more than 23,000 common seals went extinct. In 2002, the deaths of more than 30,000 individuals resulted from a second outbreak (Härkönen et al. 2006). These epidemics were recurrent events (Härkönen et al. 2006; Siebert et al. 2010). For populations that are already threatened by the presence of contaminants, such events pose a further, very great danger. Large numbers of animals can go extinct at once due to poor immune response (reduced immunity). The risk of infection is highly dependent on contact with other infected individuals from other populations. For isolated seal populations in the Baltic, this risk is not great. However, as the population expands and individual specimens migrate into the Great Belt, Little Belt and Skagerrak straits, the threat will be greater. The risk of mass deaths is difficult to estimate.

4.8. Summary

The results of the review of the primary impacts are summarized in the table below. For porpoise, bycatch is the biggest threat, followed by pollutants and eutrophication, which, however, is on a downward trend. The impact of noise is medium, but increasing. In the case of seals, pollutants and eutrophication cause a medium, decreasing impact. The impact of noise is also at an average level, but is increasing. The biggest threat is from diseases that directly affect population numbers.

It is difficult to assess the total impact on harbor porpoises and seals in the Baltic, as the individual threats are not equal depending on the situation. ASCOBANS 2002 concludes that the pressures affecting the harbor porpoise in the Baltic today are high. Based on the review, it is estimated that the pressures affecting seals are slightly smaller (medium in magnitude).

Table 1. Existing anthropogenic pressures affecting marine mammals in the Baltic Sea

Factor	Porpoises	Seals
By-catch	+++	+
Pollution	++*	++*
Eutrophication	++*	++*
Ship traffic (collisions)	+	+
Tourism and recreation	+	+
Underwater noise	++**	++**
Diseases	+	+++

+ = low impact intensity, ++ = medium, +++ = high; * = downward trend; ** = upward trend

Source: Kosecka M., Schack H., Høigaard Holst M., Thomsen F. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III. Impact assessment for variants 1, 2 and 3. DHI Poland, 2015, per: Kastelein et al. 2002

5. Description of anticipated effects on the environment in the event of not undertaking the project

- The 2015 Report analyzed the effects on marine mammals if the project was not undertaken. In doing so, three scenarios were considered:
- offshore wind energy will not be developed in the Polish maritime areas, and therefore the assessed project or a similar one will not be implemented,
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind power are not being made, but the mining industry is developing.

The results of the analysis are shown in the table below.

Table 2. Effects on marine mammals if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy will not be developed	In the case of both porpoises and seals, assessing the likely direction of the population going forward is difficult due to the little information available on these animals in the Baltic Sea (Olsen et al. 2014; Harding 2007). In the absence of OWFs in Polish waters, the development of porpoise and seal populations in OWF BIII and nearby waters will depend only on the anthropogenic pressures detailed in the previous section. Historical data indicate that porpoises were very

Lp.	Script	Environmental implications
		common in the Baltic, but their population declined significantly in the mid-20th century, largely due to fishing and bycatch (Berggren et al. 2002). Currently, the number of porpoises in the Baltic is small, and the factor that poses the main threat to these animals is bycatch. According to ASCOBANS 2002 (see www.ascobans.org), environmental capacity for porpoises can only be realized if bycatch rates fall. Another factor that poses a threat is pollutants. Noise from boats and ships can cause interference, especially if ambient noise increases as traffic increases. Negative effects of conducting seismic surveys in the area are also to be expected. However, due to the ambiguity of porpoise abundance in the Polish Baltic Sea and the behavior of these mammals, it is impossible to predict the changes that will occur in the future in terms of the species' numbers. Since the 1980s, the number of gray seals has gradually increased. The same is true for gray seals in the Gulf of Gdansk (Gull's Lacha Reserve, cf. Marine Mammal Survey Results, Volume III Section 10 of the EIA). It is difficult to determine trends for the common seal, as the abundance of this species in the Polish EEZ is very low and there are no breeding areas. As for seals, a significant threat is bycatch. This is particularly true for gray seals, which migrate throughout the Baltic Sea, including the area of OWF BIII, which they may use for foraging. No figures are known for seal bycatch in the area of the planned farm. Seals present in the area may also be negatively affected by pollutants and seismic surveys. Despite this, the gray seal population appears to be increasing, and this trend is likely to continue if the first scenario's assumptions materialize.
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	When analyzing this scenario, it is necessary to rely on the data contained in the section on cumulative environmental impacts. In this scenario (and assuming several other OWFs are built, with Baltica 3 likely to be built first), the construction process would significantly add to existing noise levels, but only temporarily. This situation may cause the temporary displacement of porpoises and seals from their construction sites. On the other hand, as a result of the construction of the OWF, it is possible to reduce some of the negative environmental impacts - fishing activities will be reduced, which means a potential decrease in the bycatch rate in the investment areas. This scenario was recently discussed in Scheidat et al. (2011), where a higher number of porpoises were found at the OWF site after construction than before. The reliability of these observations is uncertain due to the generally increasing number of

Lp.	Script	Environmental implications
		porpoises in this part of the North Sea (Thomsen et al. 2006a). The bycatch reduction discussed above also applies to seals.
3.	Offshore wind power will not develop, but mining industry will grow	Assuming that no wind energy development will take place in Polish maritime areas, but projects related to the mining industry will be implemented, noise will be introduced into the environment as a result of drilling and dredging the bottom, both of which will be low-frequency and medium-intensity sound. Since dredging and drilling noise is mainly generated by the engines of the vessels used for this purpose, it can be considered in this category. Hence, the above activities will, to some extent, increase the noise generated by ship traffic. This could lead to locally increased disturbance of porpoises, gray seals and common seals.

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, per: Kastelein et al. 2002

The analysis conducted for the 2015 Report is still valid, only to point out that the probability of the scenario related to the development of the mining industry has decreased due to the lack of confirmation to date of the abundance of hydrocarbon deposits in Polish offshore areas and changes in socio-economic trends affecting changes in the assumed energy mix, including the increased relevance of renewable energy sources.

6. Methodology for assessing the impact on environmental

The project's impact assessment was carried out in accordance with the project's framework methodology, as described in Section 5 of Volume I of the report, with some modifications or refinements, as discussed below.

6.1. Modifications or refinements to the framework methodology evaluation

6.1.1. Use of additional reports technical

It should be noted that in addition to the results of the marine mammal surveys conducted by DHI in 2012 - 2013, additional expert studies on acoustics were used to conduct an environmental impact assessment of the Project within the parameters approved by the Environmental Decision. They are:

1) "Monitoring of the acoustic background in the area of the offshore wind farm Baltic Central III. Final Report with Survey Results, DHI, August 2014."

2) "Sound Simulation Baltic II and III - Sound Simulation Pile Drivinf for Baltic FW" by Jürgen Weissenberger and Kari Mette Murvoll dated May 2020 (updated April 2022);

3) Environmental Impact Assessment of Baltic Central III Offshore Wind Farm - Numerical modelling of noise propagation from pile driving, DHI, February 2015.

(See Volume III, Section 10 of the Report).

In the period from March 2016 to April 2017, marine mammal surveys were conducted in the body of water covering the Baltica offshore wind farm area, adjacent to the area of the planned Baltica Central III offshore wind farm to the north and northwest. During the entire study period, the number of days of positive porpoise detection was 13. The results obtained show that porpoise detections in the area are relatively few. No porpoises were observed during aerial observations, despite good observation conditions. However, during the flights it was possible to observe closer unidentified seals: in May 2016. (1 individual), June 2016. (2 individuals) and in April 2017. (1 individual). The results collected indicate that the study area is an area with a low density of marine mammals.

During marine mammal monitoring carried out in 2018-2020 for the Baltic Power offshore wind farm project, located about 2 km from the Project area, detections of porpoises were sporadic. Over the course of more than a year of monitoring, 12 days of positive porpoise detections were recorded. Four observation flights were carried out as part of the monitoring during the study period, along five transects. Only during one flight, which took place on August 3, 2019, one marine mammal not designated to species was observed. In addition, sightings of marine mammals were also recorded during seabird surveys. Within the framework of the aforementioned surveys, there were 10 observations of sea grays and three observations of seals unidentified to the species.

The assessment also took into account data from acoustic monitoring of the species carried out in 2011-2013 within the framework of the SAMBAH project, according to which the Project region is an area with low predicted densities of porpoises, with densities being slightly higher between November and April.

In addition, a re-modeling of noise propagation for the BIII offshore wind farm was conducted in 2020,- see Section 9 of Volume II of the report. The modeling was repeated due to advances in knowledge of noise impacts on marine mammals, and takes into account current guidelines for thresholds of noise impacts on mammals and modified weighting functions describing them. In addition, the modeling took into account the higher power used for sodding the farm with monopile technology.

The assessment was made using available literature data - study works. The information provided in the various sections of this document is based on the most detailed information available. All scientific statements are supported by literature citations, a list of which is included at the end of this report.

6.1.2. Detailing the principles of environmental impact assessment environment

The following details the understanding of certain terms used in the EIA (Chapter 9).

An EIA framework methodology was used to assess impacts. The importance of gray seals[1] and common seals is assessed as medium, due to their conservation status and population size, but the importance of the harbor porpoise, due to its conservation status as well as its status as a critically endangered population, even though its presence in the BIII OWF area was small, is assessed as high.

The size of the impact determines the extent of the impact, it can be local, regional, national and even international. TTS, based on the number of strikes, was assessed as a local and regional impact, and the

[1] According to the "Polish Nomenclature of Mammals of the World" of the Museum and Institute of the Polish Academy of Sciences, the current Polish species name is the sea grey.

behavioral response, depending on the species considered, ranged in magnitude from local to international. The frequency of impact can be one-time, repetitive or continuous, where piling is defined as repetitive. The duration of the impact is assessed based on the duration of the impact. PTS is long-term, while TTS is short-term. Behavioral responses (e.g., escape or avoidance) were assessed as short-term (see Section 7.1.1.). Intensity describes the impact of an impact on an affected animal, and can range from low to very high, where an impact such as TTS will be rated as a high intensity impact. The reversibility of an impact is the only one of the important factors in assessing a given impact, which is ultimately rated on a scale from negligible to high. Given the scale of the Project limited to 60 turbines, it should be pointed out that the duration of these impacts will be considerably shorter than in the case of the 2015 NIS, as well as the variant provided for in the Environmental Decision.

6.2. The most far-reaching scenario of the venture - NIS 2015

The EIA for the Project within the parameters approved by the Environmental Decision began by identifying the investment scenario that will potentially have the greatest impact on marine mammals (the most far-reaching scenario - "NIS"), it was adopted in accordance with the parameters specified in the 2015 Report.

The 2015 Report assumed that the set of Project parameters representing the most far-reaching scenario - the 2015 NIS - in terms of noise would be the use of monopile foundations, since their driving into the seabed will be accompanied by potentially the highest underwater noise. Underwater noise is widely recognized as the most important impact of the OWF on marine mammals. The largest diameter of the monopile foundation considered at the time was 10 m, while the largest assumed power of the pneumatic hammer planned to install this foundation was 3000 kJ. These parameters were considered the basis for determining NIS 2015 impacts. Currently, the Project will be implemented using monopiles with a maximum diameter of 10 m (unchanged), and only in exceptional cases, i.e. lack of technical feasibility using jacet (truss) foundations. The maximum pneaumatic hammer power currently under consideration for fuindament installation is natoamis 4,500 kJ.

The main technical parameters of the project relevant to the noise impact assessment performed in the 2015 Report are listed below. The information was provided directly by the investor. For acoustic evaluation, information on only some parameters is necessary, mainly related to the type of foundation, its size and diameter. In addition, information was provided on piling time, number of hammer blows and number of turbines. In addition, it should be pointed out that the number of foundations for associated infrastructure for the Project has been limited to one.

Table 3. Baseline parameters for impact assessment - for the project in the parameters approved by the Environmental Decision, which is also the most far-reaching scenario in terms of noise impacts - NIS 2015

	Monopal	Tripod	Jacket
Pile diameter (m)	10	2.5	1.8
Number of strokes needed to drive one pile	8400	8400	8400

Number of beats per hour	2800	2800	2800
Number of strikes per foundation	8400	25200	50400
Piling time (h)	5	Indicative active piling of one foundation (excluding "soft start"): 18 hrs	Indicative active piling of one foundation (excluding "soft start"): 18 hrs (maximum 4 piles per foundation)
Hammer energy (kJ)	3000	2300	2300
Number of turbines	120	120	120

Source: Own elaboration on the basis of Offshore Wind Farm Baltic Central III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

For the purposes of this Report, new modeling was conducted in 2020 to determine noise impacts on marine mammals. Due to the different assumption made for the modeling, and resulting from both the proposed modification of the Project's parameters, i.e., a different hammer energy used for foundation placement of 4,500 kJ, and changes in the knowledge of noise impacts on marine mammals, resulting in a change in the guidelines for determining marine mammal noise sensitivity thresholds, the modeling results from the 2015 Report and this Report are not comparable. The remainder of this section juxtaposes values determining the spatial extent of mammalian impacts from modeling without bubble curtain minimization measures to verify the sufficiency and adequacy of the minimization measures that are a condition of the Environmental Decision under the modified parameters of the Project.

7. Potential impacts of offshore wind farms on mammals offshore

Construction, operation and decommissioning of OWFs can affect marine mammals in various ways. These impacts are positive or negative. The impact can be measured at the level of individuals or the entire population.

Foundation pile driving is considered the activity most likely to cause the greatest impacts on marine mammals because it is combined with high noise levels (Nedwell et al. 2007, Tougaard et al. 2009, Thomsen 2010), which can cause permanent or temporary hearing impairment and behavioral responses (e.g., flight, avoidance). At the stage of the environmental impact assessment conducted in the 2015 Report, four types of foundations were considered: monopiles, tripod foundations, jacket foundations and gravity foundations. The first three require the use of jackhammers during their installation.

In the case of gravity foundations, there is usually no need for this, although in certain situations it may be needed during site preparation (Carstensen et al. 2006). Before these foundations are placed, it is necessary to prepare the seabed, and once the foundations are in place, it may be necessary to apply a leaching protection layer. These activities cause an increase in the concentration of suspended solids in the water and the noise caused by dredging the bottom (Reach et al. 2012).

Detailed technical information on the listed types of foundations is provided in Section 3 of Volume II of the EIA.

Issues related to the impact of construction activities on the seabed are discussed in detail in the chapter of the EIA on impacts on the abiotic environment (Volume IV Section 3 of the EIA).

The other potential emissions and environmental disturbances discussed in this chapter will have impacts of much lesser significance for marine mammals.

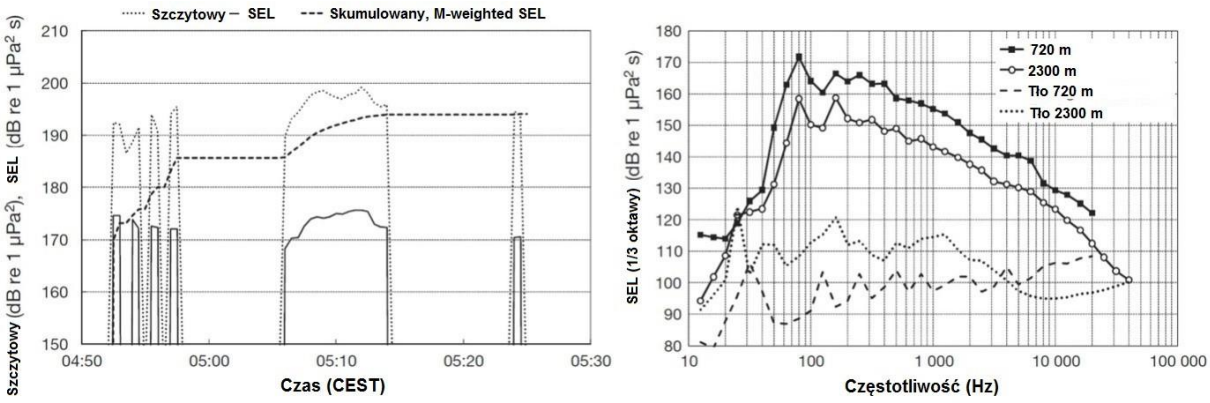
In addition, unplanned emissions may occur at any stage of the project, such as contamination of water bodies and bottom sediments with petroleum substances (during normal operation and in an emergency), antifouling agents, accidentally released municipal waste or domestic sewage, chemicals, and waste from the construction, operation or decommissioning of the farm. They will indirectly affect living organisms, including marine mammals.

7.1. Stage construction

7.1.1. Noise generated by driving piles foundation piles

Monopile, jacket and tripod foundations require the use of jackhammers during their installation, which cause high sound pressure levels (Nedwell & Howell 2004; Thomsen 2010). Measurements of the noise generated by driving 3.9-m diameter steel piles into the seabed during the construction of the Horns Rev II offshore wind farm showed that for a single hammer blow, the generated acoustic peak pressure is more than 190 dB re 1 µPa even 720 m from the location where the pile was driven (Brandt et al. 2011). Although most of the acoustic energy of piling is contained at low frequencies (<1 kHz), to which porpoises' hearing in particular is not very sensitive, some energy is also contained at frequencies to which both porpoises' and seals' hearing is very sensitive. Due to the intensity as well as the frequency range of the sounds, piling may cause significant disturbance to marine mammals in the area.

Figure 5. Left: Peak SEL level for a single pile impact measured at a distance of 720 m from the sound source. Cumulative "M-weighted" SEL ("HF dentals," "M-weighted," from Southall et al. 2007). Right: Power spectral density for piling noise - measured at two locations (Brandt et al. 2011)



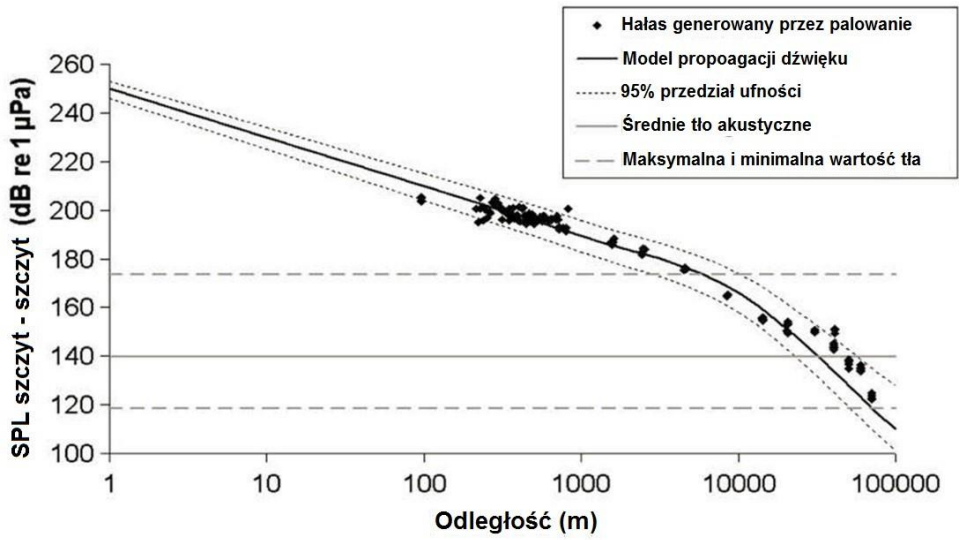
Szczytowy [dB re 1 µPa²) SEL (dB re 1 µPa² s)	Peak [dB re 1 µPa²) SEL (dB re 1 µPa² s)
Szczytowy	Peak
SEL	SEL
Skumulowany, M-weighted SEL	Cumulative, M-weighted SEL

Czas (CEST)	Time (CEST)
04:50	04:50
05:00	05:00
05:10	05:10
05:20	05:20
05:30	05:30
SEL (1/3 oktawy) (dB re 1 µPa^2 s]	SEL (1/3 octave) (dB re 1 ^{µPa2} s]
1 000	1000
10 000	10000
100 000	100000
Tło 720 m	Background 720 m
Tło 2300 m	Background 2300 m
Częstotliwość (Hz)	Frequency (Hz)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, per: Southall et al. 2007, Brandt et al. 2011

The intensity of the sound generated is closely correlated with the diameter of the driven pile (Betke 2008). So, the installation of tripod and jacket foundations with smaller pile diameters will not result in the generation of such high sound pressure levels (cf.: Chapter 9). This relationship is evident in noise measurements made during the installation of two turbines off the northeast coast of Scotland (Bailey et al. 2010).

Figure 6. Broadband sound pressure level (peak-to-peak) for piling with respect to distance from the sound source and the best adaptation of the propagation model



SPL szczyt – szczyt (dB re 1 µPa]	SPL peak-to-peak (dB re 1 µPa]
Odległość (m)	Distance (m)
Hałas generowany przez palowanie	Noise generated by piling
Model propagacji dźwięku	Sound propagation model
95% przedział ufności	95% confidence interval
Średnie tło akustyczne	Average acoustic background
Maksymalna i minimalna wartość tła	Maximum and minimum background value

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, per: Bailey et al. 2010

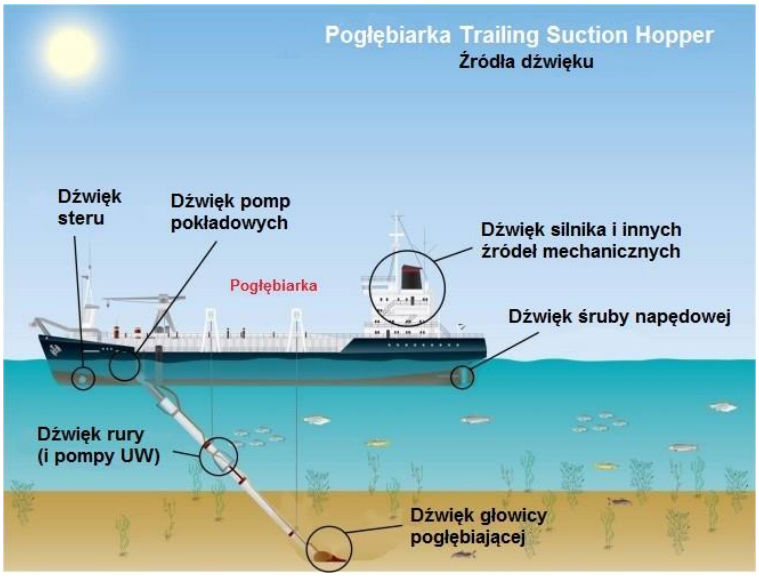
Research in the Danish part of the North Sea (Brandt et al. 2011) involved monitoring porpoise activity using detectors of so-called "clicks" sent by the animals (C-POD). A negative response to pile driving at distances of up to 18 km has been found. Porpoise activity was significantly lower during the construction period compared to the results of the baseline survey. The duration of the impact was up to 72 hours. No negative impact on porpoise activity was demonstrated at a POD station 21.2 km from the piling site. This may indicate that porpoises do not show behavioral responses at this distance, or there has been an over-migration of porpoises from areas closer to the piling site to the area of this station. (Tougaard et al. 2006) showed an impact at a distance of at least 20 km from the sound source, the return to baseline occurred 4-5 hours after the cessation of piling. (Dähne et al. 2014) in a recent study made from the German Alpha ventus platform (German part of the North Sea) confirmed the occurrence of a behavioral response of porpoises at a distance of 20 km. The impact was of short duration (median duration = 16.8 h); (Dähne et al. 2014). Only in one case were the effects of construction work evident after the cessation of activity - this involved a wind farm for which jackhammers were used for a short time in support of the construction process, but not for pile driving, but for the installation of gravity foundations (Carstensen et al. 2006). It is difficult to assess the results of this study, as the number of porpoises observed was small from the start.

7.1.2. Noise generated by dredging bottom

In many cases, before installing wind farm facilities, it is necessary to deepen the bottom in order to properly prepare it for the foundation (gravity, but also other types). There are different types of dredgers, but in many cases Trailing Suction Hopper Dredgers (TSHD) are used. Noise associated with TSHD comes from several sources, primarily from the vessel and the dredge head (CEDA 2011; Fig. below).

Most of the sound energy generated by the TSHD dredge is contained at frequencies below 1 kHz. However, depending on the composition of the extracted substrate, it can also be contained at higher frequencies. This includes larger grains of sand and gravel moving through the dredge pipe and pump (Robinson et al. 2011). Yet even if the mined substrate is sand, some of the acoustic energy is also contained at frequencies above 1 kHz, which could potentially affect porpoises and seals. Reported sound levels are 186 dB-188 dB re 1µPa rms @ 1 m (Thomsen et al. 2009; Robinson et al. 2011 These are significantly lower than those generated by piling (see above), but as the sound generated by dredging is more or less continuous and piling noise is impulsive (pulse length = 50 ms) the sounds cannot be directly compared with each other. What is clear, however, is that except in a situation where porpoises will be in the vicinity of a dredge for an extended period, no physical damage will occur (see WATER 2013).

Figure 7. Sources of sound generated by the Trailing Suction Hopper dredge



Pogłębiarka Trailing Suction Hopper	Trailing Suction Hopper Dredger
Źródła dźwięku	Sound sources
Dźwięk steru	Rudder sound
Dźwięk pomp pokładowych	Sound of deck pumps
Pogłębiarka	Dredger
Dźwięk silnika i innych źródeł mechanicznych	Sound of the engine and other mechanical sources
Dźwięk śruby napędowej	Sound of the propeller
Dźwięk rury (i pompy UW)	The sound of the pipe (and UW pump)
Dźwięk głowicy pogłębiającej	Sound of the deepening head

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, per: WATER 2013

CEDA 2011 mentions very few studies on the impact of bottom dredging, only behavioral responses in gray and Greenland walleyes have been documented (see Richardson et al. 1995), more recently also Diederichs et al. 2010 showed that porpoises avoided the area where sand mining took place in the Sylt Island area of Germany. In their study, Diederichs et al. 2010 used automated porpoise clipper detectors. He said that when the dredge was closer than 600 meters from the position of the detector placement, the time it took for the porpoise to be re-detected was three times longer than when no sand dredging work took place. However, after the ship left the area, the cliques registered at normal levels. The results of the survey are important because they also provide information on the level of sound emitted by the dredge (see Itap 2007). However, as sound transmission varies considerably between areas, the 600m distance is only binding for this particular project and there can be no generalization between all bottom dredging projects. Visual observations using aircraft have not documented the existence of an impact (Diederichs et al. 2010).

7.1.3. Noise generated by the movement of of ships

During the construction phase, ship traffic, both small and large vessels, will increase. The noise generated will cause an increase in background sound levels. Large, slow-moving craft would not be expected to cause a significant increase in background levels at frequencies relevant to seals and porpoises, as they generate sounds below 1 kHz (Richardson et al. 1995; McKenna et al. 2012). Much of

the acoustic energy generated by small and fast moving vessels can be generated at frequencies within the hearing range of both porpoises and seals (see OSPAR 2009 review).

7.1.4. Collisions with ships

Increased maritime traffic associated with construction work could potentially increase the risk of collisions between porpoises and seals and ships. Although collisions most often involve large fin whales there are data suggesting that collisions may also be an important cause of mortality for small cetaceans in areas with heavy ship traffic (Van Waerebeek et al. 2007). The risk of collision increases with the speed of the vessel (Carrillo & Ritter 2010). Collisions involving seals are not well documented.

7.1.5. An increase in the concentration of suspended solids in water water

Burying cables and foundation work disrupts the structure of bottom sediments and their spreading in the water table, increasing suspended solids concentration and water turbidity and potentially beyond. This will be especially true for gravity foundations, as their foundation may require both relocation and removal of bottom substrate by dredging the bottom to get to the appropriate substrate at a given depth (Reach et al. 2012). Disturbance of the seafloor structure through extraction, discarding, removal of sediment and flushing of excess material can result in increased turbidity of the water tone and spreading of sediment.

Marine mammals often inhabit turbid environments, and many use a sophisticated sonar system to perceive the environment around them (see Au et al. 2000). Hence, the increase in turbidity should have little impact on marine mammals in the BIII OWF area. Some minor implications may be possible for non-echoic marine mammals, which rely to some extent on the sense of sight when foraging and detecting predators (Nairn et al. 2004), but there is no direct evidence of such impacts. (McConnell et al. 1999) showed that foraging areas and distances traveled by blind gray seals in the North Sea were similar to those recorded for other seals. Thus, given this and the fact that seals often inhabit areas of high turbidity (Weiffen et al. 2006), it is suggested that during environmental exploration visual cues are not important to seals and an increase in turbidity should only have a minimal impact on their ability to function normally. Although sediment suspension is not expected to have a direct impact on seals and porpoises, there may be indirect impacts through possible negative effects of turbidity on species of organisms that constitute their food.

7.1.6. Release of pollutants and nutrients from the sludge into the water body water

One of the effects of the disturbance of bottom sediments during the construction of the farm will be the release of certain amounts of pollutants (in particular, metals and organic pollutants such as polycyclic aromatic hydrocarbons - PAHs and polychlorinated biphenyls - PCBs), as well as nutrients (in particular, nitrogen and phosphorus) into the water body. This impact is described in detail in the chapter on the impact of the project on the abiotic environment (Volume IV Section 2 of the EIA). However, they are not expected to pose a potential threat to porpoises and seals.

7.1.7. Destruction of habitats benthos

The foundation of power plant and substation foundations, the laying of cables and the anchoring of ships during this work will cause partial damage to the seabed. This situation will lead to the physical destruction of benthic organisms in these places and the loss of their habitat. These impacts will be on a local scale. This can have a periodic negative impact on benthic-eating fish, and indirectly on fish-hunting marine mammals. The results of the monitoring programs of Danish offshore wind farms indicate that the decrease in biomass and abundance of benthic fauna in the area of the farms only applies to the construction stage, then there is an increase in both the abundance of organisms and biomass. The main factor contributing to this state of affairs is the increased heterogeneity of the seabed. New habitats characteristic of hard bottom are being created, both on turbine foundations and protection against scour, resulting in a change in habitat from sandy seabed to a mixed habitat of sandy and hard bottom (E2 2006; Bioconsult 2005). The results of the study also indicate that recolonization of the soft bottom takes place relatively quickly (over a period of about 5 years), but the actual timing depends on the structure of the benthic fauna (species composition, abundance, biomass). The temporary loss of benthic biomass may indirectly affect marine mammals that use the area as a feeding ground. But as the overall biomass and abundance will not change significantly, the indirect impact in the form of reduced food will only be short-lived. Hence, it will not significantly affect marine mammals. It should also be taken into account that marine mammals are likely to leave the construction area during the installation of the turbines. Therefore, any potential impacts associated with short-term habitat alteration during the construction phase will be masked by animal responses due to the underwater noise generated.

7.1.8. Events unplanned

During the construction phase of a wind farm, there is a risk of unplanned events. One is the collision of vessels used in construction, which could result in an oil spill in the work area. This situation may result in external and internal impacts on marine mammals present in the area. Among other things, chemical burns or irritation due to direct contact, irritation of the respiratory system, inflammation, lung inflammation due to inhalation of volatile compounds or inflammation of the gastrointestinal tract, internal hemorrhage, kidney and liver dysfunction due to digestion of harmful substances can result from oil spills. In addition, fur-covered seals can develop hypothermia (NOAA, 2014).

Unplanned impacts on marine mammals also include those associated with the possible detonation of conventional weapons residues deposited in the sea and found during preparatory or construction work in the course of project implementation. Decommissioning of UXO will be carried out only in cases where it is necessary.

Detonation of conventional boron residue is a source of underwater noise and vibration emissions, and underwater explosions are among the strongest sources of sound in the sea. Such activities can affect fish and marine mammals at the individual level. The scale and scope of impacts associated with a possible detonation will vary with the size of the detonated charge, but will not exceed the regional scale. These will be high-intensity but temporary impacts. The effect of noise emissions during detonation could, in extreme cases, be damage to the bodies of marine mammals and a permanent shift in the hearing threshold (PTS) of individuals or a temporary lowering of the hearing threshold ("TTS") of those who would be in the immediate vicinity of the blast site.

7.1.9. Summary

A summary of the potential impacts of the OWF construction phase on marine mammals is provided in the table below. The table also includes a description of potential unplanned impacts.

Table 4. Potential impacts of OWF on marine mammals - construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Noise generated by driving foundation piles	Marine mammals will be exposed to underwater noise emissions during the installation of monopal, jacket and tripod foundations. The most important parameters affecting the level of impact are: • number of foundations, • diameter of the pile(s), • jackhammer energy, • piling time.
Noise generated by dredging the bottom	Marine mammals will be exposed to underwater noise emissions during seabed dredging, which will be particularly the case when gravity foundations are installed. The most important parameters affecting the level of impact are: • number and diameter of foundations, • the depth to which the dredging will take place, • power of the dredge(s), • dredge/dredge operating time.
Noise generated by ships	During the construction phase, there will be an increase in traffic of both small and larger ships, which will increase the background noise level. The most important parameters affecting the level of impact are the number of power plants being built and the length of cables being laid and the associated number and types of vessels being used.
Collisions with ships	Ship traffic during the construction phase may increase the risk of collisions with seals and porpoises. The most important parameters affecting the level of impact are the number of power plants being built and the length of cables being laid and the associated number of vessels being used.
Increase in the concentration of suspended solids in water	As a direct result of disturbing the structure of bottom sediments during construction activities, suspended solids will rise and spread in the water depths. The most important parameters affecting the level of impact are: • the type, dimensions and number of foundations to be built and the length of cables to be laid, • a type of rock material that forms the seabed.
Release of pollutants and nutrients from the sludge into the water body	Violation of the structure of bottom sediments will result in the passage of pollutants and nutrients contained in them into the

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	water. These substances have the potential to adversely affect marine mammals (directly and indirectly). The most important parameters affecting the level of impact are: • the type and amount of toxic chemicals released, • weather conditions, • a type of rock material that forms the seabed.
Destruction of benthic habitats	Local destruction of benthic communities will occur during the construction phase. This can have a periodic negative impact on the fish that feed on them, and indirectly on the marine mammals that hunt fish. The most important parameters affecting the level of impact are: • the type, dimensions and number of foundations to be built and the length of cables to be laid, • a type of rock material that forms the seabed.
Oil spill	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. From this source, about 33% of the oil entering the environment enters the waterways (mainly due to increased ship traffic in the Baltic Sea region (Kaptur, 1999). In comparison, about 37% of the oil that enters the sea comes from river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster). Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. Water and bottom sediment pollution can negatively affect marine mammals. The most important parameters affecting the level of impact are: • the type and amount of oil substances released, • weather conditions, • a type of rock material that forms the seabed.
Contamination of water depths and bottom sediments with antifouling agents	At each stage of the project, vessels (ships, barges, etc.) will be used, from whose hulls some amounts of antifouling substances may be released into the water depths during normal operation. Water and bottom sediment pollution can negatively affect marine mammals. The most important parameters affecting the level of impact are:

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	• the type and amount of antifouling substances released, • a type of rock material that forms the seabed.
Accidental release of municipal waste or domestic sewage	At each stage of the project, on the vessels as well as at the construction facilities located on land (at the port serving the implementation of the project), waste will be generated, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident. Water and bottom sediment pollution can negatively affect marine mammals. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Accidental release of chemicals and waste from farm construction	During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea. Water and bottom sediment pollution can negatively affect marine mammals. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Detonation of conventional weapons residues deposited in the sea	During the construction of the wind farm, it may be necessary to remove the remains of convention weapons located on the seabed in the project area or its immediate vicinity. Noise emissions from a detonation can affect individuals in close proximity leading to a temporary lowering of the hearing threshold ("TTS") and, in extreme cases, permanent displacement of hearing praognosis ("PTS") and injury. The scale and extent of impacts associated with a possible detonation will vary depending on the size of the detonated charge

Source: Own elaboration based on Offshore wind farm Baltic Central III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

7.2. Stage operation

7.2.1. Noise generated during operation

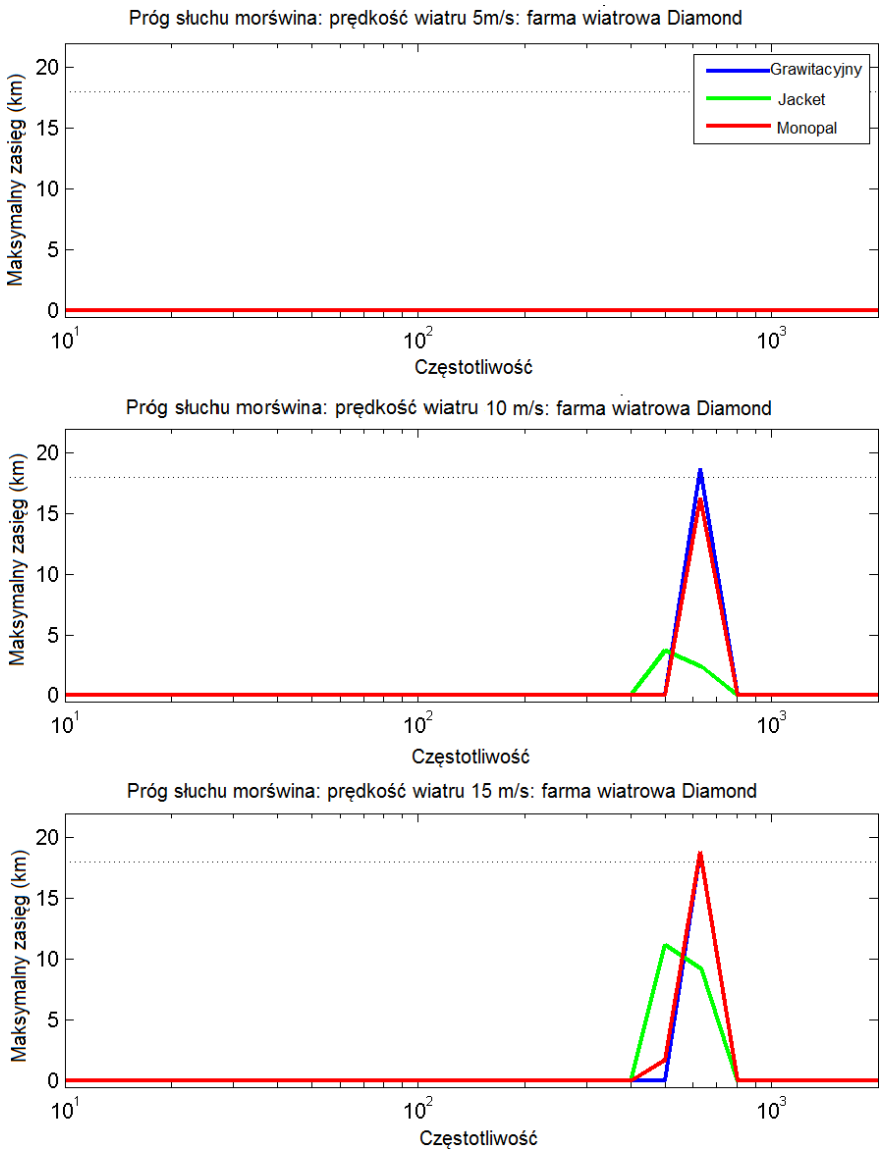
Measurement data for small wind turbines (up to 2 MW) indicate that the intensity of noise generated by operating wind turbines is relatively low, with frequencies with tonal components below 1 kHz (Wahlberg & Westerberg 2005; Madsen et al. 2006; Thomsen et al. 2006b). Based on data for small turbines (up to 2 MW) (Tougaard & Henriksen 2009), he found that porpoises can detect turbine-generated noise at distances of tens of meters, while seals are potentially able to detect said sounds at distances of several hundred meters. This is in agreement with earlier modeling results done by Thomsen et al. 2006b, which showed that sound associated with operating turbines may result in only minor impacts on marine mammals, if any. Studies on the distribution of porpoises in connection with the construction and operation of wind farms have been conducted in areas of Germany, Denmark and the Netherlands. The types of wind turbines considered were 2 - 5 MW.

In two areas, no negative impact was noted (Tougaard et al. 2006; Thompson 2010). Studies in the area of the Nysted offshore wind farm (Danish part of the Baltic Sea) have shown a decline in porpoise presence up to two years after construction began (Carstensen et al. 2006) with a reported slow return to the baseline situation (Teilmann & Carstensen 2012). A study in the Dutch North Sea showed a positive impact (Scheidat et al. 2011). It should be mentioned that in the first of the aforementioned studies, porpoise densities have been very low since the study began, so statistical evidence of the change that has occurred seems very weak. In the case of Dutch studies, there is evidence of an overall increase in porpoise abundance in this part of the North Sea (Thomsen et al. 2006a). Hence, it is possible that the observed effect is not related to the presence of the wind farm, but indicates a general trend.

The Marmo et al. 2013 study performed numerical noise modeling and environmental impact assessment of 6 MW of turbines - monopile, jacket and gravity foundations. Noise emission results for monopiles and gravity foundations were similar - 147 dB re 1 µPa at 125 Hz and 149 dB re 1µPa at 560 Hz at a distance of 5 m from a monopile and 152 dB re 1µPa at 200 Hz and 143 dB re 1µPa at a distance of 5 m from a gravity foundation. Much higher noise levels were calculated for the jacket foundation at higher frequencies, that is, 177 dB re 1 µPa at 700 Hz and 191 dB re 1µPa at 925 Hz at a distance of 5 meters from the foundation. (Marmo et al. 2013) in its noise modeling results (6 MW) for the monopole states that the noise will be heard by porpoises and seals at distances of up to 18 km. However, it does not predict a behavioral response in seals. According to the author, the response of porpoises can be expected at high wind speeds (15 ms^{-1}) at a distance of 18 km from the sound source. Yet according to the criteria adopted in the modeling, only 10% of animals will show such a response. So, it is assumed that 90% of the porpoises included in the modeling will not show a behavioral response to sound generated by the operation of a monopile-founded turbine. It should be added that Marmo et al. 2013 used rather conservative background noise data (=lowest possible noise level) in their modeling. Hence, the presented impact ranges represent the situation for the most far-reaching scenario.

The figures below show the maximum range over which porpoises are able to detect sounds generated by the wind farm at different wind speeds (comparison of gravity foundation, jacket and monopile). It is assumed that if the SPL value is lower than the background noise value, the porpoise is unable to detect the sounds generated by the wind farm. Range measured from a point located in the center of the wind farm (taken from Marmo et al. 2013).

Figure 8. The maximum range over which porpoises are able to detect sounds generated by a wind farm at different wind speeds



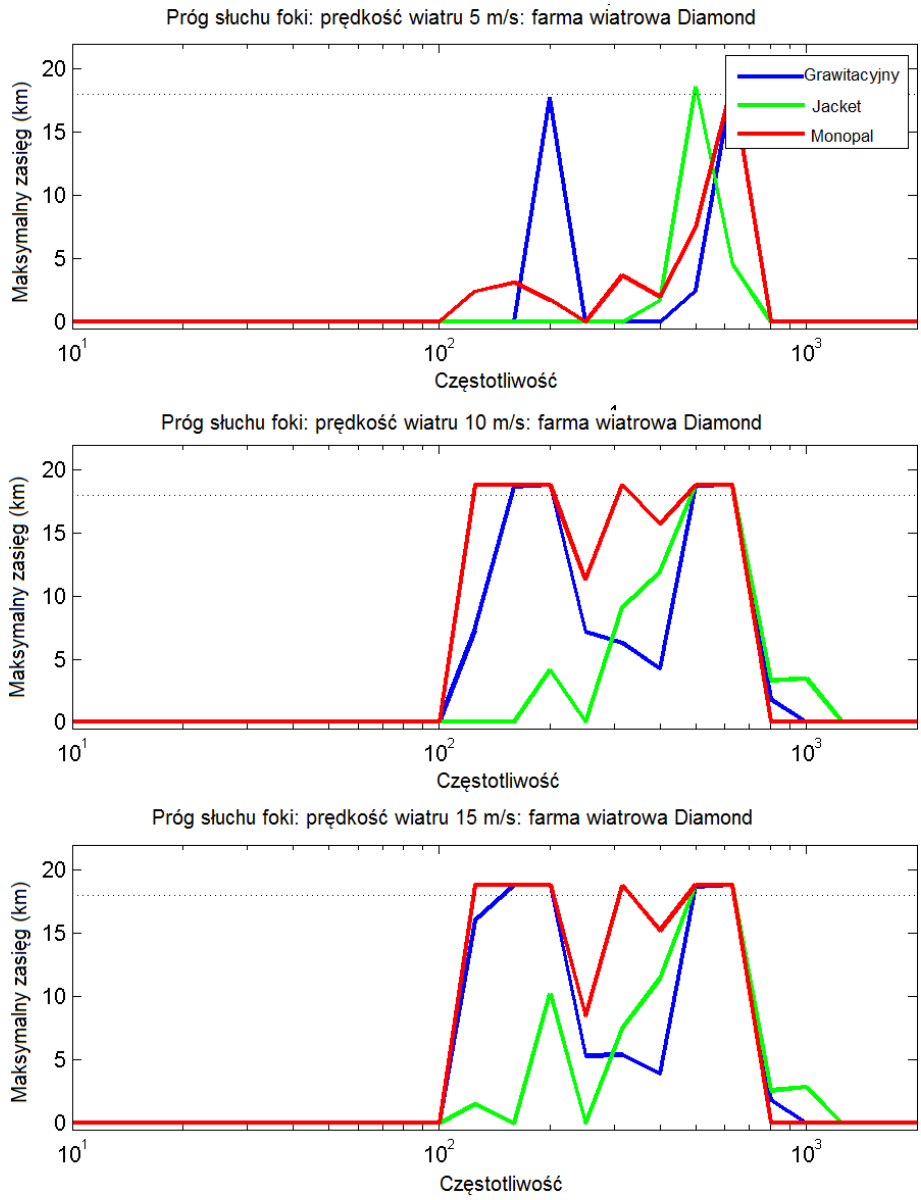
Próg słuchu morświna: prędkość wiatru 5m/s: farma wiatrowa Diamond	Porpoise hearing threshold: wind speed 5m/s: Diamond wind farm
Maksymalny zasięg (km)	Maximum range (km)
Częstotliwość	Frequency
Grawitacyjny	Gravity
Jacket	Jacket
Monopal	Monopal
Próg słuchu morświna: prędkość wiatru 10m/s: farma wiatrowa Diamond	Porpoise hearing threshold: wind speed 10m/s: Diamond wind farm
Próg słuchu morświna: prędkość wiatru 15m/s: farma wiatrowa Diamond	Porpoise hearing threshold: wind speed 15m/s: Diamond wind farm

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, per: Marmo et al. 2013

The next figures show the maximum range over which common seals are able to detect sounds generated by the wind farm at different wind speeds (comparison of gravity foundation, jacket and

monopile). It is assumed that if the SPL value is lower than the background noise value, the seal is unable to detect the sounds generated by the wind farm. Range measured from a point located in the center of the wind farm.

Figure 9. The maximum range over which common seals are able to detect sounds generated by the wind farm at different wind speeds



Próg słuchu foki: prędkość wiatru 5m/s: farma wiatrowa Diamond	Porpoise hearing threshold: wind speed 5m/s: Diamond wind farm
Maksymalny zasięg (km)	Maximum range (km)
Częstotliwość	Frequency
Grawitacyjny	Gravity
Jacket	Jacket
Monopal	Monopal
Próg słuchu foki: prędkość wiatru 10m/s: farma wiatrowa Diamond	Porpoise hearing threshold: wind speed 10m/s: Diamond wind farm
Próg słuchu foki: prędkość wiatru 15m/s: farma wiatrowa Diamond	Porpoise hearing threshold: wind speed 15m/s: Diamond wind farm

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, per: Marmo et al. 2013

7.2.2. Noise emissions caused by vessels

Turbine servicing and maintenance activities are likely to contribute to disturbance, as boats will be moving to and from the area, as well as in the area between the turbines. The scale of activity will not be the same as at the construction stage, but smaller and potentially faster vessels generating noise at higher frequencies than the large boats used in construction will be used (Richardson et al. 1995). The use of faster vessels also contributes to the increased risk of boat collisions with marine mammals in the area (Evans 2003).

7.2.3. Collisions with ships

The use of high-speed boats during the operational stage may increase the risk of collisions with marine mammals (Evans 2003).

7.2.4. The creation of an "artificial reef"

The introduction of a hard substrate can result in an artificial reef effect. The foundations are likely to be colonized by algae and zoobenthic species, which in turn will attract further species (fish), leading to an increase in foraging opportunities for marine mammals (Scheidat et al. 2011; Reach et al. 2012; Leonhard et al. 2013; Gutow et al. 2014).

A detailed description of the "artificial reef" effect is provided in the assessment of the impact of OWF BIII on benthos (Volume IV Section 3 of the EIA).

7.2.5. Field and radiation emissions electromagnetic

The cabling of the wind farm, as well as the cables between the wind farm and the land will generate electromagnetic fields, the emissions will be small to medium, depending on the design of the turbines and cabling (for a discussion see Gill et al. 2012). Electromagnetic fields have the potential to affect the movement of porpoises. However, to this day, it is not known how this species, as well as other toothfish, navigate (other than using the sense of hearing, of course). Some cetaceans have magnetic material in adipose tissue structures, bones, muscles and brain tissue. It is speculated that they are used as magnetic receptors, and whales and dolphins orient themselves to their surroundings in relation to the Earth's magnetic field (Klinowska 1986). Yet there is only indirect evidence to support this thesis. Certain mass stranding events may be related to magnetic field disturbances under certain circumstances (Klinowska 1986). It is possible that the cabling connecting the farm to the mainland will permanently affect changes in the electromagnetic field near the farm and beyond, which in turn may affect the behavior of porpoises. There is still not enough information to determine the detailed nature and magnitude of the impact. Also, some mammalian food species may experience impacts, but only on a local scale (see Gill et al. 2012), hence these impacts are assumed to be minimal.

7.2.6. Effects visual

The presence of foundations under the water and power plant structures above the surface changes the appearance of the area. This could potentially be a factor of concern for porpoises, and to a greater extent seals, as they make greater use of their eyesight in orienting themselves in space. However, the underwater appearance of the foundations will very soon begin to resemble an area of hard substrate, as it will be overgrown with various organisms.

In addition, the working turbines will cause flashes of light and cast moving shadows on the surface, which can be seen by seals (Riedmann 1990) and possibly porpoises.

The two phenomena indicated above are well known for onshore turbines. The first is the so-called stroboscopic effect, which consists of cyclic, intense reflections of the sun's rays from the moving wings of the power plant. The second is the so-called shadow flicker effect. It relies on the cyclical obscuring of the sun's rays by the rotating propeller of the power plant, resulting in the appearance of a shifting shadow, in this case - on the surface of the sea.

It is assumed that this will not result in serious disturbance, as both species spend most of their time underwater, and thus will be very rarely exposed to this potential source of disturbance. Depending on the distance to the nearest seal resting place on land, there may be an impact on seals if the visual effect can be seen by seals staying on land (which is rather impossible in the case of OWF BIII - cf.: section on landscape impact assessment, which includes visualizations of the farm from various locations on land, including beaches, Volume IV, Section 9 of the EIA).

7.2.7. Events unplanned

During the operation stage of the wind farm, there is a risk of unplanned events. One of them is the collision of vessels used in the operation and servicing of wind turbines, which can result in oil spills in the area of the structure. This situation may cause external and internal impacts on marine mammals present in the area. Among other things, chemical burns or irritation due to direct contact, irritation of the respiratory system, inflammation, lung inflammation due to inhalation of volatile compounds or inflammation of the gastrointestinal tract, internal hemorrhage, kidney and liver dysfunction due to digestion of harmful substances can result from oil spills. In addition, fur-covered seals can develop hypothermia (NOAA, 2014).

7.2.8. Summary

A summary of the potential impacts of the OWF operation stage on marine mammals is provided in the table below. The table also includes a description of potential unplanned impacts.

Table 5. Potential impacts of OWF on marine mammals - operation stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Noise generated during turbine operation	At the stage of operation of the OWF, there are noise and vibrations caused by the operation of the turbines, as well as, to a small extent, the movement of service vessels. At the same

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	time, there may be a slight reduction in noise from shipping and fishing in the described area due to restrictions on vessel traffic and a possible ban on fishing in the area of the OWF. The most important parameters affecting the level of impact are the number and spacing of power plants.
Noise and vibration emissions caused by ships	During the operation stage, there will be an increase in traffic, especially small service vessels, which will increase the background noise level. The most important parameters affecting the level of impact are the number of power plants, substations in operation, the length of the cable network and the associated number and types of vessels used.
Collisions with ships	The movement of service vessels (especially small, high-speed boats) during the operational phase may increase the risk of collisions with seals and porpoises. The most important parameters affecting the level of impact are the number of power plants being built and cables being laid and the associated number of vessels being used.
The creation of an "artificial reef"	Habitat changes brought about by the creation of an "artificial reef" can have a positive impact on ichthyofauna, thanks to the creation of new hiding places, an increase in the food base, the creation of favorable conditions for the spawning of some species and the development of juvenile forms. The most important parameters affecting the level of impact are the shape, base diameter and number of foundations.
Emission of electromagnetic fields and radiation	Cables that transmit electricity transmit an electromagnetic field that may have a slight effect on some fish species and perhaps on marine mammals. The most important parameters affecting the level of impact are the length and type of power cable.
Visual effects	The new power plant designs may have an impact on the seals, which also use their eyesight to orient themselves in the field. Seals congregating on land or on the ice may be affected by the strobe effect or shadow flicker effect. The most important factor affecting the level of impact is the existence of such a gathering place for seals near the farm.
Oil spill	See description for construction phase
Accidental release of municipal waste or domestic sewage	See description for construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Accidental release of chemicals and waste from farm operations	During the operation of the wind farm, waste directly related to the operation of the wind farm will be generated on the vessels, at the facilities located onshore (at the port serving the project) and at the project site. These may include damaged parts of farm components, cement, grout, mortar, operating fluids and other chemicals used or replaced during maintenance work. They can be accidentally released into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • a type of rock material that forms the seabed.
Contamination of water depths and bottom sediments with antifouling agents	See description for construction phase

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

7.3. Stage decommissioning

There is no experience of IMF decommissioning to date, as such activities have not yet been carried out. We know from similar oil and gas platform projects that dismantling may require the use of explosives (e.g., Santos et al. 2010). However, the technical concept of the BIII OWF (Royal Haskoning 2014) shows that the use of explosives is not currently planned.

In general, the decommissioning phase may include activities such as drilling (due to the need to dig up some elements of the farm), ship traffic (intensity and type of ships similar to the construction phase) and cutting of individual structural elements (Royal Haskoning 2014). No information is available on underwater noise levels associated with cutting. Impacts from vessel traffic will be similar to those from the construction phase. Drilling will create low-frequency noise, similar to the sound generated by ship traffic. Therefore, the impact will be limited to minor behavioral changes, with no TTS or injury.

It should be assumed that the remaining emissions and disturbances will be similar to those during the construction phase, as discussed in Section 7.1, excluding the noise associated with the driving of foundation piles and the dredging of the foundation bottom.

8. Species subject to environmental impact assessment environment

This chapter briefly characterizes marine mammals occurring in the area of the proposed OWF BIII - their protective status, abundance and distribution in Polish waters. For a full characterization, see the results of DHI's study, which constitutes Section 10 of Volume III of the EIA.

In addition, the chapter identifies the sensitivity of harbor porpoise, gray and common seals to the most important impacts of the farm. The chapter also indicates the importance of marine mammals to the ecosystem.

8.1. Porpoise

8.1.1. Protected status in Polish waters

The harbor porpoise is a protected species listed in Annexes II and IV of the Habitats Directive. It is also protected under the Agreement on the Conservation of Small Cetaceans of the Baltic and North Sea (ASCOBANS), under the auspices of the Bonn Convention. The species is also protected by the HELCOM Agreement under the Helsinki Convention and listed in Appendix II of the Washington Convention (CITES).

As for Polish regulations, the harbor porpoise is listed in Appendix I of the Decree of the Minister of Environment of December 16, 2016 on the protection of animal species (Journal of Laws of 2016, item 2183, as amended), as a species under strict protection and requiring active protection. It is also listed in the Polish Red Book of Animals.

8.1.2. Abundance and occurrence in Polish waters

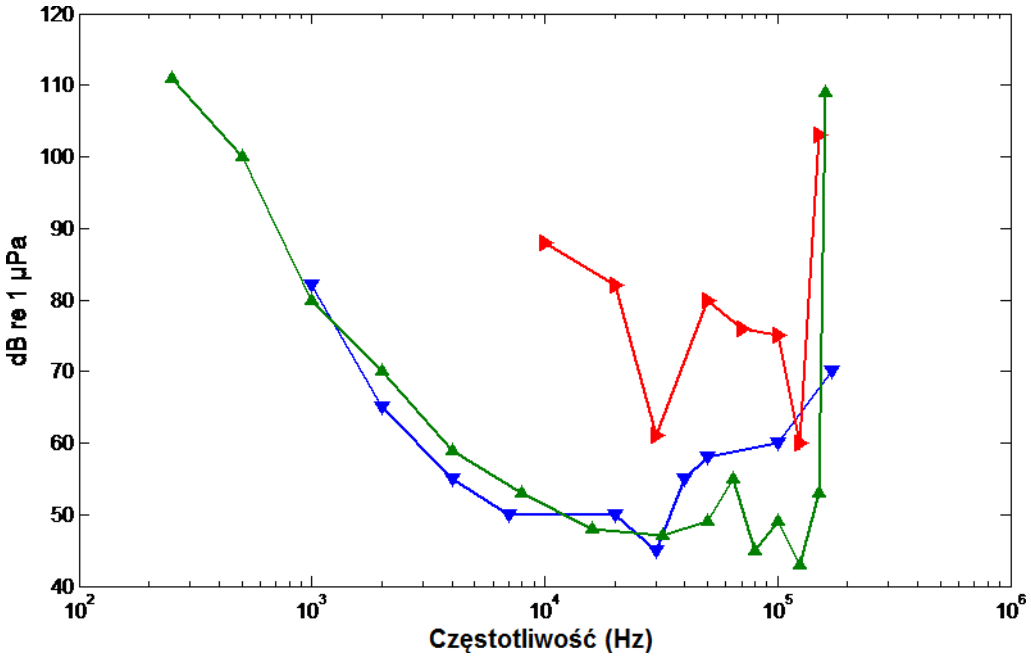
The latest comprehensive information on the distribution and density of porpoises in the Baltic Sea was brought by the European Union's large-scale project "Static Acoustic Monitoring of Baltic Porpoises (SAMBAH)." The results of the project confirmed previous speculations that porpoises in the Baltic Sea may come from two different populations, one from the Kattegat, Skagerrak and Belts Sea regions and the other from the Baltic Proper. The porpoises of the Baltic Proper are on the IUCN Red List (see Hammond et al., 2008) and have the status of a separate, critically endangered population. The population from the Baltic Proper was estimated during the SAMBAH project at only about 500 individuals (with a 95% confidence interval of 80 to 1,100), and is clearly distinct during the summer in Danish territorial waters. The population of the Belts Sea is estimated at about 18,500 individuals. During the SAMBAH program, porpoise abundance was estimated at around 20,000 based on detections of porpoise activity (see Volume III, Chapter 10 of the ROOŚ for more information).

8.1.3. Noise sensitivity underwater

Hearing is a key sense of porpoises for most aspects of their functioning. The hearing sensitivity of this species is exceptionally good and covers a wide range of frequencies (Andersen 1970; Popov et al. 1986; Kastelein et al. 2002; Kastelein et al. 2010). Spectral analysis of perceived sounds can be represented by a series of band flitches; in humans, these flitches have a width corresponding to 1/3 octave for frequencies above about 1000 Hz (Moore 2012). Similar findings apply to other mammals, including porpoises (Kastelein et al. 2009). However, the relationship may be more complex for very high, ultrasonic frequencies (Popov et al. 2006). The hearing ability of porpoises becomes more directional with increasing frequency. This results in improved echolocation, making it less susceptible to ambient noise and interference (that is, echoes bouncing off objects other than the selected target; Kastelein et al. 2005).

Below are the audiograms for porpoises, based on Kastelein et al. 2005 (green), Andersen 1970 (blue) and Popov et al. 1986 (red).

Figure 10. Porpoise audiograms

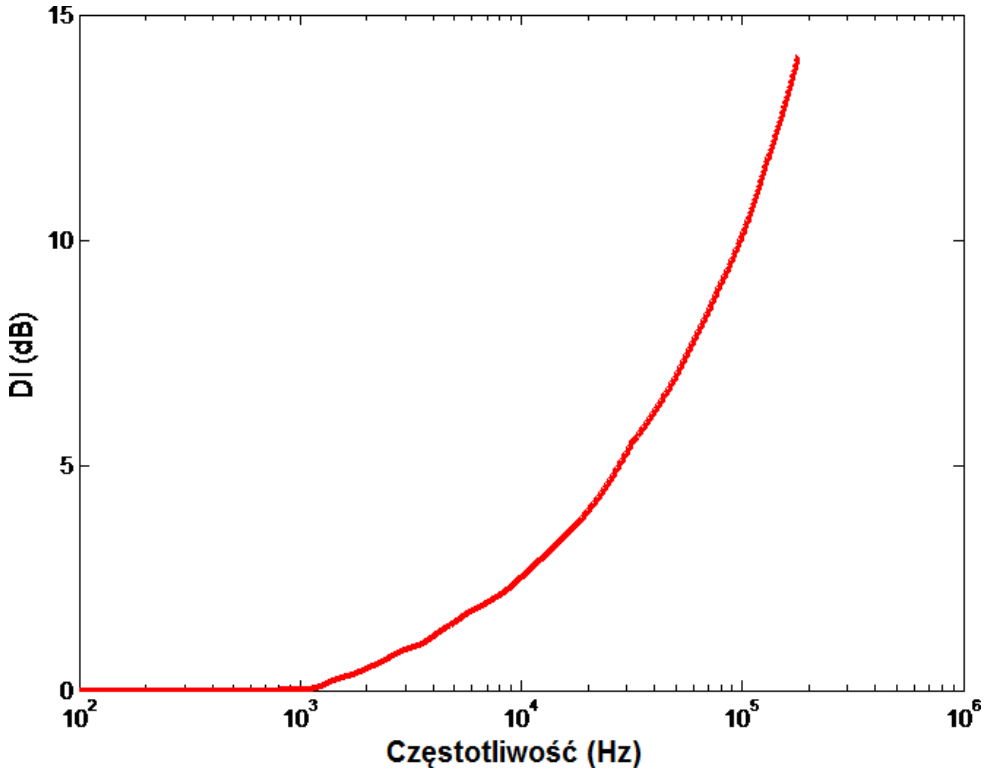


dB re 1µPa	dB re 1µPa
Częstotliwość (Hz)	Frequency (Hz)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, per: Kastelein et al. 2005, Andersen 1970, Popov et al. 1986

The next figure shows the directivity index (DI), which is an indicator of directional hearing as a function of frequency in porpoises. The figure is based on information from Kastelein et al. (2005).

Figure 11. Directionality index (DI) as a measure of frequency-dependent directionality of porpoise hearing



DI (dB)	DI (dB)
Częstotliwość (Hz)	Frequency (Hz)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, Modified from (Kastelein et al. 2005).

8.1.4. Sensitivity to construction-related impacts OWF

The construction phase is likely to cause some disturbance that may affect porpoises in the BIII OWF area. The sensitivity of the species was described on a five-point scale - very high, high, medium, low, very low. The scope of impact can be local, regional, national or even international. The table also includes the probability of the factor and the expected duration.

Table 6. Sensitivity of harbor porpoise to impacts associated with OWF construction

Sensitivity to potential impacts of the OWF							
Construction phase							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
Porpoise (Phocoena phocoena)	Noise	Driving monopiles	PTS	Local	Low	Long-term	Low
			TTS	Regional	Medium	Short-term	High
			Avoidance response	National	Low	Short-term	High

Sensitivity to potential impacts of the OWF							
Construction phase							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
		Pile driving of tripod foundations	PTS	Local	Low	Long-term	Low
			TTS	Regional	Medium	Short-term	High
			Avoid	Regional	High	Short-term	High
		Jacket foundation pile driving	PTS	Local	Low	Long-term	Low
			TTS	Regional	Medium	Short-term	High
			Avoid	Regional	High	Short-term	High
		Gravity foundation (noise from dredging the bottom)	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	Medium	Short-term	Average
		Noise caused by ships	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Low	Short-term	Low
			Avoid	Local	High	Short-term	Average
	Collisions with ships		Collisions	Local	Low	Long-term	Low
	Increase in the concentration of suspended solids in water		Impact on fish and benthos that are porpoise food, reduced navigational ability	Local	Low	Short-term	Low
	Release of pollutants and nutrients from the sludge into the water body		Impact on fish and benthos that are porpoise food, direct impact of	Local	Skip	Long-term	Very low (negligible)

Sensitivity to potential impacts of the OWF						
Construction phase						
Species	Impact factor	Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
		pollution on porpoise				
	Destruction of benthic habitats	Effects on fish and benthos that constitute the food of the porpoise	Local	Low	Long-term	Low
	Ship collisions	Oil spills	regional	Low	Short-term	Low

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014.

As can be seen in the table, the sensitivity of porpoises to noise emitted during pile driving leads to an avoidance response, as well as a temporary threshold shift in hearing ("CPPS", temporary threshold shift - TTS). This applies to monopoles, tripod and jacket foundations. For these three types of foundations, the probability of an avoidance response is high and TTS is at a medium level, and the changes are short-term. In the long term, a permanent hearing threshold shift ("TPPS", permanent threshold shift - PTS) may occur, but its probability is low. With gravity foundations and the associated need to dredge the bottom, there is a medium probability of an avoidance response for a short period. The sensitivity of porpoises to this impact is at a medium level. Noise generated by ships usually leads to an avoidance response, and porpoises show medium susceptibility to this impact.

8.1.5. Sensitivity to impacts associated with operation OWF

The exploitation phase may also cause some disturbance that may affect porpoises in the BIII OWF area, although the extent of this disturbance is likely to be very limited in time and territory.

Table 7. Sensitivity of harbor porpoise to impacts associated with OWF operations

Sensitivity to potential impacts of the OWF							
Operation stage							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
	Noise caused by	Monopal	PTS	Local	Skip	Long-term	Very low (negligible)

Sensitivity to potential impacts of the OWF							
Operation stage							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
Porpoise (Phocoena phocoena)	operating turbines		TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	High	Short-term	Low
		Jacket	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	High	Short-term	Low
		Tripod	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	High	Short-term	Low
		Gravity foundation	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	High	Short-term	Low
		Noise caused by ships	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Low	Short-term	Low
			Avoid	Local	High	Short-term	Average
	Collisions with ships		Collisions	Local	Low	Long-term	Low
	Ship collisions		Oil spills	Regio-nal	Low	Short-term	Low
	Field and radiation electromagnetic		Impact on fish that are porpoise food	Local	Skip	Long-term	Very low (negligible)
	Changes in the	Visual effects	Strobe effect, shadow	Local	Skip	Long-term	Very low (negligible)

Sensitivity to potential impacts of the OWF							
Operation stage							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
	environment u		flicker effect				
		The "artificial reef" effect	Increased foraging opportunities	Local	High	Long-term	Positive impact

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014.

In the table above, it can be seen that the sensitivity of porpoises to factors associated with the operation of the wind farm is generally very low, and the impacts of these factors in many cases are negligible. It is very likely that the avoidance response will only occur as a result of ship traffic associated with handling and servicing in a short-term form. There is a medium probability of a reef effect, which could have a positive impact on porpoises due to an increase in foraging opportunities.

8.1.6. Sensitivity to impacts associated with decommissioning OWF

Table 8. Sensitivity of harbor porpoise to impacts associated with OWF decommissioning

Sensitivity to potential impacts of the OWF						
Decommissioning stage						
Species	Impact factor	Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
Porpoise (Phocoena phocoena)	Noise generated by ships	PTS	Local	Skip	Short-term	Very low (negligible)
		TTS	Local	Low	Short-term	Low
		Avoid	Local	High	Short-term	Low
	Collisions with ships	Collisions	Local	Low	Short-term	Low
	Drilling	PTS	Local	Skip	Short-term	Very low (negligible)
		TTS	Local	Low	Short-term	Low
		Avoid	Local	High	Short-term	Low
	Ship collisions	Oil spills	Regional	Low	Short-term	Low

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014.

8.2. Sea grey (seal gray)

8.2.1. Protected status in Polish waters

The gray seal is a protected species, listed in Annex II of the Habitats Directive. The species is also protected by the HELCOM agreement under the Helsinki Convention. As for Polish regulations, the gray seal is listed in Appendix I of the Decree of the Minister of Environment of December 16, 2016 on the protection of animal species (Journal of Laws of 2016, item 2183, as amended), as **a strictly protected species**.

8.2.2. Abundance and occurrence in Polish waters

The number of gray seals in the inner Baltic was estimated at 28,000 individuals in 2012 during annual counts (during the moulting season). Despite a steady increase in the number of individuals, recolonization of the southern Baltic is very slow (HELCOM, 2013). The genetic structure of the population in the Baltic is not known, but it is possible that there is variation between the Baltic Proper and the Gulf of Bothnia (Jonas Teilmann, oral information). In recent years, gray seals have been increasingly reported in the southwestern Baltic and the Danish Straits, although the number of individuals is still very small; by the end of the 19th century, the population was close to extinction (Härkönen et al. 2007). (Dietz 2003) used satellite transmitters to track the migrations of six gray seals from the Rødsand seal sanctuary area. The results indicate that gray seals migrate through the Baltic Proper to the inner part of the Baltic Sea. A telemetry study of gray seals was also conducted by WWF Poland together with the Marine Station of the University of Gdansk, the data obtained indicate that the seals move throughout the Baltic Sea, including the area of OWF BIII (WWF Poland, 2013). (Kuklik & Skora 2005) reports on the low abundance of gray seals in Polish waters.

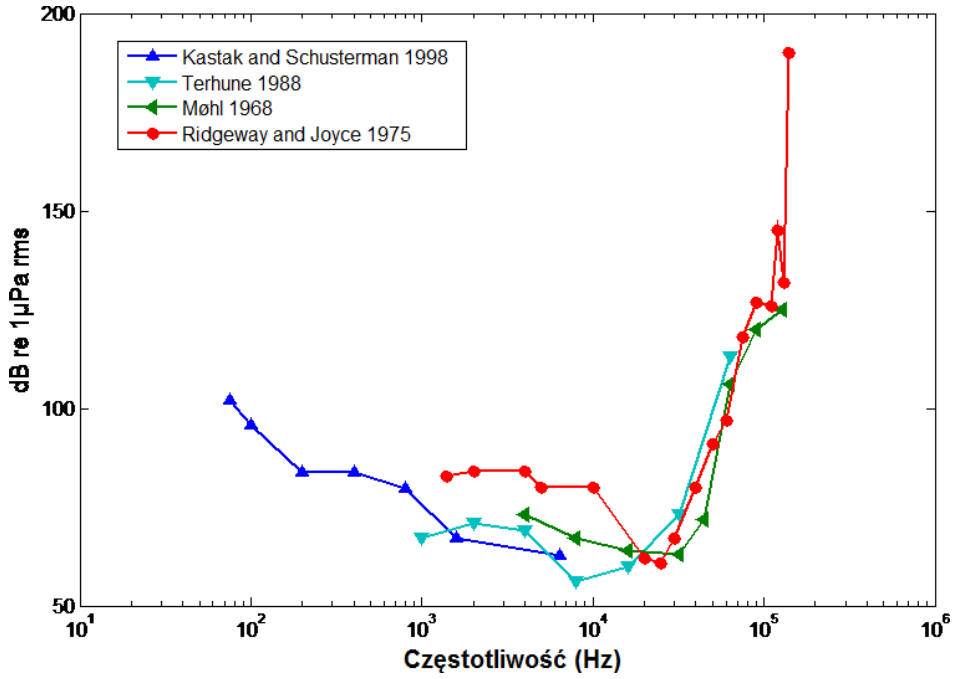
This is in line with the results of studies conducted by Biola and DHI Poland in the BIII OWF area. During the monitoring, there was one observation of a gray seal, 2 observations of common seals and one seal individual of undetermined species.

8.2.3. Noise sensitivity underwater

Common seals and gray seals are aquatic and terrestrial animals with good hearing both in the air and underwater. Underwater hearing of common seals under water has been the subject of many scientific papers (Møhl 1968; Terhune 1988; Kastak & Schusterman 1998). In contrast, gray seal hearing in an aquatic environment has been studied only once (Ridgway & Joyce 1975). The measurements were made by measuring trunk auditory potentials, which cannot be directly compared with the results of psychophysical tests conducted with common seals. However, (Schusterman 1981) assumes that the hearing ability of the two species may be very similar. It is generally recommended that hearing threshold values obtained for common seals be used as a conservative scenario for the hearing sensitivity of seal species whose exact hearing capabilities have not yet been thoroughly studied (Southall et al. 2007).

Common seal hearing thresholds are recommended for use as conservative estimates of the hearing thresholds of those seals whose hearing has not been comprehensively studied (Southall et al. 2007).

Figure 12. Underwater audiograms of common and gray seals



dB re 1µPa rms	dB re 1µPa rms
Częstotliwość (Hz)	Frequency (Hz)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014, common seal audiograms modified from (Kastak & Schusterman 1998, Terhune 1988 and Møhl 1968). Gray seal audiogram modified from (Ridgway & Joyce 1975).

8.2.4. Sensitivity to construction-related impacts OWF

Table 9. Sensitivity of gray seals to impacts associated with OWF construction

Sensitivity to potential impacts of the OWF							
Construction phase							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
Gray seal (Halichoerus grypus)	Noise	Driving monopiles	PTS	Local	Medium	Long-term	Average
			TTS	Regional	Medium	Short-term	High
			Avoid	Local	Medium	Short-term	Low
		Pile driving of tripod foundations	PTS	Local	Low	Long-term	Average
			TTS	Regional	Medium	Short-term	High
			Avoid	Local	Medium	Short-term	Low
			PTS	Local	Low	Long-term	Average
			TTS	Regional	Medium	Short-term	High

Sensitivity to potential impacts of the OWF							
Construction phase							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
		Jacket foundation pile driving	Avoid	Local	Medium	Short-term	Low
		Gravity foundation (noise from bottom dredging)	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	Skip	Short-term	Very low (negligible)
		Noise caused by ships	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Low	Short-term	Low
			Avoid	Local	Low	Short-term	Low
	Collisions with ships		Collisions	Local	Low	Long-term	Low
	Increase in the concentration of suspended solids in water		Impact on fish and benthos that are food for seals, reduced navigational ability	Local	Low	Short-term	Low
	Release of pollutants and nutrients from the sludge into the water body		Effects on fish and benthos that are food for seals, direct effects of pollution on seals	Local	Skip	Long-term	Low
	Destruction of benthic habitats		Effects on fish and benthos that are the food of seals	Local	Medium	Short-term	Average
	Ship collisions		Oil spills	regional	low	Short-term	Average

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

As can be seen in the table, the seal's sensitivity to noise emitted during pile driving leads to **an avoidance response**, as well as a **temporary threshold shift in hearing ("CPPS", temporary threshold shift - TTS)**. This applies to monopoles, tripod and jacket foundations. For these three types of foundations, the probability of an avoidance response is high and TTS is at a medium level, and these changes are short-term. In the long term, a **permanent hearing threshold shift ("TPPS", permanent threshold shift - PTS)** may occur, but its probability is low. With gravity foundations and the associated need to dredge the bottom, there is a medium probability of an avoidance response for a short period. The sensitivity of seals to this impact is at a medium level. Noise generated by ships usually leads to an avoidance response, and porpoises show medium susceptibility to this impact.

8.2.5. Sensitivity to impacts associated with operation OWF

The exploitation phase may also cause some disturbance that may affect seals in the BIII OWF area, although the extent of this disturbance is likely to be very limited in time and territory.

Table 10. Sensitivity of gray seals to impacts associated with OWF operations

Sensitivity to potential impacts of the OWF							
Operation stage							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
Gray seal (Halichoerus grypus)	Noise generated by operating turbines	Monopal	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	Skip	Short-term	Very low (negligible)
		Jacket	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	Skip	Short-term	Very low (negligible)
		Tripod	PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	Skip	Short-term	Very low (negligible)
		Gravity foundation	PTS	Local	Skip	Long-term	Very low (negligible)

Sensitivity to potential impacts of the OWF							
Operation stage							
Species	Impact factor		Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
			TTS	Local	Skip	Short-term	Very low (negligible)
			Avoid	Local	Skip	Short-term	Very low (negligible)
	Noise caused by service ships		PTS	Local	Skip	Long-term	Very low (negligible)
			TTS	Local	Low	Short-term	Low
			Avoid	Local	High	Short-term	Average
	Collisions with ships		Collisions	Local	Low	Long-term	Low
	Ship collisions		Oil spills	Regional	Low	Short-term	Average
	Electromagnetic field and radiation		Effects on seal food fish	Local	Skip	Long-term	Very low (negligible)
	Changes in the environment	Visual effects	Strobe effect, shadow flicker effect	Local	Low	Long-term	Low
		The "artificial reef" effect	Increased foraging opportunities	Local	Medium	Long-term	Average / positive impact

Source: Offshore wind farm Baltic Central II. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

As can be seen in the table above, the impacts due to the operation of the wind farm on seals are very similar to those listed for porpoises, the probability of most of them occurring is medium. As for porpoises, an avoidance response in seals can be expected from ship traffic due to servicing and handling, the probability of its occurrence is described as high, as is the probability of a positive impact due to the reef effect.

8.2.6. Sensitivity to impacts associated with decommissioning OWF

Table 11. Sensitivity of gray seals to impacts associated with OWF decommissioning

Sensitivity to potential impacts of the OWF						
Decommissioning stage						
Species	Impact factor	Impact effect	Scale of exposure	Probability	Duration of impact	Sensitivity
Gray seal (Halichoerus grypus)	Noise generated by ships	PTS	Local	Skip	Short-term	Very low (negligible)
		TTS	Local	Low	Short-term	Low
		Avoid	Local	High	Short-term	Low
	Collisions with ships	Collisions	Local	Low	Short-term	Low
	Drilling	PTS	Local	Skip	Short-term	Very low (negligible)
		TTS	Local	Low	Short-term	Low
		Avoid	Local	High	Short-term	Low
	Ship collisions	Oil spills	Regional	Low	Short-term	Average

Source: Offshore wind farm Baltic Central II. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

8.3. Seal common

8.3.1. Protected status in Polish waters

The common seal is a protected species, listed in Annex II of the Habitats Directive. The species is also protected by the HELCOM agreement under the Helsinki Convention. As for Polish regulations, the common seal is listed in Appendix I of the Decree of the Minister of Environment of December 16, 2016 on the protection of animal species (Journal of Laws of 2016, item 2183, as amended), as **a strictly protected species**.

8.3.2. Abundance and occurrence in Polish waters

There is some ambiguity about the size of the common seal population. There is evidence that common seals recorded in Polish waters belong to a separate subpopulation of seals whose resting areas are located in Falsterbo, Saltholm and Bøgestrømmen. This subpopulation is somewhat isolated from the common seals inhabiting Kattegat and Skagerrak waters, with the boundary located in the Gedser area (Olsen et al. 2014). During pre-investment monitoring, there were 2 observations of common seals in the BIII OWF area, one observed seal individual was not determined as to species.

8.3.3. Noise sensitivity underwater

The sensitivity of common seals to underwater noise is similar to that of gray seals, discussed in section 8.2.3 above.

8.3.4. Sensitivity to construction-related impacts OWF

The sensitivity of common seals to impacts associated with the construction of the OWF is similar to the sensitivity of gray seals, discussed, in section 8.2.4 above.

8.3.5. Sensitivity to impacts associated with operation OWF

The sensitivity of common seals to mining-related impacts is similar to that of gray seals, discussed, in section 8.2.5 above.

8.3.6. Sensitivity to impacts associated with decommissioning OWF

The sensitivity of common seals to impacts associated with the decommissioning of the OWF is similar to that of gray seals, discussed in section 8.2.6 above.

8.3.7. The importance of mammals marine

The classification of the importance of individual species of marine mammals was based on the applicable legislation **described above** (the species' conservation status), knowledge of the baseline status of the resource (including population abundance reported in the literature and the results of the pre-implementation environmental research program), and knowledge of their vulnerability, understood as a function of the resource's ability to adapt to a potential change resulting from the implementation of the project and its ability to return to its baseline status. The classification is shown in the table below. The importance of the gray seal and common seal is assessed as **medium**, taking into account their conservation status and population size. Porpoises, on the other hand, are considered very important (despite their small numbers in the BIII OWF area), as it is a critically endangered species (resource importance - **high**).

Table 12. Classification of resource importance of marine mammal species selected for impact assessment of OWF BIII

Species	Importance of the resource
Porpoise	Large
Grey seal	Medium
Common seal	Medium

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

9. Assessment of the impact of OWF BIII on marine mammals marine

Depending on the stage of the project, different aspects of the OWF's impact on marine mammals should be considered. The construction phase will have the greatest impact on the environment. The potential impact of these factors on marine mammals is discussed in Chapter 7. Based on the analysis, it is assessed that the most significant impact is in the form of noise generated during the driving of foundation piles.

9.1. Stage construction

During the construction of the BIII offshore wind farm, works will be carried out that have a direct or indirect impact on marine mammals. The most significant of these are:

- drilling performed during geotechnical studies,
- preparation of the bottom before the installation of the foundation, including dredging of the bottom, removal of a layer of sediments with a thickness of about 2 - 3 m and replacing it with rock material with a higher bearing capacity (only in the case of using gravity foundations), - in the proposed modified parameters of the Project, this is an eventuality concerning 1 piece of foundation for a substation
- drilling or driving foundations (only if monopiles, jacket or tripod foundations are used),
- anchoring jack - up platforms and support units during the assembly of farm components,
- burying cables in the seabed,
- heaping of rock material serving as protection against leaching,
- storage of excavated material from the preparation of the bottom for foundations. A full description of the construction work can be found in Section 4 of Volume II of the EIA.

The following direct and indirect impacts on marine mammals are expected to occur at the construction stage of OWF BIII:

- noise emissions caused by driving foundation piles,
- noise emissions caused by dredging the bottom,
- noise emissions caused by ships,
- collisions with ships,
- an increase in the concentration of suspended solids in water,
- the release of pollutants and nutrients from the sediment into the water body,
- destruction of benthic habitats.

There may also be unplanned impacts during the construction of the farm, particularly contamination of the water table and bottom sediments:

- petroleum substances,
- antifouling agents,
- accidentally released municipal waste or domestic sewage,
- accidentally released chemicals and waste from the construction of the farm, which may indirectly affect marine mammals

Unplanned impacts that may be associated with the construction phase also include noise emissions during the detonation of unexploded ordnance - UXO.

Unplanned impacts are assessed in Chapter 11.

9.1.1. Noise emissions caused by pile driving foundation piles

9.1.1.1. Introduction

As part of the impact assessment for the BIII OWF in the parameters approved by the Environmental Decision, four types of foundations were analyzed to assess the potential impact of the OWF on marine mammals. The study was conducted on the basis of cumulative noise exposure levels (SEL) emitted into the water. Details of the study can be found in the Hansen D.A., Heilskov N.F. technical report. Environmental impact assessment of the offshore wind farm Baltic Central III. Numerical modeling of piling noise propagation, DHI Poland, 2015

It is widely recognized that physiological changes due to noise exposure are related to the exposure dose, which is related to the duration of exposure (Southall et al. 2007). The cumulative sound exposure level is the best analytical descriptor of "acoustic dose" for activity covering the entire range of emitted acoustic energy. Basically, acoustic events (= individual hammer blows) are summed to obtain dose values. The term cumulative sound exposure level is commonly used in underwater acoustics terminology (see, for example, Gill et al. 2012). However, it should not be confused with cumulative impacts, a term most often used to refer to the analysis of impacts from several different locations (for example, different projects).

Based on a comparison of different "acoustic doses," it was deduced that in terms of the level of underwater noise generated, 10-meter-diameter monopiles are the most far-fetched scenario (NIS), as they generate the highest level of noise when they are driven into the seabed. Such monopiles were the basis of analyses for the BIII OWF in the parameters approved by the Environmental Decision. This diameter of monopiles was also adopted in the 2015 Report as the most far-reaching scenario (NIS).

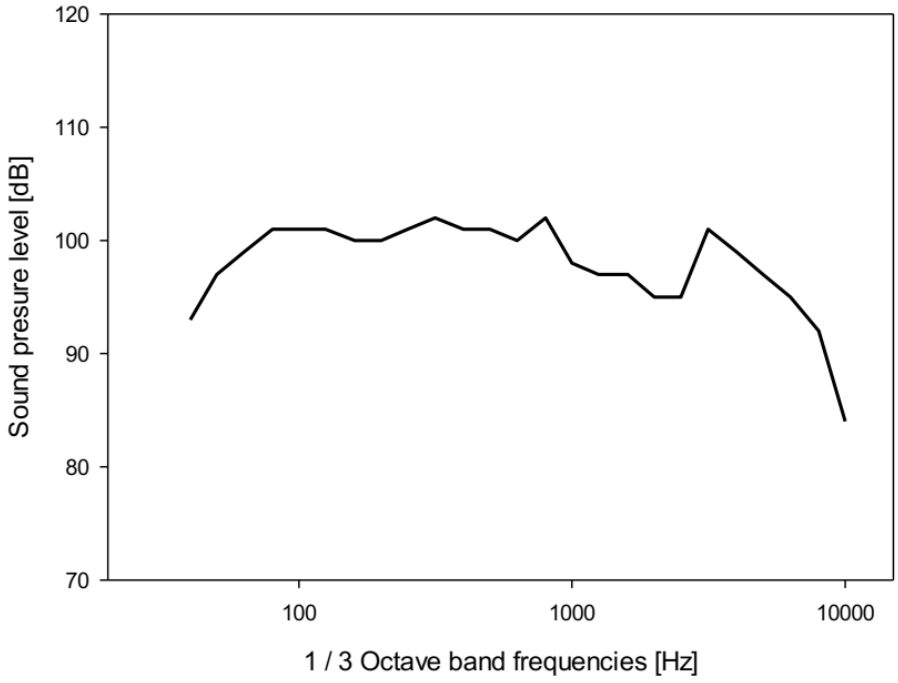
At the same time, the variant with a maximum of 208 foundations was adopted as the most far-reaching scenario from the point of view of impact duration. In this case, the use of jacket or tripod foundations should be considered NIS (cf: Table 8 in Section 6.3 above), where a maximum of 18 h of effective piling per 1 foundation is expected. This theoretically means the possibility of continuous piling for 3744 hours in the NIS (208 foundations) or 2268 hours in the Project under the parameters approved by the Environmental Decision (126 foundations). This time does not take into account technological interruptions and those resulting from unfavorable weather conditions.

In 2020, numerical modeling of pile driving noise propagation based on new research and literature was redone, including thresholds for potential types of impacts on marine mammals (Southall et al., 2019) and incorporating proposed changes to the project including the use of a 4,500 kJ jackhammer for pile driving of monopole foundations with a maximum diameter of 10 m .

9.1.1.2. Zero state - background acoustic

In order to determine the changes in the acoustic background due to the construction work of the BIII OWF, the spectrum recorded in the project area in spring 2013 was used. This season was chosen because the acoustic modeling was done for spring conditions (= the most far-reaching scenario). The spectrum used covers 1/3 octave bands from 40 Hz to 10 kHz. The value of 10 kHz was chosen as an upper limit because above this frequency no significant acoustic energy values were recorded at a distance from the piling site, so the comparison would be meaningless. As can be seen in the graph below, most of the energy of the spectrum is concentrated at frequencies below 1 kHz, then a decrease is noted (the increase around 5 kHz is most likely an artifact of the anchor system components hitting each other).

Figure 13. Spectrum in the 1/3 octave bands of the average level of background noise intensity recorded in spring 2013 in the area of OWF BIII



Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014..,

9.1.1.3. Reactions of marine mammals to noise

In general, noise impacts on marine mammals can be divided into four major categories, depending largely on the distance of the individual from the sound source:

- detection (detection),

- masking,
- behavioral changes (cessation of normal behavior),
- physical damage.

It should be mentioned that the boundaries of each zone are not sharp, and there is largely an overlap. Behavioral responses, masking and detection are strictly dependent on the level of the acoustic background, and all interactions depend on the age, sex, general physical and behavioral state of the animal (see, for example, Southall et al. 2007). If there is an overlap of frequencies between the noise generated and the sounds relevant to the animal, there is a risk that the noise will mask to some extent the signals relevant to the animals. Masking can reduce the detection distance of communication signals and signals important for navigation or foraging. For impulsive sounds such as piling, generally masking is not important (Madsen et al. 2006, Thomsen et al. 2006b), however, noise associated with increased ship traffic may be of some importance here. For porpoises, the masking problem is not relevant, as there is a frequency overlap between porpoise clicks (mainly frequencies around 130 kHz (Villadsgaard et al. 2007) and ship-generated noise, where the main frequency range is mostly below 1 kHz (Richardson et al. 1995). Underwater sounds made for communication by gray seals and common seals may overlap in frequency range with sounds generated by ships (Van Parijs et al. 2000), hence there may be masking of signals used for communication over long distances (about 75 km based on noise values generated by ships z (Arveson and Vendittis 2000), and hearing thresholds of seals z (Møhl 1968; Terhune 1988; Kastak & Schusterman 1998).

Behavioral changes range from strong reactions (such as panic or flight) to more moderate behavior, where the animal may head toward the source of the sound or slowly move away from it, or stop the behavior taking place at the moment. The response of animals can vary widely depending on the season, behavioral state, age, sex, as well as the intensity, frequency and temporal structure in which the sound generation that causes behavioral changes takes place (see Nowacek et al. 2007).

Noise-induced shifts in hearing thresholds can lead to temporary (TTS) or permanent (PTS) changes in an animal's hearing threshold. PTS induced by noise exposure has been documented only once in laboratory studies, and is most likely rare in wild populations, as the animal must be very close to the sound source for most sounds of anthropogenic origin. Hence, hearing loss is most often temporary, and the animal regains its original sensitivity after a period of convalescence. However, prolonged exposure to continuous noise, when the ear is subjected to sound levels that cause TTS without the possibility of recovery, can lead to the building of TTS. TTS of 50 dB and above will result in permanent hearing damage in most cases (Ketten 2012). For PTS and TTS, sound intensity is an important parameter determining the degree of hearing loss, as is frequency, the period of time over which exposure to sound takes place, and the time over which the recovery period can take place (Popov et al. 2011).

Porpoises

Porpoises are sensitive to a variety of human-generated sounds at fairly low levels of sound exposure (Southall et al. 2007). (Lucke et al. 2009) showed that a captive porpoise exposed to the sound of an air gun exhibited an avoidance response at sound exposure levels of ~145 dB re 1 µPa2s. Studies on the behavioral impacts of piling on wild porpoises have confirmed these results, with some studies

indicating an even lower threshold value to elicit a response - about 140 dB re 1 $^{\mu Pa2-s}$(Brandt et al. 2011, Dähne 2013, see Betke 2014). Based on the results of the aforementioned study, 140 dB re 1 µPa2s SEL was considered the threshold value for behavioral response, which was used to estimate the size of the avoidance zone by porpoises.

There have been no studies establishing the evocative value of PTS in porpoises, but (Lucke et al. 2009) measured TTS in this species, during exposure to a single pulsed signal generated by air cannons. The threshold value of TTS was 164 dB re 1 $^{\mu Pa2s}$SEL (TTS = 6 dB, hearing recovery after >4 h). A TTS of 6 dB will halve the distance at which the animal will be able to detect sound at a frequency corresponding to the frequency at which the TTS took place. Popov et al. 2011 studied TTS in another porpoise species, the Asian porpoise (Neophocaena phocaenoides asiaeorientalis). An animal exposed to sound in the frequency range between 32 and 128 kHz for 30 minutes experienced TTS at sound levels as low as 140 dB re 1 µPa. (Popov et al. 2011). Kastelein et al. 2012b also induced TTS in porpoises, using low levels of wide-band central frequency noise about

4 kHz during longer sound exposures. Exposure to a sound intensity of 124 dB re 1 µPa for 120 minutes resulted in a TTS of 6 dB. The TTS values obtained by Kastelein et al. 2012 and Popov et al. 2011 may be relevant when considering the impact of ship traffic or turbine noise, but cannot be used in a discussion of pulsatile signals like piling. It should be noted that TTS in porpoises occurs around the frequencies that characterize a sound, this applies to both continuous tones (Kastelein et al. 2013) and impulsive low-frequency sounds (Lucke et al. 2009). Pile driving is characterized by the generation of broadband sounds, however, most of the energy is concentrated at low frequencies (that is

< 1 kHz). There is no indication that TTS at these frequencies affects the ability of porpoises to navigate or forage using their sense of echolocation (porpoise clicks are characterized by frequencies in the region of ~130 kHz), (Villadsgaard et al. 2007). It could potentially affect the porpoises' ability to detect the presence of ships that generate sounds at low frequencies. However, these sounds fall into the frequency range well below 1 kHz, where porpoises' hearing is not very sensitive, so it is difficult to estimate the biological significance of TTS at low frequencies.

Since the preparation of the 2015 Report, new publications have emerged that provide guidance, including threshold values for assessing noise impacts on marine mammals. In this regard, it is important to point to the extensive review by the US NOAA, in particular the most recent publication (Southall et al. 2019) containing revised threshold values for potential hearing damage in marine mammals.

The table below contains values referring to the latest literature, and used for modeling performed for this Report in 2020. Due to the fact that the noise propagation modeling used new threshold values for sound sensitivity of porpoises, it is not methodically possible to compare the results of the modeling presented in the 2015 Report with those performed for this Report.

Table 13. Criteria for porpoise response to impulse sound

Porpoise	PTS	TTS
SPL	202 dB re 1µPa peak	196 dB re 1µPa peak
SELcum24	155 dB re $^{1\mu Pa2-s}$	140 dB re $^{1\mu Pa2-s}$

Source: Southall et al. 2019

Common seals and grey seals

According to (Southall et al. 2007), there are no studies on the behavioral responses associated with the avoidance response of seals. This finding is in agreement with observations of common and gray seals, which did not respond to construction-related noise at their resting sites and are known to have a generally rapid habituation ability, even at relatively high sound levels (Edrén et al. 2010). **(Southall et al. 2007) suggests using a behavioral response criterion based on TTS values, it is this criterion that was adopted in the 2015 Report.**

For seals, (Southall et al. 2007) indicates a PTS limit of 218 dB re 1 µPa peak (186 dB re 1 $^{\mu Pa2s}$SEL), and a TTS limit of 212 dB re 1 µPa (171 dB re 1 $^{\mu Pa2s}$SEL) underwater. These values are based on studies of one individual common seal. TTS in common seals exposed to sound for prolonged periods of time was studied recently (Kastelein et al. 2012a). A TTS of about 6 dB was achieved after a 60-minute exposure of the animal to sound with a one-octave bandwidth, with a center frequency of about 4 kHz at an intensity equal to 136 dB re 1 µPa.

In 2019 (Southall et al. 2019), revised thresholds for potential hearing damage in marine mammals, including seals, are presented. These verified values were used in the modeling conducted for this 2020 Report. The following table shows the thresholds used. Due to the fact that the noise propagation modeling used new threshold values for porpoises' sensitivity to sound, it is not methodically possible to compare the modeling results presented in the 2015 Report with those performed for this Report.

Table 14. Response criteria for grey and common seals

Common seal	PTS	TTS
SPL	218 dB re 1µPa peak	212 dB re 1µPa peak
SELcum24	185 dB re $^{1\mu Pa2s}$	170 dB re $^{1\mu Pa2s}$

Source: Southall et al. 2019

9.1.1.4. Impact assessment with consideration of measures mitigating measures

Analyses of noise emissions carried out as part of the environmental impact assessment for OWF BIII under the parameters approved by the Environmental Decision showed high significance from noise from piling without mitigation measures in the case of harbor porpoise and moderate in the case of both seal species. The EIA report forming the basis for the issuance of the Environmental Decision proposed the use of measures targeting sound transmission between the sound source and the receptor (e.g., a bubble curtain) as minimization measures. Such a solution was introduced as a condition for implementing the Project within the parameters approved by the Environmental Decision - condition II.1.A(a). In a situation where no change in this condition is assumed, there is no justification for considering and assessing the impact of the Project in parameters that do not assume the fulfillment of the condition in question.

The modeling done for the 2015 Report assumed a noise reduction of 14 dB through the **use of an air/bubble curtain** - data based on the Borkum West OWF (Pehlke et al. 2013). Details are available in the report by Hansen D.A., Heilskov N.F. Environmental impact assessment of the offshore wind farm

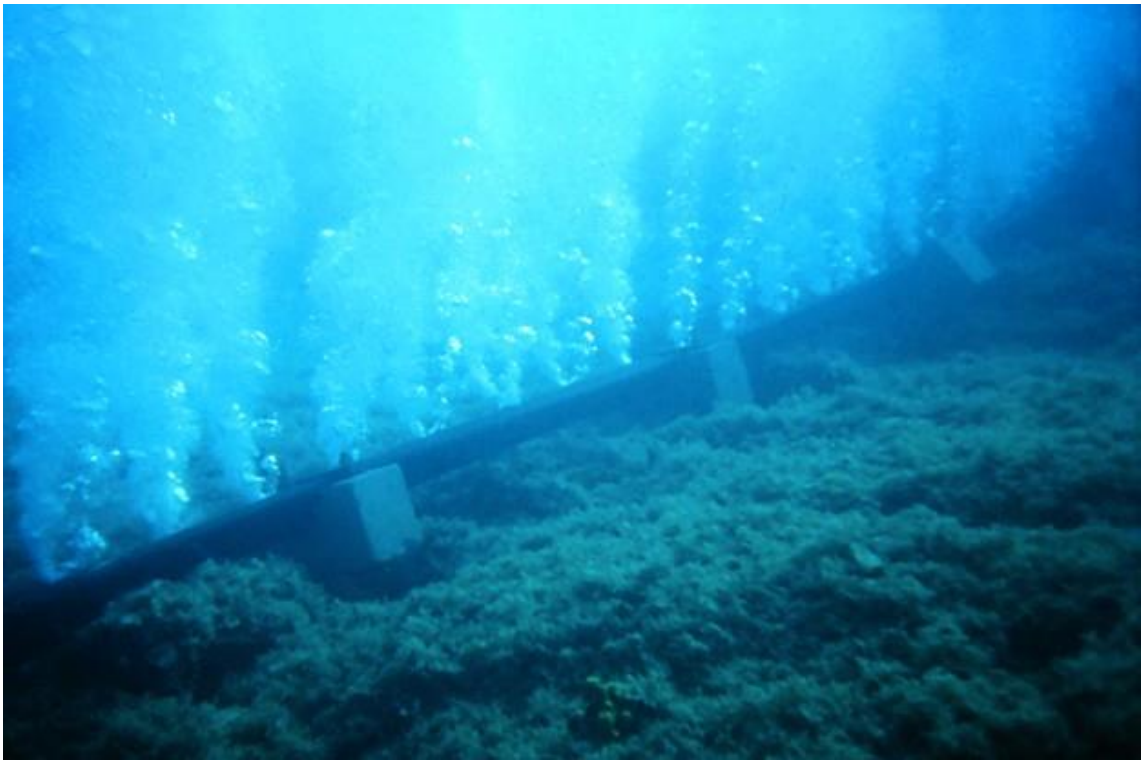
Baltic Central III. Numerical modeling of noise propagation generated by piling, DHI Poland, 2015. It is a device that creates a curtain of upward-floating air bubbles around a driven foundation pile, thus significantly reducing underwater noise. This is a solution now widely used in the construction of offshore wind farms and similar facilities such as mining platforms around the world. The operation of such a curtain during the construction of the Borkum West II offshore wind farm is shown in the following photo in Figure 14.

For the modeling carried out in 2020 for the purposes of this Report, noise reduction values by sound exposure level (SEL) were used - they take the reduction level by 11 dB, and for sound pressure level (SPL) by 14 dB.

Figure 14. Bubble curtain operation during construction of the Borkum West II offshore wind farm

Source: https://de.wikipedia.org/wiki/Big_Bubble_Curtain, (Access date: 05.2022 r.)

Figure 15. Bubble curtain operation



Source: https://de.wikipedia.org/wiki/Big_Bubble_Curtain,(Access date: 05.2022 r.)

It should be noted that the air curtain / bubble curtain is an example of a technical solution. Other devices may be used, as long as they provide the same reduction in underwater noise levels.

The method of determining the zones of potential noise impact on marine mammals is presented in Volume II, Chapter 6.13 of the Report.

The zones of potential impact for the Project in the parameters approved in the Environmental Decision were defined in the 2015 Report at the levels indicated in Table 17. It should be emphasized that they are not comparable with the data from the modeling conducted in 2020, which is due to the adoption of revised thresholds for potential hearing damage in marine mammals, and modified parameters of the Project, including monopiles with a different diameter than was adopted for the 2015 NIS in the 2015 Report, and a different power of the pneumatic hammer used.

Table 15. Zones of potential impacts of underwater noise associated with foundation installation on marine mammals (NIS 2015)

Impact	Maximum threshold range (cumulative impacts when driving 1 foundation for 1 hour) [km]
Porpoise PTS [SEL 155 dB re 1 µPa²s]	9.4
Porpoise TTS [SEL 140 dB re 1 µPa²s]	26.3
PTS seals [SEL 185 dB re 1 µPa²s]	5.1
TTS seals [SEL 170 dB re 1 µPa²s]	29.7

Impact	Maximum threshold range (cumulative impacts when driving 1 foundation for 1 hour) [km]
Seal avoidance [SEL 164 dB re 1 µPa²s]	29.7

Updated modeling results incorporating the proposed modifications to the Project, i.e. the use of a 4,500 kJ pneumatic hammer for piling monopiles with a maximum assumed diameter of 10 m, are presented in the table below. Given that the Environmental Decision imposes a condition related to the use of an air curtain or other sound level mitigation technology, the table additionally includes impact ranges without minimization for comparison purposes and to illustrate the effectiveness of the minimization measures indicated in the terms of the Environmental Decision.

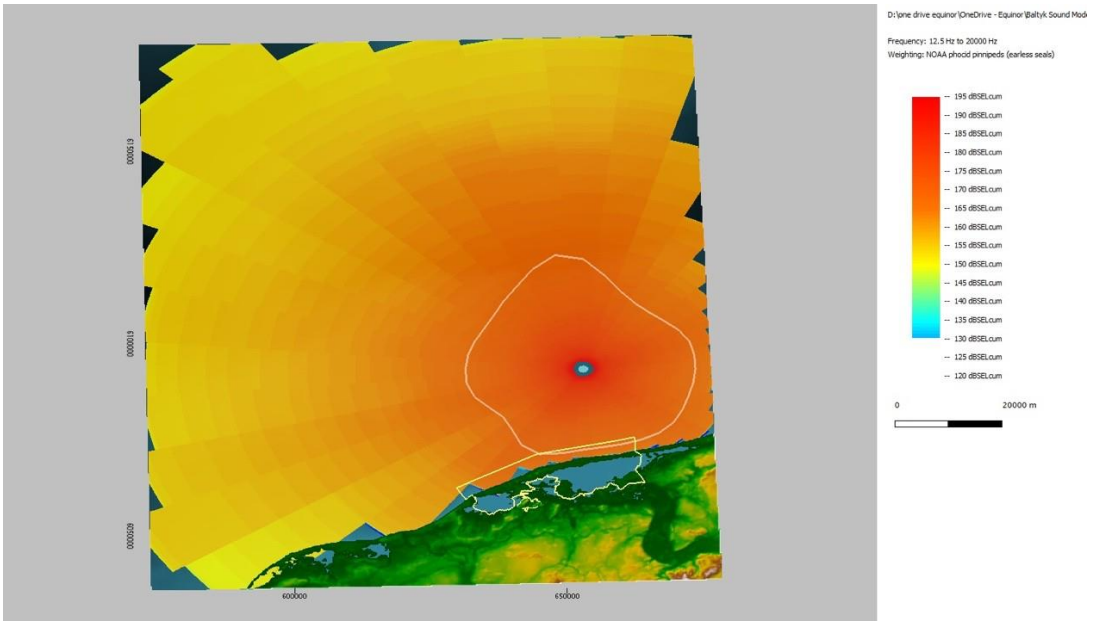
Table 16. The ranges of underwater noise impacts emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the BIII offshore wind farm development area - with and without the use of a single bubble curtain, reducing the sound pressure level (SPL) by 14 dB and the sound exposure level (SEL) by 11 dB.

Source	Taxonomy group.	The impact is not	Modeled sound type	Range of influence (m)			
				with minimization		without minimization (for comparison purposes)	
				average	max.	average	max.
Southall et al. 2019	Porpoises	PTS	Single hit	78	99	530	611
		PTS	Multiple strikes	2094	2196	9176	10396
		TTS	Single hit	138	154	908	1009
		TTS	Multiple strikes	4771	5365	28224	34439
	Seals in the water	PTS	Single hit	44	50	74	94
		PTS	Multiple strikes	1312	1416	4999	5491
		TTS	Single hit	57	68	123	142
		TTS	Multiple strikes	4872	5418	21979	30303

Source: own study based on the results of modeling performed for the BIII OWF project.

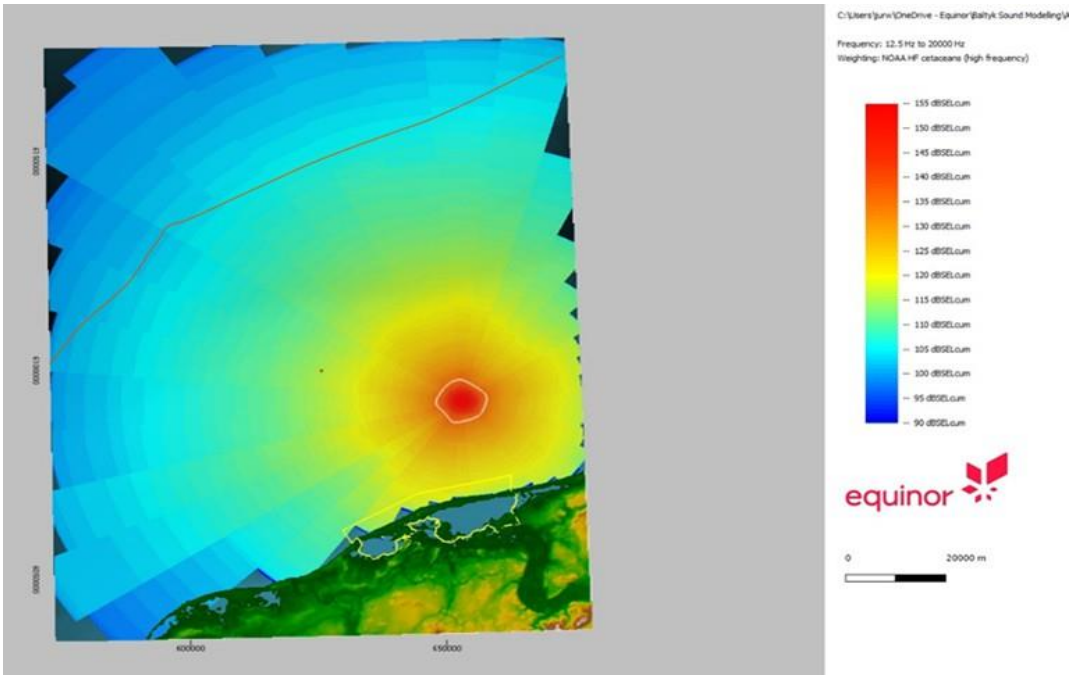
The figures below (16 to 19) show the predicted ranges of underwater noise impacts in the form of temporal shift of hearing threshold (TTS) in harbor porpoise and seals occurring in the Project area without and with the application of a single bubble curtain.

Figure 16. The extent of underwater noise impact in the form of TTS in porpoise (white line) emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the development area of OWF BIII (SELcum - 16,800 strokes) without mitigation. The yellow line marks the border of the Natura 2000 area Ostoja Słowińska.



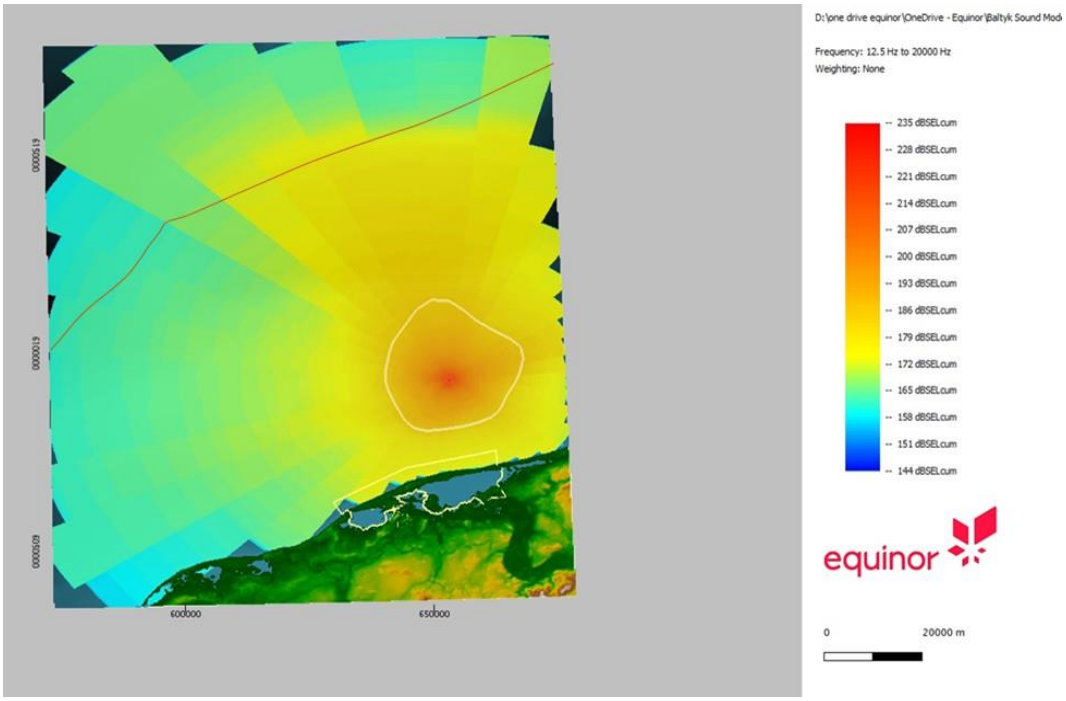
Source: investor data

Figure 17. The range of underwater noise impact in the form of TTS in porpoise (white line) emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the development area of OWF BIII (SELcum - 16,800 strokes) using a single bubble curtain. The yellow line marks the border of the Natura 2000 area Ostoja Słowińska.



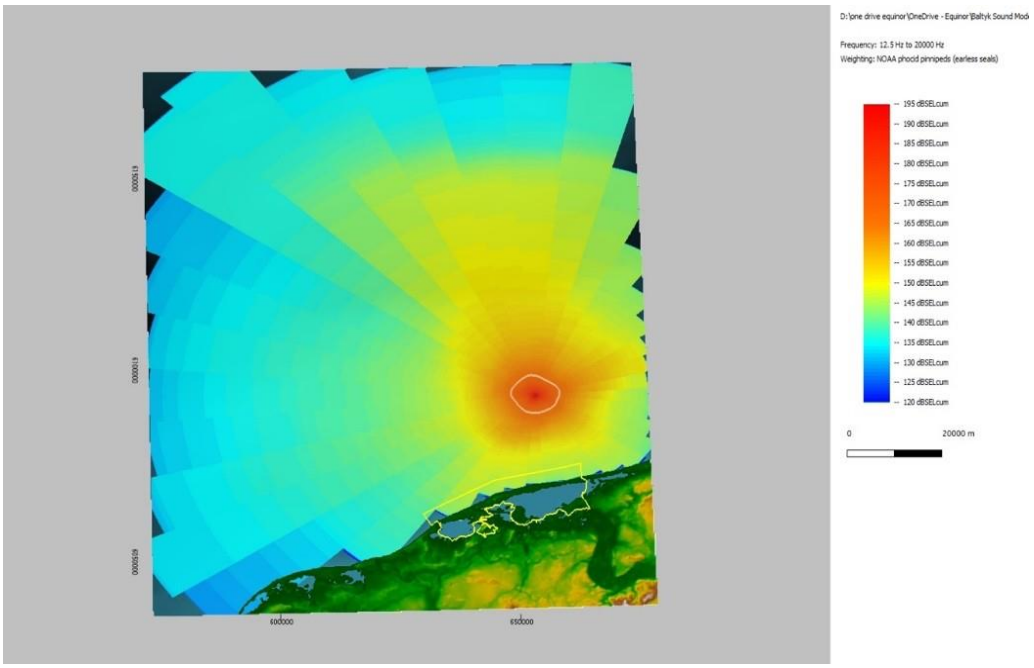
Source: investor data

Figure 18. The extent of underwater noise impact in the form of TTS in sealife (white line) emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the development area of OWF BIII (SELcum - 16,800 strokes) without mitigation. The yellow line marks the border of the Natura 2000 area Ostoja Słowińska.



Source: investor data

Figure 19. The range of underwater noise impact in the form of TTS in sealife (white line) emitted during the piling of a 10 m diameter foundation with a 4,500 kJ jackhammer in the development area of OWF BIII (SELcum - 16,800 strokes) using a single bubble curtain. The yellow line marks the border of the Natura 2000 area Ostoja Słowińska.



Source: investor data

It should be emphasized here that the condition of the Environmental Decision - II.1.A. ppk. 1) obliges to design and apply technical solutions in the form of an air curtain or other technology, minimizing the impact of underwater noise on fish and marine mammals, guaranteeing a reduction in its level, so that on the border of the nearest Natura 2000 area, protecting marine mammals, i.e., the area is protected by the Natura 2000 site. SÅ'owiÅ"ska refuge PLH220023, was no greater than 171 dB re 1 $^{\mu Pa2s}$(SEL, in water). The value of the threshold specified in the Environmental Decision corresponds to the value of the seal TTS threshold, which are presented in Figures 18 and 19. However, due to a change in the thresholds adopted as guidelines for determining impacts on marine mammals, it is proposed to amend this condition of the Environmental Decision to take into account the different sensitivity characteristics for porpoise and seals. Consequently, it is proposed to establish the boundary sizes necessary to be maintained at the boundary of the nearest Natura 2000 area protecting marine mammals, i.e. Ostoj Słowińskiej PLH220023 at 140 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the VHF function [a weighting function for cetaceans with high sensitivity to very high frequency sounds] for porpoise, and 170 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the PVC function [a weighting function for seals] for seals.

Taking into account the ranges of impact zones resulting from the modeling conducted in the 2015 Report, the impact of piling noise on marine mammals was assessed. Its result is presented in the table below.

Table 17. Impact of piling noise on mammals after mitigation measures

Species	Impact	Scale of exposure	Duration	Intensity	Frequency of impact	Reversibility	Magnitude of impact	Meaning
Porpoise (Phocoena phocoena	TPPS (one hammer blow)	Not applicable						
	TPSS (series of hammer blows)	Local	Long-term	Very high	Repeatable	Irreversible	Moderate	Moderate
	CPPS (one hammer blow)	Local	Short-term	High	Repeatable	Reversible	Insignificant	Small
	CPSS (series of hammer blows)	Regional	Short-term	High	Repeatable	Reversible - ne	Small	Small
	Avoid	Regional	Medium-term	Average	Repeat- ne	Reversible - ne	Small	Small

Species	Impact	Scale of exposure	Duration	Intensity	Frequency of impact	Reversibility	Magnitude of impact	Meaning
Common seal (Phoca vitulina) and gray seal (Halichoerus grypus)	TPPS (one hammer blow)	Not applicable						
	TPSS (series of hammer blows)	Regional	Long-term	Very high	Repeatable	Irreversible	Large	Moderate
	CPPS (one hammer blow)	Local	Short-term	High	Repeatable	Reversible	Insignificant	Skip
	CPSS (series of hammer blows)	Regional	Short-Ter-mined	High	Repeat- ne	Reversible - ne	Small	Small
	Avoid	Local	Medium-ter-minium	Low	Continued	Reversible - ne	Non-significant	Skip

In the case of the proposed change in the parameters of the BIII OWF, about 30% of the number of power plants envisaged in the case of the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015 - will be built, and about 50% less than in the parameters of the Project approved by the Environmental Decision.

As a result of updating the parameters of the project, monopile foundations or jacket foundations will be used. The modeling of noise impacts on marine mammals done in the current year is not comparable to the modeling used in the 2015 Report, due to the different thresholds for impacts on marine mammals adopted as the basis for the modeling (due to a change in scientific guidelines in this regard), as well as the adoption in the 2020 modeling of higher hammer energy used for foundation deposition operations. Nevertheless, taking into account the results of the modeling performed for the 2015 Report and the current report expressed in the impact ranges, it should be considered that the results of the conducted modeling confirm that with the assumed methods of implementation of the Project and mitigation solutions, the conditions of the Environmental Decision established to minimize the impact on marine mammals will be met. However, it should be emphasized that the proposed modification of the parameters of the Project involves a significant reduction in the number of power plants, which in turn means fewer foundations, and this will significantly reduce the duration of impacts generated.

In view of the above, it should be considered that both the nature of the impacts and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the project does not affect the outcome of the

environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained. The modeling conducted confirms that updating the parameters of the Project in relation to the parameters approved by the Environmental Decision will not change the results of the environmental impact assessment conducted in the 2015 Report determining the impact on mammals as a result of noise caused by driving foundation piles after applying the minimization measures provided for by the Environmental Decision. However, it is proposed to change the way the parameters to be met after the minimization measures are applied are described. Condition II.1.A (1) of the Environmental Decision to design and apply a technical solution in the form of an air curtain or other technology to minimize the impact of underwater noise on fish and marine mammals, ensuring that its level is so reduced that at the boundary of the nearest Natura 2000 area protecting marine mammals, i.e., the area of the Natura 2000 site. Ostoja Słowińska PLH220023, was no greater than 171 dB re 1 $^{\mu Pa2s}$(SEL in water) However, due to a change in the thresholds adopted as a guideline for determining impacts on marine mammals, it is proposed to amend this condition of the Environmental Decision to take into account the different sensitivity characteristics for harbor porpoise and seals. Consequently, it is proposed to establish the boundary sizes necessary to be maintained at the boundary of the nearest Natura 2000 area protecting marine mammals, i.e. Ostoj Słowińskiej PLH220023 at 140 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the VHF function [a weighting function for cetaceans with high sensitivity to very high frequency sounds] for porpoise, and 170 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the PVC function [a weighting function for seals] for seals.

It is therefore necessary to use measures to reduce noise from piling. An example is the use of the recalled bubble curtains.

In addition, the proper organization of the construction process should be used to ensure that no less than once every two months there is a break in the piling process of more than 4 days, and these breaks may also be due to weather conditions. If unexploded munitions are detected, it is recommended that measures be implemented to minimize this impact in the form of scaring and video monitoring of the presence of marine mammals.

9.1.2. Noise emissions caused by dredging bottom

In many cases, before installing wind farm facilities, it is necessary to deepen the bottom in order to properly prepare it for the foundation (gravity, but also other types). There are a small number of studies on this issue, but those conducted so far point to an avoidance response in mammals.

Noise and vibration caused by seabed dredging during the construction phase will cause direct, negative impacts on marine mammals that are local in scope, short-term, low-intensity, repeatable during the construction period, and reversible.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, and which formed the basis of the assessment conducted in the 2015 Report, is presented in the table below.

The project in the parameters approved by the Environmental Decision involves the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project constituting the 2015 NIS. In contrast, the updated parameters of the Project assume the implementation of

approximately 30% of the power plants envisioned for the 2015 NIS and 50% specified in the parameters of the Project approved by the Environmental Decision. The noise level associated with dredging the bottom for a given foundation will be the same regardless of the number of power plants, while the duration of exposure to the emitted noise will be significantly reduced.

Table 18. Bottom dredging noise - analysis of impacts on individual marine mammal species (construction phase, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Very low to medium (cf.: section 8.1.4.)	Noise from bottom dredging can cause avoidance reactions in marine mammals	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Very low to low (cf.: section 8.2.4.)		Negligible (scale of exposure - local, duration - short term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the updating of the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.3. Noise emissions caused by vessels

Small high-speed boats, like barges or supply vessels, generate noise, where energy is mainly concentrated in the frequency range between < 1kHz - > 10 kHz. It is possible that their presence will cause an increase in the local sound field during the construction phase, with its range covering frequencies that are significant in part for marine mammals. Porpoises, common seals and gray seals are more sensitive to high-frequency sounds, so the high-frequency components in the noise generated by boats could potentially be a problem for these animals, and the presence of ships in the area could result in porpoises moving to another area. The severity of such disruption will depend on the type and number of boats, which in this case will be small/medium sized vessels used for maintenance and construction, a jack-up vessel will also be used (Haskoning 2014). Assuming the sound exposure criteria described above and assuming a transmission loss of 15 log R, the distances at which porpoises can

react from a vessel is equal to about 1 km (based on measurements made by (Arveson and Vendittis 2000)).

Porpoise responses are noticeable at a distance of about 1 km from the noise source (based on measurements in Arveson and Venditis, 2000), assuming the above criteria and a transmission loss of 15 log(r)). Taking into account the fact that the areas of Danish waters most frequented by ships are at the same time characterized by the highest abundance of porpoises (Sveegaard et al. 2011), any displacement of mammals due to ship noise in Polish waters in the vicinity of OWF BIII should be only short-term and not far away. The same is true for both seal species analyzed here.

Potentially, there is a risk that increased noise levels resulting from ship traffic will cause TTS in all three mammal species discussed here. However, background noise levels are not expected to increase significantly as a result of more intensive traffic caused by the BIII OWF construction process. Therefore, TTS is not expected to occur as a consequence of noise caused by the presence of ships during construction.

Noise and vibration caused by ships during the construction phase will cause direct, negative impacts on marine mammals that are local in scope, short-term, low-intensity, repeatable during the construction period, and reversible.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis of the impact assessment conducted in the 2015 Report, is presented in the table below.

In the proposed updated parameters of the Project, about 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project constituting the 2015 NIS, as a result, vessel traffic and associated noise will be correspondingly lower. It is considered that the Project in the proposed updated parameters will cause impacts less than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 19. Noise from ships - analysis of impacts on individual marine mammal species (construction phase, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise (Phocoena phocoena)	Large	Very low to medium (cf.: section 8.1.4.)	Noise from ships can cause avoidance reactions in marine mammals	Negligible (scale of exposure - local, duration - short term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Very low to low (cf.: section 8.2.4.)		Negligible (scale of exposure - local, duration - short term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014.

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the updating of the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.4. Collisions with ships

It is estimated that due to the low abundance of marine mammals found in the farm's basin during environmental surveys, as well as their expected overfishing from the basin during construction, there is a very low probability of collisions between porpoises or seals and ships.

An assessment of the significance of this impact for the most far-reaching scenario that could occur under the reasonable alternative is presented in the table below. The assessment also applies to the decommissioning stage.

In the proposed updated parameters of the Project, about 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project constituting the 2015 NIS, as a result, the movement of vessels and the associated risk of collision will be correspondingly lower. It is considered that the Project in the updated parameters will cause an impact lower than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 20. Collisions with ships - analysis of impacts on individual marine mammal species (construction / decommissioning phase, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Low (cf.: section 8.1.4.)	Increased ship traffic during the construction	No change (No loss of the resource, no impact on the	No change (magnitude of impact - no change,

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			phase may pose a risk of collision to marine mammals	structure and operation of the resource)	importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Low (cf.: section 8.2.4.)		No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the updating of the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.5. An increase in the concentration of suspended solids in water water

An increase in the concentration of suspended solids in the water due to the disturbance of the bottom sediment layer will lead to water turbidity and a reduction in the navigational abilities of marine mammals using their eyesight, for example, when hunting.

In addition, there will be an indirect impact - an increase in the concentration of suspended solids may affect fish, the primary food of marine mammals. There may be an effect of avoidance of this area by representatives of some of their species, as well as increased mortality, especially of juvenile forms. Once the adverse factors have subsided, adult fish may return to previously inhabited sites (cf. Ichthyofauna Impact Assessment, Volume IV Section 4 of the EIA).

The impact assessment used the suspended solids spread model for the construction phase, made by DHI and found in Section 11 of Volume II of the EIA. Modeling was performed for both the option selected for implementation, which was approved through the Environmental Decision, and a reasonable alternative. At the same time, it should be emphasized that the modeling performed in the 2015 Report took into account the construction of gravity foundations for the power plant, and therefore the source of the greatest disturbance of bottom sediments and agitation of suspended solids. The proposed modified parameters of the project assume the exclusion of the possibility of gravity foundations for power plants. The use of this type of foundation will only be possible for an offshore substation.

The sediment transport model showed that during the construction of the farm, the concentration of suspended matter resulting from construction activities (i.e., without natural background) will not exceed 20 mg/l within the farm area and 10 mg/l outside the farm area.

In addition, the relatively high current velocity observed during the study, averaging about 0.1-0.2 m/s and a maximum of about 0.5 m/s, will promote the dilution of suspended solids (source: SMDI 2015a). (Source: hydrographic modeling report, Volume II Section 11 of the EIA).

Note that the concentrations given will be very limited in time and space. Such high concentrations will only occur if gravity foundations are used on the farm, which require dredging and leveling of the seabed, and only during dredging operations. With other types of foundations, these impacts will be many times smaller. The local decrease in water clarity inside the farm will be short-lived, and its impact will furthermore be masked by mammals leaving the area due to other, more intense disturbances.

An increase in the concentration of suspended solids in water during construction activities is a direct or indirect, negative impact on marine mammals that is local in scope, temporary, reversible, repeatable during the construction period, and of low intensity. Similar impacts will occur during the eventual decommissioning of the farm.

An assessment of the significance of this impact of the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

In the case of the tabulated parameters of the BIII OWF, about 30% of the number of power plants envisaged in the case of the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015 - will be built, and about 50% less than in the parameters of the Project approved by the Environmental Decision, and it is additionally assumed that the types of foundations used for power plants will be limited to monopal and jacket type foundations, and the number of foundations for substations will be reduced from 6 to 1 unit. Reducing the number of power plants, means fewer foundations, and thus reduces the number of events during which bottom sediments will be stirred up, and will also affect the total duration of such impacts. In addition, eliminating the type of foundations that are the source of the greatest disturbance further reduces the magnitude of the impact. It is considered that the option selected for implementation will result in impacts that are significantly less than both the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 21. Increase in suspended solids concentration in water - analysis of impacts on individual marine mammal species during construction / decommissioning (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Low (cf.: section 8.1.4.)	An increase in the concentration of suspended solids in the water can reduce the navigational abilities of mammals, as well as negatively affect fish, their main food	Negligible (scale of exposure - local, duration - temporary, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Low (cf.: section 8.2.4.)		Negligible (scale of exposure - local, duration - temporary, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014.

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.6. Release of pollutants and nutrients from the sludge into the water body water

Studies conducted directly in the area planned for the construction of the BIII OWF (see Volume III Section 5 of the EIA) confirmed the low concentration of hazardous substances in the sediments (PAHs, PCBs, heavy metals, mineral oils, radionuclides). Taking into account the above study results, it can be concluded that at the stage of construction of OWF BIII there will be no significant threats to marine mammals associated with an increase in the concentrations of toxic chemicals released from the sediments.

The possible impact of hazardous substances released from bottom sediments will furthermore be masked by mammals leaving the area due to other, more intense disturbances.

In turn, the release of nutrients (nitrogen and phosphorus) from bottom sediments can affect mammals indirectly. Eutrophication can lead to an increase in biomass production, resulting in reduced oxygen in some areas. It can also change the structure of fish populations - species that were previously insignificant and few in number may replace species of greater value to marine predators (HELCOM 2006). Porpoises, common seals and gray seals hunt herring, cod, whitefish, sprats and gobies

(Härkönen & Heide-Jørgensen 1991; Lundström K. et al. 2007; Sveegaard et al. 2012). Unfavorable changes in fish populations for these species could therefore affect marine mammals.

Note that the release of pollutants and nutrients from bottom sediments will be very limited in time and space. The highest concentrations will only occur if gravity foundations are used on the farm, which require dredging and leveling of the seabed, and only during dredging operations. With other types of foundations, these impacts will be many times smaller. This issue is discussed in detail in the section on the impact of OWF BIII on the abiotic environment (Volume IV Section 2 of the EIA).

The release of pollutants and nutrients from the sediment into the water body during construction activities is a direct or indirect, negative impact on marine mammals that is local in scope, temporary, reversible, repeatable during the construction period, and of low intensity. Similar impacts will occur during the eventual decommissioning of the farm.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

If the project is implemented under the updated parameters, about 70% fewer power plants will be built than envisioned for the set of Project parameters representing the most far-reaching scenario - the 2015 NIS, and about 50% fewer than for the Project parameters approved by the Environmental Decision. Reducing the number of power plants will result in less impact due to fewer foundations. In addition, the proposed changes to the conditions for implementation and operation of the Project assume the abandonment of the possibility of using gravity and tripod foundations for wind turbines, i.e. the types that interfere most with the bottom and thus affect the release of pollutants and nutrients from the sediments. Thus, it should be considered that the Project in the updated parameters will cause significantly lower impacts than the 2015 NIS.

Due to the reduction in the number of foundations planned for installation in the option selected for implementation, the number of locations where there will be agitation of bottom sediments associated with the anchoring of units involved in the construction of the farm will also be reduced. Since the projected maximum length of cable infrastructure in the variant selected for implementation has not changed, the scale of sediment agitation associated with its installation described in the Report remains unchanged.

Table 22. Release of pollutants and nutrients from sediment into the water body - analysis of impacts on individual marine mammal species during the construction / decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Low (cf.: section 8.1.4.)	The release of pollutants and nutrients from the sediment into the water's depths can negatively affect fish, which are the main food of marine mammals	Negligible (scale of exposure - local, duration - temporary, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Low (cf.: section 8.2.4.)		Negligible (scale of exposure - local, duration - temporary, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the actauliazation of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.7. Destruction of habitats benthos

The foundation of power plant and substation foundations, the laying of cables, and the anchoring of ships during these works will result in partial destruction of the seabed (on about 1% of the area of the farm - cf. abiotic environmental impact assessment, Volume IV Section 2 of the EIA). This situation will lead to the physical destruction of benthic organisms in these places and the loss of their habitat. These impacts will be on a local scale. This can have a periodic negative impact on benthic-eating fish, and indirectly on fish-hunting marine mammals. Effects on benthos are described in Section 3 of Volume IV of the EIA.

However, it is to be expected that already at the stage of operation of the farm there will be an "artificial reef" effect and benthic restoration on the hard structural elements of the farm and in the areas of laying the leaching protection layer.

Besides, marine mammals are likely to leave the site for the duration of the work. This means that the potential impact of the farm on benthic habitats will be masked by the response of mammals to underwater noise.

Destruction of benthic habitat during construction activities is an indirect, negative impact on marine mammals of local range, long-term, reversible, permanent, low intensity. Similar impacts will occur during the eventual decommissioning of the farm.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 , which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

If the Project is implemented under the proposed zaktauizwowowo parameters, approximately 70% fewer power plants will be built than envisioned under the set of Project parameters representing the most far-reaching scenario - the 2015 NIS, and approximately 50% fewer than under the Project parameters approved by the Environmental Decision. Reducing the number of power plants will result in less impact, due to fewer foundations and the total area transformed by foundations. In addition, the changes in the conditions for implementation and operation of the Project assume the abandonment of the possibility of using gravity and tripod type foundations for wind turbines, i.e. the types that interfere most with the bottom and thus affect the destruction of benthic habitats. Thus, it should be considered that the Project under the modified parameters will cause significantly lower impacts than the 2015 NIS.

Table 23. Destruction of benthic habitat - analysis of impacts on individual marine mammal species during the construction / decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena*)	Large	Low (cf.: section 8.1.4.)	Destruction of benthic habitat during construction may negatively affect fish, their main food for marine mammals	Insignificant (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Low (cf.: section 8.2.4.)		Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the decision, and thus the updating of the parameters of the project does not affect the outcome of the environmental

impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.8. Impacts cumulative

Assumptions for analyses of cumulative impacts of OWF BIII and other projects on marine mammals are presented in Section 13 of Volume II of the EIA.

The impact assessment conducted in the 2015 Report assumed two possible scenarios for wind farm development in the POM for cumulative impact analyses presented below:

The first assumed between 2019 and 2021, power plants with a total capacity of 900 MW will be built, including 600 MW under the BIII offshore wind farm and 300 MW under the Baltica 3 offshore wind farm. The construction of undersea cables was also scrambled for these farms. It was assumed that the average power plant would have a capacity of 6 MW, and their number was estimated at 150. Associated infrastructure (e.g., substations, social platforms, etc.) was also to be built. It was assumed that 158 foundations and about 158 km of internal cables would be installed on the seabed in this connection. This scenario has not been realized.

Subsequently, it has been put on the table that power plants with a total capacity of 1,350 MW will be built between 2023 and 2026, including 600 MW under OWF BIII and 750 MW under OWF Baltica 2. A total of 225 wind power plants will be built (assuming an average plant capacity of 6 MW). Associated infrastructure (substations, social and survey platforms, etc.) will also be built. It was assumed that 232 foundations and about 232 km of internal cables would be installed on the seabed in this connection.

In addition, there are heavily used shipping routes in the vicinity of the farm (including the Traffic Separation Scheme (TSS)), in the area of which the risk of oil spills increases.

After 2026, if additional connection conditions are obtained, the investor may build more power plants, with a total capacity of 600 MW, under the BIII offshore wind farm. 60 wind turbines will be built. Associated infrastructure will also be built. It was also assumed that an additional 63 foundations and about 62 kilometers of internal cables would be installed on the seabed as a result.

The second scenario that was considered was presented in the Environmental Impact Report prepared in 2015 for OWF BII, which assumed that in 2023 - 2026 the above amounts of power plants and infrastructure would be built not in the areas of OWF BIII and OWF Baltica 3, but as OWF BII and OWF Baltica 2. However, such an alternative scenario did not significantly change the level of impacts.

It was then assumed that in the above scenario the level of cumulative environmental impacts would be only 16.5% higher than the level analyzed in the report as a reasonable alternative (NIS 2015).

It should also be noted that the assessment of the impact of piling noise on marine mammals was made under the assumption that successive foundations are installed one after another, and the time between the piling process for successive turbines is too long to lead to accumulation of acoustic energy (and thus cumulative CPPS). If the time between the installation of one foundation and the next is less than 72 hours (the period during which porpoise return), cumulative impacts may occur, resulting in a barrier effect or long-term displacement from habitat

Compared to the assumptions of the scenarios adopted in the 2015 Report, the timing of all planned projects has changed, and they have all been delayed.

In the zone that has been designated as a potential area of cumulative piling impacts, projects have been advanced for which at most only preliminary assumptions existed at the stage of the 2015 Report. Currently, the Baltica 2 and Baltica 3 OWFs, BII OWFs, Baltic Power, FEW Baltic II and C-Wind OWFs are identified as projects in the zone that may be a source of cumulative impacts in terms of noise emissions from piling and impacts on marine mammals. All but the latter have an environmental decision. Piling of foundations at the BIII offshore wind farm may be carried out in 2023-2025. During this period, the Baltica 2 offshore wind farm, which has a signed connection agreement with a completion date similar to the BIII offshore wind farm, may also be implemented. The investor, which owns the OWF BIII and OWF BII projects, has no plans to build them ednately.

On the other hand, the BIII OWF in the tabulated parameters assumes the construction of 60 wind power plants, which is 50% of the number of power plants envisaged by the Environmental Decision and 30% of those evaluated under the NIS. Thus, the Project update contributes to reducing the total potential cumulative impacts. On the other hand, the environmental decision proceedings conducted to date after the issuance of the Environmental Decision confirm the possibility of implementing the planned projects, taking into account the potential accumulation of impacts.

From the point of view of the potential impact of construction activities on marine mammals, undoubtedly the most significant cumulative impact is noise from piling.

It should also be noted that the assessment of the impact of piling noise on marine mammals has been made under the assumption that successive foundations are installed one after the other, and the time between the piling process for successive turbines is too long to lead to accumulation of acoustic energy (and thus cumulative CPPS). If the time between the installation of one foundation and the next is less than 72 hours (the period during which porpoise return), cumulative impacts may occur, resulting in a barrier effect or long-term displacement from habitat.

On the other hand, theoretically, a situation could arise when 2 teams driving foundation piles work simultaneously in the BIII OWF area. It can also not be ruled out that foundation piles will be driven simultaneously in the OWF BIII and OWF Baltica projects (2). Such situations are unlikely, due to the limited availability of the specialized equipment required for this type of work, but nevertheless theoretically they could happen. An analysis of such an accumulation scenario, including the BIII offshore wind farm, Baltica offshore wind farm and BII offshore wind farm projects, was conducted as part of the environmental impact assessment of the Baltica offshore wind farm project (IMG/MEWO 2017).

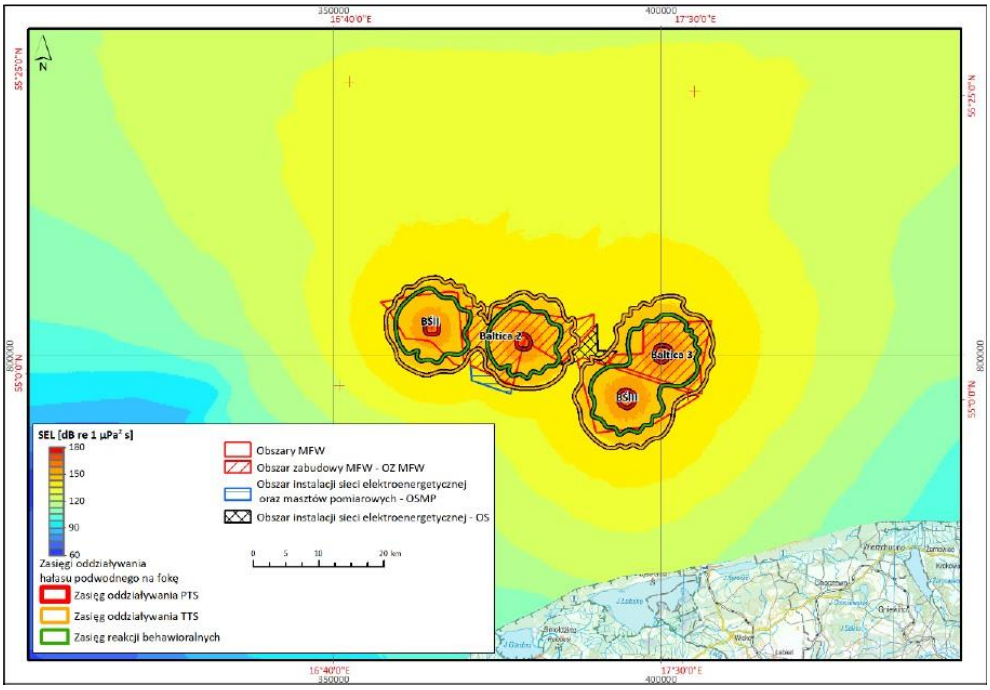
Table 24. Cumulative noise emitted by 1-4 jackhammers operating simultaneously in the area of wind farms BIII, BII, Baltica with application of mitigation measures on individual species of marine mammals (construction stage) range in meters.

Threshold value		1 source	2 sources	3 sources	4 sources
Porpoise	Behavioral response	1953	3906	5859	7812
	TTS (single pile driver strike)	4.5	9.0	13.5	18.0

Threshold value		1 source	2 sources	3 sources	4 sources
	TTS (cumulative impact (1 hour)	1114	2228	3342	4456
	PTS (single pile driver strike)	0.03	0.06	0.09	0.12
	PTS (cumulative impact (1 hour)	197	475	710	950
Seals	Behavioral response	49.3	120	178	480
	TTS (single pile driver strike)	0.03	0.1	0.1	0.2
	TTS (cumulative impact (1 hour)	99.5	240	360	480
	PTS (single pile driver strike)	0.03	0.1	0.1	0.2
	PTS (cumulative impact (1 hour)	1.7	4.1	6.1	8.2

Source: MIG/MEWO 2017

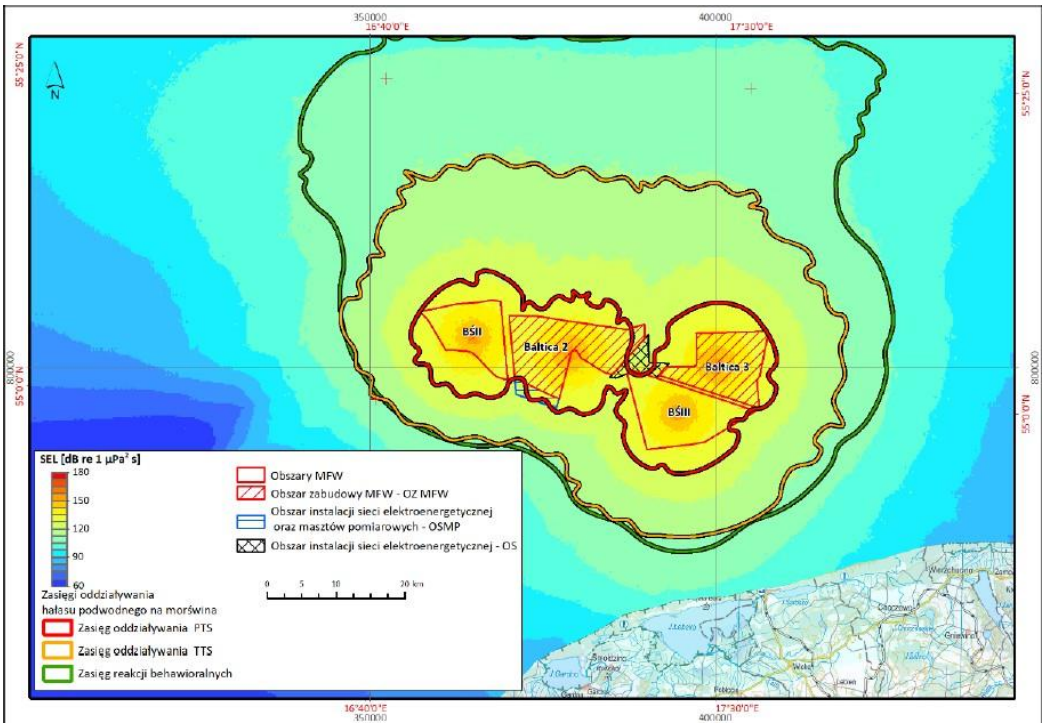
Figure 20. Maximum ranges of noise impacts from simultaneous piling on OWF Baltica, BIII, BII projects for seals



SEL [dB re 1 µPa² s]	SEL [dB re 1 µPa2ˢ]
Zasięgi oddziaływania hałasu podwodnego na fokę	The ranges of the impact of underwater noise on the seal
Zasięg oddziaływania PTS	PTS outreach
Zasięg oddziaływania TTS	TTS's range of impact
Zasięg reakcji behawioralnych	Range of behavioral responses
Obszary MFW	IMF areas
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych - OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej - OS	Power grid installation area - OS

Source: MIG/MEWO 2017

Figure 21. Maximum ranges of noise impacts from simultaneous piling on OWF Baltica, BIII, BII projects for porpoise



SEL [dB re 1 µPa² s]	SEL [dB re 1 µPa2ˢ]
Zasięgi oddziaływania hałasu podwodnego na morświna	Ranges of impact of underwater noise on porpoise
Zasięg oddziaływania PTS	PTS outreach
Zasięg oddziaływania TTS	TTS's range of impact
Zasięg reakcji behawioralnych	Range of behavioral responses
Obszary MFW	IMF areas
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych - OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej - OS	Power grid installation area - OS

Source: MIG/MEWO 2017

A comparison of the results of cumulative noise modeling and those obtained for the operation of jackhammers at a single site shows that the range of PTS and TTS for a series of hammer blows from individual emission sources does not change significantly. However, the more noise emission sources and the farther they are located from each other, the larger the combined area of TTS impacts and behavioral responses. In contrast, PTS coverage does not significantly extend beyond the boundary of a given project, and its coverage overlaps only for directly adjacent projects. The total impact associated with the operation of jackhammers in the area of OWF BIII and OWF Baltica 2 should be assessed as high.

Regardless of the above, it should be emphasized that the proposed modifications to the conditions of implementation and operation of the Project did not affect the results of the assessment conducted for the Project in the parameters approved by the Environmental Decision. Although they will not affect the results on the spatial extent of potential impacts, but due to the smaller number of power plants planned to be built, they have affected the total time during which the piling of power plant foundations will be carried out, and thus reduce the risk of cumulative impacts.

9.1.8.1. Accumulation of total time piling

Due to the large areas where TTS and avoidance response in marine mammals can occur, the 2015 Report conducted an analysis of the potential duration of these impacts. The total time of continuous piling can be 3708 hours in the NIS variant (208 jacket or tripod foundations) or 2268 hours in the parameters of the project approved by the Environmental Decision (126 foundations). This time does not take into account technological interruptions and those resulting from unfavorable weather conditions. If the duration of these breaks is less than 72 hours, which would allow mammals to move freely in the zone where these impacts occur, there may be an accumulation of noise from piling over time. It should be emphasized that the probability of conducting continuous piling of all foundations on the farm is extremely low. It is due both to the need to carry out technical interruptions related to the transportation of successive batches of foundations and the occurrence of favorable weather conditions. However, adopting the precautionary principle, it was assumed that such a scenario is possible, which would result in continuous noise pressure forcing behavioral responses for about 26 months for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and about 16 months in the parameters approved by the Environmental Decision.

Such a long period of impact could cause a significant change in the behavior of marine mammals in its range. However, it should be emphasized that, as the pre-investment monitoring showed, the study area is not a permanent location for marine mammals, but is a place for their periodic movement. The main effect of piling on over time could therefore be a barrier effect. However, according to the noise propagation modeling performed, even in the most far-reaching scenario, a corridor of several kilometers remains between the seashore and the zone where the avoidance response occurs, allowing mammals to move freely in the east-west direction. At the same time, it should be noted that the modeling was performed for monopile foundations, where, although there was the highest noise level with jackhammers, but at the same time the effective piling time was only 5 h (compared to 18 h with jacket and tripod foundations). The zone of influence, using jacket or tripod foundations, will therefore be somewhat smaller.

If the parameters of the Project are acclimated, both the time of continuous piling will be reduced to about 1080 hours, as well as the time including breaks between piling of successive foundations, to about 5400 h (1080 h of effective piling + 4320 h of breaks). Consequently, the planned modifications to the Project contribute to reducing the potential risk of cumulative impacts and reducing them if they occur.

In addition, the Environmental Decision takes into account the minimization measure proposed in the 2015 Report, which is to ensure the organization of the construction process so as to keep the intervals in the piling process no shorter than 4 days once every two months. This action is specified in Condition II.1.A(2) of the Environmental Decision. The proceedings in question are not intended to change the condition indicated.

9.1.8.2. Oil and gas extraction gas

Due to the expiration of the concessions for exploration and prospecting in the Baltic Sea and the concessions for oil and gas production from fields B3, B4, B6 and B8 (and the non-issuance of new concessions in the areas in question or in other areas relevant to the cumulative impacts of the BII offshore wind farm), no impacts are expected in this regard

9.1.8.3. Pipelines and cables

SwePol Link is a high-voltage undersea cable connection, between Poland and Sweden The completion of the connection took place in 2000. Nord Stream is a gas pipeline connecting Russia with the rest of Europe. Noise associated with the laying of the pipelines is primarily due to ship traffic and will not contribute significantly to the total acoustic impact during the construction phase of OWF BII.

9.1.8.4. Industry mining

There are three deposits of sand and gravel on the Slupsk Shoal. There is no information about carrying out any work in these areas. The potential work will not significantly increase noise levels during the construction of the BII OWF. Sand mining in a Natura 2000 habitat area is also extremely unlikely.

9.1.8.5. Shipping

There is a lot of traffic in the Baltic area. Many ships pass near the project area. Noise generated by ship traffic is continuous and its levels are much lower than those generated by pulsating piling. However, the degree of noise impact on the BII offshore wind farm area is medium and is not expected to be significantly increased as a result of traffic associated with the construction of other farms.

9.2. Stage operation

During the operation of the BIII offshore wind farm, among other things, maintenance work will be carried out in its area, affecting the seabed and seawater. Among other things, their effect will be a slight disturbance of the sludge structure, causing further release of pollutants and nutrients from the sludge. In addition, the occurrence of minor oil spills during the normal operation of ships or the release of antifouling substances from their hulls is to be expected (cf. Abiotic Environmental Impact Assessment, Volume IV Section 2 of the EIA).

A full description of the work during the operation stage is provided in Section 5 of Volume 2 of the EIA.

Marine mammals will be impacted at the operational stage primarily by foundation structures that will occupy part of the seabed. During the operation of the OWF, their colonization by benthic organisms and the formation of an "artificial reef" will occur, creating favorable conditions for development, especially fish eggs and larvae. This, in turn, could lead to an enriched food base for marine mammals.

The following impacts of OWF BIII on marine mammals are expected to occur at the operational stage:

1) noise and vibration emissions caused by operating power plants,
2) noise and vibration emissions caused by ships,
3) collisions with ships,
4) the creation of an "artificial reef."
5) electromagnetic field and radiation emissions,
6) visual effects.

The detailed impact of these factors on marine mammals is discussed in Chapter 7. Potential impacts of offshore wind farms.

There may also be unplanned impacts during the operation of the farm, particularly pollution of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the operation of the farm, which may indirectly affect marine mammals.

Unplanned impacts are assessed in Chapter 11.

9.2.1. Noise and vibration emissions caused by operating power plants

Noise during the operational phase of the OWF will be much less than during construction. However, it should be taken into account that it will be generated continuously for a long period - potentially more than 20 years.

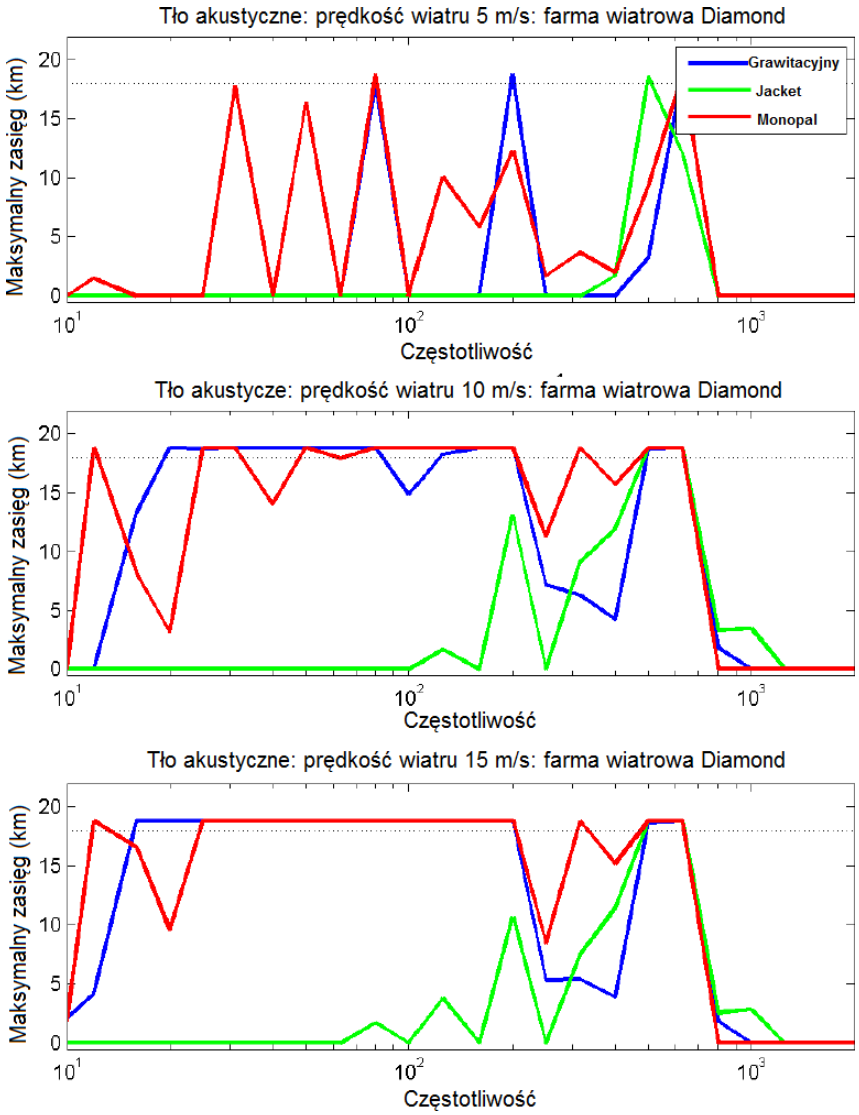
Knowledge of noise emissions prior to 2006 was summarized by Madsen and others (2006) and Thomsen and others (2006b). Both studies suggest that existing OWFs increase ambient noise to a very limited extent, thus having little impact on marine mammals. Later, Nedwell et al. (2007) conducted comprehensive measurements on several OWFs in the UK (piles ranging from 4 m to 4.7 m in diameter) - North Hoyle, Scroby Sands, Kentish Flats and Barrow. The authors concluded that the noise level emitted from the operation of the OWF is very low. No evidence was found to indicate that marine mammals are avoiding the OWF area. It was discovered that the environment in the OWF area is 2 dB louder for fish and at the same level for mammals as the surrounding areas. This type of fluctuation is no different from that normally encountered by animals during their typical activities and migrations (Nedwell et al. 2007).

The impact assessment for the project in the parameters approved by the Environmental Decision was based on the results of the modeling for the 6 MW OWF, performed by (Marmo et al. 2013), and already described earlier, in section 7.2.1.

The figure below shows the detectability (= audibility) of the modeled wind farm project above the acoustic background. The figure shows that, depending on the type of foundation and wind speed, the noise emissions of the modeled wind farm can be heard up to 20 km from the sound source. Note that this applies to frequencies below 1 kHz, where the hearing of most marine mammals - and mainly porpoises - is not very sensitive. In addition, it should be remembered that the inclusion of background noise data from (Wenz 1962) in the modeling is a very conservative approach, as the levels reported by Wenz contain a relatively small amount of energy. In the course of the inference, it was considered that larger turbines and wind farms, such as this OWF BIII in the parameters approved in the Environmental Decision and subject to evaluation in the 2015 Report, can be heard at some distance, the relevant frequencies, however, are low and of minor importance to marine mammals.

The figures below show the maximum range of noise emitted by operating wind turbines that exceeds the background sound level. Noise is shown as a function of frequency in Hz. The dotted line marks the modeling boundary. The background sound level was determined by substituting the data of Wenz (1962) for sea states of 2, 4 and 6 bft, respectively. The number of turbines equals 16, and the water depth is 30 meters.

Figure 22. Maximum range of noise emitted by an example working wind farm (Diamond OWF)



Tło akustyczne: prędkość wiatru 5 m/s: Farma wiatrowa Diamond	Acoustic background: wind speed of 5 m/s: Diamond wind farm
Maksymalny zasięg (km)	Maximum range (km)
Częstotliwość	Frequency
Grawitacyjny	Gravity
Jackpot	Jackpot
Monopal	Monopal
Tło akustyczne: prędkość wiatru 10 m/s: Farma wiatrowa Diamond	Acoustic background: wind speed of 10 m/s: Diamond wind farm
Tło akustyczne: prędkość wiatru 15 m/s: Farma wiatrowa Diamond	Acoustic background: wind speed of 15 m/s: Diamond wind farm

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014.

Modeling results on behavioral responses show that negligible effects on seals are to be expected at best. The impact on porpoises can be classified as local, of low significance.

Noise from operating power plants will cause direct, negative impacts on marine mammals that are local in scope, long-term, low-intensity, permanent during the operating period, and irreversible.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, about 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, as a result, noise and vibration emissions will be correspondingly lower. It is considered that the Project in the updated parameters will cause an impact less than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 25. Noise from operating power plants - analysis of impacts on individual marine mammal species (operational phase, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Very low to low (cf.: section 8.2.5.)	Noise from operating power plants can cause an avoidance response in marine mammals	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Very low (cf.: section 8.2.5.)		Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014..,

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not

affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2. Noise emissions caused by vessels

The 2015 Report assumed the following power plant maintenance schedule - 2 inspections per year for a turbine, 4 turbines in one day, plus additional inspections for the entire OWF. Consequently, in the case of the most far-reaching scenario (NIS) and which forms the basis of the environmental assessment in the 2015 Report and assumes the construction of 200 power plants, the service boats would be used for 1,625 inspections during the 25-year operation of the OWF. Inspections of cables or substations should be added to this, but they will be on a much smaller scale.

The service boats will mainly emit noise at 160 - 180 dB re 1µPa @1m, in the frequency range < 1kHz - > 10 kHz. The local sound field is likely to increase during construction, part of the frequency range will be relevant to marine mammals. However, overall, noise impacts will be local and of minor significance.

Noise and vibration caused by ships during the operational stage will cause direct negative impacts on marine mammals that are local in scope, short-term, low-intensity, repeatable during the operational period, and reversible.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, and forming the basis of the impact assessment in the 2015 Report, is presented in the table below.

In the case of the proposed modifications to the parameters of the Project, the assumptions regarding the pattern of maintenance work have not changed (see Volume II Section 5), however, the number of power plants has changed significantly, which significantly affects the number of inspections.

In the updated parameters of the Project, about 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, as a result, the vessel traffic and associated noise will be correspondingly lower. It is acknowledged that the Project with the encapsulated parameters will cause an impact less than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 26. Noise from ships - analysis of impacts on individual marine mammal species (operational phase, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise (Phocoena phocoena)	Large	Very low to medium (cf.: section 8.1.5.)	Noise from ships can cause avoidance reactions or hearing impairment in marine mammals	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Very low to medium (cf.: section 8.2.5.)		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D.. Monitoring of marine mammals in the area of the offshore wind farm Central Baltic III.Final report with research results. DHI Poland, 2014..,

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.3. Collisions with ships

The 2015 Report assumed the following power plant maintenance schedule - 2 inspections per year for a turbine, 4 turbines in one day, plus additional inspections for the entire OWF. Consequently, in the case of the most far-reaching scenario (NIS) and which forms the basis of the environmental assessment in the 2015 Report and assumes the construction of 200 power plants, the service boats would be used for 1,625 inspections during the 25-year operation of the OWF. Inspections of cables or substations should be added to this, but they will be on a much smaller scale.

It is estimated that due to the low abundance of marine mammals found in the farm area during environmental surveys, as well as the relatively small number of ships expected to service the farm, there is a very low probability of collisions between porpoises or seals and ships.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

In the case of the proposed modifications to the parameters of the Project, the assumptions regarding the pattern of maintenance work have not changed (see Volume II Section 5), however, the number of power plants has changed significantly, which significantly affects the number of inspections.

In the zaktau;ized parameters of the Project, approximately 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, as a result, the movement of vessels and the associated risk of collision will be correspondingly lower. It is considered that the Project in the updated parameters will cause an impact less than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 27. Collisions with ships - analysis of impacts on individual marine mammal species (operational phase, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Low (cf.: section 8.1.5.)	Increased vessel traffic during the operational phase may pose a risk of collision to marine mammals	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Low (cf.: section 8.2.5.)		No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014.

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.4. The creation of an "artificial reef"

Benthic habitats in the farm area will be lost during the construction phase due to the foundation of the OWF, but new underwater structures will provide additional hard substrate on the seabed and in the water column. These structures will be colonized by zoobenthic communities, which can attract fish (especially bentophages). The scale of the impact will depend on the number of wind turbine foundations, their type and size. In addition, the area will see a decrease in the traffic of non-service vessels, including fishing boats, which will result in some reduction in background noise levels in the area. Thus, these changes may have an indirect positive effect on marine mammals. It seems that the "artificial reef" may become an attractive feeding ground or refuge area for them, where there is less noise, compared to very busy areas (Scheidat et al. 2011; Teilmann & Carstensen 2012).

Common and gray seals may benefit from the existence of artificial reefs, and as the wind farm is not located near seal resting areas, habitat changes are unlikely to be a significant factor of concern.

The creation of an "artificial reef" is an indirect, positive impact on marine mammals of local range, long-term, reversible, permanent, low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

In the case of the updated parameters of the BIII offshore wind farm, about 70% fewer power plants will be built than envisaged in the case of the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and about 50% fewer than in the parameters of the Project approved by the Environmental Decision. In addition, the exclusion of gravity foundations from the types of foundations suitable for elector foundation will further reduce the area of the bottom subject to transformation. Reducing the number of power plants means that the impact of the "artificial reef" on marine mammals will be correspondingly less. It is considered that the Project in the proposed tabulated parameters will cause an impact less than the NIS, and less than the Project parameters approved by the Environmental Decision. In doing so, it should be noted that the assessed impact is positive, but at the same time its significance is small or negligible.

Table 28. Creation of an "artificial reef" - analysis of the impact on individual species of marine mammals at the stage of operation (NIS)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Low (cf.: section 8.1.5.)	Destruction of benthic habitat during construction may negatively affect fish, their main food for	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small positive (magnitude of impact - insignificant, importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Low (cf.: section 8.2.5.)	marine mammals	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible positive (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014.

9.2.5. Field and radiation emissions electromagnetic

Electroreception has been noted in one dolphin species (Czech-Damal et al. 2011), but does not occur in porpoises. The ability to detect magnetic fields has not been detected in any cetaceans, although there is sometimes speculation about their navigation along electromagnetic fields (Klinowska 1986). The potential impact of the electromagnetic field generated by the power cables connecting the power plants is therefore unknown, but it is unlikely that its impact on harbor porpoises and seals in the BIII OWF area could be significant.

Field and electromagnetic radiation emissions are indirect, negative impacts on marine mammals that are local in scope, long-term, irreversible, permanent, low-intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 , which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, about 70% fewer power plants will be built than those envisaged for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and about 50% fewer than in the parameters of the Project approved by the Environmental Decision, while the length of the internal power grid will remain unchanged (at most about 200 km), so the impact on marine mammals will also remain unchanged. The significance of the impact after updating the modification of the parameters of the project should be classified analogously to the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 29. Field and electromagnetic radiation emissions - analysis of impacts on individual marine mammal species during the operational phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Very low (negligible) (cf.: section 8.1.5.)	The field and electromagnetic radiation generated during the operation of the farm could potentially affect marine mammals	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Very low (negligible) (cf.: section 8.2.5.)		Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014.

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not change in relation to the parameters of the Project approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.6. Effects visual

The foundations and turbines will change the appearance of the area where they are located, which could have an impact on porpoises and, to a greater extent, seals that use visual orientation in their living environment. However, the visual impact of the OWF should be minimal. Underwater parts of the foundations and leaching protection elements quickly become overgrown and begin to resemble a reef. In the surface section, the turbines represent quite a landscape change - but it is not known how this affects porpoises and seals underwater. The sight of porpoises over water is poor. Seals, on the other hand, have well-developed eyesight, but we don't know to what extent they are influenced by new construction.

In addition, there will be a shadow flicker effect on the sea surface. On the other hand, the stroboscopic effect will be eliminated by painting the wings of the power plant with special paints that reduce the sun's glare (this is a common solution on land farms). Moreover, it should be assumed that these

phenomena will not be significant, as porpoises and both seal species spend most of their time underwater.

Visual effects are direct, negative impacts on marine mammals that are local in scope, long-term, irreversible, permanent, low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - the 2015 NIS, which formed the basis for conducting the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, about 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, consequently, visual impacts on marine mammals will be correspondingly lower. It is considered that the Project in the updated parameters will cause an impact less than the NIS and the Project in the parameters approved by the Environmental Decision.

Table 30. Visual effects - analysis of impacts on individual marine mammal species during the operational phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Very low (negligible) (cf.: section 8.1.5.)	Operating power plants can cause strobe and shadow flicker effects that can affect marine mammals	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Low (cf.: section 8.2.5.)		Negligible (scale of exposure - local, duration - long-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014.

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.7. Impacts cumulative

Assumptions for analyses of cumulative impacts of the BIII OWF and other projects on the abiotic environment are presented in the chapter in Chapter 13 of Volume II of the EIA report.

The impact assessment carried out in the 2015 Report assumed two possible scenarios for wind farm development in the POM for cumulative impact analyses, which were cited at the beginning of Section 9.1.8 above.

Compared to the assumptions of the scenarios adopted in the 2015 Report, the timing of all planned projects has changed, and they have all been delayed.

The BIII offshore wind farm in the tabulated parameters assumes the construction of 60 wind power plants, which is 50% of the number of plants envisaged by the Environmental Decision and 30% of those evaluated under the NIS. Thus, the planned modifications to the conditions of implementation and operation of the Project contribute to reducing the total potential cumulative impacts. On the other hand, the environmental decision proceedings conducted to date after the issuance of the Environmental Decision confirm the possibility of implementing the planned projects, taking into account the potential accumulation of impacts.

Consequently, it should be concluded that the impacts caused by the implementation of the Project in the parameters considered in the scenarios forming the basis of the analyses adopted in the 2015 Report will not increase if the Project is implemented in the proposed modified parameters. On the other hand, the environmental decision proceedings conducted to date after the issuance of the Environmental Decision confirm the possibility of implementing the planned projects, taking into account the potential accumulation of impacts.

Analyzing the various impacts within a single project, it can be concluded that different project elements can affect the background noise level in the area. This mainly applies to ships used in the operational stage. However, due to the relatively low volume of sound generated, any impact will be local and generally negligible.

Noise and vibration will occur if several projects are operated simultaneously. With the operation of the wind farms coming one after the other (taking into account the BSIII OWF, Baltica OWF, FEW Baltic II, Baltic Power), this will lead to further low-frequency sound emissions, audible at a distance of several kilometers. However, again, due to the fact of low-frequency emissions, the impact of the acoustic field relevant to marine mammals is expected to be moderate at most. Vessel traffic in neighboring areas will also increase, with an increased risk of collisions and emergency oil spills. There are heavily used shipping routes near the farm, including the Traffic Separation Scheme (TSS), so the risk of oil spills will increase. However, this type of impact is described in the chapter on potential cumulation of unplanned impacts (Chapter 11.6.). Noise generated by ship traffic is continuous and of much lower intensity than noise generated by piling. Hence, the existing ship traffic is not expected to cause a significant increase in noise profiles generated by the operation of OWF BIII. It is also possible that noise generated from drilling will result in an increase in the background noise levels created by the operation of OWF BII. However, the noise associated with the wells is relatively small, hence the increase in sound levels will only be local and will not cause a significant impact on the total acoustic dose (see Genesis 2011).

In conclusion, it should be stated that the actulization of the Project's paramentals will not affect the assessment of the cumulative impact on marine mammals in relation to the assessment carried out for OWF BIII in the 2015 Report in the parameters approved by the Environmental Decision. This is because the impacts at the stage of the farm's operation are very limited in scope, and the planned modifications to the Project lead to a reduction in the impacts caused by the Project that may be cumulative with those caused by other projects.

9.3. Stage decommissioning

At the decommissioning stage, as at the OWF construction stage, there are negative impacts in the form of noise and vibration, an increase in the concentration of suspended solids in the water-depth, the possibility of toxic substances entering the water from sediments or due to leakage during the implementation of the works, and habitat alteration (removal of the "artificial reef").

According to the assumptions, the decommissioning of the farm will take place after about 20 years of operation at the earliest. It should be taken into account that during this period there will be significant technological advances and it will be possible to avoid drastic interference with the environment, thus minimizing the negative effects of the decommissioning of the farm on marine mammals.

Analysis of this impact is hampered by the lack of experience in this type of project due to the early stage of offshore wind development, as well as the impossibility of predicting what technologies will be available twenty or more years down the road, when farm dismantling is carried out (OSPAR 2008). Therefore, the assessment of the impact of decommissioning factors is largely in the nature of a precautionary approach, assuming impacts like those of OWF construction.

We know from similar oil and gas platform projects that dismantling may require the use of explosives (e.g., Santos et al. 2010). However, the technical concept of the BIII OWF (Royal Haskoning 2014) shows that the use of explosives is not currently planned.

In general, the decommissioning phase may include, in particular, activities such as drilling and cutting (due to the need to remove some farm components installed in the seabed) and ship traffic (intensity and type of ships similar to the construction phase) (Royal Haskoning 2014). No information is available on underwater noise levels associated with cutting. Drilling will create low-frequency noise, similar to the sound generated by ship traffic. Therefore, the impact will be limited to minor behavioral responses, with no TTS or injury.

An analysis of the different types of offshore wind farm impacts on marine mammals at the decommissioning stage is presented in Chapter 9.1. (on the construction stage). It was assumed that the medium-term impact of the project during the construction and decommissioning phases would be similar in the case of noise emissions from ships, collisions between mammals and ships, an increase in the concentration of suspended solids in water, the release of pollutants and nutrients from the sediment into the water depths and the destruction of benthic habitats. Specific impacts of the decommissioning stage include noise from drilling and cutting of structures.

A full description of the decommissioning work can be found in Section 6 of Volume II of the EIA.

The following impacts on marine mammals are expected to occur at the decommissioning stage of OWF BIII:

1) noise emissions caused by ships,
2) noise emissions associated with drilling and cutting of structural components,
3) collisions with ships,
4) an increase in the concentration of suspended solids in water,
5) the release of pollutants and nutrients from the sediment into the water body,
6) elimination of the "artificial reef".

There may also be unplanned impacts during the decommissioning of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,
2) antifouling agents,
3) accidentally released municipal waste or domestic sewage,
4) accidentally released chemicals and waste from the construction of the farm, which may indirectly affect marine mammals.

Unplanned impacts are assessed in Chapter 11.

9.3.1. Noise emissions caused by vessels

With regard to ship traffic, the information presented in detail in the description of impacts during the construction phase can be repeated here. As in the construction stage, small and medium-sized ships emit sounds of 160-180 dB re 1µPa @1 m; in the frequency range < 1kHz - > 10 kHz. It is likely that their use will result in an increase in the local sound field during decommissioning work, covering frequencies partially relevant to marine mammals.

Noise emissions associated with ship traffic during the decommissioning of the farm are a direct, negative impact on marine mammals that is local in scope, short-term, reversible, permanent during the decommissioning period, and of low intensity.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which forms the basis of the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, about 50% fewer power plants will be decommissioned than envisaged in the Project parameters approved by the Environmental Decision, and 70% fewer than in the set of Project parameters representing the most far-reaching scenario - NIS 2015. Updating the parameters of the project will not affect noise levels, relative to that resulting from the parameters of the Project approved by the Environmental Decision, while the duration of impact will be proportionally shorter in the variant selected for implementation. It is considered that the Project in the updated parameters will cause an impact less than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 31. Noise emissions from ships - analysis of impacts on individual marine mammal species during decommissioning (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Very low to medium (cf.: section 8.1.4.)	Noise from ships can cause avoidance reactions in marine mammals	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Very low to low (cf.: section 8.2.4.)		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014.

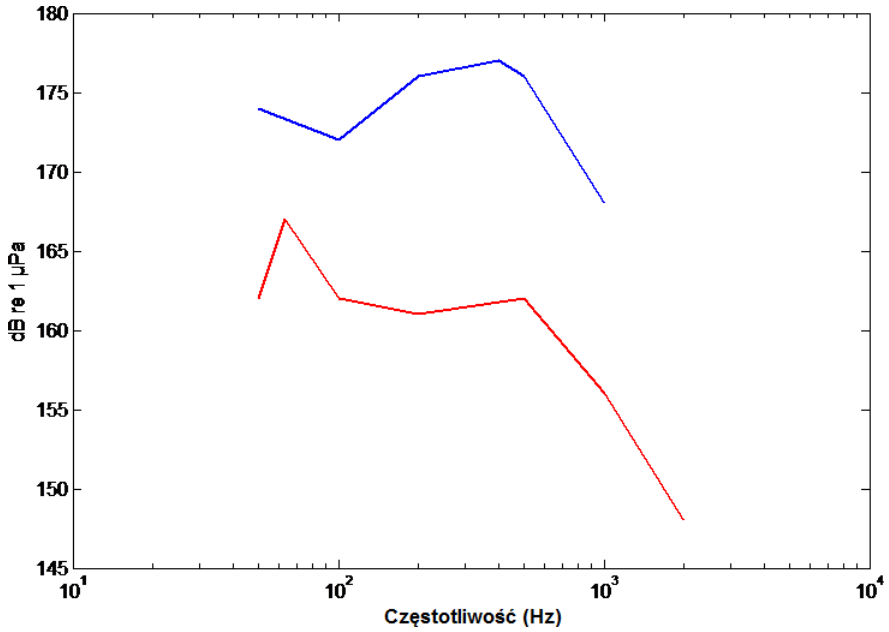
In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained

9.3.2. Noise emissions associated with drilling and cutting of structural components farms

Since there is a lack of information on the sound generated by cutting structural components, the focus was on the noise emitted by drilling from drill ships and jack-up rigs.

The noise generated by drilling largely depends on the rig used for this purpose. Drilling vessels generate the highest noise levels, while the noise generated during the operation of bottom-floored jack-up rigs is lower, both in terms of sound level and the range of frequencies generated (<1.2 kHz; Richardson et al. 1995). The noise generated by the two drilling vessels is shown in the figure below, and should be considered as the most far-fetched scenario of noise generated during drilling, as the sound intensity levels are unlikely to exceed the values presented. The energy of the noise emitted by the units is contained mainly at frequencies below 1 kHz, and any impact on the background sound level will be related to low-frequency sound. In fact, the noise generated during drilling will locally add value to the background sound level, which is currently dominated by sounds emitted by ships anyway.

Figure 23. Sound levels at source for two different vessels used for drilling in 1/3 octave bands



dB re 1µPa	dB re 1µPa
Częstotliwość	Frequency

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014, modified from (Richardson et al. 1995).

Noise emissions associated with the drilling and cutting of the farm's structural components are a direct, negative impact on marine mammals that is local in scope, short-term, reversible, permanent during the decommissioning period, and of low intensity.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which forms the basis of the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, about 50% fewer power plants will be decommissioned than envisaged in the Project parameters approved by the Environmental Decision, and 70% fewer than in the set of Project parameters representing the most far-reaching scenario - NIS 2015. Updating the parameters of the Project will not affect noise levels, relative to that resulting from the parameters of the Project approved by the Environmental Decision, while the duration of impact will be proportionally shorter. It is considered that the Project in the updated parameters will cause an impact less than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 32. Noise emissions associated with drilling and cutting elements of the farm structure - analysis of the impact on individual species of marine mammals during the decommissioning phase (NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Very low (negligible) to low (cf.: section 8.1.6.)	Decommissioning of power plants may involve with the need to drill and cut elements of the farm structure, which will generate noise and affect marine mammals	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Very low (negligible) to low (cf.: section 8.2.6.)		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014.

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.3. Impacts cumulative

Cumulative noise impacts are to be expected if other OWFs are dismantled simultaneously with the demolition of OWF BIII. This is an extremely unlikely situation. If such a situation occurs, the noise level will be increased (cf: Section 9.1.1) - another source of low-frequency noise will arrive, which can be detected from several kilometers away. However, the impact on marine mammals will remain negligible due to the low frequency.

10. Impacts related

Associated impacts are understood as the cumulation of all impacts affecting a given receptor, in this case marine mammals. The purpose of assessing associated impacts is to verify whether impacts that individually do not have a significant impact on the environment, when linked together, will not ultimately become a source of significant negative impact. This is because in such a situation it proves necessary to apply additional measures aimed at minimizing such impact.

There are a number of other factors affecting marine mammals. Abiotic elements will change due to the construction and operation of the OWF, but the indirect impact on marine mammals is likely to be negligible. Many other receptors (including human activities) will be reduced, some may even have beneficial effects on animals. Changes in hydrology, changes in the seafloor, and changes in sediment can affect the foraging behavior of marine mammals. However, the impact of the construction and operation of the OWF will be insignificant. This report discusses in detail the changes in the acoustic environment and their indirect effects on three species of marine mammals.

Trophic relationships between marine mammals and fish and benthos may be the primary element of receptor-associated interactions . On the one hand, fish (and indirectly mammals) will be affected by the negative impact exerted on benthic organisms during the construction of the farm (physical destruction of benthos, its habitats, negative impact related to the dispersion of suspended solids, etc.).on the other hand - a positive impact will be exerted by the benthos colonization of the OWF BIII foundation structure during its exploitation (the "artificial reef" effect), which will create good conditions for the development of fish eggs and larvae (and, consequently, a better feeding ground for marine mammals).

Fish (and the marine mammals that feed on them) will also be positively affected by the restriction of fishing activities in the area of the farm (e.g., the possibility of using only selected fishing methods, defining the maximum distance at which the power plant can be approached, etc.). This will reduce bycatch and reduce noise levels somewhat. The project area will therefore become more attractive to marine mammals, especially porpoises (Scheidat et al. 2011). The construction of the OWF may also result in a reduction in military activities (including airborne), which will reduce the extent of negative impacts on seals and porpoises. Navigation will also be restricted in the BIII offshore wind farm area (e.g., by indicating the maximum size of vessels that can pass through it) which therefore means a further reduction in the level of additional noise in the marine mammal habitat. It should also be noted that it is very unlikely that any other activity will take place in the BIII OWF area, such as mining or bottom dredging.

Impacts on benthos and fish are presented in Sections 3 and 4 of Volume IV of the EIA, respectively.

Marine mammals produce a variety of sounds and thus can affect the acoustic environment (reviewed in Richardson et al. 1995). However, since the surveys carried out in the BIII OWF area clearly indicate that all three species (harbor porpoise, gray seal and common seal) occur within the project area in small numbers, their impact on the acoustic background in the area of the farm will be minimal, and any changes in their distribution due to construction or operation will not change the sound level of the underwater background. Theoretically, the impact of marine mammals on tourism is also possible, although their abundance in the project area is too low to warrant any tourism activities related to their observation.

In order to identify potential related impacts, the relationship between resources/receptors (receptors) was verified. A matrix with the results of this analysis is shown in the table below.

Along the vertical axis are plotted the first category receptors, which are potential sources of impacts on the receptors listed on the horizontal axis (second category). The category analyzed here is highlighted in color. "X" indicates the existence of a potential direct relationship between specific receptors, which should be analyzed in detail in the impact assessment.

The table shows that marine mammals affect a limited number of receptors. They listed the main impacts and then considered how the analyzed changes in other receptors might affect marine mammals.

The proposed change in the parameters of the project in relation to those approved by the Environmental Decision does not affect the formation and nature of associated impacts.

Table 33. Receptor interaction matrix

	Hydrology and	Seabed	Sediments	Mineral resources	Acoustic environment	Atmosphere	Bentos	Fish	Marine mammals	Birds	Bats	Fishing	Shipping and navigation	Military operations	Military aviation	Civil aviation	Radar systems	Landscape	Tourism and recreation	Material goods	Maritime industry	Health and life of people	Cultural heritage
Hydrology and hydrochemistry									x														
Seabed									x														
Sediments									x														
Mineral resources																							
Acoustic environment									x														
Atmosphere																							
Bentos									x														
Fish									x														
Marine mammals					x			x											x				
Birds																							
Bats																							
Fishing									x														
Shipping and navigation									X														
Military operations									x														
Military aviation									x														
Civil aviation																							

	Hydrology and	Seabed	Sediments	Mineral resources	Acoustic environment	Atmosphere	Bentos	Fish	Marine mammals	Birds	Bats	Fishing	Shipping and navigation	Military operations	Military aviation	Civil aviation	Radar systems	Landscape	Tourism and recreation	Material goods	Maritime industry	Health and life of people	Cultural heritage
Radar systems																							
Landscape																							
Tourism and recreation									x														
Material goods																							
Maritime industry									x														
Health and life of people																							
Cultural heritage																							

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014.

11. Impacts unplanned

Unplanned impacts result from sudden unplanned events or failures that are not related to activities included in the project schedule (e.g., leakage of toxic substances into the water due to a collision between two vessels).

In assessing the significance of unplanned impacts, additional factors were taken into account, i.e. the probability of an event that will be the source of the impact and its potential consequences.

Based on data from other OWF projects and from similar projects, the following potential **unplanned events** that could become a source of **unplanned environmental impacts of offshore wind farms** were selected **:**

- leakage of petroleum substances as a result of a collision, accident or construction disaster (during normal operation or in an emergency),
- accidental release of municipal waste or domestic sewage,
- accidental release of construction materials or chemicals,
- contamination of the water tone and bottom sediments with antifouling agents,
- noise emissions associated with unexploded conventional weapons explosions.

It should be noted that as a result of unplanned events, the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. On the other hand, indirectly, these events can also affect living organisms that inhabit or otherwise use the seabed, the water table and the sea surface.

Compared to the 2015 Report, the non-smaller report has been supplemented with impacts related to noise emissions associated with explosions of unexploded conventional weapons. Since the 2015 Report, knowledge of both unexploded POM conventional weapons and the potential impacts associated with their disposal has increased.

A full description of potential unplanned events can be found in Section 12 of Volume II. In contrast, indirect impacts of unplanned events on marine mammals are assessed below, based on this description.

11.1. Spill of petroleum substances (during normal operation of the vessels)

During normal ship operation, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) can occur.

They may contribute slightly to the deterioration of water quality. Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. There they can be bound by bottom sediments. However, due to the nature of the sediments in the BIII offshore wind farm area (small amount of organic matter and low content of fine fractions), they will not cause any noticeable deterioration in their quality. It should be assumed that these spills will be small (stage I), up to 20^{m3}. Visible traces of such contamination under favorable conditions can disappear spontaneously due to evaporation and dispersion in the water. The size of these spills will be practically limited to the OWF area.

The contamination of sediments with petroleum substances is independent of the type of foundation used. It will be more noticeable in areas with fine-grained sediments, which have a greater capacity to absorb petroleum substances.

As a primary minimization measure, it is recommended that vessels be supplied with means to deal with minor oil spills. Mitigation activities are described in more detail in Section 12 of Volume II of the EIA.

The impact on marine mammals of a small amount of petroleum substances released into the sea during normal ship operations is assessed as an indirect, negative, local in scope, temporary or short-term, reversible, repeatable, low-intensity impact.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which forms the basis of the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, approximately 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, which also entails the use of a correspondingly smaller number of vessels for project implementation, operation or decommissioning. Thus, the number of potential leaks will decrease proportionally.

Consequently, this allows us to conclude that the Project in the updated parameters will cause an impact less than the NIS and the Project in the parameters approved by the Environmental Decision.

Table 34. Spill of small amounts of petroleum substances during normal ship operations - analysis of impacts on individual marine mammal species (any stage, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	-	During the normal operation of ships, a small leakage of oil substances may occur	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	-		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.2. Spill of petroleum substances (in an emergency situation emergency)

During the construction, operation or decommissioning of the farm, leakage of petroleum substances may occur, resulting in pollution of the water table and bottom sediments. A spill can occur as a result of a shipwreck or collision, a construction disaster at one of the farm's facilities, or during maintenance work. In the event of a collision or collision between ships, a Grade III spill, i.e. over 50^{m3}, can be expected.

It has been calculated that the probability of serious accidents is very low, on the order of $^{10-5}$ - $^{10-4}$. For the Southeast Baltic, which may include the BIII offshore wind farm area, the risk of collision was estimated at 1 case per 1060 years. The significance of this impact can be considered negligible, as the unplanned impacts described are extremely rare and practically impossible. In this case, there are organizational structures, plans of conduct in carrying out actions to combat hazards and pollution, and effective methods of cleaning up pollution.

However, if an oil spill were to occur in the area of OWF BIII during its construction, 24 hours after the accident at a probable wind direction distribution for the Southern Baltic of 3oB, its extent would cover the eastern slope of Slupsk Shoal (Pawelec et al. 2014), threatening not only the benthic organisms of the farm area, but the Slupsk Shoal Natura 2000 area, which protects, among other things, the habitat of marine clam beds and many species of macroalgae. In the best-case scenario (calm sea), oil splashes will not threaten the benthos, but only groups of organisms living in the water's depths. During a storm, the dispersion of the oil spill will contaminate the food chain in the area of the failure (Malaczynski and Czarnecki 2010).

The impact on marine mammals of more petroleum substances released into the sea during an accident or collision is assessed as **an indirect, negative, regional in scope, short-term, reversible, repeatable, medium intensity** impact.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which forms the basis of the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, approximately 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, which also entails the use of a correspondingly smaller number of vessels for project implementation, operation or decommissioning. Thus, the number of potential leaks will decrease proportionally. Consequently, this allows us to conclude that the Project in the updated parameters will cause an impact lower than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 35. Spill of more petroleum substances during an accident or collision - analysis of impacts on individual marine mammal species (any stage, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	The rationale for impact assessments	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	-	In emergency situations, a larger spill of petroleum substances may occur	Negligible (scale of exposure - regional, duration - short-term, intensity - medium)	Small (magnitude of impact - insignificant, importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	The rationale for impact assessments	Magnitude of impact	The significance of the impact
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	-		Negligible (scale of exposure - regional, duration - short-term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.3. Accidental release of municipal waste or wastewater domestic

During the construction of the wind farm, waste, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage, will be generated on vessels as well as at the construction facilities located on land (at the port serving the project). Their expected types of quantities, as well as how they will be handled, are presented in Section 10 of Volume II of the EIA. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident, causing a local increase in nutrient concentrations and deterioration of water and sediment quality, and indirectly negatively affecting fish and the marine mammals that feed on them. However, the pollutants should quickly disperse, so they will not contribute to permanent deterioration of the environment in the project area.

As a minimizing measure, it is recommended to create procedures related to waste and wastewater handling.

The impact on marine mammals of a small amount of municipal waste or domestic sewage accidentally released into the sea is assessed as indirect, negative, local in scope, short-term, reversible, repetitive, low intensity.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which forms the basis of the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, approximately 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015,

which also entails the use of a correspondingly smaller number of vessels for project implementation, operation or decommissioning. Thus, the number of potential leaks will decrease proportionally. Consequently, this allows us to conclude that the Project in the updated parameters will cause an impact lower than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 36. Accidental release of municipal waste or domestic sewage into the sea - analysis of impacts on individual marine mammal species (any stage, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	-	During the construction, operation or decommissioning of the farm, a small amount of municipal waste or domestic sewage may be accidentally released into the sea	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	-		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts remains unchanged and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.4. Accidental release of chemicals and waste from construction, operation or decommissioning of the farm

During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that about $5^{m3\ of}$ product could sink during handling. Grouts, mortars and other binders often contain hazardous substances. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 $^{g\text{-}cm\text{-}1}$, they sink and are deposited on the bottom. These substances are considered a serious threat because they cannot be easily removed from the bottom and are toxic to marine organisms.

During the operation of the farm, maintenance of its facilities will be carried out. Accidental release of small amounts of waste or operating fluids into the sea cannot be ruled out.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out this work (cf. description of the decommissioning stage), and the greatest contamination may occur if gravity foundations have to be crushed.

Each of these impacts can negatively affect marine mammals. The anticipated types and quantities of waste are presented in Section 10 of Volume II of the EIA.

For this type of investment like an OWF, a detailed plan is generally developed to address risks and pollution arising during construction, operation and decommissioning of the OWF, which develops minimization measures and how to deal with such events. It is recommended that such procedures be created as a minimization measure.

The impact on marine mammals of chemicals and waste from the construction, operation or decommissioning of the farm is assessed as indirect, negative, local in scope, short-term, reversible or irreversible, repetitive, low intensity.

If the project is implemented under the updated parameters, about 70% fewer power plants will be built than envisioned in the set of parameters for the Project representing the most far-reaching scenario - the 2015 NIS, and about 50% fewer than the parameters for the Project approved by the Environmental Decision. Thus, the potential possibility of releasing waste or chemicals into the water will decrease proportionally. Consequently, this allows us to conclude that the Project in the updated parameters will cause significantly lower impacts than the 2015 NIS, and than the Project in the parameters approved by the Environmental Decision.

Table 37. Accidental release of chemicals and waste into the sea from the construction, operation or decommissioning of a farm - analysis of impacts on individual marine mammal species (any stage, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	-	During the construction, operation or decommissioning of the farm, there may be accidental release of waste associated with the process into the sea, and at any stage of the project there may be accidental release of various types of chemicals	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	-		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.5. Contamination of water depths and bottom sediments with agents antifouling

To protect the hulls of ships from overgrowth, biocides are used, which may include, for example, copper compounds, mercury compounds, organotin compounds (such as tributyltin - TBT). These substances can pass into the water's depths and eventually be retained in the sediment. It should be assumed that the emission of these compounds will be limited by dilution in the water depths. Of the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. TBT (the most harmful substance) is currently banned in antifouling paints, but the presence of these compounds in older units cannot be ruled out.

As a minimizing measure, it is recommended that vessels whose hulls have not been coated with TBT-containing antifouling paint be used at any stage of the project. This will eliminate this most harmful impact on aquatic organisms.

The impact on marine mammals of antifouling agents is assessed as indirect, negative, local in scope, temporary or short-term, reversible or irreversible, repetitive, low intensity.

An assessment of the significance of this impact for the set of parameters of the Project constituting the most far-reaching scenario - the 2015 NIS, which forms the basis of the impact assessment in the 2015 Report, is presented in the table below.

In the updated parameters of the Project, approximately 50% fewer power plants will be built than envisaged in the parameters of the Project approved by the Environmental Decision, and 70% fewer than in the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, which also entails the use of a correspondingly smaller number of vessels for project implementation, operation or decommissioning. Thus, the possibility of releasing antifouling substances will decrease proportionally. Consequently, this allows us to conclude that the Project in the updated parameters will cause an impact lower than the 2015 NIS and the Project in the parameters approved by the Environmental Decision.

Table 38. Accidental release of antifouling agents into the sea - analysis of impacts on individual marine mammal species (any stage, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	-	During the normal operation of ships, the release of antifouling substances from their hulls may occur	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	-		Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

In view of the above, it should be considered that both the nature of the impacts does not change and their scope and magnitude are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the conditions for implementation and operation of the

Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.6. Impacts associated with noise emissions during detonation of unexploded ordnance - UXO

If UXO decommissioning proves necessary, such activities could affect marine mammals at the individual level. This is because the detonation of conventional weapons residues will be a source of underwater noise and vibration emissions. The handling of UXO and the likelihood of such an event are described in more detail in Volume II Section 12 of the report.

The scale and scope of impacts associated with a possible detonation will vary with the size of the detonated charge, but will not exceed the regional scale. These will be high-intensity but temporary impacts. The effect of noise emissions during detonations can, in extreme cases, cause damage to marine mammals and permanently shift the hearing threshold (PTS) of individuals that would be in the immediate vicinity of the blast site. The maximum zones of potential impact in the form of permanent and temporary shifts in the hearing threshold for seals and porpoise resulting from noise emissions associated with controlled detonation of unexploded munitions are presented in the table below.

Table 39. Limiting distances from the source of the UXO explosion relative to the thresholds of sensitivity of fish and marine mammals to underwater noise impacts

Detonation of unexploded ordnance		Threshold value	150 kg TNT		950 kg TNT	
			Summer	Winter	Summer	Winter
Receptors	Impact	SEL (Cum*) [dB re $^{1\mu Pa2s}$]	[km]	[km]	[km]	[km]
Seals and porpoises	PTS	179 dB	4.0	3.4	6.5	5.6
	TTS	164 dB	13.9	12.8	18.7	17.4

Source: SMDI/Ramboll 2019

The impact on marine mammals in the form of permanent body damage and/or permanent hearing damage will be a high impact that can be considered significant, due to the irreversibility of the effects and, in the case of the porpoise, also due to its protected status.

Table 40. UXO explosions - an analysis of the significance of the impact on marine mammals

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	Large	The probability of occurrence is low, but the potential effects can be significant for	High (scale of exposure - local, duration - temporary, intensity - very high)	Large (magnitude of impact - high, importance of the resource - high)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	Average	individuals (injury, death, TTS)	High (scale of exposure - local, duration - temporary, intensity - very high)	Large (magnitude of impact - high, importance of the resource - medium)

Hounding

In the event that unexploded munitions are detected on the seabed in the area of the farm and it is not possible to bypass them or extract them and bring them ashore for destruction, it is expedient to use marine mammal scaring devices before the start of bottom-clearing operations by controlled explosion by the competent services. The range and effectiveness of such devices depend on the type of device and its settings, and should be tailored to the range of potential impacts, which will depend on the size of the explosive charge and the location and time of year of the detonation. Studies of the effectiveness of such devices, done by the Danish Energy Agency's Center for Environment and Energy, indicate an effective range of between 350m and 7,500m. At a distance of 350 m, all animals were successfully spooked, most at a distance of 1-2 km, and the maximum response was recorded at a distance of 7.5 km (Hermannsen et al., 2015). These are distances that avoid the occurrence of the PTS effect in porpoises, with the explosion of even the largest unexploded munitions found in Polish marine areas.

Observations

Video monitoring of the occurrence of marine mammals during the period of preparation and implementation of seabed clearing operations from unexploded munitions will help reduce the risk of possible PTS impacts if, in the event that marine mammals are recorded in the zone of potential impact, the operation is halted until the individuals in question are present in the zone. Observations should be conducted from appropriate observation platforms on ships, according to JNCC guidelines (JNCC, 2017).

In the 2015 Report, unplanned impacts caused by noise emissions associated with unexploded conventional weapons explosions were not shaded. Nevertheless, knowledge of both unexploded conventional weapons in the POM and the potential impacts associated with their disposal has increased since the 2015 Report. Also, the advancement of the preparation of the BIII OWF project has made it possible to complete information on potential impacts.

It should be emphasized, however, that in the case of impacts related to noise resulting from the detonation of conventional weapons residues, there is a very low risk of such an event, in addition, taking into account the frequency of marine mammals in the part of the Baltic Sea where the planned Project is located, even less risk is associated with the possibility of impact due to the lack of receptors. In the end, the introduction of the minimization measures proposed above makes it possible to conclude that, once applied, the significance of the impact is low or negligible. It should also be taken into account

that the proposed modifications to the Project will not affect either the nature or magnitude of impacts related to noise emissions during the detonation of unexploded ordnance.

11.7. Cumulative impacts in emergency situations emergencies

The only unplanned impact that may be cumulative will be potential oil spills resulting from a disaster or collision.

In the case of simultaneous operation of several projects, vessel traffic in neighboring areas also increases, with an increased risk of such an event. In the vicinity of the farm is a heavily used shipping route (Traffic Separation Scheme TSS), in the area of which there is an increased risk of oil spills.

Table 41. Emergency cumulative impacts - analysis of impacts on individual marine mammal species (any stage, NIS 2015)

Species	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Porpoise *(Phocoena phocoena)*	Large	-	In emergency situations, a larger spill of petroleum substances may occur	Negligible (scale of exposure - regional, duration - short-term, intensity - medium)	Small (magnitude of impact - insignificant, importance of the resource - high)
Common seal *(Phoca vitulina)* and gray seal *(Halichoerus grypus)*	Medium	-		Negligible (scale of exposure - regional, duration - short-term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Updating the parameters of the project in relation to those approved by the Environmental Decision does not affect the formation and nature of cumulative impacts in emergency situations.

12. Assessment of the impact on the integrity, coherence and object of protection of Natura sites 2000

This chapter analyzes the potential for the BIII OWF, singly and in cumulation with other projects, to affect the integrity, coherence and object of protection of Natura 2000 areas as a result of impacts on

marine mammals. The assessment was performed in accordance with the methodology described in Section 5 of Volume I, para. 4.3.13.

12.1. Initial assessment - screening

Pre-assessment is the process by which the project's likely impacts on Natura 2000 sites are identified (either singly or in conjunction with other projects or plans) and an analysis is made of whether the anticipated impacts are likely to have a significant effect on these sites.

The result of the screening for each Natura 2000 site will be one of the following statements:

1) can be objectively concluded that no significant impacts on marine mammals are expected, or
2) the information gathered suggests that there may be a significant impact or uncertainty remains, as a result of which a proper assessment should be carried out.

12.1.1. Zone of potential impacts of the OWF BIII

In order to determine the zone of impact of the BIII OWF on marine mammals, and thus on Natura 2000 areas where marine mammals may be protected, a number of different criteria were used, the most relevant of which for marine mammals is the distance at which noise impacts them (cf.: Chapter 9). The distance at which porpoises and seals are likely to react negatively has been set at 46 km. As a precautionary measure, given the potential for daily movement of marine mammals, the reconnaissance process included Natura 2000 areas within a 100-kilometer radius, which include the aforementioned marine mammals on the list of protected species.

12.1.2. Natura 2000 areas in the impact zone of the OWF BIII

In Poland there are 4 areas within which porpoises are protected (Ostoja Słowińska, Ostoja na Zatoce Pomorskiej, Wolin and Uznam, Zatoka Pucka and Hel Peninsula). Six such areas have been designated for grey seals (Kashubian Cliffs, Ostoja Słowińska, Ostoja w ujściu Wisły, Wolin and Uznam, Zalew Wiślany and Mierzeja Wiślana, Zatoka Pucka and Półwysep Helski)[2]. In other Baltic countries, there are no special habitat protection areas protecting harbor porpoise, gray or common seals that would simultaneously be within the impact range of OWF BIII.

The table below summarizes the Natura 2000 areas relevant to this assessment, as they are located in the zone of potential impacts, along with information on their size and shortest distance from the OWF.

There is one Natura 2000 site in the vicinity of the project area, and two more a little further away - in all of which the aforementioned marine mammals are protected. One area is fully maritime, and another is partly maritime and partly land. There are no Natura 2000 sites in the project area. All the areas discussed here belong to Poland.

With regard to porpoises and seals, it should be taken into account that they are not migratory species, but use a certain area for their functioning. The extent of the area may vary, but there are no migrations between feeding and breeding areas, as in other marine mammal species. Hence, little connection

[2] Source: search engine for Natura 2000 sites http://natura2000.gdos.gov.pl/datafiles (Access date: 04.2022 r.)

between individual Natura 2000 sites is to be expected, which would require a Natura 2000 impact assessment (see, for example, Dietz 2003; Teilmann et al. 2008).

Information on Natura 2000 sites was based on Standard Data Forms (SDFs).

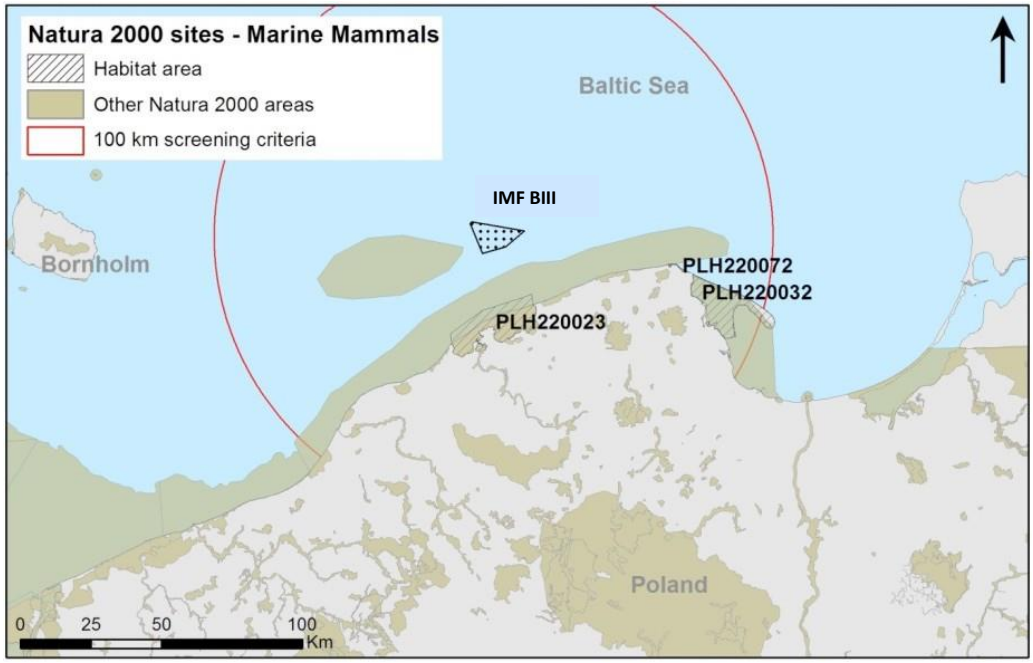
Table 42. Natura 2000 areas within the range of impact of OWF BIII on marine mammals - basic data

Natura 2000 area (code)	Name of the area	Sea / land	Area (km^2)	Average distance from IMF BIII
PLH220023	Ostoja Słowińska	Sea / land	322	19*
PLH220032	Puck Bay and Hel Peninsula	Sea / land	266	53*
PLH220072	Kashubian Cliffs	Sea / land	2.33	55*

Source: Plichta I., Kosecka_M., Thomsen_F., Świątek D. Monitoring of marine mammals in the area of the offshore wind farm Baltic Central III.Final report with research results. DHI Poland, 2014

*Counting from the border of the PSZW (the furthest towards the Natura 2000 area in question), the distances to the boundaries of the Natura 2000 areas are: Ostoja Słowińska - about 19 km, Kashubian Cliffs - 55 km, Puck Bay and Hel Peninsula - about 53 km, but the foundations will be installed on the entire area of the farm, except for areas excluded from development

Figure 24. Map of Natura 2000 areas protecting marine mammals screened (distance of 100 km from the farm)



Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

12.1.3. The object of protection of Natura 2000 areas in the zone impacts

12.1.3.1. Ostoja Slowinski

The Natura 2000 area "Ostoja Słowińska" is located at a distance of about 19 km from the planned OWF BIII. It covers the coastal lakes Łebsko and Gardno, the areas located around them and the sea waters surrounding the Gardneńsko-Lebsko Spit. Its area overlaps with that of the Slowinski National Park, protecting, among other things, unique coastal barchans, bogs and swamp forests.

Ostoja Słowińska is an area of Community Importance (SCI). This is a predominantly terrestrial area, which translates into a range of protected species. The marine part runs for 33 km along the Baltic coast, occupying a strip of shallow coastal waters 3.7 km wide. The area of the entire area is 32955.3 hectares. The Łeba and Łupawa rivers drain into the Baltic Sea. The area includes mobile dunes, coastal lakes, bogs, marshes and forests. It is an important area for water migratory birds, characterized by high densities of ducks, geese and swans. Wading birds also appear in the area. The diversity of species is very high, especially on land.

The Słowińska Ostoja also partially overlaps with Ramsar site no. 757 - Slowinski National Park, as well as with a special bird protection area - Pobrzeze Slowinskie (PLB220003).

A summary of marine mammals protected in PLH220022 is provided in the table below.

Table 43. Data on marine mammals in the area PLH220023 - Ostoja Słowińska

Species Appendix II	Population				Assessment of the area			
	Settled	Migrating			% of the national population	State of preservation	Insulation	Overall assessment
		Reproductive	Overwintering	Transient				
Gray seal *(Halichoerus grypus)*				P	0-2%	Good	No1	Good
Porpoise *(Phocoena phocoena)*				P	2-15%	Good	No1	Good

[1] Population not isolated, but occurring in boundary areas for the species P=present

Source: based on SDF

A draft conservation plan has been prepared for the area in question and for the Slowinski National Park by the Director of the Slowinski National Park. A draft of this plan was put out for public review in March 2022[3]. The draft plan is available at http://planochrony.slowinskipn.pl/wp-content/uploads/2022/03/3_Projekt_rozporzadzenia_SPN.pdf.

[3] http://planochrony.slowinskipn.pl/wp-content/uploads/2022/03/1_Ogloszenie_o_wylozeniu_projektu_Planu_ochrony_SPN.pdf (Access date 04.2022)

The conservation status of the species is good. An insignificant fraction of the national gray seal population appears in the area, the area is not used by individuals of this species as a breeding area. Most likely, therefore, it has little significance for the species.

12.1.3.2. Puck Bay and Peninsula Hel Peninsula

Site of Community Importance PLH220032 (Gulf of Puck and Hel Peninsula) is located about 55 km east of OWF BIII. It covers the Hel Peninsula, the Bay of Puck and the inner part of the coast from Wladyslawowo to Mechelinki. It has a total area of 26566.43 hectares. The area is protected because of its large number of marine and terrestrial habitats, as well as the significant number of animal species found here.

The Natura 2000 marine mammals protected within this Natura 2000 area are listed in the table below.

Table 44. Data on marine mammals in the area of the Bay of Puck and Hel Peninsula

Species Appendix II	Population size				Assessment of the area			
	Settled	Migrating individuals			% of the national population	Behavioral status	Insulation	Overall assessment
		Reproductive	Overwintering	Transient				
Gray seal *(Halichoerus grypus)*				P	15-100%	Good	No1	Good
Porpoise *(Phocoena phocoena)*				P	15-100%	Good	No1	Excellent

[1] Population not isolated, but occurring in boundary areas for the species P=present

Source: based on SDF

The conservation status of both species, the harbor porpoise (Phocoena phocoena) and the gray seal (Halichoerus grypus), is good.

12.1.3.3. Kashubian Cliffs

Site of Community Importance PLH220072 (Kaszubskie Klify), located about 53 kilometers east of OWF BIII, covers a 9-kilometer stretch of cliff coastline stretching from Władysławowo to Jastrzębia Góra. The neighboring areas are mainly sandy beaches. The marine area covers 0.4 square [kilometers].

Marine mammals protected within the area are listed in the table below.

Table 45. Data on marine mammals in the Kashubian Cliffs area

Species Appendix II	Population size				Assessment of the area			
	Settled	Migrating individuals			% of the national population	Preservation status	Insulation	Overall assessment
		Hatch	Winter	Stage				
Gray seal *(Halichoerus grypus)*					<2%	Good	No1	Significant

[1] Population not isolated, but occurring in boundary areas for the species

Source: based on SDF

The conservation status of the gray seal (Halichoerus grypus) species is good.

12.1.4. Impacts of OWF BIII on the object of protection, integrity, coherence of Natura 2000 areas

Responses of porpoises to noise from jackhammers at distances of more than 46 km - TTS 26.3 km, PTS 9.4 km - have been documented.

Large-scale behavioral responses can also lead to a barrier effect if they take place over a long period of time, but only if the migration or local/regional movement of animals takes place in narrow passages. Also, noise levels that induce a temporary lowering of the hearing threshold in seals can theoretically occur within 40 km of the BII OWF boundaries.

Both gray seals and porpoises formed the basis for the designation of the Natura 2000 area Ostoja Słowowska. **Since the distance between the construction area and the Natura 2000 area of the Słowińska Ostoja Słowińska is 19 km on average, the noise level will theoretically be high enough to trigger a reaction in porpoises.** Also, noise levels that cause a temporary lowering of the hearing threshold in seals can theoretically occur at a distance of 29.7 kilometers from the borders of OWF BIII. However, the large upwelling to the south, that is, in the body of water covered by the boundaries of the Natura 2000 area Słowińska Ostoja Słowińska, stops noise propagation and does not exceed the levels that cause TTS impacts, as well as behavioral response within the boundaries of the protected area.

Similarly, the distance from OWF BIII of the Puck Bay and Hel Peninsula area creates a theoretical possibility of TTS in seals and harbor porpoise and behavioral responses in porpoises in these areas, but the results of acoustic modeling clearly showed that the peninsula protecting the bay provides a kind of barrier against sound, thus minimizing the potential impact on marine mammals in the Natura 2000 area

Depending on the methods used to protect marine waters and protect shorelines and sediment removal (dredging the bottom, driving smaller diameter piles to protect waters or protect shorelines), there is a likelihood of significant cumulative impacts of these activities with the construction of the wind farm, as they may cause disturbance to porpoises in the Natura 2000 area. This includes the construction of other wind farms either simultaneously or one after the other in relation to the BIII offshore wind farm

project. A caveat here is that the only project that may be subject to simultaneous implementation is IMF Baltica 2.

For the above reasons, the assessment carried out in the 2015 Report concluded that at the screening stage, significant impacts on marine mammals during the construction stage of the farm could not be ruled out, and consequently, noise impacts on harbor porpoises and gray seals protected within the Natura 2000 area "Ostoja Słowińska" should be properly assessed.

Large-scale behavioral responses can also lead to a barrier effect, but only when migration or local/regional movement of animals is hindered, such as in narrow passages. The situation in the BIII OWF area is different, as the behavioral impact zone is located in open water, providing movement in all directions. As the modeling of noise propagation (Section 9 Volume II of the EIA) shows, even in the absence of mitigation, a kilometer-long corridor remains between the seashore in the area of the Slovenian Refuge and the zone where the avoidance response takes place, allowing mammals to move freely.

Although the distance from the OWF BIII area of the Bay of Puck and Hel Peninsula means that the area may experience TTS in seals and behavioral responses in porpoises, the acoustic modeling results clearly showed that the peninsula protecting the bay provides a kind of barrier against sound, thus minimizing the potential impact on marine mammals in the Natura 2000 area (cf: Section 9 of Volume II of the EIA).

Therefore, it can be concluded that the significance of the impact on marine mammals protected within the Puck Bay and Hel Peninsula area will be negligible.

Due to the distance from OWF BIII of the Kashubian Cliffs area (55 km), the only possible source of interference may be underwater noise. Due to the distance from the project area, the only potential impact may be related to underwater noise. Although the area is within the potential range of TTS and masking for gray seals, acoustic modeling results indicate that the ranges of impacts will decrease rapidly in the shallow waters south of the wind farm area. Hence, most of the noise will be suppressed and the levels will be too low to result in any impact.

Therefore, it can be concluded that the significance of the impact on marine mammals protected within the Kashubian Cliffs area will be negligible.

None of the proposed changes to the conditions for implementation and operation of the Project will result in an increase in potential impacts on marine mammals, thus it is not possible that changes in the nature or magnitude of impacts on marine mammals protected within the analyzed Natura 2000 areas could occur as a result of the Project update

12.1.5. Zone of potential impacts cumulative

The impacts that may cumulate with the impacts of OWF BIII described above, caused by other projects described in Chapter 13 of Volume II of the report, will not go beyond the 100-km zone that was designated for the assessment of impacts of OWF BIII on marine mammals.

12.1.6. Natura 2000 areas in the potential range of influence of the project

No additional areas.

12.1.7. Object of protection of Natura 2000 areas in the zone of cumulation impacts

No additional areas.

12.1.8. Cumulative impacts of OWF BIII on the object of protection, integrity, coherence of Natura 2000 areas

Due to the large areas where TTS and avoidance response in marine mammals can occur, the 2015 Report conducted an analysis of the potential duration of these impacts. It was calculated that in the case of the most far-reaching scenario (NIS), the time of continuous piling could be about 3744 or about 2268 hours in the parameters of the Project approved by the Environmental Decision with (126 jacket or tripod foundations). This time does not take into account technological interruptions and those resulting from unfavorable weather conditions. If the duration of these breaks is less than 72 hours, which would allow mammals to move freely in the zone where these impacts occur, there may be an accumulation of noise from piling over time. In the most far-reaching scenario (208 foundations), which assumes 72-hour intervals between piling of successive foundations, the total time of cumulative impact is 18,648 hours (3744 hours of effective piling + 14,904 hours of intervals), i.e. about 26 months. In the variant approved by the Environmental Decision (126 foundations), this gives a total of 11,268 hours (2268 h of effective piling + 9,000 h of breaks), i.e. about 16 months. Such a long period of impact could result in a permanent, significant change in the behavior of marine mammals in its range, and thus also in the area of Ostoja Słowińska.

If the parameters of the Project are updated, both the time of continuous piling will be reduced to about 5518 h (1098 h of effective piling + 4320 h of breaks). As a result, the planned modification of the conditions for reazilization and operation of the Project contribute to reducing the potential risk of cumulative impacts and reducing them if they occur.

Depending on the methods used for coastal protection and sediment removal (e.g., dredging, driving smaller diameter piles), there is the potential for cumulative impacts caused by these activities and the OWF construction work. The impact is on porpoises in the Natura 2000 area Ostoja Słowińska. The same is true in the case of simultaneous construction of more than one OWF or construction of several OWFs in consecutive periods. Cumulative impacts can lead to long-term or even permanent avoidance of an area by porpoises. It is also possible for TTS to occur as a result of cumulative noise caused by a series of jackhammer blows.

In the case of the Puck Bay and Hel Peninsula area, the main threat factors could be pollution, uncontrolled tourist activities and recreational development. The use of sand from the Puck Bay for beach stabilization and restoration along the Hel Peninsula may also be a threat. The possible construction of other OWFs, in particular the Baltica 3 OWF, will also be significant. However, due to the existence of the aforementioned land barrier, there will be no cumulative impact from the BIII OWF and other projects.

There may be cumulative impacts in the Kashubian Cliffs area due to the construction of other OWFs, oil and gas extraction (drilling operations), laying of pipelines, mining operations and transportation. All these activities may lead to a local increase in ambient noise levels, which will, however, be insignificant.

Due to the very weak sound propagation in shallow waters, there will be no cumulative impact on the Kashubian Cliffs area caused by OWF BIII and other projects combined.

12.1.9. Results of the evaluation preliminary

In conclusion, at the screening stage, a significant impact of OWF BIII on marine mammals protected in the Ostoja Słowińska PLH220023 area during the construction process and a significant impact on the integrity of the area cannot be excluded.

A significant impact on the coherence of the Natura 2000 network can also not be ruled out, by creating a medium-term barrier to the movement of marine mammals between the areas of Ostoja Słowińska and Zatoka Pucka. It is therefore necessary to conduct a proper assessment.

It is estimated that the significance of the impact of OWF BIII on marine mammals protected in the PLH220032 - Zatoka Pucka and Hel Peninsula and PLH220072 Kaszubskie Klify areas will be negligible. A proper assessment is not required.

12.2. A proper assessment of the Natura 2000

This section describes the process of assessing the proper impact of OWF BIII on the integrity, coherence and object of protection of the Natura 2000 area "Ostoja Słowińska". This process is carried out when the screening concludes that there is a likelihood of significant impacts or the information obtained leaves too much ambiguity (which means that it is not possible to exclude impacts).

A proper assessment is an evaluation of the impact of a project or plan on the integrity of a Natura 2000 site - either individually or in combination with other projects or plans. The assessment is conducted for marine mammals and the structure of the areas, their functions and conservation objectives.

12.2.1. Targets and conservation status of vulnerable species impacts

The overall goal for Natura 2000 sites is to maintain or restore the favorable conservation status of habitats and species protected within the site. Both the gray seal and the harbor porpoise are found only fleetingly in the area of Ostoja Słowowska. An important goal for the protection of these species in the Slovene Refuge, therefore, is to ensure that marine mammals can move freely through the area and stay there periodically. To ensure that this objective is not significantly disturbed, the impacts of OWF BIII, alone and in combination with other projects, must not, at any stage of construction, operation and decommissioning, cause permanent and irreversible displacement of seals and harbor porpoise from the area or create a permanent and irreversible barrier to movement within the area (significant impact on the integrity of the area), as well as between areas protecting these species (network cohesion).

12.2.2. Potential impacts significant

The BIII OWF area is located at an average distance of 19 kilometers from the Ostoja Słowińska Natura 2000 area. The only impact of the farm, which may reach such a range, is noise from piling foundations. Therefore, for the purpose of assessing whether it may cause behavioral responses, TTS or PTS in harbor porpoises and gray seals residing in the Natura 2000 area Ostoja Słowińska, an analysis of sound dispersion maps was conducted - Chapter 9 of the ROOŚ Volume.

Single blows of a jackhammer will not permanently and irreversibly affect the integrity and cohesion of the Słowińska Ostoja Słowińska area. They will also not cause loss of health and proper behavior of

marine mammals. Instead, they can cause behavioral reactions in porpoises in the form of dislodging from the area.

In some cases (e.g., during pile driving in the southern part of the OWF area, i.e., the closest to the aforementioned area), impacts may occur, causing behavioral reactions in the Natura 2000 area and displacement of marine mammals. However, only a small percentage of animals would be affected, and its significance is described as negligible.

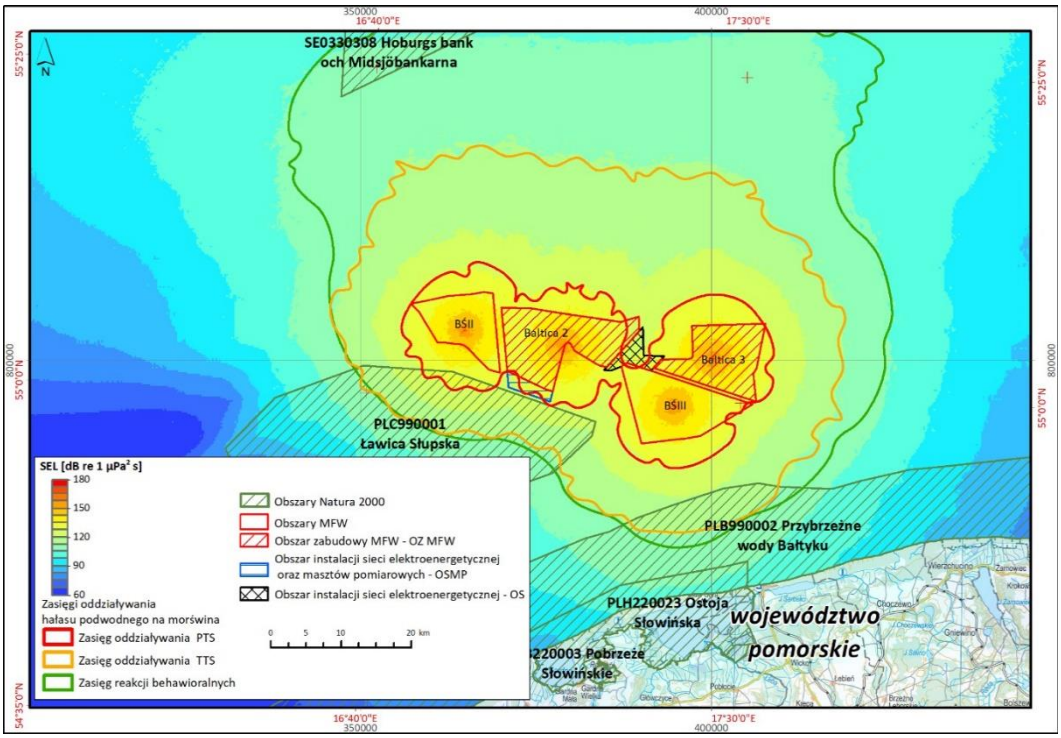
It is possible that the analyzed Natura 2000 area could be a place for gray seals to come ashore and rest, between feeding periods. The impact of underwater noise in this case will not occur. Impacts can occur when seals move to their feeding areas, which can be quite far away (Edrén et al. 2010). Porpoises are likely to leave the area for the duration of construction activities if the level of noise exposure is high enough to induce such a behavioral change. The coherence of the Natura 2000 area will not be disturbed, permanently and irreversibly, but due to the relatively long duration of the construction period, it is difficult to say without a doubt that porpoises and seals will return to the area after construction, especially since there may be cumulative impacts from the construction of subsequent OWF projects in subsequent periods.

The impact of potential cumulative impacts on Natura 2000 was assessed for cumulative impacts within OWF BIII and cumulative impacts of OWF BIII and MWF Baltica 3 (see section 9.1.8.).

In the case of parallel work at the two BIII OWF sites, the impact range for the hammer series will increase, but the TTS and PTS range for porpoise will be outside the Natura 2000 area.

Analogous results are provided by a parallel case analysis of ongoing work in other areas of the OWF located to the west and and north of OWF BIII. Analyses conducted for the environmental impact assessment for the Baltica 2 and Baltica 3 projects show that noise-related impacts from piling for concurrent works in BIII and Baltica 2 or Balitca 3 do not result in a situation where the extent of TTS and behavioral responses for both harbor porpoise and seals would reach the boundary of the Natura 2000 area Ostoja Słowińska - see figures below. Projects to the east of OWF BIII, i.e.. The Baltic Power OWF and MWF C-Wind will not cause cumulative impacts due to their different construction times.

Figure 25. Range of underwater noise impacts on porpoise cumulative for Baltic offshore wind farm and other offshore wind farms (SEL from single impact for two simultaneous pilings - weighted by HF-NMFS function, 2016)

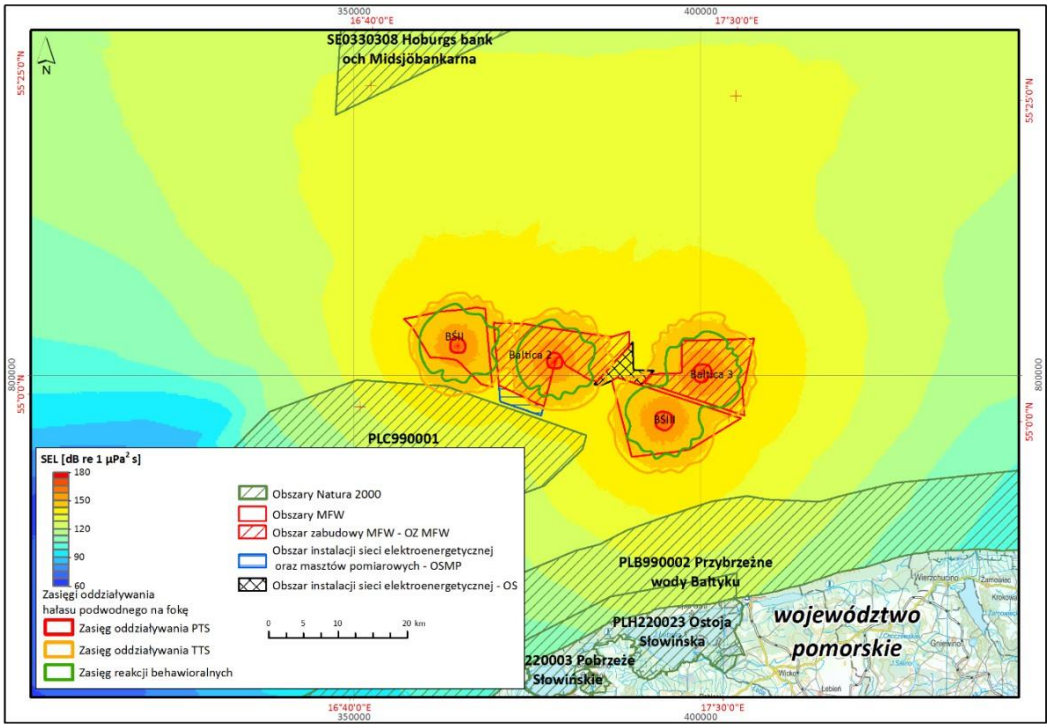


Ławica Słupska	Slupsk Shoal
Przybrzeżne wody Bałtyku	Coastal waters of the Baltic Sea
Ostoja Słowińska	Ostoja Słowińska
Pobrzeże Słowińskie	Pobrzeże Słowińskie
województwo pomorskie	pomeranian voivodship
SEL [dB re 1 µPa² s)	SEL [dB re 1 $^{\mu Pa2}$ s)
Zasięgi oddziaływania hałasu podwodnego na morświna	Ranges of impact of underwater noise on porpoise
Zasięg oddziaływania PTS	PTS outreach
Zasięg oddziaływania TTS	TTS's range of impact
Zasięg reakcji behawioralnych	Range of behavioral responses
Obszary Natura 2000	Natura 2000 areas
Obszary MFW	IMF areas
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych – OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej - OS	Power grid installation area - OS
BŚII	
BŚIII	
Baltica 2	
Baltica 3	

TTS and PTS impact ranges for $_{SELcum}$

Source: MIG/MEWO 2017

Figure 26. Range of cumulative underwater noise impacts on seals for Baltic offshore wind farm and other offshore wind farms (SEL from single impact for two simultaneous pilings - weighted by PW function -NMFS, 2016)



Przybrzeżne wody Bałtyku	Coastal waters of the Baltic Sea
Ostoja Słowińska	Ostoja Słowińska
Pobrzeże Słowińskie	Pobrzeże Słowińskie
województwo pomorskie	pomeranian voivodship
SEL [dB re 1 µPa² s)	SEL [dB re 1 µPa2 s)
Zasięgi oddziaływania hałasu podwodnego na fokę	The ranges of the impact of underwater noise on the seal
Zasięg oddziaływania PTS	PTS outreach
Zasięg oddziaływania TTS	TTS's range of impact
Zasięg reakcji behawioralnych	Range of behavioral responses
Obszary Natura 2000	Natura 2000 areas
Obszary MFW	IMF areas
Obszar zabudowy MFW – OZ MFW	OWF development area - OWF OZ
Obszar instalacji sieci elektroenergetycznej oraz masztów pomiarowych – OSMP	Area of installation of power grid and metering masts - OSMP
Obszar instalacji sieci elektroenergetycznej - OS	Power grid installation area - OS
BŚII	WBII
BŚIII	WBIII
Baltica 2	Baltica 2
Baltica 3	Baltica 3

TTS and PTS impact ranges for $_{SELcum}$

Source: MIG/MEWO 2017

Due to the large areas where TTS and avoidance response can occur in marine mammals, the 2015 Report also conducted an analysis of the potential duration of these impacts.

As indicated in Section 9.1.8.3 above, the time for continuous piling can be 3708 hours for the NIS (206 foundations) or 2268 hours for the Project under the parameters approved by the Environmental

Decision (126 foundations). This time does not take into account technological interruptions and those resulting from unfavorable weather conditions.

As indicated earlier, (Brandt et al. 2011) found that porpoises can exhibit a behavioral response for up to 72 hours after the cessation of piling.

According to the analyses conducted in the 2015 Report, if the duration of technological breaks is shorter than 72 hours, which would allow free movement of mammals in the zone of occurrence of these impacts, piling noise may accumulate over time. In the most far-reaching scenario (208 foundations), which assumes 72-hour gaps between piling of successive foundations, the total time of cumulative impact is about 18,648 hours (3744h of effective piling + 14,904h of gaps), i.e. about 26 months. For the Project in the parameters approved by the Environmental Decision (126 foundations), this gives a total of 11,340 hours (2268 h of effective piling + 9,000 h of breaks), i.e. about 16 months. For the proposed modifications to the parameters of the project, the total cumulative impact time is 5418 h (1098 h of effective piling + 4320 h of interruption), i.e. about 7.5 months.

The 2015 Report stated that such a long period of impact could result in a permanent, significant change in the behavior of marine mammals in its range, and thus a permanent or long-term disruption to the integrity of the Slovianska Ostoja Słowińska area. However, it was stressed that, as the pre-investment monitoring showed, the study area is not a permanent location for marine mammals, but is a place for their periodic movement. The main effect of piling on over time could therefore be a barrier effect. However, according to the noise propagation modeling performed, even in the most far-reaching scenario without mitigation, a multi-mile corridor remains between the seashore and the zone where the avoidance response occurs, allowing mammals to move freely in the east-west direction.

Noise from the operational OWF and increased marine traffic during the construction and operation phases will not have a negative impact on marine mammals, protected under the Natura 2000 network.

The conclusion of the analyses of cumulative impacts in the 2015 Report was that it cannot be unequivocally ruled out that the BII OWF, without the application of minimizing measures, in combination with other projects, may cause significant impacts on the integrity and cohesion of the Ostoja Słowińska area, in the form of long-term, multi-seasonal displacement of harbor porpoise and gray seals from the area as a result of noise emissions during the piling of foundations, as well as the cohesion of the areas, causing a barrier to the movement of porpoises and seals in east-west directions between the Natura 2000 areas of which they are the subject of protection, nevertheless it should be emphasized that the proposed modification of the parameters of the project significantly reduces the risk of this type of impact.

It should be emphasized that if the parameters of the Project are updated, both the time of continuous piling will be reduced to about 1098 hours, as well as the time including breaks between piling of successive foundations, to about 5418 h (1098 h of effective piling + 4320 h of breaks).

Consequently, the proposed changes to the conditions for implementation and operation of the Project contribute to reducing the potential risk of cumulative impacts and reducing them if they occur.

12.2.3. Actions minimizing

The Environmental Decision imposed obligations to mitigate impacts related to the spread of noise from piling foundations. Condition II.1.A.(1) of the Environmental Decision obliges to design and apply technical solutions in the form of an air curtain or other technology, minimizing the impact of underwater noise on fish and marine mammals, guaranteeing the reduction of its level, so that on the border of the nearest Natura 2000 area, which protects marine mammals, i.e., the area is protected by the Natura 2000 site. SÅ'owiÅ"ska refuge PLH220023, was no greater than 171 dB re 1 $^{\mu Pa2s}$(SEL, in water). However, due to a change in the thresholds adopted as guidelines for determining impacts on marine mammals, it is proposed to amend this condition of the Environmental Decision to take into account the different sensitivity characteristics for porpoise and seals. Consequently, it is proposed to establish the boundary sizes necessary to be maintained at the boundary of the nearest Natura 2000 area protecting marine mammals, i.e. Ostoj Słowińskiej PLH220023 at 140 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the VHF function [a weighting function for cetaceans with high sensitivity to very high frequency sounds] for porpoise, and 170 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the PVC function [a weighting function for seals] for seals.

The application of measures in accordance with the above condition ensures that there will be no behavioral response of porpoises in the Natura 2000 area.

An additional condition limiting the possibility of a long-term barrier effect is the minimizing action of properly organizing the construction process so as not to conduct continuous (with breaks of less than 72 hours) piling for more than a few months. Interruptions of the right length can result not only from deliberate planning of the work (e.g., technical interruptions needed to deliver more foundations from the construction port), but also from unsuitable weather conditions in which construction work is impossible. During these breaks, marine mammals will be able to move freely in the zone of potential behavioral impacts.

It is necessary to ensure that the construction process is properly organized so that there is a break in the piling process of not less than 4 days once every two months, and these breaks may also be due to weather conditions;

Use a procedure for gradually starting piling (soft start).

The proposed modifications to the project lead to a reduction in the magnitude of impacts of a number of their types, and at the same time reduce the risk of cumulative impacts, at the same time they do not affect the conditions for implementation of the Project specified in the Environmental Decision, and introduced due to limitations on the impact of the Project on marine mammals. The subject of this report is also not a change in these conditions.

12.2.4. The result of the assessment appropriate

The result of the assessment of the proper impact on Natura 2000 areas should be an unambiguous answer to the question of whether, after the application of minimizing measures, the BIII OWF, alone or in cumulation with other projects, will significantly affect the integrity, coherence or subject of protection of Natura 2000 areas.

After analyzing the possible impacts that the assessed project may cause, alone and in cumulation with other projects, it should be concluded that after applying minimizing measures, in the form of:

- limit the spread of underwater noise during foundation installation by using appropriate technology, such as air/bubble curtain,
- proper organization of the construction process, ensuring that no less than once every two months there is a break in the piling process of not less than 4 days, and these breaks may also result from weather conditions.

The conclusion of the 2015 Report and the Environmental Decision was that the BIII OWF, in the parameters approved by the Environmental Decision, will not have a significant impact on the integrity, coherence and marine mammals under protection of the Natura 2000 area Ostoja Słowińska. The proposed changes in the conditions of reazliliation and operation of the Project not only do not exceed the magnitude of impacts or change the nature of impacts of the Project assessed in the course of the environmental impact assessment conducted as part of the proceedings concluded in the course of obtaining the Environmental Decision, but result in a reduction in a number of impacts, thus concluding that the Project, as a result of updating the parameters, will also not significantly affect the integrity, integrity and marine mammals of the Natura 2000 area Ostoja Słowińska.

13. Impacts transboundary

According to the assessment conducted in the 2015 Report, in the most far-reaching scenario, (NIS) construction noise from the BIII offshore wind farm area can be heard in parts of the exclusive economic zones of Denmark, Sweden, Lithuania, Latvia and Russia. However, it will not significantly exceed the background level. TTS, PTS and behavioral impacts will therefore not rally outside the Polish EEZ.

The project will also not have a significant impact on the populations of seals or porpoises, individuals of which occur periodically in the Polish marine areas. Porpoises have a so-called opportunistic approach to foraging and travel long distances in pursuit of food (Koschinski 2002). Individuals observed at the BIII offshore wind farm are likely to move throughout the Baltic Sea, and the project area is only part of their route. The exclusion of this area during periods of greatest disturbance may cause a change in routes and foraging habits, but will not be significant at the population level.

Common seals probably roam the BIII OWF area very sporadically, as the abundance of this species in this part of the Baltic Sea is very low. The gray seals in the Baltic Proper can be classified as a single population (cf. Section 8.2.2 above), and the range of impacts is not large enough to affect the separate population living around the Gulf of Bothnia.

Possible UXO explosions associated with bottom cleaning prior to construction activities should be treated as unplanned activities with a low probability of occurrence. However, even if they occur, the extent of noise impacts will not exceed the boundary of the Polish EEZ (see Volume II Chapter 9).

Update The projects in none of the types of impacts cause a change in their nature or magnitude. Thus, it should be considered that the proposed modifications will not cause the possibility of transboundary impacts during the construction, operation and decommissioning stages of the farm.

14. Proposal monitoring

The proposed changes to the conditions for implementation and operation of the Project do not affect the conditions for monitoring specified in the Environmental Decision. The conditions and rules for conducting mammal monitoring are specified in the Environmental Decision in section 2.a (indent 3 - pages 11 and 12 of the DSU) at the stage of construction of OWF BIII and (indent 9 - page 13 of the DSU) at the stage of operation of OWF BIII. The subject of this report is also not a change in these conditions.

15. Summary and conclusions

A summary of the assessment results is presented in the tables below.

It is not expected that there will be a significant negative impact on the integrity, coherence and object of protection of Natura 2000 areas, protecting marine mammals, after the application of minimizing measures, in the form of:

- reducing the spread of underwater noise during foundation installation through the use of appropriate technology, such as bubble curtain,
- proper organization of the construction process, ensuring that there is a break in the piling process at least once every two months, not less than 4 days, and these breaks may also result from weather conditions.

Due to the distances to EEZs of other countries (the nearest one, the EEZ of Sweden, is about 30 km away) and the mostly local scale of impacts, it is not expected that OWF BIII could cause transboundary impacts on marine mammals, either alone or in cumulation. The condition is the use of measures to mitigate noise from foundation piling.

The most important cumulative impacts on marine mammals that may occur during the various stages of the project are noise from piling. Noise mitigation measures are recommended.

The use of technical solutions to limit the spread of noise from piling will significantly reduce the distance at which mammalian hearing impairments (temporary hearing threshold shift - TTS or permanent hearing threshold shift - PTS) or behavioral responses (e.g., escape) can occur in porpoise, seals and fish.

For the purpose of mitigating the impact of noise, one of the most common methods of preventing the spread of noise has been proposed, i.e. the use of an equal type of air curtains (bubble curtains). Air curtains, in simple terms, are systems that consist of a compressor and perforated tubes connected to it, releasing small air bubbles near the bottom. The bubbles, rising toward the surface, provide a block to the sound spreading around the driven pile.

A solution that was taken into account in the analyses for the environmental impact assessment of OWF BIII as a design measure to reduce the spread of underwater noise is the placement of a so-called air (bubble) curtain around the driven pile, reducing the noise level from piling by about 11-14 dB.

It should be noted that if no minimization measure is applied during the piling of the foundations of OWF BIII, within the range of potential noise impact in the form of a temporary shift in the hearing

threshold (TTS) in marine mammals is the Natura 2000 area Ostoja Słowińska (about 19 km to the south), which protects, among others, the harbor porpoise and the sea shark.

A proper assessment carried out for the Natura 2000 site Ostoja Słowińska confirmed the validity of the recommendation that technical mitigation measures be used during piling to reduce noise levels from piling.

Thus, as indicated earlier, it is recommended that at the boundary of the Natura 2000 area Ostoja Słowińska underwater noise levels should not exceed the value at which a temporary shift of the hearing threshold (TTS) could occur in marine mammals protected in the area, i.e.:

for porpoise - 140 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the VHF function [a weighting function for cetaceans with high sensitivity to very high frequency sounds according to Southall et al. 2019],

with respect to the greyhound - 170 dB re 1 $^{\mu Pa2s}$SELcum and weighted by the PVC function [a weighting function for seals according to Southall et al. 2019];

The results of the proper assessment indicated the need to reduce the possibility of a long-term barrier effect associated with the months-long process of installing the foundations, which could cause a permanent, significant change in the behavior of marine mammals in its range, and thus a permanent or long-term disruption of the integrity of the Słowińska Refuge area. Accordingly, in addition to the need for technical mitigation solutions (e.g., air curtains), it was recommended that an interruption in the piling process of no less than 4 days once every two months be maintained, and this interruption may also be due to weather conditions.

With the application of the above-mentioned minimization measures, it is concluded that there is no possibility of significant impacts on the integrity, coherence and object of protection of Natura 2000 areas due to the impacts of OWF BIII on marine mammals.

The use of technical mitigation solutions further ensures that there will be no transboundary impacts during piling. The minimum distance of the BIII OWF to the border of the Exclusive Economic Zone (EEZ) of Sweden is about 52 km, to Denmark - 57 km, to Russia - 104 km and to Germany - 170 km. The use of a technical solution, such as bubble curtains, will keep the ranges of impacts on marine organisms due to noise propagation within the Polish EEZ.

Finally, it was recommended that a gradual piling start procedure (soft start) be used, which will deter marine mammals and fish from the construction area and prevent significant hearing damage to these animals that could occur if they were in the immediate vicinity of the installed foundation.

Potentially the most significant unplanned impact could be noise associated with UXO explosions. If it is necessary to use the method of cleaning the bottom from UXOs through their controlled detonation, minimization measures should be applied in the form of observing the presence of porpoises and seals immediately prior to the planned detonation, and if mammals are found in the zone of potential impacts - halting cleaning activities for the duration of the mammals' presence and using deterrents to drive the mammals out of the impact zone.

Updating the parameters of the Project does not affect the results of the assessment conducted as part of the proceedings during which the Environmental Decision was issued.

15.1. Porpoise

Table 46. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the porpoise - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Noise emissions caused by foundation pile driving	Large	Use of mitigation measures, such as air curtains / bubble curtains, to reduce noise levels Use of construction breaks - 4 days once every two months	Insignificant (after application of mitigating measures)	Small (after application of mitigating measures)	No impact
Noise emissions caused by dredging the bottom		No	Insignificant	Small	Reducing the impact
Noise emissions caused by ships		No	Insignificant	Small	Reducing the impact
Collisions with ships		No	No change	No change	Reducing the impact
Increase in the concentration of suspended solids in water		No	Insignificant	Small	Significant reduction in impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Small	Significant reduction in impact

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Destruction of benthic habitats		No	Insignificant	Small	Significant reduction in impact

Source: own materials

Table 47. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the porpoise - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Noise emissions from operating power plants	Large	No	Insignificant	Small	Reducing the impact
Noise emissions from ships		No	Insignificant	Small	Reducing the impact
Collisions with ships		No	No change	No change	Reducing the impact
The creation of an "artificial reef"		No	Insignificant	Small Positive	Reducing the impact
Emission of electromagnetic fields and radiation		No	Insignificant	Small	No impact
Visual effects		No	Insignificant	Small	Reducing the impact

Source: own materials

Table 48. Assessment of the impact of the update of the Project on the results of the assessment of the impact of OWF BIII on the porpoise - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Noise emissions associated with drilling and cutting structures	Large	No	Insignificant	Small	Reducing the impact
Noise emissions from ships		No	Insignificant	Small	Reducing the impact
Collisions with ships		No	No change	No change	Reducing the impact
Increase in the concentration of suspended solids in water		No	Insignificant	Small	Significant reduction in impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Small	Significant reduction in impact
Elimination of the "artificial reef"		No	Insignificant	Small	Reducing the impact

Source: own materials

15.2. Gray seal and seal common

Table 49. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the gray seal and common seal - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Noise emissions caused by foundation pile driving	Medium	Use of mitigation measures, such as air curtains / bubble curtains, to reduce noise levels	Insignificant to moderate (after application of mitigating measures)	Negligible to small (after application of mitigating measures)	No impact
Noise emissions caused by dredging the bottom		No	Insignificant	Skip	Reducing the impact
Noise emissions from ships		No	Insignificant	Skip	Reducing the impact
Collisions with ships		No	No change	No change	Reducing the impact
Increase in the concentration of suspended solids in water		No	Insignificant	Skip	Significant reduction in impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Skip	Significant reduction in impact
Destruction of benthic habitats		No	Insignificant	Skip	Significant reduction in impact

Source: own materials

Table 50. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the gray seal and common seal - operation stage

	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Noise emissions from operating power plants	Large	No	Insignificant	Skip	Reducing the impact
Noise emissions from ships		No	Insignificant	Skip	Reducing the impact
Collisions with ships		No	No change	No change	Reducing the impact
The creation of an "artificial reef"		No	Insignificant	Negligible positive	Reducing the impact
Emission of electromagnetic fields and radiation		No	Insignificant	Skip	No impact
Visual effects		No	Insignificant	Skip	Reducing the impact

Source: own materials

Table 51. Assessment of the impact of the Project update on the results of the assessment of the impact of OWF BIII on the grey seal and common seal - decommissioning phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Noise emissions associated with drilling and cutting structures	Large	No	Insignificant	Skip	Reducing the impact
Noise emissions from ships		No	Insignificant	Skip	Reducing the impact

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Collisions with ships		No	No change	No change	Reducing the impact
Increase in the concentration of suspended solids in water		No	Insignificant	Skip	Significant reduction in impact
Release of pollutants and nutrients from the sludge into the water body		No	Insignificant	Skip	Significant reduction in impact
Elimination of the "artificial reef"		No	Insignificant	Skip	Reducing the impact

Source: own materials

16. Shortcomings in technology and gaps in modern knowledge

The noise impact assessment performed in this chapter of the EIA is subject to a degree of uncertainty, particularly regarding the construction phase. Pile driving generates broadband noise, but most of the acoustic energy is in the low frequency band (< 1 kHz). There is no indication that TTS at this frequency can affect porpoises' ability to use echolocation (main frequencies around 130 kHz) during navigation and foraging. Potential impacts may include the ability to spot boats generating low-frequency noise. However, most ships emit noise below 1 kHz, and porpoises' hearing is poor at this frequency. Thus, it is difficult to assess the biological significance of TTS in this case, although it is considered a transient physical injury (Kastelein et al. 2012a).

It was pointed out that the range of impact for a series of jackhammer blows would be greater than for single blows. However, given the uncertainty of the criteria associated with the series of jackhammer blows and the anecdotal validity of the underlying assumptions, the ranges in this case were not clearly defined. For example, acoustic modeling has applied best practices in assessing cumulative noise exposure over a 1-hour period. It is not clear whether such a criterion is sufficient, especially since porpoises (and other marine mammals) avoid areas of increased acoustic activity, leading to changes in the level of perceived sound doses.

With regard to porpoises, the extent of behavioral impacts during construction was determined to be very high. The 140 SEL criterion is unweighted, meaning that broadband sound levels do not take into

account the detection properties of porpoises. Since the pile-driving process generates mostly low-frequency noise, it is outside the best hearing range of porpoises. At a distance of several tens of kilometers, the frequencies at which porpoises have the most sensitive hearing will be attenuated more than the lower frequencies in sound. So although the total energy may remain significant at a distance of 90 km, the energy affecting the behavior of porpoises will not be as strong. The extent of the behavioral impact on the porpoise, therefore, is a matter of debate.

Long-term impacts in the form of displacement of porpoises from the IMF basin are also uncertain. In some cases, porpoises returned (or new animals appeared in the area) to the OWF area shortly after construction was completed (Tougaard et al. 2006; Scheidat et al. 2011). In contrast, in the case of the Nysted IMF, animals may return to its basin reluctantly or have been permanently displaced from it (Teilmann & Carstensen 2012).

In the case of seals, the range of impacts for a series of jackhammer strikes increases dramatically, but as with porpoises, the assessment criteria for a series of strikes are subject to uncertainty due to the small amount of data available and the very small number of individuals. In addition, it was taken into account that NOAA is currently reviewing the TTS and PTS criteria for pinnipeds. The ranges of cumulative noise impacts are therefore still speculative.

However, regardless of these uncertainties, most experts now agree that impacts associated with underwater noise generated by OWFs can significantly affect marine mammals. Appropriate minimization measures can effectively reduce the impact. These measures are constantly being improved in terms of quality and price.

17. Literature and other sources

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 7

Assessment of impact on bats

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Abbreviations and definitions

Barotrauma	Pressure injury, physical damage to body tissues caused by differential pressure
Chiropterofauna	Bats
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
DSIV	Habitats Directive, Annex IV
EEZ	Exclusive Economic Zone (Exclusive Economic Zone)
GDOŚ	General Directorate of Environmental Protection
IPW	Internal connection infrastructure
IPZ	External connection infrastructure
LC	Least Concern - protection status under the IUCN Red List of Threatened Species
IMF	Offshore wind farm
IMF Baltica 2	Baltica 2 offshore wind farm
IMF Baltica 3	Offshore wind farm Baltica 3
IMF BII	Offshore wind farm OWF Baltic II
OWF BIII/Project	Bałtyk Środkowy III Offshore Wind Farm
Migration	Usual seasonal and regular movement of animals (individuals, herds or entire populations) over various distances
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
EIA	Environmental impact assessment
POM	Polish maritime areas
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
TSS	Traffic Separation Scheme

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of updating the conditions for implementation and operation of the Project - OWF BIII, for which the Environmental Decision was issued, on bats is included in Section 5.7 of Volume VII of the Report.

2. Introduction

This section of the Report assesses the potential impacts of changing and updating the conditions for implementation and operation of the Project - OWF BIII on bats.

The assessment was based on the characteristics of the occurrence of bats in the BIII OWF area (Volume III Section 11) and the characteristics of the Project and the disturbances and emissions it will cause (Volume II).

The basic characterization of the chiropterofauna, in terms of susceptibility and sensitivity to the impacts of the Project, is presented in Section 8 of this document.

3. Description of the planned project

3.1. Basic parameters of the project

The parameters of the BIII OWF that are relevant to the assessment of the impact on bats are:

- farm location;
- area of the farm - total and buildable;
- power plants and other farm facilities located over water - number, total height of power plants, diameter and area swept by rotors, clearance between the sea surface and the lower position of the wing.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.2. Projects whose impacts may cumulate with those of the OWF BII on bats

Projects and activities that may cause cumulative impacts with those of OWF BIII are presented and characterized in Volume II, Section 13 of the Report. The remainder of this section assesses the cumulative impact on bats during the construction, operation and decommissioning phases of OWF BIII.

4. Existing pressures anthropogenic

There are currently no anthropogenic pressures affecting chiropterofauna in the study area. However, certain pressures can be mentioned, affecting the entire environment of the study area.

Among the most important is shipping traffic. The Baltic Sea is one of the world's most crowded bodies of water. It provides a link between the Baltics and the rest of the world, thus enabling the constant

movement of commercial ships, ferries, passenger ships and recreational vessels. The analysis of the intensity of vessel traffic in the area of OWF BIII showed that the area of the planned farm is not intensively used by ships, and the main traffic took place south of the boundaries of the area covered by the PSZW, which is related to the establishment in this area in 2010 by the International Maritime Organization (IMO) of the Traffic Separation Scheme - Slupsk Shoal, and east and north of the OWF where the customary shipping route for tankers and large bulk ships passes, designated for the largest commercial ships and for tankers. The full characteristics of ship traffic in the area of the planned BIII OWF and its zone of potential impacts are presented in Chapter 14 of Volume III of the Report.

Anthropogenic pressures from commercial fishing should be considered insignificant, due to the low fishery productivity of the region located within the planned offshore wind farm, which was more than 80% lower than the average productivity of the Polish Baltic Sea zone in 2009 - 2013 (Kuzebski, 2014 - Volume III Section 13 of the report). Between 2015 and 2020, it accounted for about 3.1% to about 7.9% (from about 116 $^{kg/km2}$ in 2020 to about 302 $^{kg/km2}$ in 2016) of the productivity observed in the POM. The average fishery productivity in fishing squares M7, M8, N7, N8 for 2015-2020 was about 215 $^{kg/km2}$ (which accounted for about 5.4% of POM productivity).

Due to the expiration of the exploration and exploration licenses in the Baltic Sea and the oil and gas licenses for fields B3, B4, B6 and B8 (Lotos 2013) and the non-issuance of new licenses in the areas in question, exploration and exploration does not currently represent additional pressure.

No other offshore activities were observed, i.e.: nature conservation areas, cultural heritage areas (exploration of wrecks of special archaeological interest), resource extraction areas, areas of military operations, munitions dumping sites, anchorages, flailing sites, scientific activities that currently affect the environmental element that is the subject of this analysis.

5. Description of anticipated effects on the environment if the project is not undertaken project

This chapter analyzes the effects on bats if the project is not undertaken. In doing so, three scenarios were considered:

- offshore wind energy will not be developed in the Polish maritime areas, so neither the BIII offshore wind farm project under evaluation nor similar projects, including the mining industry, will be implemented,
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented,
- polish maritime areas will not be invested in offshore wind energy, but the mining industry is developing.

The results of the analyses are shown in the following table (Table 1).

Table 1. Effects on bats if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy will not be developed	No activities related to the construction, operation or decommissioning of offshore wind farms preclude impacts on the bat population. The study area will remain unchanged and will continue to be used as before.

Lp.	Script	Environmental implications
2.	Offshore wind energy will be developed, but OWF BII will not be implemented	In the event that the BIII OWF is not built, but other wind farms are built in neighboring locations as a result of offshore wind development, they may pose a physical obstacle during spring and fall migrations. Thus, the risk of collision or the need to divert migration, which will involve an increase in energy expenditure by the environmental resource under study, may increase. Wind turbines can also be used by bats as hiding places or stops during migration. However, it should be caveated that due to the lack of chiropterofauna surveys in areas adjacent to OWF BIII, it is uncertain whether there are any bat migration routes in these areas. There may also be an increase in the number of insects in the area of planned wind farms, which provide a food base for bats.
3.	Offshore wind power will not develop, but mining industry will grow	If potential raw material deposits are discovered and a decision is made on their possible extraction, the region may see an increase in artificial structures above the water surface. The resulting oil rigs can serve as roosts or stopovers for bats, as well as provide new foraging areas as a result of increased insect concentrations.

Source: Ciechanowski M., Gajewski L., Kaczmarek N., "Chiropterological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

6. Methodology for assessing the impact on environmental

6.1. Framework methodology evaluation

The project's impact assessment was conducted in accordance with the framework methodology described in Chapter 5 of Volume I of the Report. In the 2015 Report, the assessment of potential impacts of the BIII OWF in the parameters approved by the Environmental Decision was based on the analysis of the most far-reaching scenario of the project - NIS 2015, i.e. such a set of parameters of the Project, which has the highest negative impact on the environment.

Due to the lack of binding legal regulations in Poland on the methodology of monitoring bats and analyzing the impact of wind farms on their population, the draft **"Guidelines for assessing the impact of wind** farms **on bats",** drawn up by Polish specialists and practitioners, was also used (Kepel et al., 2013).

6.2. The most far-reaching scenario of the venture - NIS 2015

In the assessment conducted in the course of the proceedings within the framework of which the Environmental Decision was issued, the basis for conducting the impact assessment was the set of parameters of the Project, which is the most far-reaching scenario of the project - NIS 2015, i.e. one that could potentially have the highest negative impact on bats. The parameters of the Project, which assumes the construction of 200 wind turbines with a rotor diameter of 192.5 meters, a minimum clearance of 20 meters and a total height of the structure of 212.5 meters, along with associated infrastructure in the form of 6 substations, were considered NIS 2015. In such a variant, due to the number of power plants and the size of the rotors, there is potentially the greatest possibility of impacts on bats. **In the case of NIS 2015, due to the number of power plants, the size of the rotors, and the highest density of turbines in the farm area among the alternatives considered, there was potentially**

the greatest potential for impacts on bats. The variant approved by the Environmental Decision provides for the construction of 40% fewer wind turbines, and thus was assessed during the impact assessment as potentially causing an environmental impact lower than NIS 2015. The Project in the proposed revised parameters involves the construction of 50% fewer wind turbines compared to the parameters of the Project approved by the Environmental Decision and 70% fewer power plants compared to the 2015 NIS. As a result of the change in the parameters of the Project, the maximum rotor diameter will be increased, by about 20%, nevertheless, it is associated at the same time with a reduction in the number of power plants, as a result, the maximum total area occupied by rotors in the event of a change in the parameters of the Project will be 78% in relation to the parameters of the Project approved by the Environmental Decision, and 50% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015. Since it is the number of power plants and the total entrustment occupied by the rotors that is the source of the potentially most significant impacts, thus the Project in the modified parameters will potentially be a significantly less significant source of impacts both compared to the set of Project parameters constituting the 2015 NIS, as well as the Project in the parameters approved by the Environmental Decision.

7. Potential impacts of offshore wind farms offshore wind farms

Parameters and factors affecting chiropterofauna were developed based on available and current literature. They relied on monitoring data from offshore wind farms located outside Poland. However, due to the relatively young industry of planned and constructed OWFs and the few direct studies conducted on them, information from bat inventories conducted on onshore wind farms was also used to further investigate the impact of this type of investment on the animal species that are the subject of this study.

Assessment of the impact of wind turbines on bats began at the end of the last century. Studies of the behavior of bats at wind farms have been carried out when studying the impact of this type of investment on ornithofauna. Numerous publications (Bach et al., 1999; Rahmel et al., 1999; Johnson et al., 2000) have indicated that the number of dead bats sometimes exceeded the number of dead birds found within onshore wind farms located near the forest, but also in exposed areas. Collisions have even been reported with turbines of offshore installations (European Commission, 2011). Results presented by Ahlen (1997) and Ahlen et al. among others. (1997, 2007, 2009) or Hobbs et al. (2013) confirmed the information on collisions between the studied animal species and wind turbines and presented the most likely causes of these incidents at both onshore and offshore wind farms. In Europe, dead bats belonging to 27 species were recorded under onshore wind turbines in 2013-2014[1]. In terms of the number of dead individuals identified, three species dominated: the small cockatiel *Pipistrellus pipistrellus*, the great bole *Nyctalus noctula*, and the greater cockatiel *Pipistrellus nathusii* (Rodrigues et al. 2015).

The table below shows the bat species for which the impact of offshore wind farms is likely to be most significant (in its study, species that migrate over long distances, which occur in Europe and have been recorded to collide with a wind turbine located in an onshore area, were selected).

Table 2 Bat species and their mortality risk (own compilation based on Kepel et al. 2013)

Polish name	Latin name	Protection status*,**	Reported mortality in Europe***	Degree of mortality risk
Great bole	*Nyctalus noctula*	LC, DSIV	+++	very high

[1] Based on information from the following countries: Austria, Belgium, Croatia, the Czech Republic, Estonia, France, Germany, Greece, Italy, Latvia, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, the United Kingdom and the United States

Polish name	Latin name	Protection status*,**	Reported mortality in Europe***	Degree of mortality risk
Forest bole[2]	*Nyctalus leisleri*	LC, DSIV	+++	very high
Silver-plated gloom	*Vespertilio murinus*	LC, DSIV	++	very high
Lesser spotted carlik	*Pipistrellus pygmaeus*	LC, DSIV	+++	high
Greater carlik	*Pipistrellus nathusii*	LC, DSIV	+++	very high

* Threat category according to the IUCN Red List of Threatened Species for Europe, version 2019-2, LC - least concern. ** DS IV - Annex IV of Council Directive 92/43/EEC of May 21, 1992 on the conservation of natural habitats and wild fauna and flora. *** Mortality notations: + - single, ++ - regular, +++ - very numerous; data are for the whole of Europe, including the Mediterranean region.

Source: Ciechanowski M., Gajewski L., Kaczmarek N., "Chiropterological monitoring in the area of the OWF Baltic Central II. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015, based on Kepel et al, 2013; Rodrigues et al, 2008

Wind power plants can pose a significant threat to bats on a local, regional or supra-regional scale. Bats have a low annual birth rate and a high life expectancy, so even a small amount of additional mortality could put them at risk (European Commission, 2011). In addition, they are protected under the EU Habitats Directive and the Bern Convention. Such investments can affect bats during the construction, operation or decommissioning stages in several ways. In the process of assessing the impact of offshore wind farms on chiropterofauna, migration routes should be considered first, but also foraging areas and habitats (Kepel et al. 2013).

7.1. Stage construction

The construction phase consists of the following activities:

- movement of installation (assembly) units from the port to the project site and transport of construction elements,
- preparation of the seabed for foundations,
- foundation construction,
- installation of wind power plant components (towers, nacelle, rotor),
- laying cables (digging cables into the seabed or laying them on the seabed).

Activities such as cable laying, seabed preparation and foundation construction are associated with work carried out below the water surface. Potential environmental impacts will potentially not affect the studied resource of bats. Potential impacts on bats such as increased risk of collisions or changes in foraging areas can be expected if installation units and the installation itself are moved. However, due

[2] Species name according to the 2015 publication "Polish Nomenclature of Mammals of the World" by the Museum and Institute of Zoology of the Polish Academy of Sciences. - Originally, in the Polish literature, including (Kepel et al. 2013), this species was designated by the name "borowiaczek"

to the low speeds achieved by the installation units, bats are likely to be able to avoid the obstacle (Jensen et al. 2014).

Transportation of installation elements involves increased traffic of vessels in the area of the project area, while installation is a construction activity that results in the creation of new landscape elements. Increased ship traffic and emerging wind turbines under the right weather conditions (no rain, calm sea state) will be a factor in attracting insects to the project area (Poerink et al., 2013; Rydell et al., 2010; Ahlen, 2003). Their increased concentration can create new foraging areas for bats (Poerink et al., 2013). In addition, the resulting structures as well as the vessels themselves can be used as new hiding places or stops (Ahlen et al., 2007, 2009; Rydell et al., 2012). They will be all the more attractive to inhabit because of their proximity to the gathering food base. Emerging structures may also be associated with the first collisions of bats by crossing their daily or periodic migration routes.

Most of the ongoing work on bat activity within offshore wind farms concerns projects located close to shore, up to 14 km away (Ahlen et al. 2007, 2009). Observations have shown that the activity of the environmental resource under study differs significantly between the terrestrial and marine areas. About 8,000 bat activities have been recorded on land. At the same time over the maritime area, the number was about 4,000. Attention is also drawn to the phenomenon of foraging bats in the vicinity of offshore wind farms. Due to only recently discovered opportunities for bats to hunt at sea, gaps in knowledge are pointed out regarding the range and exact distances from shore where foraging takes place. In addition, there is a lack of accurate research regarding the concentration of insects in the marine area. It is indicated that there are areas with varying amounts of food that are more or less likely to attract bats. Thus, it is believed that the exposure of bats to the risk of collision or change of foraging grounds cannot be studied.

Based on studies conducted by Ahlen (2009), migratory and non-migratory bats were found in the area of a wind farm located 14 km from the shore. Both groups of bats were actively foraging within the wind turbines and above the water surface due to the presence of insect assemblages. However, there was no existing correlation between food base concentration, distance from shore and bottom structure. The area's abundance of offshore insects is most likely due to wind conditions and ocean currents.

According to information posted in Rydell (2010), the insects presumably move actively or passively across the Baltic Sea. Beshamer and Bekker (2008) indicate the presence of the insects at a distance of about 30 km from the shore, with the highest activity occurring during low wind strength, but as the wind strength increased, their presence continued to be recorded. In addition, the authors cite results on observed bat species in the area of Dutch offshore wind farms, some 60 - 80 km from the shore. As a result, there is a risk of collision and a change in foraging grounds. In addition, as a result of the activities outlined, there will be a significant increase in noise in the offshore wind farm construction region, which may disorient bats during flight and act as a barrier effect. Thus, bats may be forced to change their migration route, which involves additional energy expenditure (European Commission, 2011). Potential impacts and their effects on bats are shown in the table below (Table 3).

Table 3. Potential impacts of OWF on bats - construction phase

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Collisions	During construction, there will be increased ship traffic in the farm area and more wind farm facilities will be built, causing the possibility of bat collisions with these facilities. The most important parameters affecting the level of impact are: • the types and number of vessels used during the construction phase,

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	• number of power plants and other farm facilities under construction.
Barrier effect	There will be a significant increase in noise in the offshore wind farm construction area due to ship traffic and construction activities, which may disorient bats during flight and act as a barrier effect. Bats may be forced to change their migration route, which involves additional energy expenditure. The most important parameters affecting the level of impact are: • the level of noise emissions from ships, machinery and equipment used during the construction phase, • the existence of bat migration routes in the project area, • the time of year when construction work will be carried out.
Change of feeding grounds	Increased ship traffic during construction and the emerging wind farm facilities will cause a concentration of insects in the project area. This will result in the creation of new foraging areas for bats. The most important parameters affecting the level of impact are: • number of power plants and other farm facilities under construction, • weather conditions, • the time of year when construction work will be carried out.
Oil spill	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. From this source, about 33% of the oil entering the environment enters the waterways (mainly due to increased ship traffic in the Baltic Sea region (Kaptur, 1999). By comparison, about 37% of the oil going into the sea comes from the river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster). Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom.

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	Water pollution may indirectly adversely affect bats that hunt insects that congregate over spillways. The most important parameters affecting the level of impact are: • the type and amount of oil substances released, • weather conditions, • season.
Contamination of water depths and bottom sediments with antifouling agents	At each stage of the project, vessels (ships, barges, etc.) will be used, from whose hulls some amounts of antifouling substances may be released into the water depths during normal operation. Water pollution has the potential to negatively affect bats. The most important parameters affecting the level of impact are: • the type and amount of antifouling substances released, • season • weather conditions.
Accidental release of municipal waste or domestic sewage	At each stage of the project, on the vessels as well as at the construction facilities located on land (at the port serving the implementation of the project), waste will be generated, mainly municipal and other waste not directly related to the construction process, as well as domestic sewage. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident. Water pollution has the potential to negatively affect bats. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • season.
Accidental release of chemicals and waste from farm construction	During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea. Water and bottom sediment pollution could potentially affect bats. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • season.

Source: Source: Ciechanowski M., Gajewski L., Kaczmarek N., "Chiropterological monitoring in the area of the OWF Baltic Central II. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

7.2. Stage operation

The greatest impact on chiropterofauna can be observed during the operation of an offshore wind farm. The stage is related to the presence and operation of wind turbines in the study area of the OWF, which, as a new landscape element, constitute a physical barrier along the bat migration route. Collision with a turbine rotor is the main cause of their mass mortality (Kunz et al., 2007; Kepel et al., 2013). Animals struck by rotor blades die from fractures, open wounds, multi-organ injuries or wing amputations (Kepel et al., 2013; Horn et al., 2008). Collisions cannot be considered only as a result of accidental collisions with the rotor blades of bats flying through the rotor rotation area. The mortality of these animals is compounded by their unusual behavior. It has been observed that bats often explore different parts of turbines by making flights around them (Horn et al., 2008). Recent studies have shown that bats are trying to sit on the turbine covers.

In addition, in the case of migratory species over the sea that maintain low altitudes above the water, upon encountering a windmill they can fly from its base to the top within minutes (Kepel et al., 2008; Ahlen et al., 2009). Observations of bats were made at wind farms located a slight distance from the shore. There is information regarding bat activity at a distance of about 60 - 80 km from the shore (Boshamer, Bekker, 2008).

New offshore structures may involve changes in bat feeding areas. Most temperate zone species are insectivorous. At low wind speeds (up to 6 m/s) and high temperatures, insects may concentrate around wind turbines, whose large numbers are likely to lure mammals seeking food. Wind turbines begin operation at wind speeds of about 4 m/s. Due to the small range of speeds (4 m/s - 6 m/s), there is a low probability of days when bats will be concentrated at the same time when the turbines are operating. The number of days mentioned is limited and the impact on bats is small (Jensen et al., 2014). In recent years, changes have been observed in the way bats forage for food, with bats foraging at altitudes of about 250 to 500 meters and some at 1,200 meters in late summer (Rydell et al., 2010). The abandonment of existing foraging sites in favor of hunting at higher elevations has been linked to the "hill - topping" phenomenon (Kepel et al., 2013). The phenomenon is associated with the migration of insects, which, as a result of encountering an obstacle in the form of a wind turbine, head up along the obstacle and congregate near the top of the turbine. The insect assemblages around the turbines of offshore wind farms, which move passively or actively over the Baltic Sea area, are an important food source for both migratory and sedentary bats (Furmankiewicz et al., 2009; Ahlen et al., 2007). Concentrations of these organisms can also be induced as a result of an increase in the temperature of the wind turbine itself caused by the operation of the device (Jensen et al., 2014). As a result, bats attracted to and hunting in such areas are at a higher risk of collisions as a result of striking rotor blades.

The operation of wind turbines involves the rotation of the turbine blades. The result of their work is large differences in pressure. The resulting decompression phenomenon can cause barotrauma in bats. Barotrauma is a pressure shock in which the alveoli rupture, and there are no external injuries in dead bats (Furmankiewicz et al., 2009; Baerwald et al., 2008).

Wind farms can also affect bats through their habitat. Farms located offshore will not destroy habitat in any way, but may create new hiding places (Ahlen et al., 2007). Such sites will be attractive to bats in terms of their proximity to the aforementioned foraging areas, or they may be used as a stop along the flyway during migration (Ahlen et al., 2009; Rydell et al., 2012). However, bats are more likely to collide with rotor blades when flying out of such sites.

The barrier effect may be due to noise from the continuous operation of wind turbines. Noise can confuse bats and force them to establish new migration routes, which may require more energy inputs that are important in the migration process (European Commission, 2011). Research by Nicholls and Racey (2009) indicated that with the right combination of wavelength, pulse repetition frequency and power, it is possible to reduce bat activity in the area of wind turbines. Nonetheless, noise can also be a factor in luring bats to the area of operating windmills. Various types of sounds, including ultrasound, emitted by wind turbines can contribute to increased bat activity in the area of wind farms. To date, there is insufficient evidence for this (Szewczak et al., 2006).

Potential emissions or disturbances associated with the operation stage and their impact on bats are presented in the table below, which also includes a description of potential unplanned impacts.

Table 4. Potential impacts of OWF on bats - operation stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Collisions	Operating wind turbines will be a physical obstacle to flying bats. In addition, service vessels will be used in the farm area during operation. This results in the possibility of collisions between bats and these facilities. The most important parameters affecting the level of impact are: • the types and number of vessels used during the operational stage, • number of power plants in operation.
Barotrauma	Operating wind turbines can induce pressure shock in passing bats, causing alveolar rupture and subsequent death (barotrauma effect). The most important parameters affecting the level of impact are: • number of power plants in operation.
Barrier effect	Noise generated by operating wind turbines may deter or attract bats and structures in the area will act as a physical barrier. The most important parameters affecting the level of impact are: • the level of noise emissions from power plants, • number of power plants in operation, • the existence of bat migration routes in the project area.
Habitat change	Wind farm facilities can be adapted as potential new bat roosts. The most important parameters affecting the level of impact are: • the number of power plants and other farm facilities in operation.
Change of feeding grounds	Operated wind farm facilities will cause a concentration of insects in the project area. This will result in the creation of new foraging areas for bats. The most important parameters affecting the level of impact are:

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
	• the number of power plants and other farm facilities in operation, • weather conditions, • season.
Oil spill	See description for construction phase
Accidental release of municipal waste or domestic sewage	See description for construction phase
Accidental release of chemicals and waste from farm operations	During the operation of the wind farm, waste directly related to the operation of the wind farm will be generated on the vessels, at the facilities located onshore (at the port servicing the investment) and at the project site. These may include damaged parts of farm components, cement, grout, mortar, operating fluids and other chemicals used or replaced during maintenance work. They can be accidentally released into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions.
Contamination of water depths and bottom sediments with antifouling agents	See description for construction phase

Source: Source: Ciechanowski M., Gajewski L., Kaczmarek N., "Chiropterological monitoring in the area of the OWF Baltic Central II. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

7.3. Stage decommissioning

The liquidation stage consists of the following activities:

- physical removal of investment elements from the project area,
- storage and disposal of removed farm components,
- the presence of vessels involved in the decommissioning of the farm.

The activities outlined above - the physical removal of elements of the project and the presence of vessels - have the potential to affect bats through increased vessel traffic and noise emissions. The aforementioned activities will affect bats to a similar extent, which was presented in Section 7.1 (construction phase). Increased boat traffic may result in increased bat activity attracted by insect concentrations in the work area (Poerink et al., 2013; Rydell et al., 2010; Ahlen, 2003). Moving vessels will also be used as hiding places or stops along the migration route due to their proximity to the food base, among other reasons (Ahlen et al., 2007, 2009; Rydell et al., 2012). Such activities can expose bats to collisions with ships or dismantled parts of windmills. Wind farm decommissioning work may involve ultrasonic emissions, which, as during the construction phase, can cause a barrier effect (European Commission, 2011). Storage and disposal activities do not significantly affect the subject of the study.

Potential emissions or disturbances associated with the decommissioning phase and their impact on bats are presented in the table below, which also includes a description of potential unplanned impacts.

Table 5. Potential impacts of OWF on bats - decommissioning stage

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
Collisions	During decommissioning, there will be increased ship traffic in the farm area and more wind farm facilities will be dismantled. This results in the possibility of collisions between bats and these facilities. The most important parameters affecting the level of impact are: • types and number of vessels used in the decommissioning stage, • the number of dismantled power plants and other farm facilities.
Barrier effect	In the area of OWF decommissioning, there will be a significant increase in noise, caused by ship traffic and dismantling work, which may disorient bats during flight and act as a barrier effect. Bats may be forced to change their migration route, which involves additional energy expenditure. The most important parameters affecting the level of impact are: • the level of noise emissions from ships, machinery and equipment used during the decommissioning stage, • the existence of bat migration routes in the project area, • the time of year when decommissioning work will be carried out.
Change of feeding grounds	Increased ship traffic during the decommissioning of wind farm facilities will cause a concentration of insects in the project area. This will result in the creation of new foraging areas for bats. The most important parameters affecting the level of impact are: • number of decommissioned power plants and other farm facilities, • weather conditions, • the time of year when decommissioning work will be carried out.
Oil spill	See description for construction phase
Contamination of water depths and bottom sediments with antifouling agents	See description for construction phase
Accidental release of municipal waste or domestic sewage	See description for construction phase
Accidental release of chemicals and waste	During the decommissioning of the wind farm, waste directly related to the decommissioning of the wind farm will be

Type of emission or disturbance	Rationale for selection and key parameters and factors affecting the level of impact
from the decommissioning of the farm	generated on the vessels, at the facilities located onshore (at the port handling the decommissioning of the project) and at the project site. These may include damaged parts of farm components, operating fluids, etc. They can be accidentally released into the sea. The most important parameters affecting the level of impact are: • the type and amount of waste or wastewater released, • weather conditions, • season.

Source: Source: Ciechanowski M., Gajewski L., Kaczmarek N., "Chiropterological monitoring in the area of the OWF Baltic Central II. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

8. Species subject to environmental impact assessment environment

The assessment of the impact of OWF BIII on bats took into account the great booby - the only bat species found in the area of the proposed farm during the surveys conducted in 2013, and, following the principle of prudence, the greater carlik, the lesser carlik and the forest booby - bat species found during the surveys conducted in 2016 in the body of water adjacent to the area of OWF BIII, at the listening points located closest to the area of the planned farm (see Chapter 11 of Volume III of the Report). The chapter briefly characterizes the species in question, identifies their sensitivity to the most important impacts of wind farms and their importance to the ecosystem.

8.1. Basic characteristics of bats in the area of OWF BIII

8.1.1. Great bole

According to the results of chiropterological monitoring, only one species of bat, belonging to the gloomy bat family - the great boa constrictor - has been recorded in the area of OWF BIII and its buffer zone **(Error!** The **source of the reference cannot be found.)**. The recording of the sounds of this bat took place during the spring migration (late April and May) in the northeastern part of the area designated for the OWF project. In total, signals emitted by this bat species were recorded 13 times during the monitoring cruises taking place during the mentioned period.

Table 6 List of chiropterofauna species identified in the area of OWF BIII

Species		Number of contacts		Meaning
Polish name	Latin name	Spring migration	Autumn migration	
Great bole	*Nyctalus noctula*	13	0	Under strict protection

Low Great Boer activity was also recorded during the fall migration period at listening point P_N02, located northwest of the area of the planned OWF BIII, during an inspection conducted in August 2016. (one of two).

The Great Boer makes regular seasonal migrations of nearly 1,000 kilometers between breeding sites and wintering grounds located in central and southern Europe. The longest recorded migration of this species was 1546 km (GDOŚ 2012).

In terms of mortality due to contact with wind turbines, the great aurochs is the dominant species among bats in the temperate zone and second only to the lesser dwarf in Europe (Rodrigues et al. 2015). It belongs to a group of species with a very high risk of mortality in contact with the turbine. Bats in this group are characterized by fast and low-altitude flight (sometimes reaching considerable heights) and frequent use of open spaces as foraging grounds or undertaking long-distance migrations (often over 1,000 km) along routes that cross various European countries (Kepel et al. 2013).

The Great Boer takes migratory flights up to 40 meters above the water surface. Under certain meteorological conditions, such as a southerly wind during spring migration or a northerly wind during autumn migration, individuals can reach heights of more than 40 meters. However, such events are few due to the need for the coincidence in time of the mentioned circumstances, i.e. high temperatures and certain wind directions (Jensen et al. 2014). As a result of encountering high vertical obstacles in its path, it can suddenly change altitude and move from near the surface of the water to the top of a closely located turbine within minutes (Ahlen et al. 2009). Surveys conducted in 2007 (Ahlen et al. 2007) in the area of offshore wind farms located on the southeast and west coast of Sweden - the Kalmar Strait and the Sound within 14 km of the shore, recorded numerous activities of the great booby. Migrations of this species took place in the southeastern direction. It was also shown that working wind turbines were not avoided by Nyctalus noctula. The bat species studied searched a wide area around the turbines and hunted near the rotor blades and near the water surface. In the long term, wind turbines played the role of hiding places or acted as stopovers during migration. It was also indicated that Nyctalus noctula has the highest tolerance to wind speed during hunting. They were recorded at wind speeds of up to 10 m/s, where most bats preferred winds of up to about 5 m/s.

8.1.2. Carlik greater

Greater Spotted Carrier activity was found at listening post P_N03, located north of the area of the planned OWF BIII, during two of three inspections conducted during the spring migration period in 2016 and 2017. (low in May 2016 and moderate in May 2017). Low activity of this species was also recorded during the fall migration period at listening point P_N02, located northwest of the area of the planned BIII OWF, during an inspection conducted in August 2016. (one of two).

In terms of mortality due to contact with wind farms, the greater carduck is third among bats in Europe, just behind the great bole (Rodrigues et al. 2015). It belongs to a group of species with a very high mortality risk. Bats in this group are characterized by fast and low-altitude flight (sometimes reaching considerable heights) and frequent use of open spaces as foraging grounds or undertaking long-distance migrations (often over 1,000 km) along routes that cross various European countries (Kepel et al. 2013).

The greater carlik is characterized by fast flight. The species takes long-distance flights, migrating from the northeast to the southwest, even over distances of up to 1,905 kilometers (European Commission 2011) (GDOŚ 2012).

Smaller bat species like the greater carnivora typically make migratory flights at 1- 3 m above sea level, but can nevertheless change their flight altitude significantly depending on the availability of insects (Ahlen 2007).

8.1.3. Karlik fine

Low activity of the lesser spotted carp was found during autumn migration in August 2016 at listening point P_N03, located north of the area of the planned OWF BIII.

The lesser spotted carlik belongs to a group of species with a high risk of mortality in contact with wind turbines. This group includes sedentary (at least in western Europe) species of carnivores (i.e., in addition to the small cockatiel - the lesser carnivore and the medium carnivore), with a fairly maneuverable but not very fast flight, hunting at a lower altitude and at a shorter distance from vertical obstacles (trees) than the greater carnivore (Kepel et al. 2013). According to bat studies of bat behavior when flying past or foraging near offshore wind turbines located in southern Scandinavia, the Lesser Spotted Carrier is a partially migratory species. Prior to the 2000 survey, the species was not considered migratory. During the survey, however, it turned out that it was the most common species over the surveyed marine areas, recorded in surprisingly high numbers of individuals (Ahlen et al. 2009, 2007).

Smaller species of bats like the lesser spotted carnivore usually make migratory flights at 1- 3 meters above the sea surface, but nevertheless they can significantly change their flight altitude depending on the availability of insects (Ahlen 2007).

8.1.4. Borowiec forest

Low activity of the Forest Boer was found during autumn migration in August and September 2016 at listening point P_N03, located north of the area of the planned OWF BIII.

The forest bole belongs to a group of species with a very high risk of mortality. Bats in this group are characterized by fast and low-altitude flight (sometimes reaching considerable heights) and frequent use of open spaces as foraging grounds or undertaking long-distance migrations (often over 1,000 km) along routes that cross various European countries (Kepel et al. 2013).

The species takes long-distance flights (European Commission 2011). The forest boer has been observed migrating a distance of 1567 km (GDOŚ 2012).

8.2. Sensitivity of bats to potential impacts of the of the project

In the following tables **(Error! Unable to find the source of the reference, Error! Cannot find the source of the reference. i Error! The source of the reference cannot be found.)** the sensitivity of the identified over the BIII OWF area and in its vicinity to the potential impacts of the planned farm during its construction, operation and decommissioning is presented.

Table 7 Sensitivity of bats to potential impacts of OWF - construction phase

Species Common name/Latin name	Sensitivity/susceptibility to potential impacts of the OWF		
	Construction phase		
	Collisions	Barrier effect	Change of feeding grounds
Great bole *Nyctalus noctula*	Average	Skip	Average
Greater carlik *Pipistrellus nathusii*	Average	Skip	Average
Lesser spotted carlik Pipistrellus pygmaeus	Small	Skip	Average
Forest bole Nyctalus leisleri	Average	Skip	Average

Table 8 Sensitivity of bats to potential impacts of the OWF - operation stage

Species Common name/Latin name	Sensitivity/susceptibility to potential impacts of the OWF				
	Operation stage				
	Collisions	Barotrauma	Barrier effect	Change of feeding grounds	Habitat change
Great bole *Nyctalus noctula*	Very large	Very large	Skip	Average	Small
Greater carlik *Pipistrellus nathusii*	Very large	Very large	Skip	Average	Small
Lesser spotted carlik *Pipistrellus pygmaeus*	Large	Large	Skip	Average	Small
Forest bole *Nyctalus leisleri*	Very large	Very large	Skip	Average	Small

Table 9 Sensitivity of bats to potential impacts of the OWF - decommissioning phase

Species Common name/Latin name	Sensitivity/susceptibility to potential impacts of the OWF		
	Decommissioning stage		
	Collisions	Barrier effect	Change of feeding grounds
Great bole *Nyctalus noctula*	Average	Skip	Average
Greater carlik *Pipistrellus nathusii*	Average	Skip	Average
Small dwarf *Pipistrellus pygmaeus*	Small	Skip	Average
Forest bole *Nyctalus leisleri*	Average	Skip	Average

The susceptibility/sensitivity of bats to the types of impacts presented above was based on literature data (Kepel et al. 2013, Rodrigues et al. 2015; European Commission 2011).

All of the bat species identified over the BIII offshore wind farm site and in its vicinity, with the exception of the lesser spotted carnifex, are among those with a very high risk of mortality in contact with the wind farm. Due to the fast and unmaneuverable flight and reaching considerable heights in the process, the probability of collision with the blade of an operating turbine or death due to barotrauma is very high during the operation stage of an offshore wind farm. In the case of the small cockatiel, the degree of exposure to mortality is described as high (Kepel et al. 2013). The risk of collision is reduced during the construction and decommissioning phases due to the reduced number of artificial structures, the absence of rotating turbines, and thus the non-generation of pressure shock.

The bat species found are negligibly sensitive to the barrier effect. All identified species undertake long-distance migrations (European Commission 2011), which require appropriate energy management. The project area, as a result of ultrasonic emissions, may only slightly disrupt migration routes and lengthen them.

By using echolocation, bats are able to avoid working turbines. In fact, probably due to the need to conserve energy when traversing long distances over open space, they are often found within working wind farms (Keeley et al. 2001). In addition, cases of bats being attracted to the project area as a result of the emission of the light source have been reported (European Commission 2011; Rodrigues et al. 2015; Jensen et al. 2014).

Newly created structures can become new habitat, used as hiding places or stops when taking flights over marine areas. This phenomenon has been confirmed by numerous studies along the southern coast of Sweden (Ahlen et al. 2009, 2007; Rydell et al. 2012). Bat surveys covering the coastal areas and islands of the Scandinavian Peninsula and the islands of southern Sweden and Denmark conducted in 2005, 2006 and 2008 found that bats used structures such as wind turbines, ships and possibly bridges and lighthouses as resting places on their flight paths. During the aforementioned surveys on a group of offshore wind turbines located 5.8 kilometers offshore, individual bats belonging to the species of the lesser spotted carlik, greater spotted carlik and possibly the woodrat were observed staying on the turbines for several days and regularly foraging over the surrounding waters. Some of these bats flew around the turbines emitting territorial or mating signals. During the survey, the great boer was also observed trying to find a place to rest on the turbine. Resting bats have also been found by maintenance technicians in the nacelles of wind turbines (Ahlen et al. 2009, 2007). It should be noted that bat surveys in southern Scandinavia were conducted under different conditions than those found in the area of the planned BIII offshore wind farm - observations in offshore waters were conducted primarily within straits: Kalmar Sea, Sound and Kattegat, up to 14.2, 11.8 and 19.1 km from the shore, respectively, and in the open waters of the Baltic Sea, up to 9.1 km from Bornholm Island, while the planned OWF will be located in the open waters of the Baltic Sea, at the closest distance of about 23 km from the shoreline. Given the lack of data on the occurrence of the phenomenon in question at a greater distance from the shore under open sea conditions, and the low identified bat activity in the BIII offshore wind farm area, the sensitivity of all species to impacts related to habitat change resulting from the appearance of new structures above sea level was assessed as low.

8.3. Importance of bats

All bat species included in the assessment identified over the area of the planned OWF BIII and in its vicinity are under strict protection in Poland and require active protection in accordance with the provisions of the Regulation of the Minister of Environment of December 16, 2016 on the protection of animal species (Journal of Laws item 2183, as amended). Any bat wintering grounds where more than 200 individuals of these mammals have been found at least once in three consecutive years may have a designated year-round protection zone, which includes enclosures and roosts occupied by bats. These species are also included in Annex IV of the EEC Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora and in Annex II of the Bern Convention. In addition, bats are protected under the Bern Convention, the Bonn Convention and EUROBATS. Due to the above, the importance of the studied resource is described as very high.

9. Assessment of the impact of OWF BIII on bats

9.1. Stage construction

Most of the works carried out during the construction of OWF BIII will not have a negative impact on bats, as they will take place below the water surface. Factors likely to affect them will be increased ship traffic and power plant structures rising above the water's surface.

A full description of the construction work can be found in Chapter 4 of Volume II of the EIA.

The possibility of the following impacts on bats at the construction stage of OWF BIII is expected:

- collisions;
- change of feeding grounds.

Unplanned impacts described in Chapter 9 of Volume II of the Report may also occur during the construction of the farm, but none of them were considered significant in terms of assessing the impact on bats moving over the analyzed water body.

9.1.1. Collisions

More farm facilities under construction may be used as new hiding places and stops along the migration route. Bats, thus lured to the construction area, will be vulnerable to collisions with vessels and power plants under construction. The Great Boer found in the farm area is a species with a very high risk of mortality in collisions with wind turbines.

However, the installation units will not reach significant speeds, so foraging and migrating individuals will not have problems avoiding the obstacle. In addition, the number of power plants will increase gradually, and they will not be in operation until at least a given stage of the farm is put into operation.

Minimization measures are not required because even in the 2015 NIS, the significance of the above impact on bats was assessed as low.

Bat collisions during the construction phase are direct, negative impacts of local scope, short-term, irreversible, repeatable during the construction period, with low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. (Table 10)

Analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which should translate into the total time associated with the construction of the power plant, and thus the time of construction vessel operations in the Project area. A factor that can significantly affect the total construction time is weather conditions, however, given that the amount of power plants under construction in relation to the parameters resulting from the 2015 NIS has been reduced to 30%, and thus even assuming unfavorable weather conditions, the total construction time of the project will be shorter.

Table 10 Bat collision significance assessment (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Great bole	Very large	Average	Bats may be attracted to the area of the farm under	Negligible (scale of exposure - local, duration -	Small (magnitude of impact - insignificant,
Greater carlik	Very large	Average			
Lesser spotted carlik	Very large	Small			

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Forest bole	Very large	Average	construction and collide with its facilities and vessels	short-term, intensity - low)	Importance of the resource - very high)

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.2. Change feeding grounds

Increased ship (and helicopter) traffic and emerging structures above the water's surface are associated with an increase in the concentration of insects in the study area, and thus with the creation of attractive feeding grounds for bats. However, the concentration of insects can only occur under certain weather conditions (no wind, high temperatures).

Minimization measures are not required because even in the 2015 NIS, the significance of the above impact on bats was assessed as low.

The change in bat feeding grounds during the construction phase is a direct, negative or positive impact, local in scope, short-term, reversible, repeatable during the construction period, with low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. (Table 10)

Analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which should translate into the total time associated with the construction of the power plant, and thus the time of construction vessel operations in the Project area. A factor that can significantly affect the total construction time is weather conditions, however, given that the amount of power plants under construction in relation to the parameters resulting from the 2015 NIS has been reduced to 30%, and thus even assuming unfavorable weather conditions, the total construction time of the project will be shorter.

Table 11 Impact assessment involving alteration of bat feeding grounds (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Great bole	Very large	Average	Concentration of insects	Negligible (scale of	Small (magnitude of
Greater carlik	Very large	Average			

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Lesser spotted carlik	Very large	Average	around ships and emerging turbines may create attractive foraging areas for bats	exposure - local, duration - short-term, intensity - low)	impact - insignificant, importance of the resource - very high)
Forest bole	Very large	Average			

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.3. Cumulative impacts

In the area of OWF BIII, no existing or planned projects for which an environmental decision has been issued have been identified that could potentially, together with OWF BIII, cause cumulative impacts on bats at the stage of its construction.

9.2. Stage operation

The operation phase of the farm involves continuous operation of the turbines and the creation of a permanent obstacle in the form of artificial structures at sea.

The following impacts on bats are expected to occur at the construction stage of OWF BIII:

- collisions;
- barotrauma;
- change of feeding grounds.

During the operation of the farm, the unplanned impacts described in Chapter 9 of Volume II of the Report may also occur, but none of them were considered significant in terms of assessing the impact on bats moving over the analyzed water body.

9.2.1. Collisions

The main source of potential bat mortality at OWF BIII will be their collisions with rotating rotor blades.

The assessment of this impact in the BIII OWF area is influenced by several factors, described below.

The operation of the subject project with a maximum number of 100 turbines in the case of the parameters of the Project approved by the Environmental Decision and 60 turbines in the case of the variant after changes is planned for a period of 25 years, with the possibility of extending it to 30 years.

The identified bat species are characterized by a high and very high risk of mortality from collisions with wind turbines.

While operating wind turbines may cross potential migration routes, no large concentration of bats has been recorded in the study area, indicating the absence of a permanent migration corridor.

In addition, bats, according to previous research results, migrate in dispersal, in groups of 2 - 3 individuals, which also affects the magnitude of the impact.

Service vessels used during the operational stage will not reach significant speeds, so foraging and migrating individuals will have no trouble avoiding the obstacle.

Minimization measures are not required because even in the 2015 NIS, the significance of the above impact on bats was assessed as low.

Collisions between bats and power plant blades during the operation stage are direct, negative impacts of local extent, long-term, irreversible, repeatable during the operation period, of low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. (Table 12)

In the case of the proposed changes in the conditions of implementation and operation of the Project, there is a change in the parameter of the maximum total height of the wind turbine (an increase of about 17%) and the maximum diameter of the rotor (an increase of about 20%), but nevertheless these changes are correlated behind the change in the number of power plants. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. In the case of collisions, the most significant parameter affecting the increase in the probability of collisions is the maximum total rotor zone, which in the case of changes in the parameters of the project will be 78% relative to the parameters of the project approved by the Environmental Decision, and 50% relative to the set of parameters of the project representing the most far-reaching scenario - NIS 2015.

Table 12 Bat collision assessment (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Great bole	Very large	Very large	Bats may be attracted to the area of the operated farm and collide with its facilities and vessels	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - very high)
Greater carlik	Very large	Very large			
Lesser spotted carlik	Very large	Large			
Forest bole	Very large	Very large			

Therefore, it should be considered that both the nature of the impacts remains unchanged and their scope and magnitude will be slightly smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2. Barotrauma

Bats can also potentially die as a result of rapid decompression due to pressure shock from flying close to the rotor wing (barotrauma). The factors influencing the impact assessment are the same as for collisions due to collisions with power plant wings.

Minimization measures are not required because even in the 2015 NIS, the significance of the above impact on bats was assessed as low.

Bat mortality as a result of barotrauma during the operation stage is a direct, negative impact of local scope, long-term, irreversible, repeatable during the operation period, of low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below (Table 13).

In the case of the proposed changes in the conditions of implementation and operation of the Project, there is a change in the parameter of the maximum total height of the wind turbine (an increase of about 17%) and the maximum diameter of the rotor (an increase of about 20%), but nevertheless these changes are correlated behind the change in the number of power plants. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. In the case of collisions, the most significant parameter affecting the increase in the probability of collisions is the maximum total rotor zone, which in the case of changes in the parameters of the project will be 78% in relation to the parameters of the Project approved by the Environmental Decision, and 50% in relation to the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015.

Table 13 Assessment of bat mortality due to barotrauma (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Great bole	Very large	Very large	Bats may be attracted to the area of an exploited farm and die as a result of barotrauma	Negligible (scale of exposure - local, duration - long-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - very high)
Greater carlik	Very large	Very large			
Lesser spotted carlik	Very large	Large			
Forest bole	Very large	Very large			

Therefore, it should be considered that both the nature of the impacts remains unchanged and their scope and magnitude will be slightly smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.3. Change feeding grounds

The farm facilities themselves and the lights they will be equipped with can attract insects. They may also be attracted by the increase in temperature due to rotor blades. This could potentially create foraging areas, attracting bats to the area of the planned wind farm.

However, bats can forage when weather conditions are right, such as wind speeds of up to 6 m/s and no rain. Monitoring conducted for the report recorded the presence of the Great Boer at comparable wind speeds (see Appendix J of the Report). During the survey of hydrological conditions (see Appendix A to the Report) in the area of the planned wind farm during spring migration, the average wind speed was 5.6 m/s with a maximum of 12 m/s, while during autumn migration, the average wind speed was 7.1 m/s with a maximum of 19.7 m/s. Days when the wind speed was 0 m/s were also recorded. As a result, there may be few days during migration when insects and hunting bats will be present with the simultaneous operation of the turbines.

Minimization measures are not required because even in the 2015 NIS, the significance of the above impact on bats was assessed as low.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below (Table 14).

Analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, and thus the scale of potential insect concentrations in their area will be correspondingly smaller.

Table 14 Impact assessment involving alteration of bat feeding grounds (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Great bole	Very large	Average	Concentration of insects near turbines creates attractive foraging areas for bats	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - very high)
Greater carlik	Very large	Average			
Lesser spotted carlik	Very large	Average			
Forest bole	Very large	Average			

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will be smaller than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.4. Impacts cumulative

In the area of OWF BIII, no existing or planned projects for which an environmental decision has been issued have been identified that could potentially, together with OWF BIII, cause cumulative impacts on bats at the stage of its operation.

9.3. Stage decommissioning

Activities related to the physical removal of wind farm components from the project area are mainly underwater work. However, the listed activities result in increased ship (and helicopter) traffic in the area of the project. As mentioned earlier, this phenomenon, when weather conditions are right, results in an increased concentration of insects and the creation of attractive feeding grounds for bats. Animals in flight may be attracted to the disassembly area, which will provide an attractive hunting ground.

During the decommissioning of the farm, the unplanned impacts described in Chapter 9 of Volume II of the Report may also occur, but none of them were considered significant in terms of assessing the impact on bats moving over the analyzed water body.

9.3.1. Collisions

Activities related to the physical removal of wind farm components from the project area are mainly underwater work. Only the dismantling of power plants and substations will be carried out above the water surface. However, the listed activities will result in increased vessel traffic in the project area. As mentioned earlier, with the right weather conditions, this will result in an increased concentration of insects and the creation of attractive feeding grounds for bats. Animals in flight may be attracted to the disassembly area, which will provide an attractive hunting ground.

However, the installation units will not reach significant speeds, so foraging and migrating individuals will not have problems avoiding the obstacle. In addition, the number of power plants will gradually decrease until they are completely removed.

Minimization measures are not required because even in the 2015 NIS, the significance of the above impact on bats was assessed as low.

Bat collisions during the decommissioning stage are direct, negative impacts of local scope, short-term, irreversible, repeatable during the decommissioning period, with low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. (Table 15)

Analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which should translate into the total time associated with the decommissioning stage of the power plant, and thus the time of construction vessel operations in the Project area.

Table 15 Bat collision assessment (decommissioning stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Great bole	Very large	Average	Bats may be attracted to the area of the decommissione	Negligible (scale of exposure - local, duration -	Small (magnitude of impact - insignificant,
Greater carlik	Very large	Average			
Lesser spotted carlik	Very large	Small			

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Forest bole	Very large	Average	d farm and collide with its facilities and vessels	short-term, intensity - low)	importance of the resource - very high)

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.2. Change feeding grounds

Increased ship traffic over the water surface during the decommissioning period of the farm is associated with an increase in the concentration of insects in the study area, and thus with the creation of attractive feeding grounds for bats. However, the concentration of insects can only occur under certain weather conditions (no wind, high temperatures).

Minimization measures are not required because even in the 2015 NIS, the significance of the above impact on bats was assessed as low.

The change in bat feeding grounds during the decommissioning stage is a direct, negative or positive impact, local in scope, short-term, reversible, repeatable during the decommissioning period, with low intensity.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below. (Table 16)

Analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision, which should translate into the total time associated with the decommissioning stage of the power plant, and thus the time of construction vessel operations in the Project area.

Table 16 Impact assessment involving alteration of bat feeding grounds (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Great bole	Very large	Average	Concentration of insects around ships and emerging turbines may create attractive	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Small (magnitude of impact - insignificant, importance of the resource - very high)
Greater carlik	Very large	Average			
Lesser spotted carlik	Very large	Average			
Forest bole	Very large	Average			

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			foraging areas for bats		

Therefore, it should be considered that both the nature of the impacts does not change and their scope and magnitude will not be greater than in the case of the variant approved by the Environmental Decision, and thus the updating of the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.3. Cumulative impacts

In the area of OWF BIII, no existing or planned projects for which an environmental decision has been issued have been identified that could potentially, together with OWF BIII, cause cumulative impacts on bats at the stage of its construction.

10. Impacts related

Related impacts are understood as a chain of all impacts that may occur in the ecosystem, following the occurrence of an impact on one of its elements. The purpose of assessing associated impacts is to verify that direct impacts on one receptor, will not become a source of indirect impacts on another receptor or on the ecosystem as a functional whole, especially in conjunction with direct impacts on that receptor.

A direct impact on one element of the abiotic environment in the study area will usually result in an indirect impact on another abiotic element, and then also on biotic elements. Section 7 of Volume II of the EIA presents a matrix of interrelationships, which was developed in the system of emission source - emission - impact - direct impact receptor - indirect impact receptor.

In the case of chiropterofauna, we can talk about such a connection in the context of unplanned impacts (see Chapter 11 below). Pollution of water bodies with various types of toxic substances, especially petroleum-based substances, can indirectly affect bats, causing poisoning or drowning.

11. Impacts unplanned

Unplanned impacts result from sudden unplanned events or failures that are not related to activities included in the project schedule (e.g., leakage of toxic substances into the water due to a collision between two vessels).

In assessing the significance of unplanned impacts, additional factors were taken into account, i.e. the probability of an event that will be the source of the impact and its potential consequences.

Based on data from other OWF projects and from similar projects, as well as on the knowledge and experience of the study's authors, the following potential **unplanned events** that could become a source of**unplanned environmental impacts of offshore wind farms** were selected**:**

- leakage of petroleum substances as a result of a collision, accident or construction disaster (during normal operation or in an emergency),

- accidental release of municipal waste or domestic sewage,
- accidental release of construction materials or chemicals,
- contamination of the water tone and bottom sediments with antifouling agents.

It should be noted that as a result of unplanned events, the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. On the other hand, indirectly, these events can also affect living organisms that inhabitor otherwise use the seabed, the water table and the sea surface.

A full description of potential unplanned events can be found in Section 12 of Volume II of the report. In contrast, potential indirect impacts of unplanned events on bats are analyzed below, based on this description.

11.1. Spill of petroleum substances (during normal operation of ships)

During normal ship operation, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) can occur. It should be assumed that these spills will be small (stage I), up to 20^{m3}.

The release of petroleum substances into the marine environment could potentially have a negative impact on bats. Insects, which are the food base of temperate zone bats, under the right weather conditions (no rain, calm sea state) can accumulate near the surface of the water, thus luring bats into the area of possible spills (Poerink et al., 2013; Rydell et al., 2010; Ahlen, 1997). As a result, hunting individuals may be at risk of poisoning due to toxic substances entering the body or drowning through impaired swimming (Rafferty, 2011; Neuweiler, 2000; Ryberg, 1947). The mere collision of vessels without the spill of hazardous substances does not threaten bats. At the operation stage, in addition to the aforementioned emergency events that may occur during the construction and decommissioning of the OWF, situations such as leaks from the transformer or oil system of the operating wind turbine, as well as incidental oil spills related to maintenance and repair work may occur. Events of this type have the potential to negatively impact bats as described above.

It is estimated that the possible occurrence of the above contingencies, due to the low bat activity recorded during the monitoring surveys, will not affect the structure and functioning of bats migrating through the Baltic Sea or cause their mortality.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below (Table 17).

Analyzing the impact of the proposed changes to the Project's implementation and operation conditions on the possibility and magnitude of impacts, it should be considered that the impacts associated with the implementation of the Project will be no greater than the level assessed for the Project during the impact assessment conducted in the 2015 Report. The number of power plants will be drastically reduced, by about 70% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, and 50% in relation to the parameters of the Project approved by the Environmental Decision. A change in the conditions for implementation and operation of the Project does not affect the outcome of the assessment in this regard. In turn, the fact that the number of power plants and the associated reduction in the number of vessels both during the construction and operation phases is an additional element that reduces the sources of impacts.

Table 17 Assessment of the impact on bats of small amounts of petroleum substances released into the sea during normal ship operations (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bats (big bole)	Very large	Average	During the normal operation of ships, a small leakage of petroleum substances may occur. They have the potential to negatively impact bats.	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - very high)

11.2. Spill of petroleum substances (in an emergency)

During the construction, operation or decommissioning of the farm, leakage of petroleum substances may occur, resulting in pollution of the water table and bottom sediments. A spill can occur as a result of a shipwreck or collision, a construction disaster at one of the farm's facilities, or during maintenance work. In the event of a collision or collision between ships, a Grade III spill, i.e. over 50^{m3}, can be expected.

It has been calculated that the probability of serious accidents is very low, on the order of $^{10-5}$ - $^{10-4}$. For the southeastern Baltic, which may include the BII offshore wind farm area, the risk of collision was estimated at 1 case per 1060 years. The significance of this impact can be considered negligible, as the unplanned impacts described are extremely rare and practically impossible. In this case, there are organizational structures, plans of conduct in carrying out actions to combat hazards and pollution, and effective methods of cleaning up pollution.

The assessment of the impact on bats of this impact does not differ from that presented in the section above. Changing the parameters of the Project does not affect the outcome of the evaluation in this regard. In turn, the fact that the number of power plants and the associated reduction in the number of vessels both during the construction and operation phases is an additional element that reduces the sources of impacts.

Table 18 Assessment of the impact on bats of more petroleum substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bats (big bole)	Very large	Average	In emergency situations, more oil spills may occur.	No change (No loss of the resource, no impact on the structure and	No change (magnitude of impact - unchanged,

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
				operation of the resource)	importance of the resource - very high)

11.3. Accidental release of municipal waste or domestic sewage

During the construction, operation or decommissioning of a wind farm, waste, mainly municipal and other waste not directly related to the construction/operation/ decommissioning process, as well as domestic sewage, will be generated on vessels as well as at the construction/ decommissioning facilities located on land (at the port serving the project). Their expected types of quantities, as well as how they will be handled, are presented in Section 10 of Volume II of the report. Waste and wastewater can be accidentally released into the sea when picked up from ships by another vessel and in the event of an accident, causing a local increase in nutrient concentrations and deterioration of water quality.

As a minimizing measure, it is recommended to create procedures related to waste and wastewater handling.

It is estimated that the possible occurrence of the above contingencies, due to the low bat activity recorded during the monitoring surveys, will not affect the structure and functioning of bats migrating through the Baltic Sea or cause their mortality.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below (Table 19).

Changing the parameters of the Project does not affect the outcome of the evaluation in this regard. In turn, the fact of reducing the number of power plants and the associated reduction in the number of vessels both during construction and operation is an additional element that reduces the sources of impacts.

Table 19 Assessment of impacts on bats of municipal waste or domestic sewage accidentally released into the sea (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bats (big bole)	Very large	Average	During the construction, operation or decommissioning of the farm, a small amount of municipal waste or domestic sewage may be accidentally released into the sea	No change (No loss of the resource, no impact on the structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - very high)

11.4. Accidental release of chemicals and waste from construction, operation or decommissioning of the farm

During construction, waste directly related to the construction process will be generated on vessels, at construction/ decommissioning facilities located on land (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that about $5^{m3\ of}$ product could sink during handling. Grouts, mortars and other binders often contain hazardous substances. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 $^{g\text{-}cm\text{-}1}$, they sink and are deposited on the bottom. These substances are considered a serious threat because they cannot be easily removed from the bottom and are toxic to marine organisms.

During the operation of the farm, maintenance of its facilities will be carried out. Accidental release of small amounts of waste or operating fluids into the sea cannot be ruled out.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out this work (cf. description of the decommissioning stage), and the greatest contamination may occur if gravity foundations have to be crushed.

Anticipated waste types and quantities are presented in Section 10 of Volume II of the report.

It is estimated that the possible occurrence of the above contingencies, due to the low bat activity recorded during the monitoring surveys, will not affect the structure and functioning of bats migrating through the Baltic Sea or cause their mortality.

For this type of investment like an OWF, a detailed plan is generally developed to address risks and pollution arising during construction, operation and decommissioning of the OWF, which develops minimization measures and how to deal with such events. It is recommended that such procedures be created as a minimization measure.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below (Table 20).

Updating the parameters of the Project does not affect the outcome of the assessment in this regard. In turn, the fact of reducing the number of power plants and the associated reduction in the number of vessels both during construction and operation is an additional element that reduces the sources of impacts.

Table 20 Assessment of the impact on bats of chemicals and waste from construction, operation or decommissioning of the farm released accidentally into the sea (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bats (big bole)	Very large	Average	During the construction, operation or decommissioning of the farm, there	No change (No loss of the resource, no impact on the structure and	No change (magnitude of impact - no change, importance of

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			may be accidental release of waste associated with the process into the sea, and at any stage of the project there may be accidental release of various types of chemicals	operation of the resource)	the resource - very high)

11.5. Contamination of water depths and bottom sediments with antifouling agents

To protect the hulls of ships from overgrowth, biocides are used, which may include, for example, copper compounds, mercury compounds, organotin compounds (such as tributyltin - TBT). These substances can pass into the water's depths and eventually be retained in the sediment. It should be assumed that the emission of these compounds will be limited by dilution in the water depths. Of the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. TBT (the most harmful substance) is currently banned in antifouling paints, but the presence of these compounds in older units cannot be ruled out.

As a minimizing measure, it is recommended that vessels whose hulls have not been coated with TBT-containing antifouling paint be used at any stage of the project. This will eliminate this most harmful impact on aquatic organisms.

It is estimated that the possible occurrence of the above contingencies, due to the low bat activity recorded during the monitoring surveys, will not affect the structure and functioning of bats migrating through the Baltic Sea or cause their mortality.

An assessment of the significance of this impact for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015 is presented in the table below (Table 21).

The proposed change in the conditions for implementation and operation of the Project does not affect the outcome of the assessment in this regard. In turn, the fact of reducing the number of power plants and the associated reduction in the number of vessels both during construction and operation is an additional element that reduces the sources of impacts.

Table 21 Assessment of impacts on bats of antifouling agents released into the sea (unplanned impacts, any phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bats (big bole)	Very large	Average	During the normal operation of ships, the release of antifouling substances from	No change (No loss of the resource, no impact on the structure and	No change (magnitude of impact - no change, importance of

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			their hulls may occur	operation of the resource)	the resource - very high)

11.6. Cumulative impacts in emergency situations

The only unplanned impact that may be cumulative will be potential oil spills resulting from a disaster or collision.

In the case of simultaneous operation of several projects, vessel traffic in neighboring areas also increases, with an increased risk of such an event. In the vicinity of the farm is a heavily used shipping route (Traffic Separation Scheme TSS), in the area of which there is an increased risk of oil spills.

However, even with the assumption that the number of vessels in the construction / operation / decommissioning phases is doubled compared to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015, assessed in Chapter 9 of the report (then the assessment of the impact on bats remains unchanged, as shown in the table below.

Table 22 Assessment of the cumulative impact on bats of more petroleum substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Bats (big bole)	Very large	Average	In emergency situations, more oil spills may occur.	No change (No loss of resource, no impact on structure and operation of the resource)	No change (magnitude of impact - no change, importance of the resource - very high)

12. Assessment of the impact on the integrity, coherence and object of protection of Natura 2000 sites

This chapter analyzes the potential for the BII OWF, singly and in cumulation with other projects, to affect the integrity, coherence and object of protection of Natura 2000 areas as a result of impacts caused to bats. The assessment was performed in accordance with the methodology described in Section 5 of Volume I of the report.

12.1. Initial assessment - screening

Pre-assessment is the process by which the project's likely impacts on Natura 2000 sites are identified (either singly or in conjunction with other projects or plans) and an analysis is made of whether the anticipated impacts are likely to have a significant effect on these sites.

12.1.1. Zone of potential impacts of the OWF BIII

During the surveys in the BIII offshore wind farm area, 1 species of bats, the great booby, was found to be slightly active. Due to literature data indicating the possibility of bat activity in marine areas at a distance of 60-80 km from the shoreline (section 7.2 above), the zone of potential impacts of OWF BII on bats was set at 100 km.

12.1.2. Natura 2000 areas in the impact zone of the OWF BIII

The area designated for the project lies outside the boundaries of the areas of the European Natura 2000 network. The nearest area, PLC99001 Slupsk Shoal, is about 5.5 kilometers away. However, this is an area where bat species are not a focus of protection.

The Great Boer is not a subject of protection in any of the nearby Polish Natura 2000 areas (Council Directive 92/43/EEC of May 21, 1992), such as:

- Coastal waters of the Baltic PLB990002 (distance about 8.3 km to the S);
- Sarbska Spit PLH220018 (a distance of about 23.4 km to the S);
- Białogóra PLH220003 (a distance of about 30.4 km to the SE);
- Piasnickie Łąki PLH220021 (a distance of about 35.5 km to the SE);
- Ostoja Słowińska PLH220023 (distance approx. 18.9 km to the S);
- Pobrzeże Słowińskie PLB220003 (distance approx. 18.9 km to the S);
- Klify Poddębskie PLH220100 (a distance of about 35.6 km to the SW);
- Przymorskie Muds PLH220024 (a distance of about 52.8 km to the SW).

The closest Natura 2000 network areas where the big bole is present, but not protected, are:

- Lower Oder PLH320037 (Poland, a distance of about 300 km to the SW);
- Norra Fyledalen SE0430089 (Sweden, a distance of about 216 km NW);
- Åtvidsnäs SE0230219 (Sweden, a distance of about 350 km to the N);
- Händelö SE0230134 (Sweden, distance approx. 490 km to the N);
- Tåkern SE0230067 (Sweden, a distance of about 410 km to the N);
- Sandemar SE0110015 (Sweden, distance approx. 470 km to the N).

12.1.3. The object of protection of Natura 2000 areas in the zone impacts

No

12.1.4. Impacts of OWF BII on the object of protection, integrity, coherence of Natura 2000 areas

No

12.1.5. Zone of potential impacts cumulative

Impacts that may cumulate with the potential impacts of OWF BII described above (Chapter 7), caused by other projects described in Section 13 of Volume II of the report, will not go beyond the 100 km zone that was designated for the assessment of impacts of OWF BII on bats.

12.1.6. Natura 2000 areas in the zone of impacts cumulative

No

12.1.7. Object of protection of Natura 2000 areas in the zone of cumulation impacts

No

12.1.8. Cumulative impacts of OWF BII on the subject of protection, integrity, coherence of Natura 2000 areas

No

12.1.9. Results of the evaluation preliminary

Due to the lack of Natura 2000 areas with bats in the zone of potential impacts, and no bat migration route has been identified in the farm area, the BIII OWF will not have a significant impact on bats that are the subject of protection of Natura 2000 areas, or on their integrity and coherence.

13. Impacts transboundary

All of those identified over the BIII OWF area and in its vicinity, except for the small dwarf, are long-distance migrants, often making migrations of more than 1,000 kilometers.

The BIII OWF will be located in the open sea at a distance of 23 kilometers from the Polish coastline. The number of contacts recorded during monitoring surveys conducted over its area and over the neighboring body of water does not indicate the existence of a migration corridor for bats in the area of the farm in question. Therefore, the implementation of the project will not cause transboundary impacts on the population of identified bat species in other countries.

14. Proposal monitoring

In section II.2.a, concerning monitoring of bats during the operation stage, It is proposed to clarify the condition of the Environmental Decision set forth in paragraph. II.2.a by indicating that bat activity recorders will be deployed in no less than 6 in the first line of power plants on the western and southern boundary of the BIII OWF area, which is justified by the characteristics of previous bat sightings in the area of the planned farm and the infrastructure of offshore wind farms planned by other investors. It is also proposed to repeal the part of the condition concerning the study of bat mortality as part of post-implementation monitoring during the operation of the Project. Monitoring must be carried out with verified research methods. It should be noted that in the case of the study of bat mortality, there are no methods that give authoritative results for conducting such studies in marine areas. The nature of the environment, including wave action, ocean currents, and the activity of animals picking up dead specimens, makes it impossible to reliably design bat mortality monitoring within OWF BIII. This change

is also consistent with the rationale of the Environmental Decision, which indicates that bat monitoring should only be based on a survey of bat activity, and should be conducted on the same basis as monitoring prior to the Project. It should also be emphasized that the conditions for monitoring bat mortality were not specified in other environmental decisions for the OWF.

15. Summary and conclusions

According to the results of the assessment of the impact of OWF BIII on bats, the planned wind farm will not have a significant negative impact on these organisms at any stage of the project, for any of the considered variants of the project.

The proposed changes to the conditions for implementation and operation of the Project, including a significant reduction in the number of planned power plants, will reduce potential sources of impacts on bats. The change in parameters related to the increase in the maximum height of the power plant and the maximum rotor diameter is fully offset by the change in the number of power plants, consequently, the maximum total rotor zone in the case of changes in the parameters of the project will be 78% in relation to the parameters of the Project approved by the Environmental Decision, and 50% in relation to the set of parameters of the Project representing the most far-reaching scenario - NIS 2015.

Consequently, it should be considered that the modification of the Project will contribute to a reduction in the impacts on bats of OWF BIII compared to the parameters of the Project approved by the Environmental Decision. A summary of the assessment of the impact of the project at the stage of construction, operation and decommissioning in the BIII OWF area, as well as the impact of the proposed changes in the parameters of the Project on the significance of the impact are presented in the tables below.

Table 23 Assessment of the impact of changing the parameters of the Project on the results of the assessment of the impact of the BSIII OWF on bats - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Collisions	Very large	No	Insignificant	Small	Reducing impacts
Change of feeding grounds			Insignificant	Small	Reducing impacts

Table 24 Assessment of the impact of changing the parameters of the Project on the results of the assessment of the impact of the BSIII OWF on bats - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Collisions	Very large	No	Insignificant	Small	Reducing impacts
Barotrauma			Insignificant	Small	Reducing impacts
Change of feeding grounds			Insignificant	Small	Reducing impacts

Table 25 Assessment of the impact of changing the parameters of the Project on the results of the assessment of the impact of the BSIII OWF on bats - decommissioning stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact
Collisions	Very large	No	Insignificant	Small	Reducing impacts
Change of feeding grounds			Insignificant	Small	Reducing impacts

16. Shortcomings in technology and gaps in modern knowledge

Due to the lack of binding legal regulations in Poland on the methodology for monitoring bats and analyzing the impact of wind farms on their population, a methodology based on the draft "Guidelines for assessing the impact of wind farms on bats," prepared by Polish specialists and practitioners on behalf of the General Directorate for Environmental Protection in 2011 (Kepel et al., 2013), was adopted for the study of bats in the area of the planned project. It is based on acoustic observations on planned transects covering the entire study area, as well as acoustic observations at selected control points (static observations), and in the main, the research methods, analyses and results presented in the above project relate to wind farms located onshore.

A major obstacle during the analysis of the environmental impact assessment of the offshore wind farm was the lack of information regarding research on bat migration routes or exit points from the Polish coast. Existing data on bats at operating offshore wind farms is poor. Most of the information on bat activity surveys relates to farms located close to the shore. Detailed data on the chiropterofauna occurring farther from the shore are lacking.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 8

Cultural heritage impact assessment

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Abbreviations and definitions

BHMW	Navy Hydrographic Office
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
EPSA	Records of Underwater Archaeological Sites
OWF BIII / Project	Offshore wind farm OWF Central Baltic III
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
EIA	Environmental impact assessment
PPIS	State District Sanitary Inspector
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report/ EIA/ RIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
TSS	Traffic Separation Scheme
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (consolidated text, Journal of Laws of 2022, item 1029)

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of updating the conditions for implementation and operation of the Project - OWF BIII, for which the Environmental Decision was issued, on cultural heritage is included in Section 5.8 of Volume VI of the Report.

2. Introduction

This section of the Report assesses the potential impacts of the proposed changes to the conditions for implementation and operation of the Project - OWF BIII on cultural heritage, as defined by the Environmental Decision. It is based on the research and analysis and findings made for the impact assessment done in the 2015 Report. It should be pointed out here that these data remain valid for the variant indicated for implementation under the Environmental Decision. In the case of the variant proposed for implementation on the basis of an amendment to the Environmental Decision, they should also be considered adequate, which is due to the fact that the scale of the planned Project changes, where its parameters related to the number of wind power plants are reduced by 50% in relation to the Environmental Decision, a decisive part of the parameters remain the same, and some of the parameters indicated in the Environmental Decision as possible to be later clarified, such as the method of foundation. the method of foundation, even in the case of parameters that increase, such as the total height of the power plant or the diameter of the rotor, changes in this regard will not affect changes in the scope and nature of impacts on cultural heritage, and the simultaneous change in the number of power plants offsets the possible impact of individual changes.

Changes in the description of the project are primarily related to technological progress and the subsequent optimization of the technical solutions of the power plant, as well as the refinement of the approved variant, resulting from the progress of design work, including the development of a preliminary plan for the farm and the reduction of the wind power foundation technologies considered for use. The updated parameters of the BIII OWF are the subject of both the description of the Project and the basis for conducting the impact assessment.

The assessment refers to changes in the conditions for implementation and operation of the Project in relation to the variant, which is the subject of the currently valid Environmental Decision, and analyzes whether they are likely to change the impacts identified earlier. The assessment used the Environmental Impact Assessment conducted in 2015 as part of the Report[1], on the basis of which the Environmental Decision[2]was issued.

This section of the report analyzes the potential impacts of OWF BIII on objects of great significance for the protection of cultural heritage. The assessment was based on the results of an archaeological survey conducted by the Maritime Institute in Gdansk in the area of OWF BIII and in a 1-mile buffer around its borders as part of a comprehensive pre-investment marine environmental research program conducted for the planned wind farm in 2012 - 2014. Their results are described in Section 12 of Volume III of the report.

Acquired data on known objects in the Database of Underwater Objects ("BDOP") of the Navy Hydrographic Office was also used for the assessment.

The results of DHI's modeling of suspended solids spreading and sea current regime shifts, which can be found in Section 11 of Volume II of the report, were also used for the assessment.

[1] Environmental impact report, SDMI Doradztwo inwestycyjna Sp. z o.o., April 2015

[2] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016.

3. Description of the planned project

The parameters of the BIII OWF that are relevant to the analysis of the project's impact on objects of great importance for the protection of cultural heritage are:

- farm location,
- area of the farm - total and buildable,
- foundations - types, number and seabed area occupied by them,
- power cables - their length and the surface of the bottom disturbed during their laying.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, as well as their changes from the variant specified in the Environmental Decision, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.1. Projects whose impacts may cumulate with those of OWF BIII on cultural heritage

In the area of OWF BIII, no existing, ongoing or planned projects for which an environmental decision has been issued have been identified that could potentially, together with OWF BII, cause cumulative impacts on cultural heritage (see Section 13 of Volume II of the Report).

4. Existing pressures anthropogenic

No significant anthropogenic pressures have been recorded in the area of the proposed BIII offshore wind farm, which could affect objects of great significance for the protection of cultural heritage.

The Baltic Sea is the body of water with the highest volume of shipping traffic in the world. The area of OWF BIII is outside the shipping lane, but in close proximity to it (e.g., TSS - about 0.8 km to the south). For more information on ship traffic, see Chapter 14 of Volume III of the Report.

Seasonally, there is fishing-related tourist traffic in the area. During the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality, which may have an indirect effect on sediments. In addition to the aforementioned possibility of contamination of the area, the number of anchorages in the region may also increase.

Commercial fishing by fishing boats is carried out in or near the study area. One form of fishing that affects the bottom is fishing trawling. This activity may cause disturbance of the bottom structure and degradation of existing heritage objects on the bottom. However, the intensity of this activity is low, especially since, in general, the fishery productivity (catch per area) in the area of the planned wind farm, as well as in its immediate vicinity (fishing squares M8, N8, M7, N7) is low in relation to the average fishery productivity in Polish marine areas. The area also saw significantly lower-than-average fishing fleet activity. Detailed information in this regard is presented in the report with the results of fisheries monitoring (Volume III Section 13 of the report), while the impact assessment is presented in Chapter 10 of Volume IV of the report.

There are also no anthropogenic pressures associated with seabed mineral extraction in the study area. Their deposits have not been documented, and the area is not used for mining.

In the area of OWF BIII, no other offshore activities were observed that could affect the development of the seabed, i.e.: nature conservation areas (based on GDOŚ Geoportal), resource extraction areas (Table XVII of the South Baltic Lithological Atlas), areas of military activities (no need to apply for survey permits), ammunition dumping sites (HELCOM report), flapping sites, i.e. sites of deposition of dredged material from dredging of port channels.

5. Description of the expected consequences if the project is not undertaken project

This chapter analyzes the effects on objects of great importance for the protection of cultural heritage if the project is not undertaken. In doing so, three scenarios were considered:

- offshore wind energy will not be developed in the Polish maritime areas, so the assessed OWF BII project, or any similar project, will not be implemented,
- offshore wind energy will be developed in Polish maritime areas, but the project under evaluation - BII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind power are not being made, but the mining industry is developing.

The results of the analysis are shown in the table below. Since the project has not been relocated, but only slightly reduced in scope, the effects of not undertaking it are the same as those discussed in the 2015 Report.

Table 1. Effects on objects of great significance for the protection of cultural heritage if the project is not undertaken

Lp.	Script	Effects on objects of great importance for the protection of cultural heritage
1.	Offshore wind energy will not be developed	No action related to the construction, operation or decommissioning of offshore wind farms would mean that these projects would have no impact on objects of significance for the protection of cultural heritage. The area designated for OWF BIII will remain unchanged and continue to be used as before (no navigation obstructions, fishing area). It will be possible to explore, identify and extract potential deposits in the area. In the analyzed area, due to the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality, which may have an indirect impact on archaeological sites. Bottom trawls used for fishing are one of the biggest immediate threats to archaeological sites on the bottom (Delgado & Staniforth, 2010, p.5). The B96.1 shipwreck located during the bottom inventory of the area of the planned OWF BIII could be used for tourism. The wreck has little historical value, so it could be made available for wreck diving if properly prepared.
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	From the point of view of impacts on objects of significance for the protection of cultural heritage, the location of the project, the number and distribution of foundations, the route of power cables, and the type of sediments present in the planned locations of other OWFs are of key importance. The area designated for OWF BIII will remain unchanged and continue to be used as before (no navigation obstructions, fishing area). It will be possible to explore, identify and extract potential deposits in the area. In

Lp.	Script	Effects on objects of great importance for the protection of cultural heritage
		the analyzed area, due to the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality, which may have an indirect impact on archaeological sites. Bottom trawls used for fishing are one of the biggest immediate threats to archaeological sites on the bottom (Delgado & Staniforth 2010, p.5). The B96.1 shipwreck located during the bottom inventory of the area of the planned OWF BIII could be used for tourism. The wreck has little historical value, so it could be made available for wreck diving if properly prepared. Construction of offshore wind farms in locations other than offshore wind farm BIII reduces potential direct negative impacts on the B96.1 shipwreck located within the boundaries of offshore wind farm BIII, related to the construction, operation and eventual decommissioning of offshore wind farm BIII (e.g., threat of direct damage to the wreck by ship anchors, etc.). If objects of importance for the protection of cultural heritage (e.g., a shipwreck) are inventoried in the areas of other planned farms, during the construction, operation and eventual decommissioning of these projects there may be a direct threat to these objects - in particular, there is a risk of direct damage to them (e.g., by ship anchors) or impacts related to the uplift, dissolution and redeposition of suspended solids. A greater impact involving the formation of greater long-lived suspended solids will be observed for clayey sediments (with a high content of organic matter and fine fractions). The smallest impact will be on the location of offshore wind farms in the area of coarse sands (with a low content of fine fractions). Due to the lack of information on objects of value for cultural heritage protection in neighboring fields, it is impossible to determine conclusively whether another location for the project would be more favorable.
3.	Offshore wind power will not develop, but mining industry will grow	The area designated for OWF BIII will remain unchanged and continue to be used as before (no navigation obstructions, fishing area). In the analyzed area, due to the normal operation of ships, spills of various types of substances (diesel and lubricating oils, gasoline, etc.) may enter the water depths in small quantities, causing deterioration of water quality, which may have an indirect impact on archaeological sites. Bottom trawls used for fishing are one of the biggest immediate threats to archaeological sites on the bottom (Delgado & Staniforth 2010, p.5). The B96.1 shipwreck located during the bottom inventory of the area of the planned OWF BIII could be used for tourism. The wreck has little historical value, so it could be made available for wreck diving if properly prepared. It will be possible to explore, identify and extract potential deposits in the area. If the mining industry develops, significant disturbance of the sediment structure and associated lifting, spreading and deposition of suspended solids will be observed. Without the application of a special protection zone for the inventoried wreck and other possible valuable objects, they may be damaged or even destroyed.

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

6. Methodology for assessing the impact on environmental

The project's impact assessment was conducted in accordance with the framework methodology adopted by the project, as described in Chapter 5 of Volume I of the Report.

The assessment of potential impacts of the BIII OWF in the 2015 Report was based on the analysis of the set of parameters of the Project, which is the most far-reaching scenario - NIS 2015, which has the highest negative impact on abiotic elements. It was considered that with regard to cultural heritage, such a scenario is the construction of 200 wind turbines and 6 foundations of supporting infrastructure, internal connection infrastructure in the form of cables with a total maximum length of 200 km. It was considered that any other scenario considered for the Project, including the option selected for implementation, would result in environmental impacts equal to or less than the 2015 NIS. The variant identified for implementation as a result of the Project update consists of 60 power plants, about 70% less than in the 2015 NIS, and also involves abandoning the use of gravity foundations for power plants and reducing the number of substation foundations from 6 to 1 unit.

The impact assessment of the planned project also took into account the cumulative visual impacts with other projects.

An assessment of the impact on cultural heritage sites was carried out for the various stages of the project: construction, operation and decommissioning.

6.1. Protection zones around wrecks

For the purposes of this impact assessment, it has been assumed that in order to ensure the safety of crews working in the area of the farm at each stage, i.e. construction, operation and decommissioning, a protection zone is designated around the identified wrecks, within the boundaries of which no anchoring of ships or placement of farm components, including the laying of cables, is allowed. The designation of such a zone is also aimed at eliminating uncontrolled dilution of elements of a given wreck by accidental trawling of the ship's anchor.

It was initially assumed that 50-meter protection zones would be designated, but it should be emphasized that the size of such a zone should be verified in each case after detailed magnetometer surveys performed at a later stage of the project.

Therefore, this impact assessment did not consider cases of wrecks without designated protection zones.

7. Potential impacts of offshore wind farms offshore wind farms

In this chapter, potential impacts of offshore wind farms at different stages of investment are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding the potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report (SMDI 2015).

7.1. Stage construction

During the construction phase of an offshore wind farm, archaeological sites can be completely destroyed by foundations or damaged by the anchors of ships working on the construction. It should be

noted that any destruction of an archaeological object is permanent, with no possibility of restoring the original condition of the artifact in question (Cooper V. et al., 2011).

Table 2. Potential impacts of the OWF on objects of great importance for the protection of cultural heritage - construction phase

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Damage or complete destruction of archaeological sites by ship anchors	During the construction of the OWF, archaeological sites may be completely destroyed or damaged by the anchors of ships (or the legs of jack-up ships) working on the construction. Any destruction of an archaeological object is permanent, with no possibility of restoring the original condition of the artifact in question (Cooper V. et al., 2011). The most important factors affecting the level of impact are: • location of archaeological sites in relation to the constructed elements of the OWF, • the volume of ship traffic and their flow routes, • the size of the designated protection zone around archaeological sites.
Damage or complete destruction of archaeological objects during gravity foundation placement and cable laying	Preparation of the bottom for foundations and foundation placement can damage or completely destroy archaeological material located at the site of installed foundations (Cooper V. et al., 2011). The most important factors affecting the level of impact are: • location of archaeological objects in relation to the foundations to be laid, • number of foundations (area of occupied seabed), • the size of the designated protection zone around archaeological sites.
Damage or complete destruction of archaeological objects during installation of pile foundations	In the process of driving the piles, using a hydraulic hammer, there will be vibrations that can liquefy the top layer of sediments and uncover archaeological objects, so they can undergo erosion processes much faster. Pile foundations (monopiles, jacket, tripod) interfere with deeper sediments. This can directly destroy archaeological material found in deeper sediments (Sparvath K.S., 2012). The most important factors affecting the level of impact are: • location of archaeological objects in relation to the installed foundations, • dimensions and number of foundations, • the type of material that makes up the top layer of sediment, • the size of the designated protection zone around archaeological sites.
Ground settlement	Depending on the mass, the foundation can cause soil compaction, i.e. compaction due to a reduction in the number of free spaces between sediment grains, resulting in subsidence of the soil, which may contain archaeological material (Sparvath K.S., 2012). The most important parameters affecting the level of impact are: • types, dimensions, weight and number of foundations, • a type of rock material that forms the seabed.

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Exposure of archaeological objects	Installing foundations and cables on the bottom can expose archaeological objects by removing some of the sediment or liquefying their top layer. Exposed archaeological valuables can undergo erosion processes much faster (Heywood E., 2012). The most important factors affecting the level of impact are: • location of archaeological objects in relation to the installed foundations and cable route, • dimensions and number of foundations and length of cables, • the type of material that makes up the top layer of sediment.
Deposition of agitated sediment	During the construction of the OWF, work will be carried out that will disturb the structure of the bottom sediments. These include, in particular, the installation of foundations and the laying of power cables. Such disturbances will also be caused by anchoring vessels. As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and dissolve in the water depths, and then be re-deposited on the bottom. The subsidence of the sediment stirred up during construction can have positive effects by covering the archaeological site with an additional protective layer. The most important factors affecting the level of impact are: • location of archaeological objects in relation to the installed foundations and cable route, • the dimensions and number of foundations to be built and the length of cables to be laid, • the type of material that makes up the sediment layer.
Discovery of new objects	Additional detailed reconnaissance of the bottom of the area for individual structural elements of the offshore wind farm can be positive and contribute to the discovery of other important cultural heritage elements that would otherwise be unmarked and exposed to uncontrolled destruction by other offshore economic activities (e.g., fishing, mineral extraction, both aggregates and hydrocarbons). The most important factors affecting the level of impact are: • location of archaeological sites in relation to the installed elements of the farm, • the scope and methodology of geotechnical studies of the seabed.
Pollution of water bodies and bottom sediments with petroleum substances	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. From this source, about 33% of the oil entering the environment enters the waterways (mainly due to increased ship traffic in the Baltic Sea region (Kaptur G., 1999). In comparison, about 37% of the oil that enters the sea comes from river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster).

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
	Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. Contaminated sediments can coat archaeological sites. The most important factors affecting the level of impact are: • the type and amount of oil substances released, • weather conditions, • a type of rock material that forms the seabed.
Pollution of the water body with accidentally released chemicals	During the construction of a wind farm, various chemicals may be accidentally released into the sea. The contamination of water with chemicals and the associated change in water quality can affect the intensity of destruction of uncovered archaeological objects. The most important factors affecting the level of impact are: • the type and amount of waste or chemicals released, • weather conditions.

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

7.2. Stage operation

Potential impacts on archaeological sites at the operational stage are related to direct damage caused by routine inspections (monitoring) and maintenance work of wind turbines (Cooper V. et al., 2011).

Table 3. Potential impacts of the OWF on objects of great importance for the protection of cultural heritage - operation stage

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Damage or complete destruction of archaeological sites by ship anchors	During the operation of the OWF, archaeological sites may be completely destroyed or damaged by the anchors of ships servicing farm components. Any destruction of an archaeological object is permanent, with no possibility of restoring the original condition of the artifact in question (Cooper V. et al., 2011). The most important factors affecting the level of impact are: • location of archaeological sites in relation to the serviced elements of the OWF, • the volume of ship traffic and their flow routes, • the size of the designated protection zone around archaeological sites.
Ground settlement	Depending on the mass, the foundation may cause soil compaction, i.e. compaction due to a reduction in the number of free spaces between sediment grains, resulting in subsidence of the soil, which may contain archaeological material (Sparvath K.S., 2012). The most important parameters affecting the level of impact are: • types, dimensions, weight and number of foundations,

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
	• a type of rock material that forms the seabed.
Exposure of archaeological objects	The foundation structures of individual farm facilities may cause changes in the regime of sea currents, which may result in the exposure of archaeological objects. Exposed archaeological valuables can undergo erosion processes much faster (Heywood E., 2012). The most important factors affecting the level of impact are: • dimensions, number and compaction of foundations, • the type of material that makes up the top layer of sediment.
Pollution of water bodies and bottom sediments with petroleum substances	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. Approximately 33% of the oil entering the environment enters waters from this source, mainly due to increased ship traffic in the Baltic Sea region (Kaptur G., 1999). In comparison, about 37% of the oil that enters the sea comes from river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster). Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. Contaminated sediments can coat archaeological sites. The most important factors affecting the level of impact are: • the type and amount of oil substances released, • weather conditions, • a type of rock material that forms the seabed.
Pollution of the water body with accidentally released chemicals	During the operation of a wind farm, various chemicals may be accidentally released into the sea. The contamination of water with chemicals and the associated change in water quality can affect the intensity of destruction of uncovered archaeological objects. The most important parameters affecting the level of impact are: • the type and amount of waste or chemicals released, • weather conditions.

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

7.3. Stage decommissioning

During dismantling, the impacts of an offshore wind farm are similar to those presented during the construction phase (Chapter 7.1.). Impacts on archaeological sites will not occur if underwater elements of the farm are left in place (Cooper V. et al., 2011).

Table 4. Potential impacts of the OWF on objects of great importance for the protection of cultural heritage - decommissioning stage

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Damage or complete destruction of archaeological sites by ship anchors	During the decommissioning of the OWF, archaeological objects may be completely destroyed or damaged by the anchors of ships working to dismantle elements from the farm area. Any destruction of an archaeological object is permanent, with no possibility of restoring the original condition of the artifact in question (Cooper V. et al., 2011). The most important factors affecting the level of impact are: • location of archaeological sites in relation to the decommissioned elements of the OWF, • the volume of ship traffic and their flow routes, • the size of the designated protection zone around archaeological sites.
Damage or complete destruction of archaeological objects during dismantling of foundations and cables	During the dismantling of elements of the farm (foundations, cables), archaeological material located in the area of the dismantling work may be damaged or completely destroyed (Cooper V. et al., 2011). The most important factors affecting the level of impact are: • location of archaeological sites in relation to the decommissioned elements of the farm, • the number of dismantled foundations and the length of cables, • the size of the designated protection zone around archaeological sites.
Exposure of archaeological objects	Dismantling work on foundations and cables on the bottom may expose archaeological objects by removing some of the sediment or liquefying their top layer. Exposed archaeological valuables can undergo erosion processes much faster (Heywood E., 2012). The most important factors affecting the level of impact are: • the location of archaeological objects in relation to the dismantled foundations and cable route, • dimensions and number of dismantled foundations and length of cables, • the type of material that makes up the top layer of sediment.
Deposition of agitated sediment	During the decommissioning of the OWF, work will be carried out that will disturb the structure of the bottom sediments. These include, in particular, the removal of foundations and power cables. Such disturbances will also be caused by anchoring vessels. As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and dissolve in the water depths, and then be re-deposited on the bottom. The subsidence of the sediment stirred up during the dismantling work can have positive effects by covering the archaeological site with an additional protective layer. The most important factors affecting the level of impact are: • the location of archaeological objects in relation to the dismantled foundations and cable route,

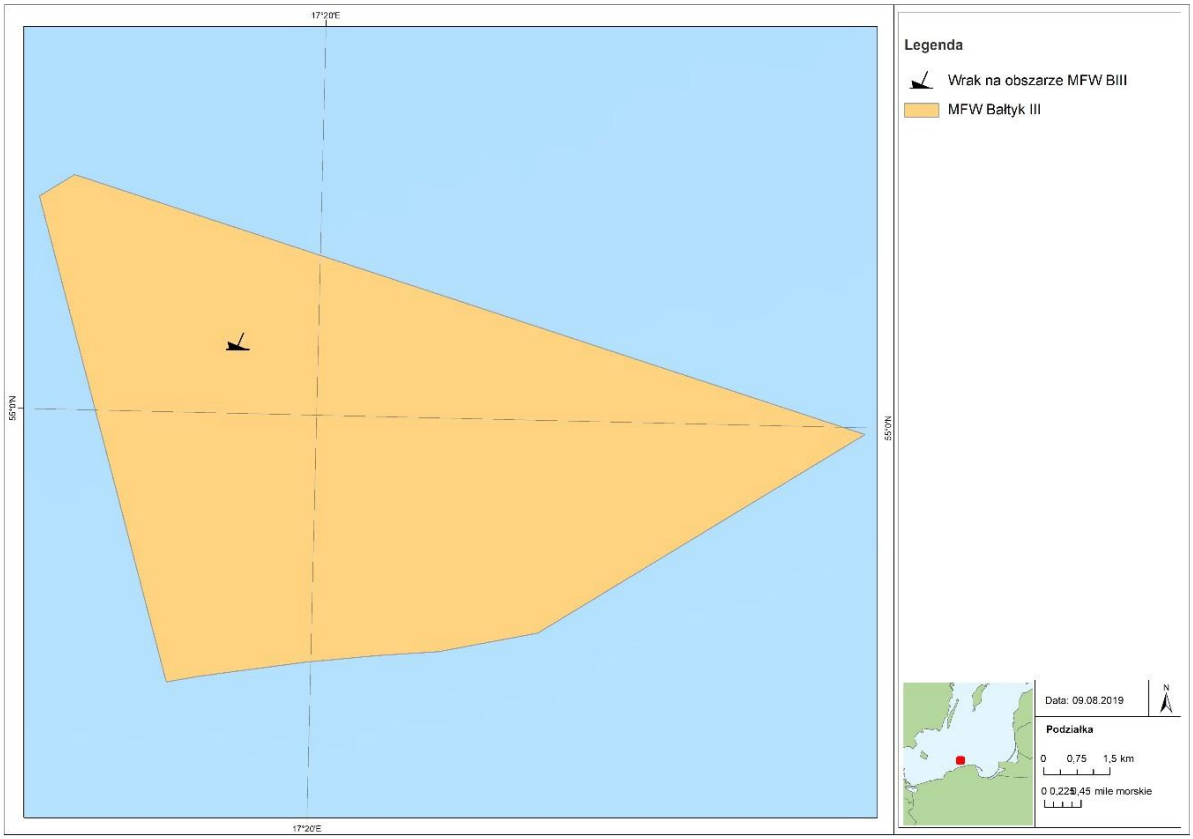
Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
	• the dimensions and number of dismantled foundations and the length of dismantled cables, • the type of material that makes up the sediment layer.
Pollution of water bodies and bottom sediments with petroleum substances	At each stage of the project, vessels (ships, barges, etc.) will be used, from which small spills of petroleum substances (lubricating and diesel oils, gasoline, etc.) into the water depths may occur during normal operation. Pollution entering the water's depths during normal ship operations is the second largest source of oil pollution at sea. From this source, about 33% of the oil entering the environment enters the waterways (mainly due to increased ship traffic in the Baltic Sea region (Kaptur G., 1999). In comparison, about 37% of the oil that enters the sea comes from river runoff from land, and only in third place are tanker disasters (12%). Release of petroleum substances can also occur in emergency situations (ship failure or collision, power substation failure, construction disaster). Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. Contaminated sediments can coat archaeological sites. The most important factors affecting the level of impact are: • the type and amount of oil substances released, • weather conditions, • a type of rock material that forms the seabed.
Pollution of the water body with accidentally released chemicals	During the decommissioning of a wind farm, various chemicals may be accidentally released into the sea. The contamination of water with chemicals and the associated change in water quality can affect the intensity of destruction of uncovered archaeological objects. The most important parameters affecting the level of impact are: • the type and amount of waste or chemicals released, • weather conditions.

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

8. Receptors under evaluation impact

There is one shipwreck in the IMF BIII area (see Volume III Chapter 12). The wreck is tentatively dated to the early 20th century. This is evidenced by both the steam propulsion system and the mixed steel and wood plating. The site is listed in the Inventory of Underwater Archaeological Sites ("EPSA") under the symbol B96.1.

Figure 1. Location of the wreck in the area of the OWF BIII field



Legenda	Legend
Wrak na obszarze MFW BIII	Wreck in the area of OWF BIII
MFW Bałtyk III	OWF Baltic III
Data: 09.08.2019	Date: 09.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

The length of the wreck is about 60.4 meters, the width is 9 meters (debris scattered over a width of 16 meters). The wreck protrudes above the bottom from about 2 to 4.5 meters. The initial depth around the wreck was estimated at 32.5 meters, and the minimum depth above the wreck at 28.0 meters. The bottom around the wreck is sandy, and the wreck is heavily covered with sand. The wreck during the planned investment works will be a bottom obstacle, significantly hindering both any work requiring anchoring in the area and the siting of power plant foundations or the laying of cables. The wreck was found to have little historical value; however, it could successfully serve as a tourist attraction.

Its importance as a resource (the subject of the impact assessment) was determined to be medium.

It should be emphasized that the vulnerability of archaeological sites, including wrecks, to potential OWF impacts causing their destruction or damage is high or even very high. This is because the effects of such impacts are irreversible.

A review of geological cores from the BIII offshore wind farm field, conducted for the presence of archaeological relics (i.e., elements of cultural heritage from prehistoric periods), and an analysis of the reconstructed paleolandscape ruled out the possibility of finding paleolandscape relics in the BIII offshore wind farm field.

9. Assessment of the impact of the BIII offshore wind farm on objects of great significance for

heritage protection cultural heritage

The chapter directly cites the description of impacts that was presented in the 2015 Report (SMDI 2015).

9.1. Stage construction

During the construction of the BIII OWF, works will be carried out that may cause impacts on objects of great significance for the protection of cultural heritage located in the project area, the most significant of which are:

1) drilling performed during geotechnical studies,
2) preparation of the bottom prior to the installation of the foundation, including dredging of the bottom, removal of the sediment layer with a thickness of about 2 - 3 m and replacing it with rock material with a higher bearing capacity (only in the case of gravity foundations, which can be used in the currently proposed variant of the Project only for supporting infrastructure),
3) drilling or driving foundations (only in the case of monopiles, jacket or tripod foundations, while in the currently requested variant of the Project tripod foundations can be used only for supporting infrastructure),
4) anchoring jack - up platforms and support units during the assembly of farm components,
5) burying cables in the seabed,
6) heaping of rock material serving as protection against leaching, A full description of the construction work is provided in Section 4 of Volume II of the EIA.

Considering that the location of the identified wreck within the farm area has been recognized and can be taken into account in the process of designing the farm, the analysis of the impact of damaging or completely destroying archaeological objects as a result of direct interference with this object during the installation of foundations and cables has been abandoned.

In the case of the Project update, 60 wind power plants are assumed and the following types of foundations for wind power plants are assumed: monopile and jacket (truss) type. The following types of foundations are allowed for the offshore substation: monopile, tripod, jacket (truss) or gravity type. The solution adopted for implementation will depend on design solutions. Therefore, the use of a gravity foundation will only be possible for one marine substation foundation.

In addition, the location of the wreck identified within the boundaries of the farm area was taken into account during the development of the preliminary development plan for OWF BIII (see Chapter 8 of Section 1 of Volume II of the Report).

At the stage of construction of OWF BIII, the following impacts of OWF BIII are expected to occur:

1) damage or complete destruction by ship anchors,
2) exposed during the foundation of gravity foundations and cable laying (by removing some of the sediment or liquefying the top layer of sediment),
3) damage during the installation of pile foundations (by liquefaction of the top layer of sediment),
4) sedimentation of agitated sediment.

There may also be unplanned impacts during the construction of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,

2) accidentally released chemicals from the construction of the farm. Unplanned impacts are assessed in Chapter 11.

During geotechnical investigations and construction activities, new, previously unidentified archaeological sites may be discovered, which, due to the lack of knowledge of their existence, were not included in the impact assessment presented in this report.

9.1.1. Damage or complete destruction by anchors vessels

The B96.1 wreck will be a bottom obstacle that will significantly impede any work requiring anchoring in the area of the BIII OWF under construction. During the construction phase, the wreck may be damaged by the anchors of ships (including the legs of jack-up ships) involved in the construction of the farm. It can also be diluted by accidental trawling by ship anchors. Any destruction of an archaeological object is permanent, with no way to restore the artifact to its original state (Cooper, Howell, Hamel 2011).

The impact assessment assumes that a 50-meter protection zone will be set around the wreck, where no ship anchoring will be allowed. This is a preliminary assumption, and the final size of the zone will be determined at a later stage of the project. This zone will, on the one hand, serve to ensure the safety of ship crews working in the farm area, and on the other hand, reduce the risk of damage to the wreck, so it can be considered a measure to minimize the negative impacts of OWF BIII, which should be implemented to protect the wreck. It is recognized that with the application of the protection zone, damage to the wreck by ship anchors will be accidental, although such a case (i.e., the failure of the ship to comply with the rules of the zone) cannot, of course, be fully excluded.

Damage or complete destruction of the wreck by ship anchors during the construction phase is a direct, negative impact of local extent, irreversible, temporary, repeatable during the construction period, of medium intensity. It should be noted that the designation of a protection zone significantly reduces the likelihood of such an incident.

An assessment of the significance of this impact for the most far-reaching scenario that could occur under the reasonable alternative is presented in the table below.

Table 5. Impact assessment involving damage or complete destruction of the wreck by ship anchors (construction phase)

Subject	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small (when a designated protection zone)	The wreck may be damaged or destroyed by ship anchors during construction work. The damage to the wreckage is irreversible.	Insignificant (scale of exposure - local, duration - temporary, intensity - medium)	Negligible (importance of the resource - medium, magnitude of impact - insignificant)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

In the variant that is the subject of this Report, about 70% fewer power plants, and thus their foundations, will be built than envisioned for the set of parameters of the Project constituting the 2015 NIS, and twice as many as specified in the Environmental Decision, which entails a lower risk of damage or wreckage during the construction of the farm. The location of the identified wreck was included in the preliminary development plan for the wind farm. It is therefore considered that the project will cause significantly lower impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.2. Exposure during gravity foundation placement and cable laying cables (by removing some of the sediment or liquefying the top layer of sediment)

The installation of foundations and the laying of cables may expose archaeological objects by removing some of the sediment or liquefying the top layer of sediment. Exposed archaeological sites can undergo erosion processes much faster (Heywood E., 2012).

Exposure of buried shipwreck fragments during gravity foundation placement and cable laying during the construction phase is a direct, negative impact of local extent, irreversible, short-term, repeatable during the construction period, with medium intensity.

The significance of this impact has been significantly reduced as a result of the proposed modifications to the Project's conditions by excluding the possibility of using gravity foundations under the power plants and by including the location of an identified archaeological site in the preliminary development plan for OWF BIII. The table below shows the assessment of impacts from the 2015 Report for the set of parameters of the Project representing the most far-reaching scenario - NIS 2015.

The impact assessment in the 2015 Report assumes that a 50-meter protection zone will be set around the wreck, where no farm components, including foundations and cables, will be allowed to be located. This is a preliminary assumption, and the final size of the zone will be determined at a later stage of the project. This zone can be considered as a measure to minimize the negative impacts of OWF BIII, which should be implemented to protect the wreck. Given that even in the most far-reaching scenario - NIS 2015, the significance of the impact is negligible, it was concluded that other minimization measures are not required.

In the variant adopted for implementation, 60 wind turbines will be built with monopal foundations (jacket foundations are allowed in justified cases) instead of the gravity foundations discussed in the 2015 Report. In the variant of the Project approved by the Environmental Decision, it was assumed that 120 power plants would be implemented. The Project update will result in 50% fewer foundations than envisioned in the Environmental Decision and 70% fewer than in the set of Project parameters constituting the 2015 NIS, so the risk of exposing buried wreck fragments will be significantly minimized. A gravity foundation is allowed only for the implementation of an offshore substation. The length and number of cables with the implementation of the variant associated with the construction of 60 wind turbines will not increase compared to the variant approved by the Environmental Decision.

Table 6. Impact assessment involving exposure of a buried section of wreckage during gravity foundation placement and cable laying due to liquefaction of the top layer of sediment (construction phase, NIS 2015)

Subject	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small (when a designated protection zone)	Construction work may expose fragments of the wreckage, which may then be destroyed. The damage to the wreckage is irreversible.	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (importance of the resource - medium, magnitude of impact - insignificant)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

After additional analysis, the variant selected for implementation plans to use monopile foundations for all wind turbines in the Project. If it is not technically possible to install this type of foundation for any of the planned power plants, the use of jacket foundations is envisioned. In the case of an indoor marine substation, there is no way to limit the type of foundations considered at this stage. Accordingly, an indoor marine substation can be placed on a foundation: monopile, tripod, jacket (truss) or gravity foundation. The final decision on the foundation method will be determined in the construction project, based on verified studies of geotechnical conditions adapted to the selected types of generators and stations.

In the preliminary development plan for the farm, the location of the shipwreck was taken into account, assuming that greater distances are maintained from the existing shipwreck than in the parameters of the Project approved by the Environmental Decision. It is therefore considered that the project will cause significantly lower impacts from both the set of parameters of the Project constituting the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.3. Damage during installation of pile foundations (through liquefaction of the top layer of sediments)

Vibrations generated during the driving of monopiles and jacket or tripod foundations could cause liquefaction of the top layer of sediments, which could lead to damage to the B96.1 wreck, even despite the use of a protection zone. The direct impact of vibrations can be felt at a distance of several meters from the driven pile. It should be noted that such an impact can only occur if the project uses pile foundations, which will be located in close proximity to the wreck.

Damage or complete destruction of the wreckage during the installation of pile foundations during the construction phase is a direct, negative impact of local scope, irreversible, short-term, repeatable during the construction period, of medium intensity.

The table below shows the assessment of impacts from the 2015 Report for the sets of parameters of the Project representing the most far-reaching scenario - NIS 2015.

The impact assessment in the 2015 Report assumes that a 50-meter protection zone will be set around the wreck, where no farm components, including foundations and cables, will be allowed to be located. This is a preliminary assumption, and the final size of the zone will be determined at a later stage of the project. This zone can be considered as a measure to minimize the negative impacts of OWF BIII, which should be implemented to protect the wreck. Given that even in the most far-reaching scenario - NIS 2015 , the significance of the impact is low, it was considered that other minimization measures are not required. It should be noted that gravity foundations do not cause this type of impact, so their use in the immediate vicinity of the wreck would be beneficial from the point of view of the potential impact of the investment on the discovered object. However, this recommendation is not binding, as the discovered wreck has no major archaeological value, and it is additionally envisaged to establish a protection zone.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the Project update, 50% of the power plants will be realized in relation to the parameters of the Project approved by the Environmental Decision, consequently, the risk of destruction or permanent damage to the wreckage will be proportionally lower.

Table 7. Impact assessment involving wreck damage during installation of pile foundations (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Medium (when designated protection zone)	The wreckage may be damaged during construction work. The damage to the wreckage is irreversible.	Small (scale of exposure - local, duration - short-term, intensity - very high)	Small (importance of the resource - medium, magnitude of impact - small)

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisaged for the set of parameters of the Project constituting the 2015 NIS, and twice as many as specified in the Environmental Decision, which entails a lower risk of damage or wrecking during the construction of the farm. In the preliminary development plan for the farm, the location of the shipwreck was taken into account, assuming that a greater distance from the existing shipwreck was maintained than in the parameters of the Project approved by the Environmental Decision. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.4. Deposition of agitated sediment

During the construction of the offshore wind farm, work is being carried out to disturb the structure of the bottom sediments. These include, in particular, the installation of gravity foundations (if such

foundations are used in the project) and the laying of power cables. Such disturbances will also be caused by anchoring vessels and by unplanned activity in the form of unexploded ordnance explosions.

As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and dissipate (resuspension) in the water depths, and be re-deposited on the bottom.

The suspended solids stirred up during construction activities will re-deposit on the seabed after a while. Since in the key parameters affecting the results of the modeling of suspended solids spreading and sedimentation, the parameters of the BIII OWF are within or very close to the originally assumed parameters of the farm in the area (BSIII OWF), for the purposes of the Report, the model developed for the previously made assumptions (SMDI 2015) was used. The results of the modeling should be considered as the most far-reaching scenario of potential impacts related to the agitation of the BIII OWF sediments. The rationale for the approach taken can be found in Chapter 4 of Volume II of the Report. In the same chapter, Figure 6 shows the extent and scale of suspended solids redeposition in the NIS resulting from the modeling in question.

In addition, the layer of sediment that settles to the bottom should not exceed 3.5 mm at any point in this area. This means that the B96.1 wreck, located within the boundaries of the area, will not be covered with sediment. The fall of the sediment stirred up during construction in such a quantity can be considered a positive impact - the wreck will be covered with an additional protective layer.

The deposition of disturbed sediment during the construction phase is a direct, positive impact of local extent, reversible, short-term, repeatable during the construction period, of medium intensity.

An assessment of the significance of this impact for the most far-reaching scenario that could occur under the reasonable alternative is presented in the table below.

Given that even in the case of the most far-reaching scenario - NIS 2015, the significance of this impact during the construction phase of the OWF is small or negligible (depending on the wreck), minimization measures are not required.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the proposed update of the Project, 50% of the power plants will be realized in relation to the parameters of the Project approved by the Environmental Decision, and the possibility of using a gravity foundation only under the offshore substation has been allowed, the wind turbines will have monopile foundations (jacked if warranted) which will consequently significantly reduce the scale of deposition of agitated sediment.

Table 8. Impact assessment involving the deposition of agitated sediment (construction phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small	The wreckage could be buried during construction work. The extra layer of sediment can provide an additional layer of protection for the wreckage.	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (importance of the resource - medium, magnitude of impact - insignificant)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisaged for the set of parameters of the Project constituting the NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, which is associated with less change in morphology during their construction of the farm, and thus with a smaller spatial and temporal extent of seabed disturbance. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.1.5. Impacts cumulative

Assumptions for analyses of cumulative impacts of the BIII OWF and other projects on objects of cultural heritage protection significance are presented in Section 3.1.

Due to the different distance between the planned investment (OWF BII) and other planned investments, i.e. offshore wind farms, there is no potential for cumulative impact on cultural heritage identified in the area of OWF BIII. An impact that may occur if planned offshore wind farms are built during the construction phase may be vibration caused by pile driving using a hydraulic hammer on these farms. The result could be damage/destruction of the wreckage. However, the 2015 Report recognized that this impact, even in the case of the extreme variant (percussive driving of foundation elements), is only a local impact (vibrations may affect a radius of several meters), the risk of cumulative impacts on objects located in the area of OWF BIII does not exist.

It should be noted here that in the event of a change in the conditions of implementation and operation of the Project, approximately 70% fewer foundations will be built than envisaged for the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, which is associated with a correspondingly smaller scope and range of impacts, and thus less ability to cumulate with the impacts of other facilities. It is therefore considered that the project will result in lower emissions and impacts from both the 2015 NIS and the variant approved in the Environmental Decision. Thus, it should be considered that both the nature of the impacts and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the change in the conditions for implementation and operation of the Project does not affect the cumulative impacts in relation to the variant approved by the Environmental Decision.

9.2. Stage operation

During the operation of OWF BIII, works affecting the seabed will be carried out in its area, mainly maintenance works. A full description of the work during the operation stage is provided in Section 5 of Volume II of the EIA.

No structural elements of the farm will be located in the protection zone around the wreck. The impacts of OWF BIII at the operation stage are expected to be limited to the possibility of direct damage to the B96.1 wreck by ship anchors, due to routine inspections and maintenance work. It is recognized that

with the application of the protection zone, damage to the wreck by ship anchors will be accidental, although such a case (i.e., the failure of the ship to comply with the rules of the zone) cannot, of course, be fully excluded.

There may also be unplanned impacts during the operation of the farm, particularly pollution of the water table and bottom sediments:

- petroleum substances;
- accidentally released chemicals from the operation of the farm.

Unplanned impacts are assessed in Chapter 11.

9.2.1. Damage or complete destruction by anchors vessels

The B96.1 wreck will be a bottom obstacle that will significantly impede any work requiring anchoring in the area of the BIII OWF in operation. During the operational stage, the wreck may be damaged or completely destroyed by the anchors of ships engaged in servicing the farm's components. There can also be dilution of their components through accidental trawling by ship anchors. Any destruction of an archaeological object is permanent, with no possibility of restoring the original condition of the artifact in question (Cooper V. et al., 2011).

The impact assessment assumes that a 50-meter protection zone will be set around the wreck, where no ship anchoring will be allowed. This is a preliminary assumption, and the final size of the zone will be determined at a later stage of the project. This zone will, on the one hand, serve to ensure the safety of ship crews working in the farm area, and on the other hand, reduce the risk of damage to the wreck, so it can be considered a measure to minimize the negative impacts of OWF BIII, which should be implemented to protect the wreck. It is recognized that with the application of the protection zone, damage to the wreck by ship anchors will be accidental, although such a case (i.e., the failure of the ship to comply with the rules of the zone) cannot, of course, be fully excluded.

Damage or complete destruction of the wreck by ship anchors during the operation stage is a direct, negative impact of local extent, temporary, irreversible, repeatable during the construction period, of medium intensity. It should be noted that the designation of a protection zone significantly reduces the likelihood of such an incident.

An assessment of the significance of this impact for the most far-reaching scenario that could occur under the reasonable alternative is presented in the table below.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the Project update, 50% of the power plant will be realized in relation to the parameters of the Project approved by the Environmental Decision, which means fewer maintenance operations, consequently, the risk of destruction or permanent damage to the wreck will be proportionally lower.

Table 9. Impact assessment of damage or complete destruction of a wreck by ship anchors (operational phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small (when a designated protection zone)	The wreck may be damaged or destroyed by ship anchors during operation. The damage to the wreckage is irreversible.	Insignificant (scale of exposure - local, duration - temporary, intensity - medium)	Negligible (importance of the resource - medium, magnitude of impact - insignificant)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

In the variant that is the subject of this Report, approximately 70% fewer foundations will be built than envisioned for the set of Project parameters that constitute the 2015 NIS, and twice as many as specified in the Environmental Decision. In the preliminary development plan for the farm, the location of archaeological sites and shipwrecks was taken into account, assuming that greater distances from existing wrecks were maintained than were excluded in the parameters of the Project approved by the Environmental Decision, which entails a lower risk of damage or destruction of wrecks during maintenance work. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.2.2. Impacts cumulative

Due to the local nature of the potential impact of damaging or completely destroying the B96.1 wreck at the stage of operation of OWF BIII, no cumulation of such impact of OWF BIII with the impacts of other offshore wind farms in the immediate vicinity of the planned project is expected.

9.3. Stage decommissioning

The decommissioning phase will most likely see the removal of most of the farm's facilities from the seabed, in accordance with international regulations for installations and structures in marine areas (United Nations Convention on the Law of the Sea - UNCLOS).

These regulations set conditions for the removal of elements and installation of wind farms in the areas of the continental shelf and the exclusive economic zone. Decommissioning work should be carried out in such a way that it does not impede navigation or adversely affect the marine environment.

The standards also define exceptional situations in which there is no obligation to completely remove infrastructure elements. It is possible to leave such objects when:

- the weight of the foundation in the air exceeds 4,000 tons or is located at a depth of more than 100 meters, provided that it does not cause hindrance to the use of marine areas by other industries,
- decommissioning of elements is technically impossible or too costly,
- there is a threat to the lives of personnel decommissioning the wind farm,
- decommissioning entails an unacceptable risk of pollution of the marine environment.

In some locations, such as straits or archipelagic waters used for international shipping, it is necessary to completely remove installations and structures of structures, with no exceptions.

If some elements are left on the seabed, appropriate studies should be conducted to determine whether the farm's remains will not interfere with ship traffic and will not have a negative impact on biotic and abiotic elements of the environment. Make sure that the parts of the structure left behind do not begin to move under the influence of waves, tides, currents or storm surges, causing a hazard to shipping.

During decommissioning of the BIII OWF, the following impacts of the project on the identified wrecks are expected to occur:

1) damage or complete destruction by ship anchors,
2) sedimentation of agitated sediment.

There may also be unplanned impacts during the decommissioning of the farm, particularly contamination of the water table and bottom sediments:

1) petroleum substances,
2) accidentally released chemicals from farm decommissioning. Unplanned impacts are assessed in Chapter 11.

9.3.1. Damage or complete destruction by anchors vessels

The B96.1 wreck will be a bottom obstacle that will significantly impede any work requiring anchoring in the area of the decommissioned OWF BIII. During the decommissioning stage, the wreck may be damaged by the anchors of ships involved in dismantling the farm. It can also be diluted by accidental trawling by ship anchors. Any destruction of an archaeological object is permanent, with no way to restore the artifact to its original state (Cooper, Howell, Hamel 2011).

The impact assessment assumes that a 50-meter protection zone will be set around the wreck, where no ship anchoring will be allowed. This is a preliminary assumption, and the final size of the zone will be determined at a later stage of the project. This zone will, on the one hand, serve to ensure the safety of ship crews working in the farm area, and on the other hand, reduce the risk of damage to the wreck, so it can be considered a **measure to minimize the negative impacts of OWF BIII** , which should be implemented to protect the wreck. It is recognized that with the application of the protection zone, damage to the wreck by ship anchors will be accidental, although such a case (i.e., the failure of the ship to comply with the rules of the zone) cannot, of course, be fully excluded.

Damage or complete destruction of the wreck by ship anchors during the decommissioning stage is a **direct, negative impact of local extent, irreversible, temporary, recurrent during the decommissioning period, of medium intensity.** It should be noted that the designation of a protection zone significantly reduces the likelihood of such an incident.

The 2015 Report conducted an assessment of the significance of the impact of a set of parameters of the Project that represent the most far-reaching scenario - the 2015 NIS. The assessment is shown in the table below.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the proposed update of the Project, 50% of the power plants will be realized in relation to the parameters of the Project approved by the Environmental Decision, which means fewer maintenance operations, consequently, the risk of destruction or permanent damage to the wreck will be proportionally lower.

Table 10. Impact assessment involving damage or complete destruction of a wreck by ship anchors (decommissioning phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small (when a designated protection zone)	The wreck may be damaged or destroyed by ship anchors during dismantling work. The damage to the wreckage is irreversible.	Insignificant (scale of exposure - local, duration - temporary, intensity - medium)	Negligible (importance of the resource - medium, magnitude of impact - insignificant)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

In the variant that is the subject of this Report, approximately 70% fewer foundations will be built than envisioned for the set of Project parameters that constitute the 2015 NIS, and twice as many as specified in the Environmental Decision. In the preliminary development plan for the farm, the location of the shipwreck was taken into account, assuming that greater distances from the existing shipwreck were maintained than were excluded in the parameters of the Project approved by the Environmental Decision, which entails a lower risk of damage or destruction of the shipwreck during maintenance work. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.2. Deposition of agitated sediment

As a direct result of the disturbance of the bottom sediment structure, suspended solids will rise and spread (resuspension) in the water depths and be re-deposited on the bottom. Sedimentation is likely to be somewhat more extensive and intense than during the construction phase, described in Section 9.1.

The deposition of agitated sediment on the seafloor, resulting from the previous disturbance of the bottom sediment structure and the spreading of suspended solids during the decommissioning stage, will cause a**direct negative impact of local extent, short-term, reversible, repeatable during the**

decommissioning period, with medium intensity. The fall of shaken sediment during decommissioning can be considered a **positive** impact - the wreck will be covered with an additional protective layer.

The 2015 Report conducted an assessment of the significance of the impact of a set of parameters of the Project that represent the most far-reaching scenario - the 2015 NIS. The assessment is shown in the table below.

Given that even for the set of parameters that constitute the most far-reaching scenario - NIS 2015, which may occur, the significance of this impact at the stage of decommissioning of the OWF is small or negligible (depending on the wreck), minimization measures are not required.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the Project update, 50% of the power plant will be realized in relation to the parameters of the Project approved by the Environmental Decision, consequently, if the power plant is decommissioned, it will cause significant reductions in the scale of the source of agitation and deposition of agitated sediment.

Table 11. Impact assessment involving deposition of agitated sediment (decommissioning stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small	During the dismantling work, the wreckage could be buried. The extra layer of sediment can provide an additional layer of protection for the wreckage.	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (importance of the resource - medium, magnitude of impact - insignificant)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisaged for the set of parameters of the Project constituting the NIS 2015, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been excluded, which is associated with a smaller change in morphology during their decommissioning of the farm, and thus a smaller spatial and temporal extent of seabed disturbance. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9.3.3. Impacts cumulative

Given the local nature of potential OWF impacts at the decommissioning stage and the location of the B96.1 wreck, it was concluded that the risk of cumulative impacts of OWF BIII and impacts of other OWFs at this stage is unlikely.

10. Impacts related

Archaeological sites on the seafloor can be potential habitat for benthos and marine fish. Their damage, elimination, or burial can cause negative effects on these living organisms. At the same time, historic sites are located on the seabed. The impact on the bottom and sediments (discussed in Section 2 of this volume) is crucial to the identified wreck. A change in the morphology of the bottom, an increase in the amount of suspended solids, and a change in the structure of the sediment can cause damage to the facilities or cause them to be completely destroyed.

The change in hydrodynamic conditions near the bottom, resulting from the installation of large-scale facilities, may locally alter sediment transport in the dynamic layer, thereby exposing objects of cultural heritage importance that were undiscovered during the survey.

11. Impacts unplanned

Unplanned impacts are the result of sudden unplanned events or failures that are not related to activities included in the project schedule (e.g., leakage of petroleum substances into the water due to a collision between two vessels).

In assessing the significance of unplanned impacts, additional factors were taken into account, i.e. the probability of an event that will be the source of the impact and its potential consequences.

It should be noted that as a result of unplanned events, the abiotic environment, primarily marine waters and, to a lesser extent, bottom sediments, may be directly contaminated. On the other hand, indirectly, these events may also affect sites that are important for the protection of cultural heritage.

Based on data from other OWF projects and from similar projects, as well as on the knowledge and experience of the study's authors, the following potential unplanned events have been selected, which could become a source of unplanned indirect impacts of offshore wind farms on objects of great importance for the protection of cultural heritage:

- leakage of petroleum substances during normal operation or in an emergency situation as a result of a collision, accident or construction disaster,
- accidental release of chemicals into the water body.

In the form of a separate subsection, rules for dealing with encounters with military objects, including unexploded ordnance, are discussed.

A full description of potential unplanned events can be found in Section 12 of Volume II of the report. In contrast, the following, based on this description, assesses the indirect impacts of unplanned events on the B96.1 wreck, which was identified within the boundaries of the area of the planned BIII OWF.

11.1. Oil spills during normal operations vessels

During normal ship operation, spills of various types of petroleum substances (lubricating and diesel oils, gasoline) can occur.

They may contribute slightly to the deterioration of water quality. Heavier oil fractions can be sorbed on the surface of organic and mineral suspensions, which will cause their specific gravity to increase and gradually sink to the bottom. Wreck B96.1 may be covered by an additional layer of such sediment. It should be assumed that these spills will be small (stage I), up to 20^{m3}. Visible traces of such contamination under favorable conditions can disappear spontaneously due to evaporation and dispersion in the water. The size of these spills will be practically limited to the OWF area.

As a primary minimization measure, it is recommended that vessels be supplied with means to deal with minor oil spills. Mitigation activities are described in more detail in Section 12 of Volume II of the EIA.

The impact on the BS2_120 and BS2_156 wrecks of a small amount of petroleum substances released into the sea during normal ship operations is assessed as an indirect, negative, local in scope, short-term, reversible, repetitive, low-intensity impact.

The 2015 Report conducted an assessment of the significance of the impact of a set of parameters of the Project that represent the most far-reaching scenario - the 2015 NIS. The assessment is shown in the table below.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the Project update, 50% of the power plants will be realized in relation to the parameters of the Project approved by the Environmental Decision, which means fewer ship operations, consequently, the risk of oil spills will be proportionally lower.

Table 12. Wreck impact assessment of seawater contamination by petroleum substances during normal ship operations (any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small	During the normal operation of the ships at each stage of the project, small spills of petroleum substances may occur. Falling of contaminated suspension may occur.	Negligible (scale of exposure - local, duration - short-term, intensity - low)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.2. Spill of petroleum substances in an emergency situation emergency

During the construction, operation or decommissioning of the farm, leakage of petroleum substances may occur, resulting in pollution of the water body. A spill can occur as a result of a shipwreck or collision, a construction disaster at one of the farm's facilities, or during maintenance work. In the event of a collision or collision between ships, a Grade III spill, i.e. over 50^{m3}, can be expected.

It has been calculated that the probability of serious accidents is very low, on the order of 10- 5 - 10-4. For the Southeast Baltic area, which may include the BSIII offshore wind farm area, the risk of collision was estimated at 1 case per 1060 years. The significance of this impact can be considered negligible, as the unplanned impacts described are extremely rare and practically impossible. In this case, there are organizational structures, plans of conduct in carrying out actions to combat hazards and pollution, and effective methods of cleaning up pollution.

The impact on the B96.1 wreck of more petroleum substances released into the sea during an accident or collision is assessed as an indirect, negative, regional in scope, short-term, reversible, repetitive, high-intensity impact.

The 2015 Report conducted an assessment of the significance of the impact of a set of parameters of the Project that represent the most far-reaching scenario - the 2015 NIS. The assessment, is shown in the table below.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the proposed Project update, 50% of the power plants will be realized in relation to the parameters of the Project approved by the Environmental Decision, which also involves the use of a correspondingly smaller number of vessels for construction, operation and decommissioning of the Project. Thus, the likelihood of a crash or collision will decrease proportionately.

Table 13. Assessment of impacts involving contamination of seawater with higher amounts of petroleum substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small	In emergency situations, contamination of the water body with petroleum substances may occur. Water pollution can affect the processes that destroy a wreck. Falling of contaminated suspension may occur.	Small (scale of exposure - regional, duration - short-term, intensity - high)	Small (magnitude of impact - low, importance of the resource - medium)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

Thus, it should be considered that both the nature of the impacts does not change, and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.3. Accidental release of chemicals into the sink water

During the construction of the wind farm, waste directly related to the construction process will be generated on vessels, at construction facilities located onshore (at the port serving the project) and at the project site. These can include damaged parts of the farm's assembled components, cement, grout, mortar, binders used to join the foundation and power plant components, and other chemicals used during construction work. They can be accidentally released into the sea.

The bulk cement is packed in bags of about 1^{m3}. It was assumed that about $5^{m3product}$could sink during handling. Grouts, mortars and other binders often contain hazardous substances. E.g., epoxy (two-component) grouts contain in various proportions: epoxy resin, alkyl glycidyl ethers, polyamines. Once they enter the water depths, due to their high density of about 1.3 $^{g\text{-}cm\text{-}1}$, they sink and are deposited on the bottom. These substances are considered a serious threat because they cannot be easily removed from the bottom.

During the operation of the farm, maintenance of its facilities will be carried out. Accidental release of small amounts of waste or operating fluids into the sea cannot be ruled out.

During decommissioning of the farm, it seems inevitable that bottom sediments will be contaminated with waste from the process. The magnitude of this impact will depend on the method adopted for carrying out this work (cf. description of the decommissioning stage), and the greatest contamination may occur if gravity foundations have to be crushed.

Any of these impacts could negatively affect the B96.1 wreck. The contamination of water with chemicals and the associated change in water quality can affect the intensity of destruction of uncovered archaeological objects.

The anticipated types and quantities of waste are presented in Section 10 of Volume II of the EIA.

For this type of investment, such as an OWF, a detailed plan is generally developed to address risks and pollution arising during the construction, operation and decommissioning of the OWF, which develops minimization measures and how to deal with such events. It is recommended that such procedures be created as a minimization measure.

The impact on the B96.1 wreck of chemicals from the construction, operation or decommissioning of the farm is assessed as an indirect, negative, local in scope, short-term, reversible or irreversible, recurrent, medium intensity impact.

The 2015 Report conducted an assessment of the significance of the impact of a set of parameters of the Project that represent the most far-reaching scenario - the 2015 NIS. The assessment is shown in the table below.

The variant approved by the Environmental Decision assumes the construction of about 40% fewer power plants than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS. As a result of the proposed Project update, 50% of the power plants will be realized in relation to the parameters of the Project approved by the Environmental Decision, which also involves the use of a correspondingly smaller number of vessels for construction, operation and decommissioning of the Project.

Table 14. Assessment of the impact of chemicals from the construction, operation or decommissioning of a farm released accidentally into the sea (unplanned impacts, any phase, NIS 2015)

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B.96.1	Medium	Average	During the construction, operation or decommissioning of the farm, various chemicals may be accidentally released. Water pollution can affect the processes that destroy a wreck.	Negligible (scale of exposure - local, duration - short term, intensity - medium)	Negligible (magnitude of impact - insignificant, importance of the resource - medium)

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

Thus, it should be considered that both the nature of the impacts does not change and their scope and intensity are smaller than in the case of the variant approved by the Decision, and thus the proposed change in the parameters of implementation and operation of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.4. Impacts cumulative

The only unplanned impact that may be cumulative will be potential oil spills resulting from a disaster or collision.

In the case of simultaneous operation of several projects, vessel traffic in neighboring areas also increases, with an increased risk of such an event. There is a customary shipping route near the farm, in the area of which the risk of oil spills increases.

However, even assuming that the number of vessels in the construction/operational/decommissioning phases doubles from the set of parameters described as NIS 2015 and assessed in Chapter 9, the B96.1 wreck impact assessment remains unchanged, as shown in the table below.

Table 15. Assessment of cumulative impact involving the spill of more petroleum substances released into the sea during an accident or collision (unplanned impacts, any stage, NIS 2015)

Impact	Wreck B96.1
Pollution of water bodies and bottom sediments with petroleum substances (emergency situations)	Small

Source: Pomian I., Różycki J., Gajewski L., Hac B., "Archaeological monitoring in the area of the OWF Baltic Central III. Final Report with Impact Assessment," Maritime Institute in Gdansk, 2015.

11.5. Accidental discovery of military objects and unexploded ordnance

Since the BIII OWF area has been used in the past for the installation of naval mine barrages, steps should be taken to prevent accidents with unexploded ordnance and, in particular, chemical warfare agents at each stage of the project.

To this end, procedures should be implemented related to both the ongoing identification of such items during installation work, possible first aid in the event of contamination, the establishment of communication and notification procedures and, finally, the removal of contaminants from the vessel.

1. Rules of conduct after fishing out chemicals:
2. Do not touch contaminated parts of the ship, sampling equipment and fished out unknown objects and substances;
3. Position and maintain the unit relative to the wind so that the contaminated areas are on the leeward side. Close all openings in the wheelhouse and rooms without allowing the poisonous agent to enter;
4. Notify the nearest alert point (the Maritime Office in Slupsk and the Navy), stating: who, what, where and when they fished out, whether there are casualties and what are the symptoms of poisoning;
5. Immediately remove the contaminated clothing, put it in a plastic bag and close it tightly;
6. By handy means, immediately remove the chemical from the body. Do not rub it on your skin, rub your eyes or spread it around the deck, especially in the rooms of the ship;
7. Wash contaminated areas with plenty of drinking water and soap. Flush the blurred eyes with plenty of drinking water starting from the base of the nose towards the outer corners of the eyes. Do not use eye ointment and do not bandage them. After drying the contaminated skin areas, decontaminate them with an anti-chemical kit. Such kits should be in the first aid kit on all units;
8. Do not puncture the resulting blisters and apply sterile dressings;
9. Before entering the port, notify the Harbormaster's Office (Bosmanat) of the number of contaminated crew and agree on a mooring location. It is forbidden to stop with other uncontaminated units. The mooring site should be as far away as possible, properly prepared and secured taking into account the wind direction;
10. To provide premedical first aid to the crew contaminated with chemical agents, use: 2% sodium bicarbonate solution or 0.1% monochloroamine solution (for eye wash) or use an individual anti-chemical package.

The same procedures, only limited, should be developed for situations involving the accidental extraction of conventional military objects. Given the impossibility of assessing what type of weapon is mined (conventional objects often do not differ in external appearance from chemical weapons), all precautions should be taken as with chemical weapons. Discovery of such an object should be reported to the Maritime Office in Slupsk and the Navy. This obligation arises from the Act of March 21, 1991 on the maritime areas of the Republic of Poland and maritime administration (consolidated text, Journal of Laws of 2022, item 457).

In a situation where military objects are encountered, the Maritime Administration, together with the Navy, will make a decision on how to proceed/restrict navigation and stop the work.

As part of the UXO management strategy, the Investor has planned a number of activities, some of which have already been implemented in the BIII OWF project preparation process to date, as detailed in Chapter 9 of Volume II of the Report.

If a controlled explosion of UXO is required, there may be impacts associated with shock wave propagation, as well as agitation and sedimentation. However, the likelihood of conducting such

activities in the zone of potential impact on the detected shipwreck is extremely unlikely, due to the designation of a 50-meter protection zone. Any precipitation of agitated sediment will be insignificant.

Table 16. Impact assessment involving damage or complete destruction of a wreck by a UXO explosion

Receptor	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Wreck B96.1	Medium	Small (when a designated protection zone)	If the bottom is cleared of UXO by explosion, the wreckage may be damaged or destroyed by the shock wave. The damage to the wreckage is irreversible.	Insignificant (scale of exposure - local, duration - temporary, intensity - medium)	Negligible (importance of the resource - medium, magnitude of impact - insignificant)

12. Impacts transboundary

The wreck of the steamboat B96.1, found in the area of the planned OWF BIII, is not of high historical value. Nevertheless, according to the provisions of the 2001 UNESCO Convention on the Protection of Underwater Heritage and the 1982 UN Convention on the Law of the Sea, there is an obligation to protect the wreck from destruction. Attention should be paid to the intercultural nature of monuments located in marine areas. In most cases, shipwrecks located off the coast of a country come from a completely different area. The destruction of the B96.1 wreck would reduce the resources of the international cultural heritage of marine areas.

The impacts of the BIII OWF will not have a transboundary impact on other archaeological sites located within the exclusive economic zones of other countries, due to the local nature of the impacts.

13. Proposal monitoring

In the area of the planned offshore wind farm BIII, the risk of significant impact on objects of great importance for the protection of cultural heritage has not been identified, so there is no justification for indicating monitoring activities in this regard.

If new potential archaeological objects are discovered that may be part of the identified wrecks, areas where the sedimentary layer has been eroded should be re-inventoried, with a view to possibly revisiting areas excluded from anchoring and other exploitation.

14. Summary and conclusions

According to the results of the 2015 Report's environmental impact assessment of the OWF, the planned investment involving the construction of the BIII OWF will not have a significant negative impact on objects of great importance for the protection of cultural heritage.

Archaeological monitoring in the area in question revealed only one archaeological site, located in the central part of the OWF BIII field. The B96.1 wreck, which was found, is not of high historical value and can be made available for tourist diving. Once the protection zones for the wreck are designated,

significant negative impacts will not occur. The deposition of agitated sediment is a positive impact (an additional protective layer).

Due to the local nature of the impacts, no risk of cumulative impacts of OWF BIII with those of other projects, including those located in the immediate vicinity of other OWFs, is expected.

Nor will the impacts of OWF BIII have a transboundary impact on other archaeological sites located within the exclusive economic zones of other countries.

A summary of the results of the impact analysis is presented in the table below. Note that the impact assessment performed in the 2015 Report was conducted for a set of parameters of the Project representing the most far-reaching scenario - NIS 2015. It assumed the construction of 200 power plants and 6 foundations of supporting infrastructure, and allowed for the possibility of using gravity foundations. In contrast, the Project after the proposed modifications assumes the construction of 60 power plants and 1 substation foundation, as well as a limitation in the foundation methods of power plants to monopile or jacket type foundations. It is considered that the variant selected for implementation will cause impacts significantly less than the set of parameters of the Project constituting the 2015 NIS.

Table 17. Summary of the results of the assessment of the impact of OWF BIII on wreck B96.1 - construction phase

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact	Comments
Damage or total destruction by ship anchors	Medium	Creation of a protection zone around the wreck	Insignificant	Skip	Significant reduction in impact	The establishment of a protection zone is necessary for the protection of the wreck and for the safety of the works to be carried out
Exposure during gravity foundation placement and cable laying (liquefaction of the top layer of sediment)			Insignificant	Skip	Significant reduction in impact	No
Damage during installation of pile foundations			Small	Small	Reducing the impact	No

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact	Comments
Deposition of agitated sediment			Insignificant	Skip	Significant reduction in impact	The extra layer of sediment can provide an additional layer of protection for the wreckage.

Table 18. Summary of the results of the assessment of the impact of OWF BIII on wreck B96.1 - operation stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact	Comments
Damage or complete destruction of the wreck by ship anchors	Medium	Creation of a protection zone around the wreck	Insignificant	Skip	Reducing the impact	The establishment of a protection zone is necessary for the protection of the wreck and for the safety of the work.

Table 19. Summary of the results of the assessment of the impact of OWF BIII on wreck B96.1 - decommissioning stage

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact	Comments
Damage or complete destruction of the wreck by ship anchors	Medium	Protection zone around the wreck	Insignificant	Skip	Reducing the impact	The establishment of a protection zone is necessary for the protection of the wreck and for the safety of the

Impact	Importance of the resource	Minimization measures	Magnitude of impact	The significance of the impact	The impact of updating the parameters of the Project on the significance of the impact	Comments
						works to be carried out
Deposition of agitated sediment			Insignificant	Skip	Significant reduction in impact	The extra layer of sediment can provide an additional layer of protection for the wreckage.

Source: own elaboration

15. Shortcomings in technology and gaps in modern knowledge

No offshore wind farm construction, operation or dismantling work has been carried out in the southern Baltic Sea to date. There are no strict regulations in Polish law regarding the protection of archaeological monuments on the seabed in such large-scale developments. It is also difficult to estimate the proposed protection zones for wrecks. The research conducted by the Maritime Institute in Gdansk did not include magnetometer measurements, so the exact extent of all wreckage elements is unknown.

Due to the survey methods used, the area was not definitively recognized for the presence of objects of military origin. Such surveys are necessary to be carried out in narrowed areas located directly under the elements of the OWF structure and infrastructure, as well as at the sites of potential anchoring of units involved in the construction process.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 9

Landscape impact assessment

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
EEZ	Polish Exclusive Economic Zone (Exclusive Economic Zone)
EW	Wind power plant/wind turbines
IMGW	Institute of Meteorology and Water Management
km	Kilometer
m	Metre
IMF	Offshore wind farm
IMF BII	Offshore Wind Farm Baltic II
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
IMF BP	Baltic Power Offshore Wind Farm
MIP	Offshore electricity transmission infrastructure
m above sea level.	Meters above sea level
MSE	Offshore substation
MSL	Average sea level
MW	Megawatt
NIS	The Furthest Going Scenario according to the 2015 Report
OCHK	Protected landscape area
PK	Landscape park
PN	National park
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
RHDHV	Royal HaskoningDHV (contractor for the preliminary technical concept of OWF BIII)
Landscape law	Law of April 24, 2015 on amendments to certain laws in connection with the strengthening of landscape protection tools (Journal of Laws 2015, item 774, as amended)
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (consolidated text, Journal of Laws of 2022, item 1029)
W120	Variant approved by the Environmental Decision in which the number of turbines is 120
W60	The variant selected for implementation (the Project after the proposed modifications) and at the same time the intermediate variant from the 2015 Report - the variant in which the number of turbines was 60

1. Summary non-specialist

A non-specialist summary of the results of the impact assessment of the changes to the updated conditions for implementation and operation of the BIII OWF Project, for which the Environmental Decision on the landscape was issued, is included in Section 5.9 of Volume VI of the Report.

2. Introduction

This section of the Report assesses the potential impacts of the proposed changes and updates to the conditions for implementation and operation of the Project-BIII OWF on the landscape. It is based on the research and analysis and findings made for the impact assessment done in the 2015 Report. It should be pointed out here that these data remain valid for the variant indicated for implementation under the Environmental Decision. In the case of the variant proposed for implementation on the basis of an amendment to the Environmental Decision, they should also be considered adequate, which is due to the fact that the scale of the planned Project changes, where its parameters related to the number of wind power plants are reduced by 50% in relation to the Environmental Decision, a decisive part of the parameters remain the same, and some parameters indicated in the Environmental Decision as possible to be further specified, such as the method of foundation.

In the current implementation variant, the maximum total height of the SHPP has been assumed to 310 m, which is a 12.72% increase over the parameters in the currently held DWA. The developer has also adopted a maximum rotor diameter of 250m, an increase of 13.63% over the parameters in the current DWA. The investor has also assumed that the development of the technology for the construction of SHPPs will allow it to reduce the number of SHPPs from 120 in its current DWA to 60 units. Increasing the parameters of the SHPP, assuming that it is implemented 50% less than adopted in the DWA2015, resulted in the maximum total rotor zone decreasing from an area of 3,768,000^{m3} to 2,945,244^{m3}, which is a reduction of 21.83% compared to the data contained in the current Environmental Decision.

The assessment refers to changes in the scope of the project, which is currently the variant accepted for implementation, compared to the variant for which the Environmental Decision was issued in 2015. It analyzed whether there would be an increased impact compared to that discussed in the 2015 Report. The assessment uses the environmental impact assessment conducted in 2015 as part of the 2015 Report, on the basis of which the Environmental Decision[1]is currently issued. The report is an additional supplementary study, which, in essence, does not change the results of the assessment carried out in the 2015 Report, but makes it possible to estimate the positive effect of the modifications proposed as part of the amendment to the Environmental Decision.

3. Description of the planned project

3.1. Parameters of the BII OWF relevant to the assessment of the impact of the project on the landscape

The **parameters of the BIII OWF** that are relevant to the assessment of the project's impact on the landscape are:

- the location of the farm (in particular, the distance from viewpoints);

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KSZ.22 dated March 27, 2017.

- area of the farm - total and buildable;
- the number of wind turbines and their technical parameters (total height, rotor diameter, rotor color);
- the number of ships and their intensity during the construction and decommissioning phases.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, as well as their changes from the variant specified in the Environmental Decision, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.2. Projects whose impacts may cumulate with impacts of OWF BIII on the landscape

There are other projects planned in the project area that could potentially, together with the BIII OWF, cause cumulative impacts on the environment, including the landscape.

Projects and activities that may cause cumulative impacts with those of OWF BIII are presented and characterized in Volume II, Section 10 of the Report. The remainder of this section assesses the cumulative impact on the landscape during the construction, operation and decommissioning stages of the BIII OWF.

4. Existing pressures anthropogenic

Existing anthropogenic pressures that affect the quality of the landscape can be divided into pressures that affect the **landscape directly related to the coastline,** which includes the marine area of the Baltic Sea together with a limited part of the land located directly at the coastline (the beach, dunes, coastal boulevards, the so-called "seascape"), and pressures that affect the **landscape located outside the immediate area of the coastline (the "land" landscape)**.

Due to its attractiveness and transportation accessibility, settlements are concentrated on the coast, which has a significant impact on the landscape. The coastal zone of the sea is also extremely attractive from the point of view of tourism development in Poland. As a result, the development of tourist facilities is intensifying, including the construction of resorts, hotels and a wide range of tourist and recreational infrastructure. To increase the tourist value of coastal towns, it is located in the immediate vicinity of the shore and sometimes even on the ridges of the coastal dunes. The largest tourism investments are located in large towns with historic spa conditions, where hotels, restaurants and recreational facilities have grown over the years. Due to the limited land area of the coastal strip, the modern development of these localities comes at the expense of natural coastal areas, where land is most attractive for investment. This, again, is forcing increased activity in protecting the sea coast.

Anthropopressions affecting the **seascape** include, in particular:

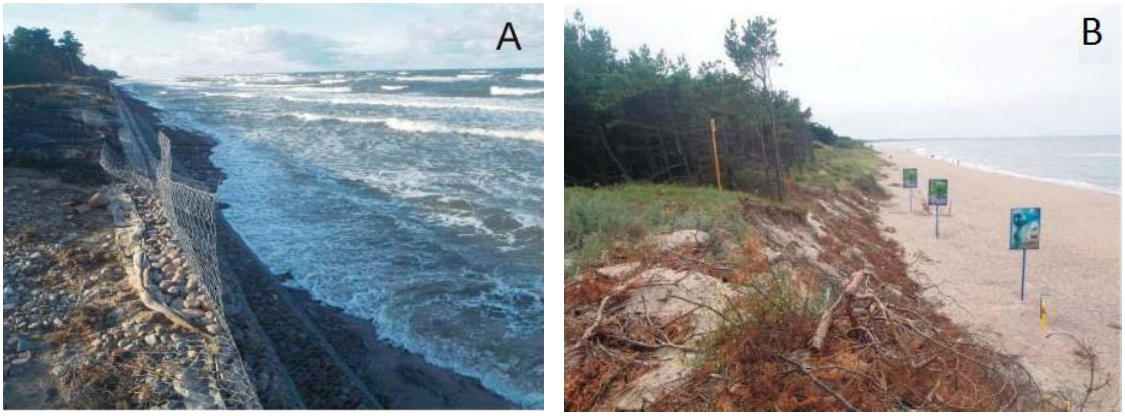
- anthropopressions related to shore protection,
- tourism-related anthropopressions,
- shipping.

Anthropopressions related to shore protection

The development of settlements along the seashore, including on the crest of dunes and cliffs, necessitates the use of shoreline protection and development against storms. For this purpose, concrete and steel ties, surcharges of rock blocks or precast concrete blocks, breakwaters, spurs, underwater sills are most commonly used. Fascine fences, brushwood and branches of trees and shrubs are also used, including plantings of plants that fix the moving ground of dunes and beaches[2].

Examples of bank protection are presented in the figure below.

Figure 1. Photo A - construction of a gabion band under a cliff during a storm, Jastrzebia Gora, 2010 Photo B - brushwood on a high dune slope, Lazy, 2012



Source: WWF, Report..., 2013[3]

Anthropopressions related to tourism

These pressures include the development of recreational infrastructure on the beach and an increase in the number of tourists, which is associated, among other things, with an increase in the amount of waste and garbage left on the shore and thrown by the sea. An increase in the number of tourists staying on the beach may also be associated with the devastation of natural vegetation and its disappearance, which can lead to significant changes in the seascape. In addition, an important pressure is the intensive development of buildings, which in an increasing number of places are located in the immediate vicinity of the coastal strip, so as to provide the so-called "sea view" from the windows of newly built hotels and apartment buildings.

Anthropopressures associated with maritime shipping

Maritime traffic and existing shipping routes can generate visual impacts on the seascape. Indeed, the Baltic Sea is used extensively by various types of vessels, which include ferries, passenger ships, recreational vessels, commercial vessels, fishing boats, among others. However, they are constantly and invariably associated with the seascape, so it is difficult to conclude unequivocally that the presence of ships in the field of view in the seascape has a disruptive effect on the seascape.

With regard to **the terrestrial landscape, industries** developing in coastal centers and also encroaching on the maritime area are important. The development of industry, including in tourist destinations, is

[2] Łabuz Tomasz, Ways of coastal protection and their impact on the natural environment of the Polish Baltic coast. Report, WWF, 2013

[3] Łabuz Tomasz, Ways of coastal protection and their impact on the natural environment of the Polish Baltic coast. Report, WWF, 2013

linked to the transportation accessibility of the coast, which contributes to the increase in sea traffic, as well as the expansion of these centers and ports and port areas (such as in Ustka). Anthropopressions affecting the value of the terrestrial landscape also include existing onshore wind farms within a short distance (within a radius of up to about 10 km) of the coastline. Such farms may include, for example, wind farms in the municipality of Darlowo, in the municipality of Postomino (this municipality is adjacent to the municipality of Ustka), in the municipality of Slupsk, or in the municipality of Wicko (this municipality is adjacent to the City and municipality of Leba).

5. Description of anticipated effects on the environment if the project is not undertaken project

The analysis of the "zero variant," i.e., if the BIII offshore wind farm were not implemented, can be considered for two cases:

1) scenario 1: the offshore wind energy sector in Poland is not developing at all (neither the BIII OWF nor any other OWF is being realized within the Polish EEZ),

2) scenario 2: the offshore wind sector develops in Poland (OWFs are built within the Polish EEZ), but the BIII OWF is not realized,

assuming that other forms of maritime use (resource extraction, shipping, fishing, etc.) develop in both scenarios.

The lack of implementation of the BIII OWF and other OWF projects would mean that there would be no impacts on the seascape associated with the construction, operation and decommissioning of the projects, and the availability of the farm area for other users (e.g., marine traffic, recreational fishing, in line with their existing use). In this case, there would be no change in the existing use of the land designated for the location of the planned OWF. Therefore, changes to the seascape are not expected to occur. However, it is impossible at this stage to predict how areas that are currently planned for OWF development could be developed in the future.

In the absence of the implementation of both the BIII OWF and other OWFs, there will be no need to build an MIP to transmit the produced electricity to land.

It should also be assumed that in such a case, in order to meet the growing demand for electricity consumption, and because of the need to meet ambitious climate policy goals, there will be a need to obtain energy from other sources, including non-carbon and renewable sources. Such sources may include onshore wind farms, which may be built in larger numbers. These farms will generate visual impacts on the terrestrial part of the landscape, including in the windiest coastal areas. It should be noted that turbines installed on land tend to have less power than turbines installed offshore, so to match the amount of energy harvested from OWF turbines, many more would have to be built, thus contributing significantly to increased landscape impacts.

In the case of the implementation of other OWF projects and the non-implementation of OWF BIII, visual impacts are expected to be generated only by projects other than OWF BIII.

Such projects include: Baltica 3 OWF (about 25 km from the coast), Baltica 2 OWF (about 32 km from the coast) and BII OWF (about 36 km from the coast), Baltic Power OWF (about 22 km from the coast), Balic II OWF (about 51 km from the coast) . In this case, it will be necessary to build connection infrastructure for these farms, the impacts of which on the seascape will only involve increased ship traffic during the construction (and eventual decommissioning) phase.

It can be tentatively thought that the above-mentioned OWF projects considered separately would have the same or similar visual impacts on the landscape as the BIII OWF. However, if the projects listed

above were implemented, and the BIII offshore wind farm was abandoned, the total cumulative impact of these projects on the seascape would be less than if both the BIII offshore wind farm and other offshore wind farm projects were implemented.

It should also be mentioned that failure to implement offshore projects within the Polish borders of the Exclusive Economic Zone (EEZ), will result in lost environmental benefits. Taking into account the requirements of Directive 2009/28/EC on the promotion of the use of energy from renewable sources, which mandates that the evaluation of projects involving the use of renewable sources take into account their impact on emission reductions and the implementation of the principle of sustainable development, it should be noted that the abandonment of the construction of offshore wind farms may result in the failure to achieve reductions in greenhouse gas emissions and increased emissions of pollutants by the conventional power industry.

6. Methodology for assessing the impact on landscape

The impact assessment of the Project was conducted in accordance with the framework methodology adopted by the project, described in Section 5 of Volume I of the Report.

The assessment of the potential impacts of the BIII OWF was based on the analysis of the variant approved by the Environmental Decision assuming the construction of 120 power plants and the current variant selected for the construction of 60 power plants according to the proposed modification of the Project.

The variant approved by the Environmental Decision assumed:

- the implementation of 120 SHPPs,
- max. construction height 275 m
- mac. rotor diameter 220 m
- total area of the rotor zone 3,768,000^{m2}

The proposed Implementation Option assumes:

- implementation of 60 SHPPs, a 50% reduction
- max. construction height 310 m, an increase of 12.72%
- mac. 250 m rotor diameter, an increase of 13.63%
- total area of the rotor zone 2,945,244^{m2}, a reduction of 21.83%

The impact assessment of the planned project also took into account the cumulative visual impacts with other projects.

The landscape impact assessment was carried out for the different stages of the project: construction, operation and decommissioning as well as with a distinction between the seascape and the terrestrial landscape. The maritime landscape in this study is indicatively assumed to be the areas located in the vicinity of the project including: the Baltic marine area, the coastline and the part of the land located directly at the coastline (beach, dunes, seaside boulevards). This landscape will include the view from the land toward the sea, the view from the sea toward the land, and the view along the coastline (Hill et al. 2001).

The terrestrial landscape includes areas beyond the coastline, which in Polish conditions are generally separated by a forest complex located in a strip of dunes.

Taking into account the nature of the impacts of the planned OWF on the landscape, the impact assessment methodology assumes that the terrestrial landscape is, in principle, not affected by wind power plants located in the Polish exclusive economic zone, as the coastal strip of forested dunes is an effective barrier that obstructs the view of the sea.

Therefore, the characterization and impact assessment will focus on the seascape in this document.

The assessment of the impact of the planned project on the landscape, was carried out in accordance with the general methodology indicated in Volume I, Chapter 5 of the EIA report. However, due to the specificity of the analysis in the context of the landscape, the methodology was expanded to include a number of additional elements. General methodology terms or categories were also clarified where appropriate.

The landscape impact assessment methodology, with additional elements, includes:

- Analysis of meteorological conditions affecting the visibility of the project;
- Identification of zones of potential visibility of the OWF;
- Identify and identify audience groups that will be exposed to the visual impacts of the OWF;
- Determination of sites from which photographic documentation of the area was taken;
- Implementation of IMF visualization;
- Making a presentation of the issues in graphic form (on maps);
- Evaluate the significance of the impact of the OWF on the landscape on a scale of: very large, large, moderate, small, negligible or no change.

The analysis of the impact of the Baltic Central III offshore wind farm on the landscape began with an analysis of available literature describing the project site and its immediate surroundings, topographic maps, aerial and satellite photographs, environmental documentation, as well as strategic documents of relevant administrative units.

On this basis, a description of the terrestrial and seascape in the vicinity of the OWF was made, taking into account the sensitivity of the terrestrial and seascape to possible changes.

Based on relevant data and materials, an analysis of meteorological conditions affecting the visibility of the planned project was also carried out.

Based on the available literature data, data on the parameters of the project, and data on the landscape, the zones from which the planned OWF may be visible were determined. On this basis, the groups of recipients exposed to the visual impact of the OWF were identified, and locations were determined from which photographic documentation of the site was taken during the field visit.

The photographic documentation was used to create a visualization of the planned investment. The visualizations were made using WindPRO, a program specially designed for this purpose. The analysis was performed for different visibility conditions (no cloud cover, low cloud cover, medium cloud cover, total cloud cover, dusk) and variants (alternative variant, variant selected for implementation). In accordance with the adopted methodology of the EIA, the Report presents detailed results only for the most far-reaching scenario (the variant selected for implementation) - the largest parameters, the closest viewpoints, the best visibility conditions - taking into account the accumulation of other projects. The parameters that were adopted for the visualization are included in Chapter 10 of Volume II of the EIA.

The issues discussed were also presented graphically: on maps and drawings. The significance of individual impacts was assessed by taking into account the importance of the viewpoint (understood as an impact receptor) and the magnitude of the impact, using an impact assessment matrix (see Chapter 5 Volume I).

For the purpose of assessing the impact of OWF BIII on the landscape, the definition of one of the components determining the magnitude of the impact was modified, namely the definition of the duration of the impact. According to the detailing done, the duration of the impact was classified as:

- temporary - an impact that ceases when the activity that is the source of the impact ends, and the receptor of the impact returns to its initial state with the cessation of the activity that was the source of the impact; also intermittent, sporadic impacts;
- short-term - an impact that lasts up to 1 year after the activity that gave rise to it;
- medium-term - an impact that persists from 1 to 3 years after the beginning of the activity that gave rise to it; also an impact that is intermittent, sporadic, regularly recurring over an extended period of time (e.g., seasonal disturbances);
- long-term - an impact that persists for more than 3 years from the start of the activity that gave rise to it, or an impact that persists during operation and disappears after its termination.

Depending on the relationship between the importance of the viewpoint and the magnitude of the impact, each impact was classified into one of 6 categories as impact: very large, large, moderate, small, negligible, no change.

The impact assessment of the planned project also took into account the cumulative visual impacts with other projects.

The landscape impact assessment was conducted for the different stages of the project: construction, operation and decommissioning.

7. Potential impact of offshore wind farms of offshore wind farms

Information summarizing the most important emissions that the offshore wind farm may cause during the various stages of construction, operation and decommissioning, along with an identification of the type of emissions and impacts with a linkage matrix, is presented in Section 7 of Volume II of the Report.

In this chapter, the potential impacts of offshore wind farms on the landscape at different stages of investment are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report.

7.1. Stage construction

During the construction phase of the project, potential impacts on the landscape are associated with increased traffic of vessels, including large-scale equipment and machinery, involved in the construction of the farm. During construction, the landscape may also be affected by newly constructed elements of the farm.

These impacts have the potential to change the attractiveness of the seascape. The scale of such an impact depends on:

- the type of vessels - large-size vessels will be more visible from appropriate vantage points than smaller-size vessels;
- the number of units moving along a given route in a certain period of time - the higher the volume of units along one route, the more noticeable the increased traffic at sea will be to observers on land;

- the choice of traffic routes between the project and construction and assembly ports - the shorter the distance of the farm and the flow routes of the vessels from the shoreline, the better they will be visible from land;
- location of the point where the observer is located - visibility of the farm and vessels at sea increases with the altitude of the observation point;
- season and weather conditions - weather conditions such as sunshine, cloud cover or precipitation will affect the visibility of vessels and farm elements by observers ashore - the better the weather conditions, the better the visibility of the farm and vessels from shore. The visibility of vessels at sea may be more noticeable during the holiday season, when tourists are relaxing on the beaches.

It should be mentioned that the vessels may be visible to observers on land during the work carried out at the project site and during the passage from the construction and assembly ports to the construction sites of the planned project. Visibility depends on the size of the vessel and the distance of the farm/navigation route from the shore.

Impacts on the OWF landscape during the construction phase also include the storage of wind farm components at the construction and assembly port. This is a local impact of a temporary nature, limited to the industrial port area, possibly its immediate surroundings.

The factors indicated above may contribute to changing the aesthetic value of the seascape. However, assessing whether there has been a reduction or increase in the attractiveness of the landscape depends on the individual tastes of the observer. By some observers, increased vessel traffic may be perceived as a disturbance of the landscape, by others it may be noticed but not considered in the category of disturbance, and still other observers may not pay any attention at all to the fact that ships or newly built OWF facilities are appearing at sea. There is also a sizable group of people for whom passing high-specification offshore wind farm vessels transporting the farm's building blocks will be seen as a unique attraction, encountered only for a short period of time in select locations around the world.

7.2. Stage operation

Potential impacts of offshore wind farms on the seascape at the operational stage include visual impacts of the OWF, including impacts related to light signage.

A visibility study conducted in the United Kingdom of Great Britain and Northern Ireland[4] of existing offshore farms has shown that farms located in offshore areas can be visible from land during the daytime even at distances of up to 42 kilometers.

Obstacle markings

Wind farms located offshore should have appropriate obstruction signage, which may contribute to increased impacts on the seascape.

This is because wind turbines are subject to aviation and navigational safety regulations, which mandate that individual farm facilities be given proper color schemes, lighting, and equipped with warning systems.

[4] Sullivan, R.G., Kirchler, L.B., Cothren J., Winters, S.L., Offshore Wind Turbine Visibility and Visual Impact Threshold Distances, National Association of Environmental Professionals, 2013

Polish legal conditions also regulate the issue of proper obstruction marking. Indeed, in accordance with the provisions of Articles [871] (6) and [872] (1) of the Aviation Law of July 3, 2002. - *Aviation Law*[5] construction objects posing a threat to the safety of aircraft traffic ("aviation obstacles"), should be immediately notified to the President of the Civil Aviation Authority ("CAA") and marked.

According to the Ordinance of the Minister of Infrastructure of January 12, 2021, on air obstacles, obstacle surfaces and devices of a hazardous nature (Journal of Laws, item 264), obstacle markings are understood as luminous (day or night) and graphic-color markings. The markings should be visible from all sides and should indicate the location, general shape and size of the aerial obstacle.

Daytime aerial markings

According to the aforementioned regulation, wind turbines that are aerial obstacles shall be marked by being painted white. The rotor blades, nacelle and 2/3 of the upper part of the support structure are painted.

Nighttime aerial signage

Wind turbines that are aerial obstacles shall be marked with a light of medium intensity marked as type B, placed on the highest point of the nacelle.

The light is red in color, with a light beam intensity of 2000 candelas. The flash rate is 20 - 60/min.

Switching the warning lights on and off is controlled according to the brightness of the environment by a twilight switch. In the case of power plants 150 meters above the level of the surrounding terrain or water and higher, a backup medium-intensity obstruction light type B is placed, which is activated automatically in the event of an obstruction light failure.

When two or more aerial obstacles, which are wind turbines, are within 900 m of each other, the obstacle lights deployed on them flash simultaneously

If it is not possible to permanently mark an aerial obstacle during its construction, temporary marking by boards or flags is allowed. For temporary signage, orange (or red) and white signs or flags are used. Boards or flags should be square in shape with an area of at least $4^{m2.}$

Navigational markings

Offshore wind power plants should be marked in accordance with the method of navigational marking adopted in the Ordinance of the Minister of Transport, Construction and Maritime Economy of 2012[6] on the navigational marking of Polish maritime areas. According to this regulation, offshore wind turbines must be distinguishable during the day and night, and meet the following conditions:

- the tower of each wind turbine should be painted omnidirectionally from MSL up to a height of 15 m or up to the level at which the navigation markings are located (the higher of the two heights should be chosen); alternatively, horizontal omnidirectional stripes with a width of not less than 2 m may be used at intervals equal to the width of these stripes; reflective materials may also be used; the navigation markings, if the generator is to be equipped with them, shall be a white light with characteristics: letter "U" in Morse code - Mo (U) and be mounted at a

[5] Law of July 3, 2002. - Aviation Law (i.e. OJ. U. of 2020, item 1970, as amended).

[6] Ordinance of the Minister of Transport, Construction and Maritime Economy of December 4, 2012 on the navigation marking of Polish maritime areas (Journal of Laws of 2013, item 57)

height of at least 6 m above mean sea level, but below the lowest point of the arc drawn by the rotor blades;

- corners and other points of change of direction of the boundary of the wind power farm should be marked with flashing lights of yellow color with the light characteristics given for the "special sign" so that they are visible from every direction and have a nominal range of at least 5 Mm; the boundary of the wind power farm should be marked along the perimeter, at intervals of not more than 2 Mm, with flashing lights of yellow color with characteristics that are clearly different from those used at the corner points of the wind power farm, so that these lights are visible from every direction and have a nominal range of at least 2 Mm; the distance between all the lights used, counting along the border of the wind power farm, must not exceed 2 Mm; the corner lights should be synchronized with each other; it is permissible to equip with yellow-colored flashing lights, with characteristics clearly different from those used at the corner points of the farm, visible from every direction, with a nominal range of at least 2 Mm, all wind power plants forming the farm or all wind power plants located on the border of the farm;
- due to the need for accurate identification at wind farms, the following may be additionally installed: racons, radar reflectors or radar echo amplifiers and AIS equipment, as well as nautophones, the range of which should not be less than 2 Mm;
- if a transformer, meteorological or service station is part of a wind power farm, it should be included in the farm's navigational marking system, but if it is not part of the farm, it should be marked like an "offshore" structure.

"Offshore" structures should be marked by one or more white lights with the following characteristics: the letter "U" in Morse code - a period of 15 s - Mo (U) 15 s, in such a way that at least one light is visible by vessels approaching from any direction. These lights should be synchronized with each other, have a minimum luminosity of 1,400 candelas and be installed between 6 and 30 meters above Mean Sea Level (MSL). The vertical divergence of the lights should be selected so that they are seen by ships from the limit of the maximum range of the lights to the marked "offshore" structure itself. Each "offshore" structure may also be equipped with plaques identifying its name or number, which should be easily visible from all directions during the day and at night (through the use of backlighting or reflective materials) - the plaques should be yellow in color with black symbols (letters or numbers) 1 m high.

As mentioned above, according to the literature cited above, the night (aerial light) markings of the OWF can be seen even at a distance of about 39 km. Daytime navigation markings (yellow color at the bottom of the tower), on the other hand, were visible to a maximum of about 17 km (Sullivan 2013).

Wind farms can also influence the development of tourism in the region. There are known cases where the construction of an offshore wind farm has become an integral part of long-term tourism development concepts for coastal regions.

For example, the following were created:

- offshore wind energy information centers (temporary and permanent exhibitions on offshore wind energy and/or specific projects) (e.g., Nysted OWF, Lillgrund OWF, Scroby Sands OWF, Bremerhaven OWF);
- information boards dedicated to offshore wind energy or specific projects (e.g., Blekinge OWF);
- offshore wind farm viewing platforms with telescopes (e.g., Nysted OWF).

Also organized are:

on navigational markings of Polish maritime areas. Experience in other countries shows that such attractions are very popular with the public. For example, the information center dedicated to the IMF Scroby Sands averages about 30,000 visitors annually[7].

Thus, for local travel agencies, freight companies, sightseeing flight companies, shipowners or port operators, there is an opportunity for an additional source of revenue due to the possibility of organizing and operating such tours and events. It can be estimated that offshore wind farms visible from the shore may be at least as much a tourist attraction for some tourists as an obstacle to recreation for another group. However, neither foreign literature nor industry data indicate that the presence of offshore wind farms in the landscape negatively affects the profitability of the tourism industry in coastal destinations.

7.3. Stage decommissioning

The potential impacts of offshore wind farms on the seascape at the decommissioning stage are analogous to those for the construction stage (Chapter 7.1.), but with the difference that, contrary to the construction stage, during which new elements of the farm are created, at the decommissioning stage the dismantling of the existing investment takes place. Such action, in the context of landscape impacts, can therefore be considered in the long term as restoring the original value of the landscape.

7.4. Range of expected visual impact of the OWF BIII

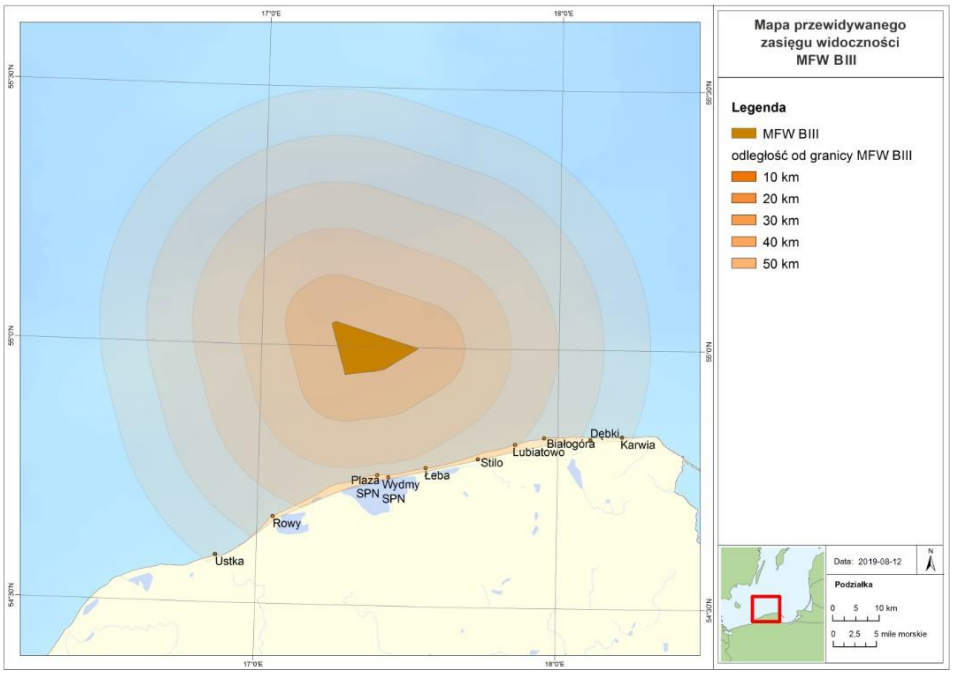
According to the 2015 Report, based on the recommendations of the guidelines, literature data, the parameters of the project, the results of computer analysis (visualizations), and taking into account the excellent visibility and visibility conditions and the excellent eyesight of the observer, in order to eliminate any doubts, it was considered that the planned project could be visible to observers from land within a radius of up to 50 km.

The following observation points (receptors) that are the subject of the impact assessment are located within this visibility range: Ustka, Rowy, Słowiński PN beach, Słowiński PN dunes, Łeba, the lighthouse in Stilo, Białogóra, Lubiatowo, Dębki and Karwia.

The predicted visibility range of the project, along with the receptors selected for evaluation, is presented in the map below.

[7] https://uk-ireland.rwe.com/locations/scroby-sands-offshore-wind-farm, access date: 05.2022

Figure 2. Expected range of visibility of OWF BIII



--	Map of predicted visibility range of OWF BIII
Legenda	Legend
MFW BIII	IMF BIII
Odległość od granicy MFW BIII	Distance from the border of the OWF BIII
Ustka	Ustka
Rowy	Ditches
Plaża SPN	SPN beach
Wydmy SPN	Dunes of the SNP
Łeba	Leba
Stilo	Stilo
Lubiatowo	Lubiatowo
Białogóra	Bialogóra
Dębki	Dębki
Karwia	Karwia
Data: 2019-08-12	Date: 2019-08-12
Podziałka	Pitch
Mile morskie	Sea miles

Source: own materials

8. Features of the area determining the scale of potential impact

8.1. General description of the area

According to Kondracki's physicogeographic division (Kondracki 2002), the planned offshore wind farm Baltic Central II will be located in the vicinity of the northern land area of Poland, which in this division is classified as mesoregion Wybrzeże Słowińskie **Wybrzeże Sł**owińskie[8],[9] reaches from the western edge of Pomorskie Voivodeship along the coast of the Baltic Sea to the western edge of Pobrzeże Kaszubskie. The landscape of this mesoregion consists mainly of coastal dunes, marshes and lakes (such as Łebsko).

[8] Pomeranian Voivodeship Spatial Development Plan. Determinants of spatial development - part A: province, Gdansk, 2009.

[9] Kondracki J., Geografia fizyczna - Polski, PWN, Warsaw, 1967

The most valuable areas of the area have been protected as part of the Slovinski National Park. There is a landscape of coastal dunes (including the beach), coastal lakes and marshes. Characteristically, halophilic (salt-loving) plants are present. The coast is leveled by wave activity and devoid of bays. The bays that were once created were closed by spits, on which powerful dunes developed, some of which are today mobile, such as on Lake Lebsko. These spits cut off former lagoons from the sea, resulting in the creation of a number of shallow coastal lakes (Łebsko, Sarbsko, Wiecko, Gardno).

An extremely specific and unique morphological form is the coastal dune belts. They occur in the form of spits and coastal dune fields. They occupy a small area, but remarkably enrich the landscape and are a specific element of the province's natural biodiversity. They were formed during the Holocene period, and obtained their final shape in the course of the development of morphological processes over the past 5,000 years. They are composed of loose sands, accumulated in fields and dune shafts, with varying proportions of organogenic formations. The varying width of the dune belts and spits is the result of a complex process of their accumulation and maritime degradation, both modern and dating back (in the highest forms and away from the current seashore) to the former periods of transgression of the so-called lithorinous sea

8.2. General characteristics of landscape values in the zone of potential impact

Within the range of potential impact of the planned OWF are the following localities: Ustka (Ustka city municipality), Rowy (Ustka rural municipality), Leba (Leba municipality), Lubiatowo (Choczewo municipality), Białogóra (Krokowa municipality), Dębki and Karwia (Krokowa municipality).

To the south of the planned project, the land area includes area forms of landscape protection, such as:

- Slowinski National Park,
- landscape parks (Seaside PK),
- areas of protected landscape, (Nadmorski OCHK, OCHK Pobrzeża na wschód od Ustki).

There are no bays, islands or offshore rocks along the coastline. The terrain is varied with rolling dunes and cliffs. Along the coast there is a strip of forest complex separating coastal towns from the beach, from which the turbines may be visible.

The update of the ecophysiographic study for the Pomeranian Voivodeship Spatial Development Plan[10] valorizes landscape resources and assesses the value of these resources in the region within the boundaries of the specified landscape units. This assessment shows that areas with very high value of features resulting from the structure of landscape spatial units are concentrated in the eastern and central parts of Pomorskie.

The Słupsk municipality and a fragment of the Choczewo municipality were classified as areas with "outstanding, very high or high" landscape value. These are areas rated as "very strongly, strongly or moderately" threatening to landscape protection.

However, in the visual assessment of the province's landscape, resulting from the structure of landscape units, in terms of visual value:

- the area around Lake Lebsko was rated as medium,
- the coast near Leba - as significant,
- the coast near Lubiatow and Bialogóra - as medium.

[10] Czochański J., Lemańczyk J. ed. Update of the ecophysiographic study to the spatial management plan of Pomorskie Voivodeship, Voivodeship Spatial Planning Office in Słupsk, Marshal's Office of Pomorskie Voivodeship, Słupsk - Gdańsk 2007

With this in mind, the importance of the seascape (as a resource that BIII OWF may impact) is categorized as medium.

8.3. Social groups exposed to visual impact IMF

Two main social groups will be exposed to visual impacts associated with the location of OWF BIII in the maritime area: residents of coastal towns located in the zone of influence and tourists visiting the Polish coast in this zone.

I. Residents of coastal towns

As the BIII OWF may have a visual impact on a stretch of coastline of about 80 km, this analysis includes residents of villages along this stretch of coastline in the group exposed to the project's visual impacts. In particular, these are the residents of the villages (looking from west to east):

- city of Ustka (municipality of Ustka) - minimum distance from OWF BIII approx. 48 km;
- Rowy (rural municipality of Ustka) - minimum distance from OWF BIII approx. 34 km;
- Leba (commune of Leba) - minimum distance from OWF BIII approx. 23 km;
- Lubiatowo (Choczewo municipality) - minimum distance from OWF BIII approx. 31 km;
- Białogóra (Krokowa municipality) - minimum distance from OWF BIII approx. 36 km;
- Dębki (Krokowa municipality) - minimum distance from OWF BIII approx. 43 km;
- Karwia (Krokowa municipality) - minimum distance from OWF BIII approx. 49 km.

It should be noted that these villages are located mostly surrounded by forest complexes that shield the view of the sea. For this reason, IMFs will not be visible from these localities, except in specially exposed areas to the sea.

Photo 1. Forest complex located between the village of Lubiatowo and the Baltic Sea

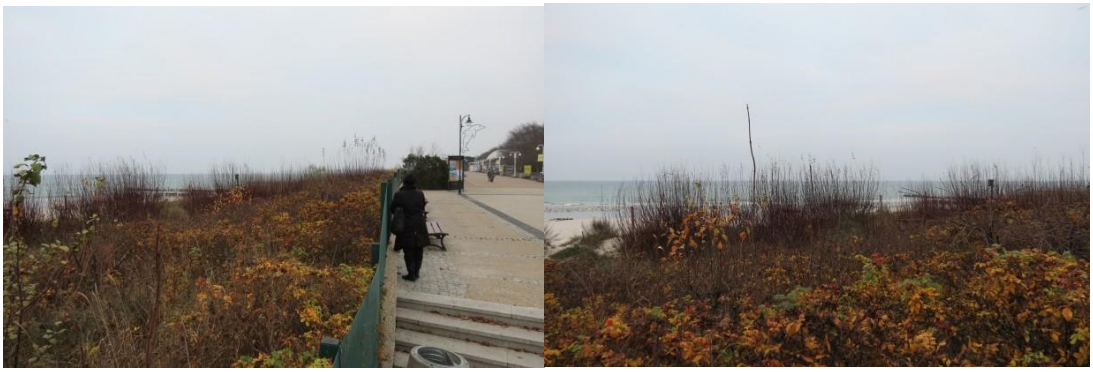
Source: provided by the Contracting Authority

Places with special exposure to the sea include, for example:

- seaports in Ustka and Leba, with exposure to the sea,
- hotels (e.g., Hotel Neptun located on the beach near Leba),
- lighthouses in the vicinity of the towns of Ustka, Leba, Stilo,

- seaside promenade in Ustka[11] - a long walking route along the beach, built on the dunes, along which exclusive guesthouses and restaurants have been built. Along this promenade, however, there are trees and shrubbery that will limit the view of the sea.

Photo 2. Limited view of the sea from the promenade in Ustka



Source: provided by the Contracting Authority

In addition, visual impacts may affect local residents who will enjoy recreation at a beach located near the village.

II. Tourists

This group includes tourists who will use the seaside beach and other tourist attractions, such as viewpoints (Stilo lighthouse).

The coastal areas are considered to be areas of high natural value, which are an attraction for both domestic and foreign tourists. The high volume of tourist traffic in the coastal strip during the holiday season is confirmed by published statistics.

According to statistics from the Central Statistical Office for 2019[12] (data from 2020-2021 may not be representative due to the epidemiological situation), in coastal municipalities, tourists using facilities in the coastal area accounted for 21.3% of all overnight tourists nationwide during the holiday season. Coastal municipalities are home to 24% of all tourist accommodations included in the reporting. The accommodation on offer in the region is very diverse and includes hotels of various categories, hotels, holiday resorts, guesthouses, private accommodation, campgrounds and campsites.

The users of the accommodation base in the coastal municipalities are mainly domestic tourists (80.5% in 2019). Foreign tourists are mainly Germans, Russians, Norwegians, British, Czechs and Swedes, (about 19.5% of total overnight stays). Overnight stays granted in July and August predominate.

According to the number of nights provided, the rural municipality of Ustka, the rural municipality of Słupsk, Główczyce, Choczewo and Gniewino fall into the category of low-visited seaside destinations in Poland. It is estimated that only up to 1,000 overnight stays were provided in each of these municipalities in 2019. Between 1,000 and 10,000 were provided in the Smoldzino municipality, between 10,000 and 99,000 in the Wicko municipality, and between 100,000 and 902,000 overnight stays in the Leba municipality and the Ustka municipality.[13] The accommodation on offer in the region

[11] https://www.ustka.info.pl/atrakcje/promenada, [access date: 05.2022 r.]
[12] Tourist accommodation facilities in coastal areas in July and August 2019, CSO, Warsaw 11.2019
[13] Tourist accommodation facilities in coastal areas in July and August 2019, CSO, Warsaw 11.2019

is very diverse and includes both hotels of various categories, holiday resorts, guesthouses, private quarters, campgrounds and campsites.

8.4. Detailed characterization of the value and sensitivity to impacts of viewpoints (receptors)

Observation points (receptors) are vantage points in the potential impact zone that, due to their exposure and relevance to public perception of potential impacts, have been identified as potentially sensitive to impacts from the BII OWF.

For these points, verified during the field visit, a landscape impact assessment was performed.

The location of the points was determined taking into account:

- location within the designated visibility range of the OWF,
- the number of residents of the nearest village,
- the tourism potential of the nearest locality,
- the presence of area forms of land protection,
- tourist attractiveness (i.e., e.g., observation towers, bike paths, etc.),
- unique terrain.

The importance of each point was determined by the factor with the highest value (e.g. low population, but high tourism potential - high tourism potential was taken into account).

Table 1. Classification of the importance of viewpoints

Point importance category	Definition of
Insignificant	Location outside the designated visibility range of the OWF
Small	Location within the designated visibility range of the OWF, Low population (up to 100 people), Lack of tourism potential, Lack of area forms of nature and landscape protection, Lack of tourist attractions
Medium	Location within designated range of IMF visibility, Population from 101 - to 500, Tourism potential (number of tourists over 5,000), Occurrence of area forms of nature and landscape protection, Occurrence of tourist attractions
Large	Location within designated range of IMF visibility, Population from 501 - to 5000, Tourist potential (number of tourists over 10 thousand), Occurrence of area forms of nature and landscape protection, Occurrence of tourist attractions (e.g., observation towers, bicycle paths, etc.), Unique terrain
Very large	Location within the designated visibility range of the OWF, Population over 5001, Tourist potential (number of tourists over 100 thousand), Occurrence of area forms of nature and landscape protection, Occurrence of tourist attractions (e.g., observation towers, bicycle paths, etc.), Unique terrain

Source: Offshore wind farm Baltic Central II. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The following viewpoints with sea exposure were selected from which visibility of the Project is possible:

- beach in the town of Ustka;
- the beach in the vicinity of the village of Rowy;
- the dunes within the boundaries of the Slovinski National Park;
- beach within the boundaries of the Slovinski National Park;
- a beach in the vicinity of the town of Leba;
- the lighthouse in the town of Stilo;
- the beach near the village of Białogóra;
- the beach in the vicinity of the village of Lubiatowo;
- the beach in the vicinity of the village of Dębki;
- the beach in the vicinity of the village of Karwia.

For these points, according to the classification of resource importance given above, a category of importance was indicated.

Table 2. Description of the points from which the photographic documentation was taken, along with the reasons for their selection

Point	Category of importance of the resource	Definition of
Ustka (beach)	Very large	Location within the designated visibility range of the OWF (about 48 km), The number of residents of the nearest village (about 16,000 residents), Tourism potential of the nearest town (about 100,000 tourists), Occurrence of area forms of nature and landscape protection, Occurrence of tourist attractions (e.g., observation towers, bicycle paths, etc.), Unique terrain
Ditches (beach)	Medium	Location within the IMF's designated range of visibility (about 39 km), The number of residents of the nearest village (about 360 residents), Tourist potential of the nearest town (several thousand tourists during the summer season), Presence of area forms of nature and landscape protection (Słowiński PN buffer zone, OCHK Pas Pobrzeża na wschód od Ustki, OSO Pobrzeże Słowińskie), Occurrence of tourist attractions (e.g., monuments, cliffs, moving dunes, bathing beaches)
Slowinski PN (dunes)	Very large	Location within the designated range of visibility of the OWF (about 43 km from the BI OWF),

Point	Category of importance of the resource	Definition of
		The population of the nearest town - Leba (about 16,000 residents), Tourist potential of the nearest village (number of tourists about 250 thousand people), Occurrence of area forms of nature and landscape protection, Occurrence of tourist attractions (moving dunes, hiking trails), Unique terrain
Slowinski PN (beach)	Very large	Location within the designated range of visibility of the OWF (about 43 km from OWF BII), The population of the nearest town - Leba (about 16,000 residents), Tourist potential (about 250,000 tourists), Occurrence of area forms of nature and landscape protection, Occurrence of tourist attractions (moving dunes, hiking trails), Unique terrain
Leba (beach)	Very large	Location within the designated range of visibility of the OWF (about 48 km from OWF BII), The population of the nearest town - Leba (from 16,000 inhabitants), High tourist potential of Leba (it is estimated that more than 100,000 tourists come to Leba on weekends during the summer season, and about 60,000 during the week[14]), The presence of area forms of nature and landscape protection (the buffer zone of the Slowinski National Park), Occurrence of tourist attractions (e.g., museums, recreational and educational parks, monuments, funfairs, swimming pools, etc.)
Stilo	Medium	A lighthouse that is a tourist attraction (distance of about 56 km from OWF BII - outside the expected range of visibility of the OWF), Presence of area forms of nature and landscape protection (Nadmorski OCHK, SAC Sarbska Spit)
Stilo	Medium	Lighthouse which is a tourist attraction (distance approx. 28 km from IMF BIII) Presence of area forms of nature and landscape protection (Nadmorski OCHK, SAC Sarbska Spit)
Lubiatowo (beach)	Medium	Location within the designated range of visibility of the OWF (about 31 km from OWF BIII) The number of residents of the nearest village (about 200 people) Tourist potential of the nearest village (no data available) Presence of area forms of nature and landscape protection (Seaside OCHK) Occurrence of tourist attractions (i.e. manor and farm complex and park, bicycle and hiking trails, monuments, nature monuments)

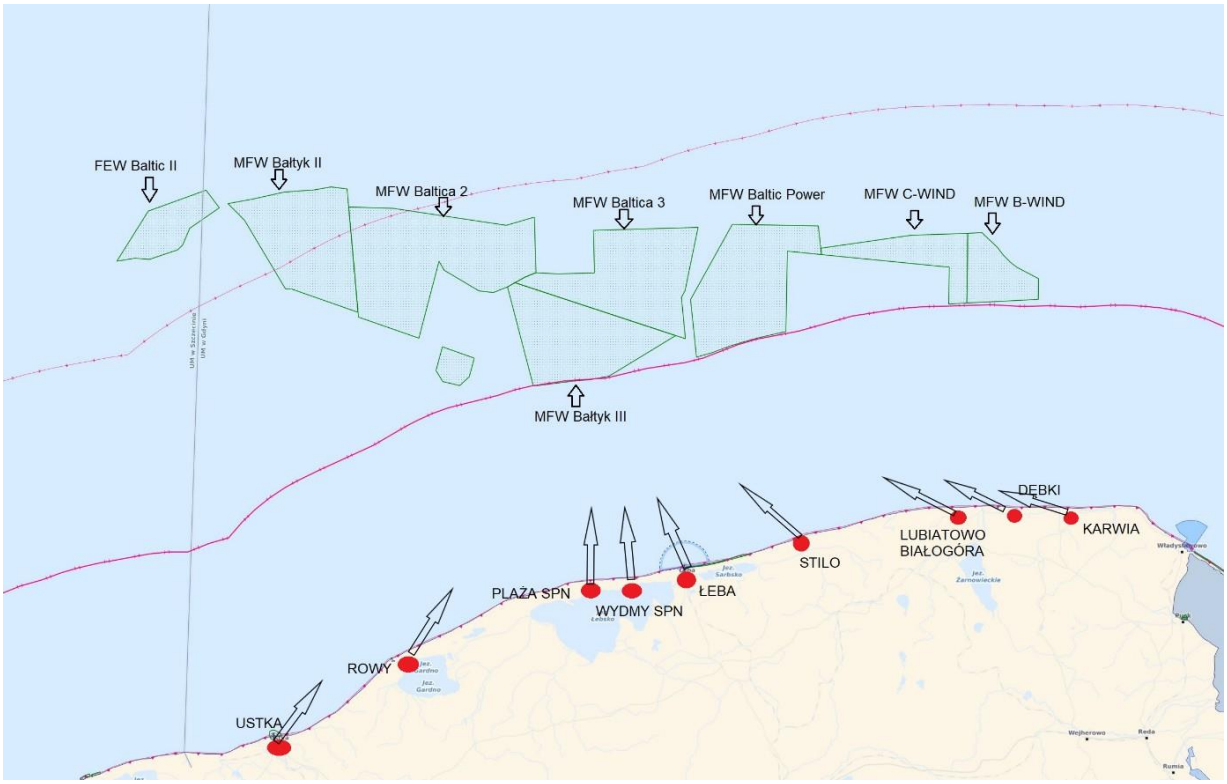
[14] Based on statements made by the mayor of Leba in August 2014 (http://www.tvn24.pl/pomorze,42/jedna-bigkaretka-na-100-tys-osob-w-weekendy-w-lebie-bywa-dramatycznie,457019.html, [access date: 05.2022 r.])

Point	Category of importance of the resource	Definition of
Białogóra (beach)	Medium	Location within the designated range of visibility of the OWF (about 36 km from OWF BIII) The number of residents of the nearest village (about 400 people) Presence of numerous area forms of nature and landscape protection (Nadmorski PK, Nadmorski OCHK, Białogóra SAC, Białogóra reserve, Piaśnica reserve)
Dębki (beach)	Medium	Location within the designated visibility range of the OWF (about 40 km) The number of residents of the nearest village (about 200 people) Tourist potential of the nearest village (no data available) Presence of area forms of nature and landscape protection Occurrence of tourist attractions
Karwia (beach)	Large	Location within the designated visibility range of the OWF (about 48 km) The number of residents of the nearest village (about 1,000 people) Tourism potential of the nearest town (30-35 thousand people) Presence of area forms of nature and landscape protection (Nadmorski OCHK, in the vicinity of Nadmorski PK, SAC Bielawa and Bory Bażynowe, SPA Bielawskie B這ta, reserve Bielawa) Occurrence of tourist attractions, i.e. bathing beaches, historic buildings

Source: Offshore wind farm Baltic Central II. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The significance rating for each of the selected points was determined to be at least average. The distribution of the selected viewpoints along with the direction of photography (red arrows) is illustrated on the map below.

Figure 3. Map of sites from which photographic documentation was taken



UM w Szczecinie	UM in Szczecin
UM w Gdyni	UM in Gdynia
FEW Baltic II	FEW Baltic II
MFW Bałtyk II	OWF Baltic II
MFW Baltica 2	IMF Baltica 2
MFW Baltica 3	IMF Baltica 3
MFW Baltic Power	Baltic Power OWF
MFW C-WIND	IMF C-WIND
MFW B-WIND	IMF B-WIND
MFW Bałtyk III	OWF Baltic III
Jez. Gardno	Jez. Gardno
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Jez. Żarnowieckie	Jez. Zarnowiec
Władysławowo	Wladyslawowo
Puck	Puck
Wejherowo	Wejherowo
Reda	Reda
Rumia	Rumia
Łeba	Leba
Ustka	Ustka
Stilo	Stilo
Lubiatowo	Lubiatowo
Białogóra	Bialogóra
Dębki	Dębki
Karwia	Karwia

Source: own study: Sipam.gov.pl[15]

[15] www.sipam.gov.pl

From these points, photographic documentation of the seascape was taken during a field visit in April, August, November and December 2014 and January 2015 for this study.

8.5. Meteorological conditions of the area of the planned project project

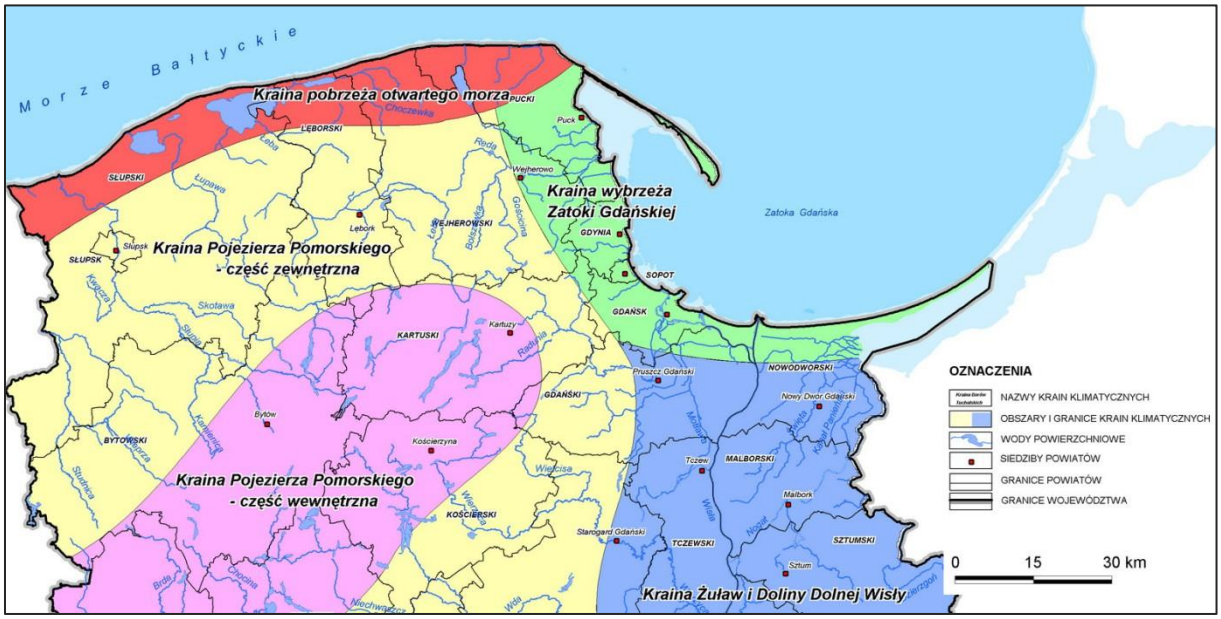
According to information from the Chief Inspectorate of Environmental Protection[16] geomorphological diversity, proximity to the Baltic Sea and location within the range of influence of large barometric centers cause a clear differentiation of climatic conditions in the Pomeranian zone. For this reason, the zone was divided into local climate types. The prevailing climate on the coast was classified as a coastal belt climate type with the smallest air temperature amplitudes, high humidity, mild winters, cooler summers, and strong winds:
precipitation for this type of climate ranges from 500 to 600 mm per year,

- the average summer temperature is 17.5 - 20°C,
- the number of frosty days varies from 30 to 50.

The prevailing wind here is from a westerly and southwesterly direction. The coastal region has the highest wind speeds in Poland (outside the mountains) and a high number of days per year with strong winds above 15 m/s. At the interface between land and sea, there is also a local wind, known as a breeze, with a changing direction throughout the day.

According to the update of the ecophysiographic study of the Pomorskie Voivodeship[17], the planned project is located closest to the climatic zone called "Land of the open sea coast".

Figure 4. Climatic regions of the Pomeranian Voivodeship



Morze Bałtyckie	Baltic Sea
Kraina pobrzeża otwartego morza	Land of the open sea coast
Zatoka Gdańska	Gulf of Gdansk
Kraina wybrzeża Zatoki Gdańskiej	Land of the coast of the Gulf of Gdansk
Kraina Pojezierza Pomorskiego – część zewnętrzna	Land of the Pomeranian Lake District - outer part

[16] Chief Inspectorate of Environmental Protection, www.powietrze.gios.gov.pl, [access date: 05.2022 r.]
[17] Update of the ecophysiographic study for the spatial development plan of Pomorskie voivodeship, Provincial Office of Spatial Planning in Slupsk, Marshal's Office of Pomorskie Voivodeship, Slupsk - Gdansk, 2007

Kraina Pojezierza Pomorskiego – część wewnętrzna	Land of the Pomeranian Lake District - inner part
Kraina Żuław i Doliny Dolnej Wisły	Land of Żuławy and Lower Vistula Valley
Oznaczenia	Signs
NAZWY KRAIN KLIMATYCZNYCH	NAMES OF CLIMATIC LANDS
OBSZARY I GRANICE KRAIN KLIMATYCZNYCH	AREAS AND BOUNDARIES OF CLIMATIC LANDS
SIEDZIBY POWIATÓW	DISTRICT SEATS
GRANICE POWIATÓW	DISTRICT BOUNDARIES
GRANICE WOJEWÓDZTWA	PROVINCE BORDERS

Source: Pomeranian Region Land Information System.

Among the meteorological parameters of particular importance in the context of visual impacts of the planned BIII OWF, it is necessary to point out those that may affect the visibility of the investment from the shore.

Increased visibility of OWF BIII will be influenced by sunshine and the number of clear days (without cloud cover or precipitation) per year.

Reduced or even outright reduction in visibility of OWF BIII from the shoreline will be affected by such meteorological conditions as precipitation (rain and snow), haze, fog and cloud cover.

The atmospheric conditions indicated above make up an important factor in assessing visual impact called visibility.

According to "Fundamentals of Meteorology,"[18] visibility (horizontal) is one of a set of parameters of the state of the troposphere (in addition to temperature, pressure, cloud cover or precipitation, among others) that enable the description of weather at a given time and place. Is the greatest distance from which, under specific conditions, an object can still be perceived.

Visual visibility on the Polish coast above 5 nautical miles[19] is about 60% in winter, 70 - 80% in spring and autumn, and more than 80% in summer. Limited visibility (0.5 - 2 nautical miles), occurring due to, for example, fog, vapor, falling snow or heavy rain, occurs on about 5 - 9% of days in October - April and 3 - 4% of days in May - September.

Solar insolation is understood as the time given in hours during which sunlight falls directly on a specific location on the Earth's surface. Sunshine depends on the length of the day, the season and cloud cover.

The distribution of solar radiation is uneven over the annual cycle. Approximately 80% of the annual sunshine falls in the spring-summer period (April-September), with the duration of solar operation in summer extending to 16 hrs/day, while in winter it shrinks to 8 hours a day[20]. Other important meteorological conditions include cloud cover. The average annual cloud cover in Poland[21] varies from about 5 to 5.5 octants, i.e. from just over 60% to 70%. The areas with the least cloud cover are: Northwestern Poland (around Swinoujscie), regions of central Poland, and the Sandomierska Basin and Roztocze. The Pomeranian Lake District and the Sudetic foothills have the highest degree of sky coverage. Cloudiness in the western part of Poland is higher than in its central and eastern parts, the belt of elevated values runs meridionally. The highest cloud cover is in winter (nearly 80% in the Pomeranian and Suwalskie Lake Districts and the Karkonosze Mountains, up to about 70% in Nowy Sącz and northwestern Poland). The lowest cloud cover is observed in summer, with the majority of the

[18] Tymanski Piotr, Holec Michal, Basics of meteorology and meteorological navigation", Maritime Publishing House, Gdansk, 1973

[19] Rokiciński K., Geographical and hydrometeorological characteristics of the Baltic Sea as an area of asymmetric operations, Zeszyty naukowe Akademii Marynarki wojennej rok XLVIII NR 1 (168) 2007,

[20] http://www.enis-pv.com/naslonecznienie-w-polsce.html, [access date: 10.09.2015 r.]

[21] The relationship of Poland's climate in the second half of the 20th century to global and regional scale processes. Cloudiness in Poland, http://klimat.imgw.pl/wp-content/uploads/2013/01/1_5.pdf, [access date: 10.09.2015 r.]

country slightly exceeding 60%. The least cloudy areas of the country are around Swinoujscie, the coast of the Gulf of Gdansk and the Sandomierz Basin. The most serene month is August. Cloudless or nearly cloudless skies occur a total of about 20% of the time. The average annual number of cloudy days (cloudiness > 7) in Poland varies from 110 (around Swinoujscie) to 200 (in the mountains), the least number of cloudy days occurs in summer, the most in winter. Maximum cloud cover[22] occurs in March-September, and minimum cloud cover May-June.

The number of days with fog in Poland, depending on the region, varies between 30 and 110 days a year. Most days with fog occur in the Chojnice region (Pomeranian Voivodeship) and in the west of the country. The number of days with precipitation (data from 1971 to 1990) in the coastal region fluctuates between about 169 and 181 days per year.[23]

The highest frequency of fog[24] is in September-April (and especially January-March). In coastal areas, the maximum incidence of fog is recorded in autumn. Advection fogs are specific to the seas and coastal zones. They are formed when warm air flows over the cold ground and then the fog reaches up to 300 - 500 m, sometimes making only the tops of masts visible over large areas.

According to data from IMGW, the coast near Leba has the following spatial distribution of selected climatic elements (Table 3).

Table 3. IMGW meteorological data for the vicinity of Leba[25]

Climate element	Ustka	Area up to about 50 km west of Leba	Area up to about 50 km east of Leba
Sunshine [average number of hours per year]	1700	1650	> 1700
Fog [average number of days per year]	50	40 - 60	40-50
Precipitation [average mm per year]	650	650-700	650-600
Cloudiness [number of cloudy days, cloudiness > 7]	160	160	160 - 150
Cloud cover [average sky coverage on a scale of 0-8 per year]	5	5-5,2	4,8 - 5
Number of clear days [cloud cover < 2]	35	35	40 - 45

Source: IMGW

Meteorological conditions directly contribute to an increase or decrease in visibility. There are even measurements of visibility, which are particularly important in shipping and aviation, for example. Visibility is a resultant of meteorological conditions - when there is fog or cloud cover, visibility

[22] Rokiciński K., Geographical and hydrometeorological characteristics of the Baltic Sea as an area for asymmetric operations, Zeszyty naukowe Akademii Marynarki wojennej rok XLVIII NR 1 (168) 2007
[23] Blażejczyk K., Bioclimatic determinants of recreation and tourism in Poland", Polish Academy of Sciences, Institute of Geography and Spatial Management, Warsaw 2004
[24] Rokiciński K., Geographical and hydrometeorological characteristics of the Baltic Sea as an area for asymmetric operations, Zeszyty naukowe Akademii Marynarki wojennej rok XLVIII NR 1 (168) 2007
[25] Atlas of Poland's climate edited by Halina Lorenc, Institute of Meteorology and Water Management. Warsaw 2005

decreases, while it increases during sunny days, and when there is a high transparency of the atmosphere, without haze or turbidity.

For the purpose of this analysis, detailed visibility data for 2013 was obtained, based on studies conducted by the Institute of Meteorology and Water Management (IMGW) at the IMGW-PIB Leba Hydrological and Meteorological Station.

The visual method of determining horizontal visibility is widely used in the measurement practice of meteorological stations and posts. Surrounding the location of the measurement point are selected characteristic terrain objects (visibility reefs), which are 50, 200, 500 and 1000 m, and 2, 4, 10 and 50 km away from the location of visibility observations.

Visibility was determined according to the generally accepted international visibility scale and indicated for use at the International Meteorological Conference in Warsaw in 1935. This scale is still in effect today[26]

Table 4. International Visibility Scale

Visibility class	Description
0	reper at 50 m invisible
1	50 m still visible, while the reper at 200 m already invisible
2	200 m still visible, while the reper at 500 m already invisible
3	500 m still visible, while the reper at 1 km already invisible
4	1 km still visible, while the reper at 2 km already invisible
5	2 km still visible, while the reper at 4 km already invisible
6	4 km still visible, while the reper at 10 km already invisible
7	10 km still visible, while the reper at 20 km already invisible
8	20 km still visible, while the reper at 50 km already invisible
9	50 km still visible

Since the planned offshore wind farm BIII is located about 23 km from the shoreline, it is most important for its visibility to determine how often weather conditions prevail for visibility degrees:

- 0 - 7 (visibility from 0 to 19 km) - as they define the time during which weather conditions prevail that prevent visibility of IMF BIII even from the nearest observation point located on land,
- 8 (visibility of more than 20 km) - as it defines the time during which there are atmospheric conditions that allow visibility of IMF BIII from land.

The measurement station in Leba conducts visibility surveys in accordance with the Manual for Meteorological Stations developed by the World Meteorological Organization (WMO). The measurements were made with the proper measuring equipment and reperes, and were carried out every hour, around the clock, all year round.

At this station, the survey was conducted using the PWD22 visibility meter, which surveys visibility to the farthest repertory located at a distance of 20 km. The data obtained from the Leba research station, for which the visibility value was determined as grade 8, therefore means that the visibility can be 20

[26] Maciążek A., Measurements. Visibility, IMGW Observer Newspaper No. 4, 2005

km or above 20 km. The disappearance of visibility at 50 km is not specified. For the purposes of this analysis, the notation of Grade 8 visibility was therefore assumed to be the highest, unlimited visibility.

8.6. Impacts cumulative

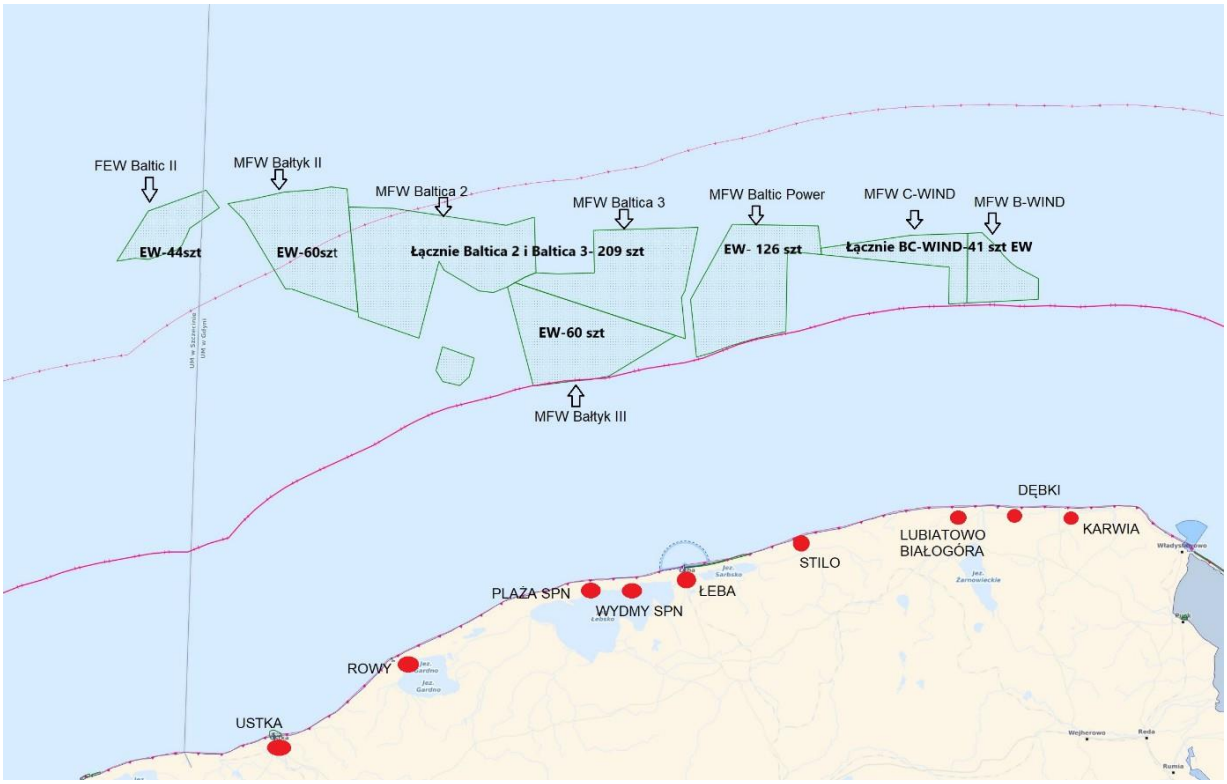
In Section 10 of Volume II of the report, a detailed analysis was made, based on which it was determined that the impacts of OWF BIII may cumulate with those of OWF Baltic II ("OWF BII"), OWF Baltica 2, OWF Baltica 3:

- OWF BII - is located a minimum of about 37 km from the coast and about 17 km west of OWF BIII. At this stage, the location of the various turbines in the project is unknown;
- OWF Baltica 2 - is located at the shortest distance of about 31 km from the coast. It is immediately adjacent to OWF BIII to the north and at a distance of about 10 km to the west of OWF BIII. At this stage, the location of the various turbines in the project is unknown;
- OWF Baltica 3 - is located at the shortest distance of about 25 km from the coast. It is directly adjacent to OWF BIII to the north. At this stage, the location of the various turbines in the project is unknown.
- Baltic Power OWF - is located about 24 km from the coast. It is directly adjacent to the Baltica 3 offshore wind farm to the west and the BIII offshore wind farm to the southwest. It is adjacent to the east side in the northern part of the BC WIND OWF. At this stage, the location of the various turbines in the project is unknown;

The cumulative impact assessment was conducted for the construction, operation and decommissioning phases of all wind farms. In addition, cumulative impacts at the construction stage of the BIII OWF external connection infrastructure (MIP) were also examined.

Compared to the situation analyzed in the 2015 Report, for the purposes of this Report, when considering the possibility of cumulative impacts, two additional projects for which environmental decisions have been issued were also considered, i.e. FEW Baltic II and the Baltic Power OWF. It was considered that these two additional projects would not in any way affect the assessment of cumulative impacts on the landscape. This assessment is due to several conditions that have been taken into account in this case. In the case of the FEW Baltic II project, its shortest distance from the shore is about 51 km (according to the EIA report for the FEW Baltic II project). This means that the project is outside the range of visibility from the shore. Thus, it cannot further cumulate impacts. In the case of the Baltic Power OWF project, the smallest distance from the shore is much lower because 22 km, but nevertheless the distance separating it from the BIII OWF is about 3 km. Thus, taking into account both the observer's field of view and the shape of the seashore, this means that the observer's position on the shore closest to the BIII OWF is at a distance of about 26 km from the Baltic Power OWF project. Notwithstanding the above, in the case of the Baltic Power OWF, there will be an additional accumulation of impacts. However, according to the analyses conducted in the Environmental Impact Report for the Baltic Power OWF, these impacts will not be significant. The pre-mitigated rant indicated that the Baltic Power, Baltica, Baltic II and Baltic Central III offshore wind farms will not be visible at the same time in the case of Jastrzebia Gora.

Figure 5. Illustration of the maximum number of wind turbines planned to be implemented under each OWF



UM w Szczecinie	UM in Szczecin
UM w Gdyni	UM in Gdynia
FEW Baltic II	FEW Baltic II
MFW Bałtyk II	OWF Baltic II
MFW Baltica 2	IMF Baltica 2
MFW Baltica 3	IMF Baltica 3
MFW Baltic Power	Baltic Power OWF
MFW C-WIND	IMF C-WIND
MFW B-WIND	IMF B-WIND
MFW Bałtyk III	OWF Baltic III
Jez. Gardno	Jez. Gardno
Jez. Łebsko	Jez. Lebsko
Jez. Sarbsko	Jez. Sarbsko
Jez. Żarnowieckie	Jez. Zarnowiec
Władysławowo	Wladyslawowo
Puck	Puck
Wejherowo	Wejherowo
Reda	Reda
Rumia	Rumia
Łeba	Leba
Ustka	Ustka
Stilo	Stilo
Lubiatowo	Lubiatowo
Białogóra	Bialogóra
Dębki	Dębki
Karwia	Karwia
EW-44szt	EW-44pcs
EW-60szt	EW-60pcs
Łącznie Baltica 2 i Baltica 3 – 209 szt	Total Baltica 2 and Baltica 3 - 209 pcs
EW – 126 szt	EW - 126 pcs
Łącznie BC-Wind – 41 szt EW	Total BC-Wind - 41 pcs EW
EW – 60 szt	EW - 60 pcs

Source: own study: Sipam.gov.pl[27]

Wind turbines may be visible for 5,000 hours a year in Leba, but 50% of them will be visible for a very short time (a few dozen hours a year). In the case of Lubiatow, individual power plants can be visible for more than 5,000 hours a year, and 25% of the wind turbines installed in the listed OWFs can be visible for up to 500 hours a year. From the village of Dębki, individual power plants will be visible almost 1000 hours a year, but in practice, more than 25% of the installed power plants will never be visible.[28]

The total width of development in the offshore area with wind farms is about 102 kilometers. The total maximum number of wind turbines that can be realized on all the above listed OWFs is 540 units. The number of wind power plants planned to be built under the BIII offshore wind farm is 60pc, accounting for 11.1% of the total EW planned to be built in this area of the Baltic Sea. The preferred variant for implementation involves a 12.72% increase in the maximum height of the wind turbine structure compared to the variant approved by the environmental decision, and a 13.63% increase in rotor diameter compared to the variant approved by the environmental decision. Nevertheless, the investor decided to reduce the number of wind turbines by 50% and reduce the area of the rotor zone by 21.83% compared to the variant approved by the environmental decision, which translates into the fact that the preferred parameters of the OWF in the current variant will not cause a greater impact on the landscape than in the variant approved by the environmental decision.

Below are visualizations showing the cumulative impacts of the farms in question.

Figure 6 Visualization of the view of the Baltic Power offshore wind farm together with Baltica, Baltic II and Baltic Central III from Dębki (autumn season)

Source: Report on the environmental impact of the Baltic Power offshore wind farm. MEVO 2020.

Figure 7 Visualization of the view of the Baltic Power offshore wind farm together with Baltica, Baltic II and Baltic Central III from Lubiatow (summer season)

Source: Report on the environmental impact of the Baltic Power offshore wind farm. MEVO 2020.

[27] www.sipam.gov.pl
[28] Report on the environmental impact of the Baltic Power offshore wind farm. MEVO 2020.

Figure 8 Visualization of the view of the Baltic Power offshore wind farm together with Baltica, Baltic II and Baltic Central III from the dune in the Slowinski National Park (spring season)

Source: Report on the environmental impact of the Baltic Power offshore wind farm. MEVO 2020.

8.7. Visualizations of the wind farm wind farm

From the selected points, photographic documentation of the seascape was taken during a field visit in August, November and December 2014 and January 2015 for this study. These photographs were taken in the direction of the planned development.

For the analyses conducted for this project, a common method used by turbine manufacturers was used:

- the color of the tower, nacelle and turbine propellers: RAL7035 ("light gray"),
- the color of the red propeller tips: RAL3024 ("luminous red"),
- the color of the white propeller tips: RAL9003 ("signal white").

According to visibility data obtained from the IMGW for the Leba region, for most of the year[29] there are conditions of very good visibility (grade 8), which allow observation of the object located at a distance of more than 20 km. Therefore, visualizations made for conditions of no/low cloud cover will be crucial for assessing the impact on the seascape of OWF BIII, as visibility reaches the highest values under such atmospheric conditions (high air clarity, no haze, etc.).

For the observation point located on the beach near the town of Leba, a visualization showing the visibility of the IMF's aerial lighting at night was also made. Navigational lighting is not indicated because, according to the literature, it will not be visible from land.

The WindPRO program used to perform the visualization does not have the ability to automatically adjust the visibility of night lighting, so the presented visibility of aviation lights is based on literature data.

It should be noted that at this stage of the proceedings, the exact spacing of the wind turbines is not known for either the BIII OWF project or other OWF projects. Thus, the visualizations made show turbines spaced according to the principle of spreading the planned number of power plants evenly over the entire body of water available for the project. The visualizations produced may therefore differ slightly from the actual view of the IMF from the indicated vantage points. However, the possible different placement of turbines in the farm area should not significantly affect the visibility of the entire farm from vantage points.

[29] Based on 2013 data.

9. Assessment of the impact of the investment on landscape

The chapter directly cites the description of impacts that was presented in the 2015 Report.

9.1. Stage construction

During the construction phase, there will be movement of installation/assembly units (such as self-elevating platforms - "jack-up", drilling rigs, etc.) from the port to the project site and transportation of components/subassemblies to the project site by ship.

It should be noted that the types and movement of ships will depend on numerous factors that are currently unknown, such as the location of ports, the number, type and size of turbines installed at a given stage, economic conditions at the construction stage, etc.

In addition to the basic vessels listed above, depending on the selected farm components during the construction of a wind farm may be used, dredgers for preparing the bottom for the gravity foundation for MST, barges for transporting equipment for preparing the seabed for foundations or for hauling away the excavated spoil, pumps and generators for pumping cement binder, e.g., for the installation of monopiles, and other vessels for e.g., discharging stones/boulders for leaching protection.

The construction phase will generate short-term, local impacts on the landscape.

These units will not be visible to observers on land during the work performed at the project site. They will, however, be visible when flowing to the construction site.

According to Chapter 14 of Volume III of the EIA, the Baltic Sea is one of the most shipping-intensive seas in the world.

The units used during the construction phase will therefore be among many others moving in the area of the planned project. The likely routes of these vessels will be from the ports to the targeted work sites in the location earmarked for the Central Baltic offshore wind farm III.

The scale of such impacts will be smaller for the variant selected for implementation (60 turbines) than for the variant approved by the Environmental Decision (120 turbines) evaluated in the 2015 Report, and with fewer farm components to be stored, transported and assembled (by about 70%) compared to the 2015 NIS.

Considering the above, it was concluded that the movement of vessels involved in the construction of the farm is an impact on the landscape:

- local scale;
- discontinuous and repetitive over time - dependent primarily on weather conditions, which determine the ability of ships to go to sea and carry out construction work at sea;
- instantaneous - occurs only when ships are moving through the maritime area in the zone of visibility from the shore;
- low intensity - the ships involved in the construction of the farm will not be particularly distinguished from the existing marine traffic taking place in the so-called "coastal traffic zone" (see Chapter 4 of Volume II, which discusses the expected types and traffic of ships);
- reversible - it ceases to be perceptible as soon as ship traffic ceases (the factor that affects the landscape then disappears).

Therefore, based on the impact magnitude assessment matrix, the magnitude of impact associated with vessel traffic during the construction phase of the BIII OWF (for all analyzed variants) was classified as insignificant. As the significance of the landscape (as an affected resource) was classified as medium, the significance of the impact was assessed as negligible.

Cumulative impact assessment

In the case of simultaneous construction of the BIII offshore wind farm and the Baltica 3 offshore wind farm and MIP, there could potentially be a cumulative impact on the landscape of the units used for the construction of the above projects. Given that only individual phases 2 of OWB-BIII and Baltica (Baltica 3 area) can be built at the same time (see Volume II Chapter 10), this cumulation will not increase the significance of the impact.

The impact will be:

- local scale - limited to a small section on the beach in Ustka;
- one-time - the work performed in connection with the laying of cables will not continue after completion;
- temporary - the impact will cease as soon as the cable laying work is completed;
- medium intensity - the work will be clearly noticeable;
- reversible - it will cease to be felt as soon as the work stops (the factor that affects the landscape then disappears).

Considering the above and based on the impact magnitude assessment matrix, the magnitude of the impact associated with the MIP construction work is classified as insignificant. As the significance of the seascape (as an impacted resource) was classified as medium, the significance of the cumulative impact was assessed as negligible.

Summary

In summary, since about 50% fewer power plants will be built in the variant that is the subject of this Report, they will be 12.72% higher, with a total area of the rotor zone that is 13.63% smaller than specified in the Environmental Decision, therefore, based on the impact magnitude assessment matrix, the magnitude of the impact associated with vessel traffic at the BIII OWF construction stage (for all analyzed variants, including the variant that is the subject of this Report) is classified as insignificant. As the significance of the landscape (as an affected resource) was classified as medium, the significance of the impact was assessed as negligible.

9.2. Stage operation

In order to study the degree of visibility of OWF BIII from the beach, field visits were conducted at the stage of preparing the 2015 Report, during which photographic documentation of the seascape was made, in the vicinity of coastal towns: Ustka, Rowy and Leba. Photographs were also taken from the lighthouse in Stilo and from the dunes and beach located within the boundaries of the Slovinski National Park. The photographic documentation was taken during daylight hours in various overcast conditions and at dusk.

As mentioned earlier, due to the forest complexes overgrowing the coast, the planned development is not expected to be visible from most coastal towns. However, it can be visible from the beach, tourist

coastal paths, viewpoints located on the dunes or from the lighthouse. In some localities, such as Leba and Ustka, it can also be visible from ports and seaside promenades.

Presented below are visualizations generated with Windpro software depicting the landscape after the construction of the BIII offshore wind farm in the furthest scenarios, that is, with the best visibility with the highest turbines.

Other planned projects of the same type were also included in the assessment:

- Offshore Baltic II,
- IMF Baltica 2,
- IMF Baltica 3.

The following is a tabular list of visualizations made for different sky conditions, for two of the variants analyzed in the 2015 Report, i.e. the variant approved in the Environmental Decision (W120) and the variant specified in the 2015 Report intermediate - W60, and corresponding to the Project after the changes proposed in this Report.

The impact assessment was performed for all the viewpoints listed above. Below is the full analysis performed for the Slowinski National Park (dunes and beach) and Leba, as the closest and most impacted receptors. Evaluation results for other locations: Ustka, Rowy, Stilo, Lubiatowo, Białogóra, Dębki and Karwia are presented in Table 7 and, in the case of cumulative impact assessment, Table 8.

In the visualizations below, the location of each wind farm is indicated by "markers," as shown in the legend below.

Table 5. IMF range markers on visualizations

Marker color	IMF
	IMF BII coverage
	IMF BIII coverage
	The range of the Baltica 2 offshore wind farm
	Baltica 3 OWF coverage

The visualizations are presented in the following order:

1. Dunes within the boundaries of the Slowinski National Park,
2. The beach within the boundaries of the Slovinski National Park,
3. Leba,
4. Other locations.

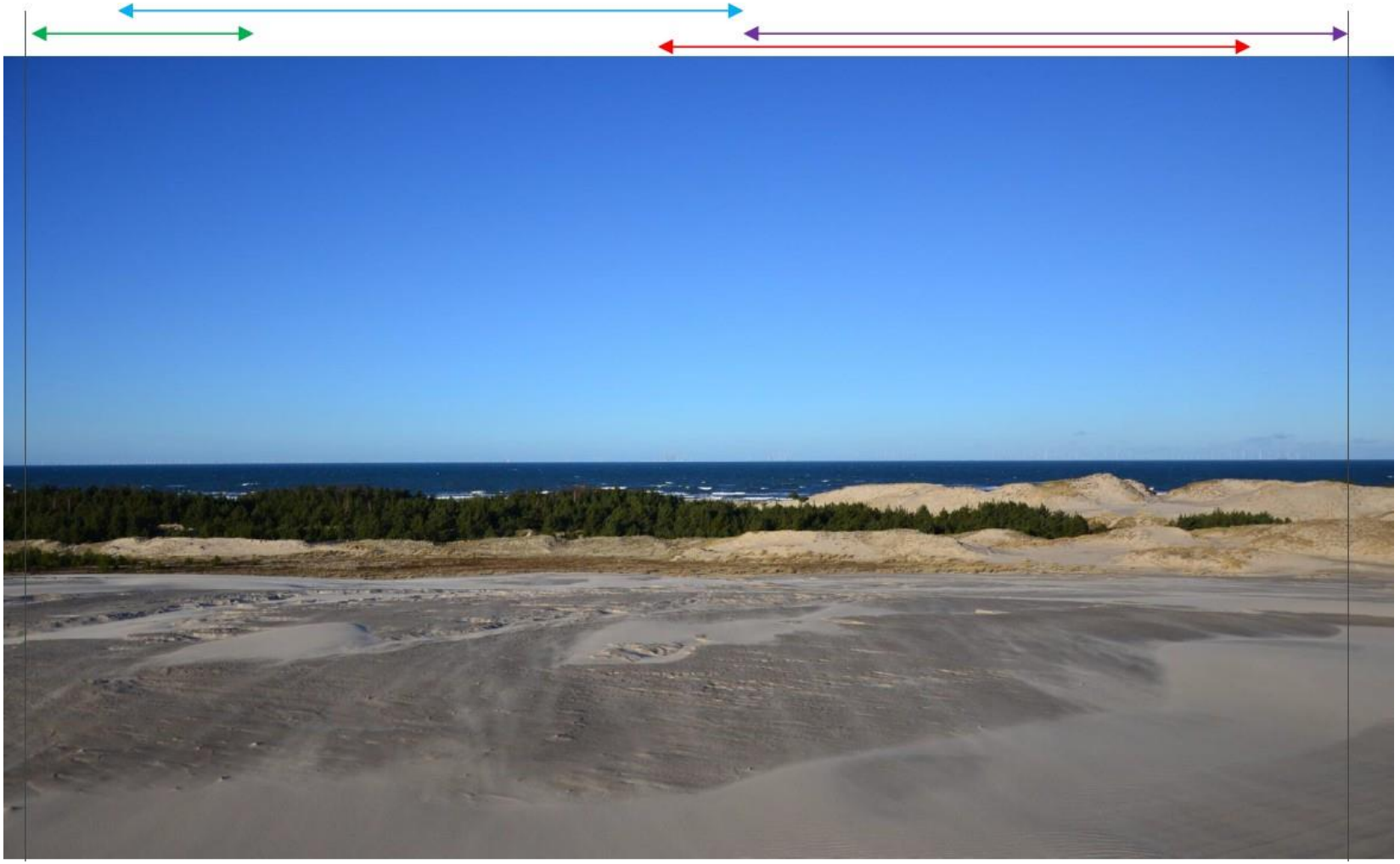
The analysis presented above presents much more far-reaching impacts than those that will occur in the event of a revised decision for the project that is the scope of this Report.

9.2.1. The dunes of the Słowiński Park National Park

The photograph was taken from the dunes of the Slovinski National Park in a northerly direction. Distances of planned IMFs from the location of the photo:

- OWF BIII - min. 23 km in the northern direction;
- IMF Baltica 3 - min. 28 km in the northern direction;
- IMF Baltica 2 - min. 35 km in the northwest direction;
- OWF BII - min. 43 km in the northwest direction.
- The photograph was taken from the top of a dune having an exposure overlooking the sea. The following visualization was made considering no/low cloud cover

Visualization 1. Visualization taken from the dunes of Slowinski PN for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



9.2.1.1. Evaluation

Visibility from the dunes of the Slovinski National Park - no cloud cover/small cloud cover Based on the analysis of the above visualizations, it should be concluded that:

- the visibility of the BIII OWF and its visual impact on an observer located at this vantage point, regardless of the option considered, is similar;
- from the point from which the photographs were taken, the turbines belonging to OWF Baltica 3 will also be visible to a similar degree;
- the turbines belonging to OWF Baltica 2 will also be faintly visible from the point from which the photographs were taken;
- turbines belonging to IMF BII may also be visible from the point from which the photographs were taken;
- visible turbines will not be a landscape dominant;
- the visibility of planned investments will decrease or increase depending on the location of the observer. An observer located at the top of the dune will see the planned investments, an observer located in a lower area will have a limited field of view of the turbines or may not see them at all;
- the visual impact on the seascape will be less if only the OWF Baltic Central III is implemented. The impact will be greater, but still insignificant, if the other planned investments discussed in this report are implemented.

The projected impact on the landscape will not affect the loss of the resource. Depending on meteorological conditions, the visibility of the turbines will vary.

In the farthest scenario, with no/low cloud cover and the rotors positioned facing the observer, the visibility of the turbines in the presented visualizations is low, and the contrast between the turbines and the background is not clear.

According to the classification of the magnitude of the impact, for the variant selected for implementation (60 turbines) and the rational approved by the environmental decision (120 turbines), there will be an impact:

- regional scale - the visibility range of OWF BIII is up to about 50 km;
- permanent - the elements of the BIII OWF will be permanently present in the maritime space throughout the Project's lifetime, but their visibility will be variable depending on weather conditions;
- long-term - it is assumed that the operation stage of the project will be many years (25- 30 years);
- medium intensity - elements of the project will be visible from this point, but will not be dominant;
- reversible - interference in the landscape ceases to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Chapter 6 of Volume II).

Accordingly, the magnitude of the impact was determined to be low.

Impact assessment of OWF BIII
Based on the impact significance assessment matrix, considering:

- receptor importance: very high;
- magnitude of impact: small,

moderate significance was found for the variant selected for implementation (W60) and the variant approved by the environmental decision (W120). In the case of the variant selected for implementation (W60), we will see slightly different technical parameters of the wind power plants as for the one approved by the Environmental Decision (W120), the difference will be the fact that 50% fewer wind power plants will be implemented in the variant preferred for implementation (W60), they will be 12.72% taller, have a larger rotor diameter by 13.63% and have a smaller total rotor zone area by 13.63% than specified in the Environmental Decision and therefore the scale of the impact on the landscape will be comparable.

Assessment of cumulative impacts
Receptor importance: very high
As for OWF BIII, there will be an impact in the context of cumulative impacts:

- regional scale - the visibility range of OWF BIII is up to about 50 km;
- permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project;
- long-term - it is assumed that the exploitation stage of projects will be many years;
- medium intensity - elements of the projects will be visible from this point;
- reversible - interference in the landscape ceases to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Chapter 6 of Volume II).

Accordingly, the magnitude of the impact was determined to be low.

The cumulative impact significance for this receptor was determined to be moderate.

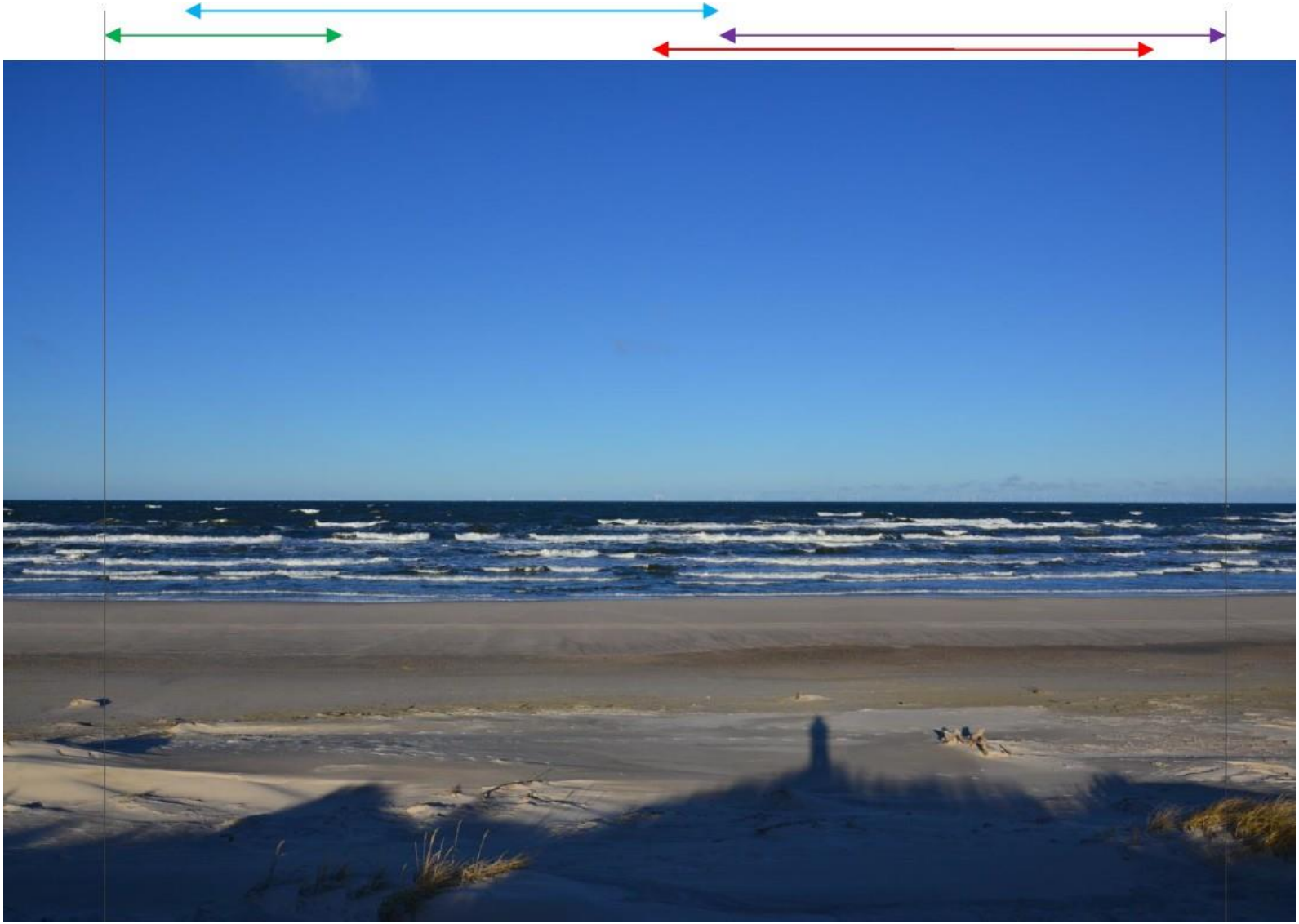
9.2.2. The beach of the Slowinski National Park- the photograph was taken from the slowinski PN beach in the northern direction.

Distances of planned IMFs from the location of the photo:

- OWF BIII - min. 23 km in the northern direction;
- IMF Baltica 3 - min. 28 km in the northern direction;
- IMF Baltica 2 - min. 35 km in the northwest direction;
- OWF BII - min. 43 km in the northwest direction.

The following visualization was made considering no/low cloud cover.

Visualization 2. Visualization made from the beach of Słowiński PN for OWF BII, OWF Baltica 2, OWF BIII, OWF Baltica 3,- positioning of turbines facing the observer



9.2.2.1. Evaluation

Visibility from the beach of the Slovinski National Park - no/low cloud cover

Based on the analysis of the above visualizations, it should be concluded that:

- the visibility of the BIII OWF and its visual impact on an observer located at this vantage point, regardless of the option considered, is similar;
- from the point from which the photographs were taken, the turbines belonging to OWF Baltica 3 will also be visible to a similar degree;
- the turbines belonging to OWF Baltica 2 will also be faintly visible from the point from which the photographs were taken;
- turbines belonging to IMF BII may also be visible from the point from which the photographs were taken;
- visible turbines will not be a landscape dominant;
- the visual impact on the seascape will be less if only the OWF Baltic Central III is implemented. The impact will be greater if the other planned investments discussed in this report are implemented.

The projected impact on the landscape will not affect the loss of the resource. Depending on meteorological conditions, the visibility of the turbines will vary.

In the farthest scenario, with no/low cloud cover and the rotors positioned facing the observer, the visibility of the turbines in the presented visualizations is low, and the contrast between the turbines and the background is not clear.

According to the impact magnitude classification, for the variant selected for implementation (60 turbines) and the variant approved by the environmental decision (120 turbines), there will be an impact:

- regional scale - the visibility range of OWF BIII is up to about 50 km;
- permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project;
- long-term - it is assumed that the operation stage of the project will be many years (25- 30 years);
- medium intensity - elements of the project will be visible from this point;
- reversible - interference in the landscape ceases to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Chapter 6 of Volume II).

Accordingly, the magnitude of the impact was determined to be low.

Impact assessment of OWF BIII

Based on the impact significance assessment matrix, considering:

- receptor importance: very high;
- magnitude of impact: small,

moderate significance was found for the variant selected for implementation (W60) and the variant approved by the environmental decision (W120). In the case of the variant selected for implementation

(W60), we will see slightly different technical parameters of the wind power plants as for the one approved by the Environmental Decision (W120), the difference will be the fact that 50% fewer wind power plants will be implemented in the variant preferred for implementation (W60), they will be 12.72% taller, have a larger rotor diameter by 13.63%, and have a smaller total rotor zone area by 13.63% than specified in the Environmental Decision and thus the scale of landscape impact will be smaller or comparable to that specified in the current DWA.

Assessment of cumulative impacts
Receptor importance: very high
As for OWF BIII, there will be an impact in the context of cumulative impacts:

- regional scale - the visibility range of OWF BIII is up to about 50 km;
- permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project;
- long-term - it is assumed that the exploitation stage of projects will be many years (25- 30 years);
- medium intensity - elements of the projects will be visible from this point;
- reversible - interference in the landscape ceases to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Chapter 6 of Volume II).

Accordingly, the magnitude of the impact was determined to be low.

The cumulative impact significance for this receptor was determined to be moderate.

Summary

In the variant that is the subject of this Report, about 50% fewer power plants will be built than specified in the Environmental Decision. The impact will be similar to that of the variant approved by the Environmental Decision:

- regional scale - the visibility range of OWF BIII is up to about 50 km,
- permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project,
- long-term - the operation stage of the project is assumed to be many years,
- low intensity - due to the distance of OWF BIII from the coastline, the elements of the project will be barely visible, they will not dominate the landscape,
- reversible - interference in the landscape will cease to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Section 6 of Volume III of the report).

Accordingly, the magnitude of the impact was determined to be low. While the significance of the impact as moderate. Therefore, the landscape impacts are at the same level as the variant for which the Environmental Decision was obtained.

9.2.3. Leba

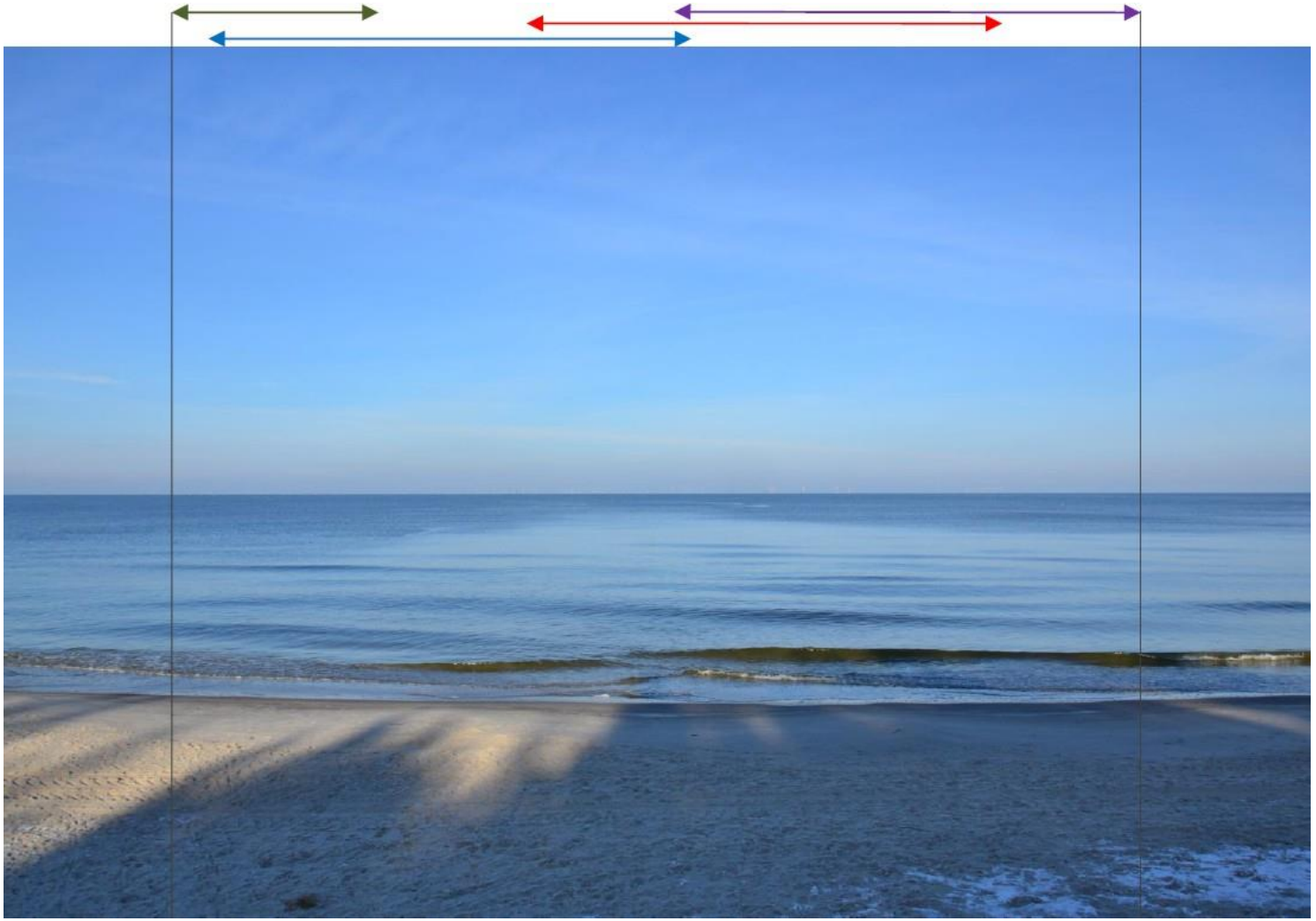
The photographs were taken from the beach near the town of Leba in a northwesterly direction. Distances of planned IMFs from the location of the photo:

- OWF BIII - min. 23 km in the northwest direction;
- IMF Baltica 3 - min. 27 km in the northwest direction;
- IMF Baltica 2 - min. 38 km in the northwest direction;
- OWF BII - min. 48 km in the northwest direction.

Due to the degree of visibility of the wind farms, the visualizations below include: no cloud cover/small cloud cover, medium cloud cover, total cloud cover and night time.

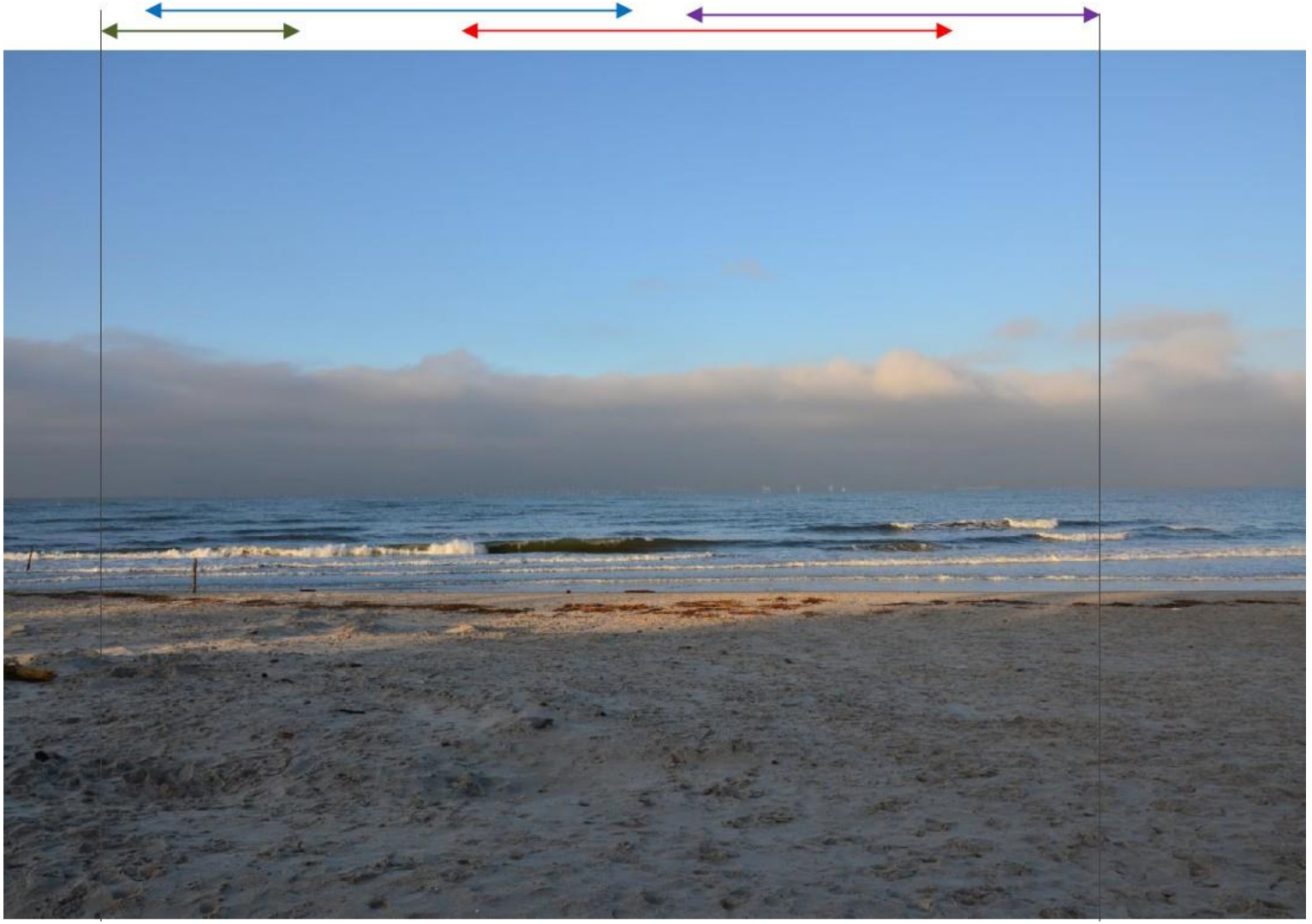
The following visualization was made considering no/low cloud cover.

Visualization 3. Visualization taken from the beach near Leba for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



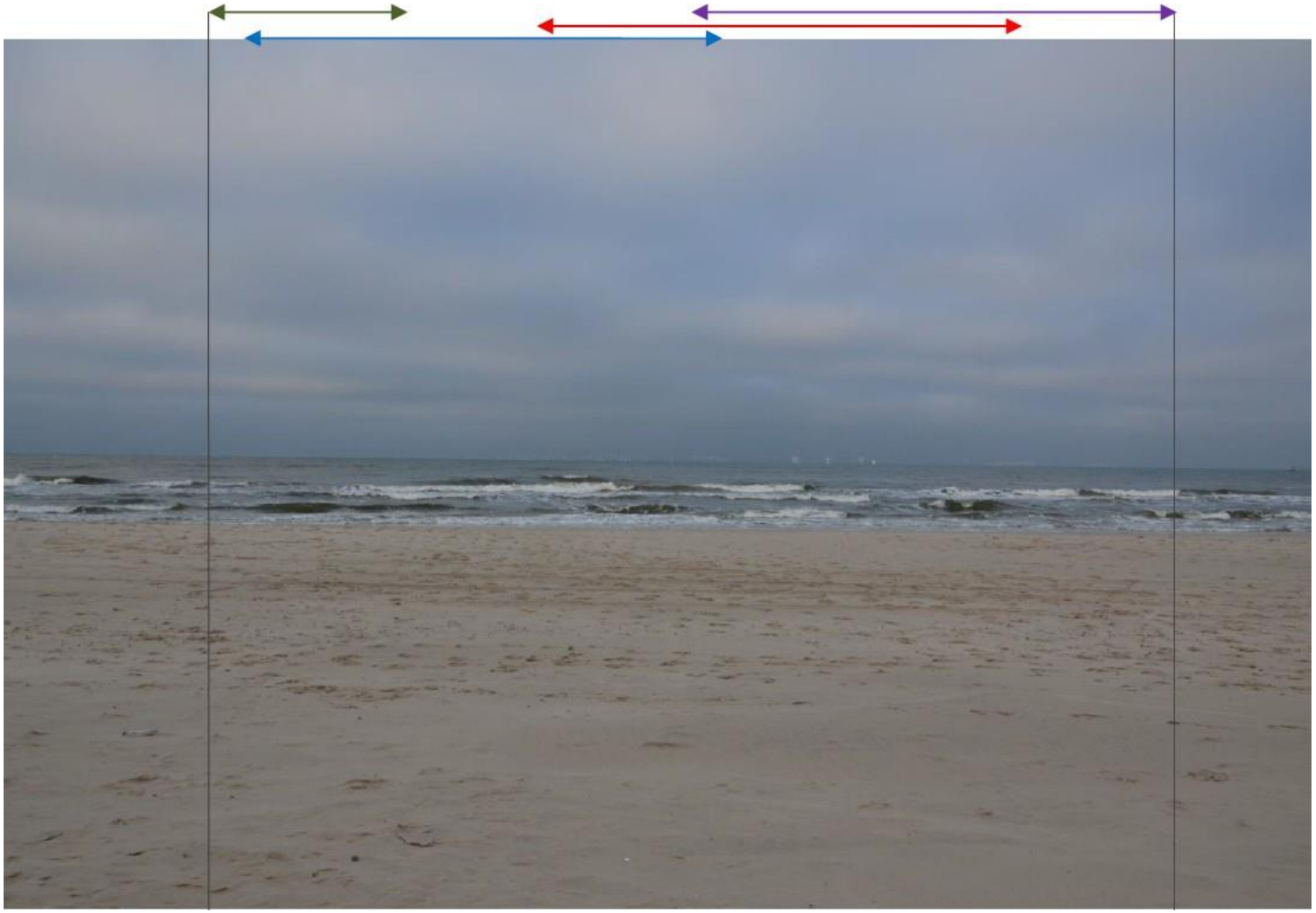
The following visualization was made considering the average cloud cover.

Visualization 4. Visualization taken from the beach near Leba for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - facing the observer



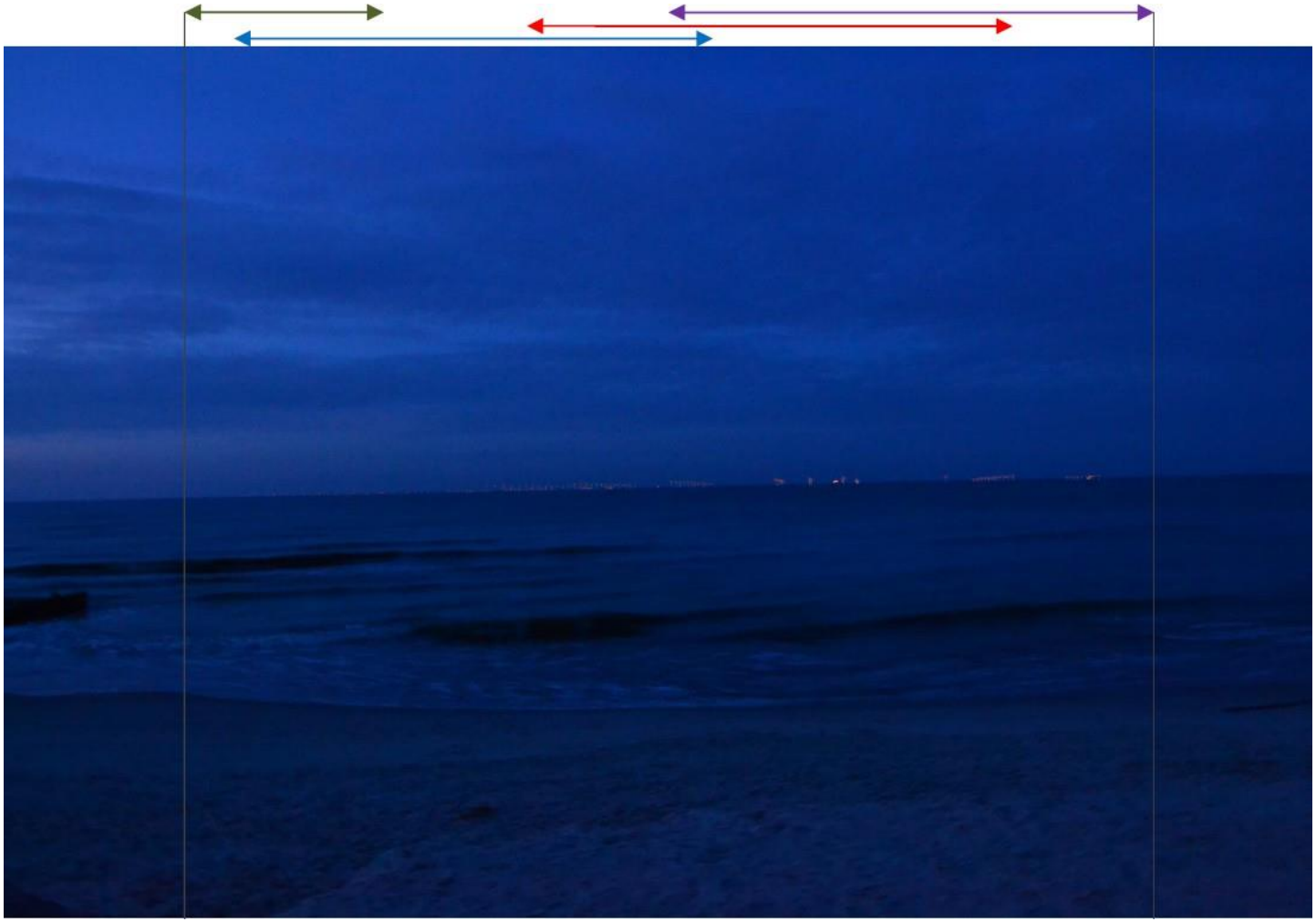
The following visualization was made considering total cloud cover.

Visualization 5. Visualization taken from the beach near Leba for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



The following visualization was made taking into account the visibility of turbine aerial signage visible at night. The visibility presented was developed on the basis of literature data.

Visualization 6. Visualization taken from the beach near Leba for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 in the evening time



9.2.3.1. Evaluation

Visibility of the IMF from the beach in the vicinity of the town of Leba - no cloud cover / slight cloud cover, medium cloud cover, total cloud cover / in the evening.
Based on the analysis of the above visualizations, it should be concluded that:

- the visibility of the BIII OWF and its visual impact on an observer located at this vantage point, regardless of the number of turbines in the project, is similar;
- from the point from which the above photographs were taken, the turbines belonging to OWF Baltica 3 will also be visible, and to a small extent the turbines of OWF Baltica 2 and OWF BII may be visible. These turbines will not be a landscape dominant;
- iMF BII is not expected to be visible from this point, alternatively, its visibility may be incidental;
- the visual impact on the seascape will be less if only the OWF Baltic Central III is implemented. The impact will be greater if the Baltica 2 and Baltica 3 offshore wind farms are realized.

The projected impact on the landscape will not affect the loss of the resource. Depending on meteorological conditions, the visibility of the turbines will vary. With no cloud cover/low cloud cover, medium cloud cover and total cloud cover, presented in the above visualizations, the visibility of the turbines is slightly different, but the turbines are not clearly distinguishable from the background.

According to the impact magnitude classification, for the variant selected for implementation (W60) and the variant approved by the environmental decision (W120), there will be an impact:

- regional scale - the visibility range of OWF BIII is up to about 50 km;
- permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project;
- long-term - the operation stage of the project is assumed to be many years;
- medium intensity - elements of the project will be visible from this point;
- reversible - interference in the landscape ceases to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Chapter 6 of Volume II).

Accordingly, the magnitude of the impact was determined to be low.

<u>Impact assessment of OWF BIII</u>
Based on the impact significance assessment matrix, considering:

- receptor importance: very high;
- magnitude of impact: small,

moderate significance was found for the variant selected for implementation (W60) and the variant approved by the environmental decision (W120). In the case of the variant selected for implementation (W60), we will see slightly different technical parameters of the wind power plants as for the one approved by the Environmental Decision (W120), the difference will be the fact that 50% fewer wind power plants will be implemented in the variant preferred for implementation (W60), they will be 12.72% taller, have a larger rotor diameter by 13.63%, and have a smaller total rotor zone area by 13.63% than specified in the Environmental Decision and thus the scale of the impact on the landscape will be of moderate impact significance compared to the impact contained in the current DWA.

<u>Assessment of cumulative impacts</u>

Receptor importance: very high
As for OWF BIII, there will be an impact in the context of cumulative impacts:

- regional scale - the visibility range of OWF BIII is up to about 50 km;
- permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project;
- medium-term - after the cessation of operation of the farm, the elements of the project will be present in the marine space until they are dismantled;
- medium intensity - due to the distance of the BIII OWF from the coastline, elements of the project will be visible;
- reversible - interference in the landscape ceases to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Chapter 6 of Volume II).

Accordingly, the magnitude of the impact was determined to be low.

The cumulative impact significance for this receptor was determined to be moderate.
The above visualizations also show the visibility of aerial obstruction lighting. The visualizations made show the visibility of the lights based on literature data - this is not the visibility calculated by WindPRO - this program only has the ability to take into account this type of lighting, without the ability to assess to what extent from a given distance the lighting will be visible.
Based on literature data, it is concluded that:

- aerial obstruction lighting will be visible from OWF BIII, OWF Baltica 2 and OWF Baltica 3;
- iMF BII aerial obstruction lighting will not be visible from this vantage point.

Summary

In the variant that is the subject of this Report, about 50% fewer power plants will be built than envisioned in the Environmental Decision. The impact will be similar to that of the variant approved by the Environmental Decision:

1) regional scale - the visibility range of OWF BIII is up to about 50 km,
2) permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project,
3) long-term - the operation stage of the project is assumed to be many years,
4) low intensity - due to the distance of OWF BIII from the coastline, the elements of the project will be barely visible, they will not dominate the landscape,
5) reversible - interference in the landscape will cease to be perceptible after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Section 6 of Volume II of the report).

Accordingly, the magnitude of the impact was determined to be low. While the significance of the impact as moderate. Therefore, landscape impacts occur at the same level for the variant (W60) as for the variant (w120) for which the Environmental Decision was obtained.

9.2.4. Other locations

Below are visualizations for the other locations: Ustka (Visualization 7), Rowy (Visualization 8), Stilo (Visualization 9), Lubiatowo (Visualization 10), Białogóra (Visualization 11), Dębki (Visualization 12) and Karwia (Visualization 13).

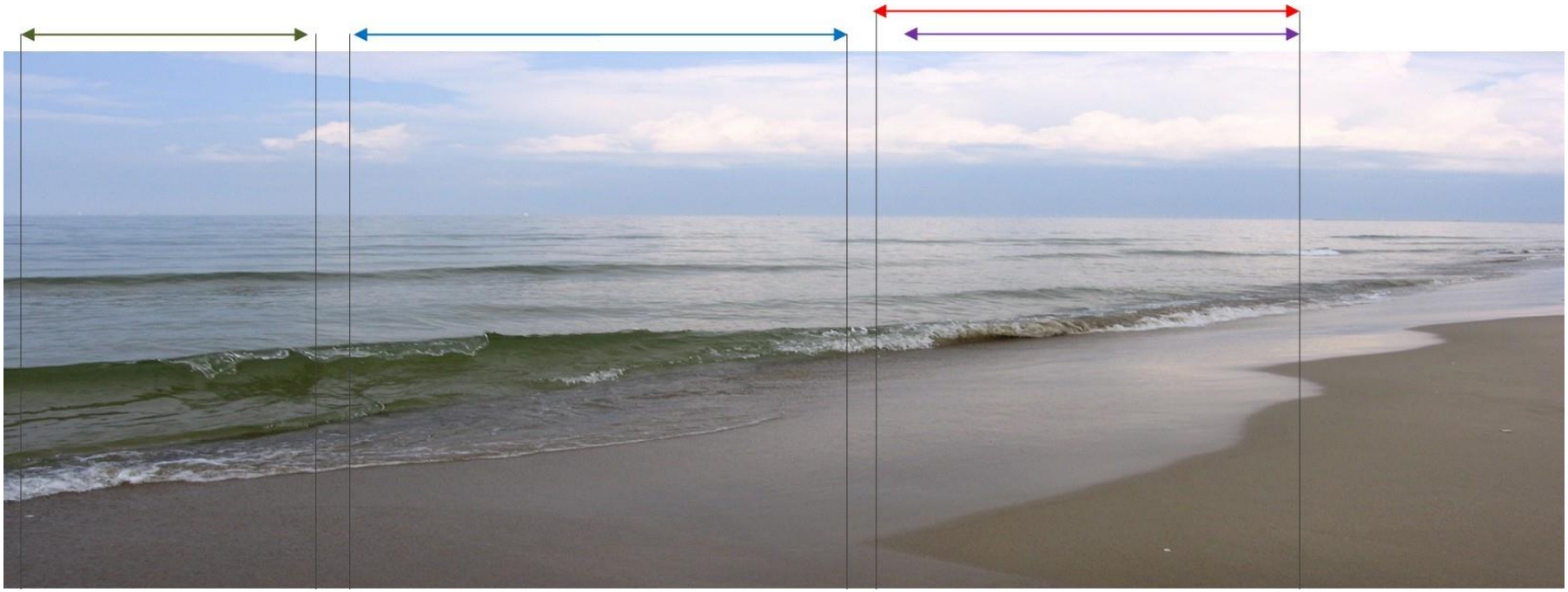
Table 6 shows the distances of the planned IMFs from the shooting site along with visibility conditions.

Table 6. Parameters at which photographs were taken in the locations of Ustka, Rowy, Stilo, Lubiatowo, Białogóra, Dębki and Karwia

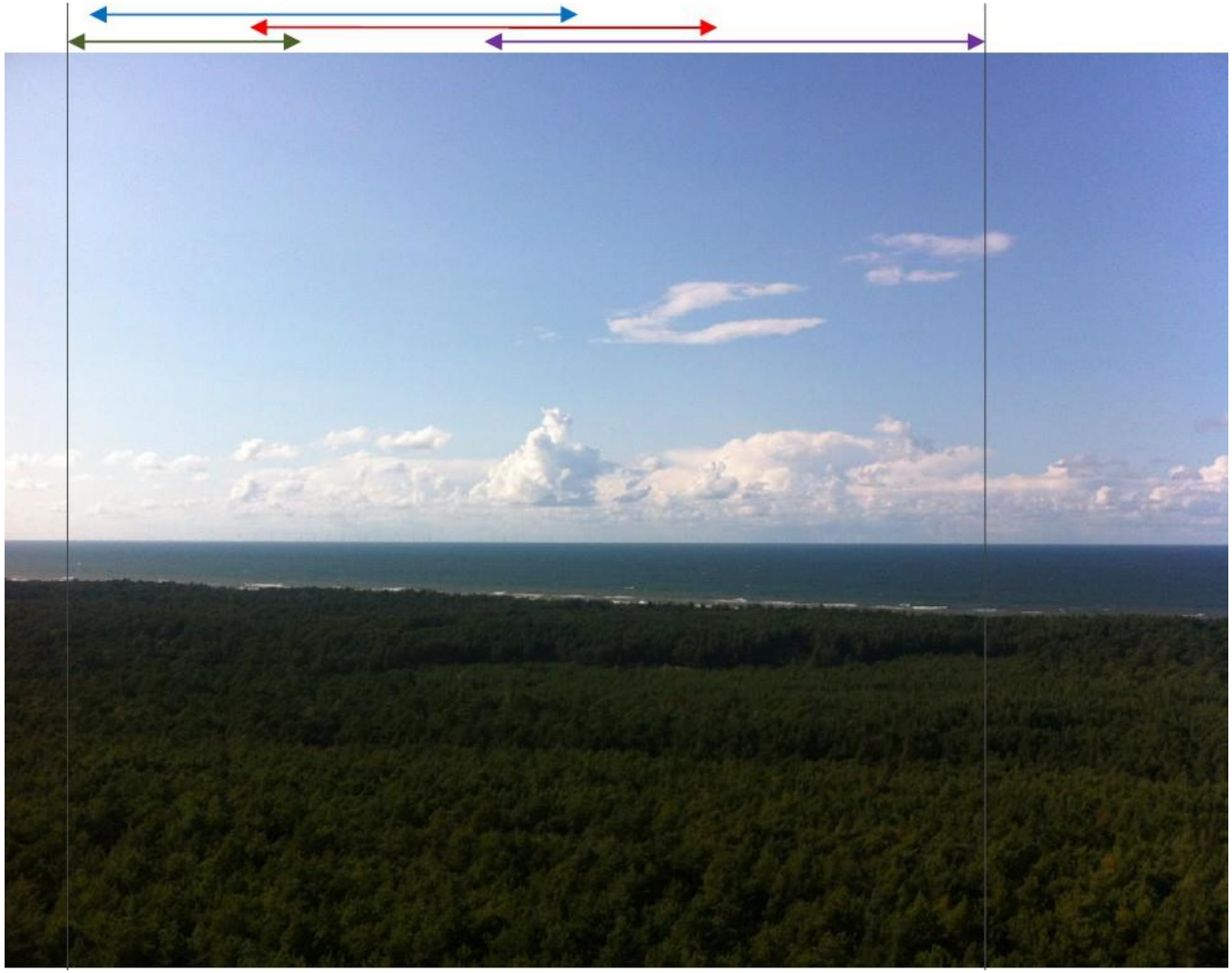
Point (receptor)	Distances of the planned IMF from the place where the photo was taken				Visibility conditions
	IMF BIII	IMF Baltica 3	IMF Baltica 2	IMF BII	
Ustka (beach) (visualization 7)	min. 48 km in the NE direction	min. 58 km in the NE direction	min. 47 km in the NE direction	- min. 48 km in N direction	slight cloud cover/ lack of cloud cover
Rowy (beach) (visualization 8)	min. 34 km in the NE direction	min. 43 km in the NE direction	min. 35 km in the NE direction	min. 39 km in the NE direction	medium cloudiness
Stilo (lighthouse) (visualization 9)	min. 28 km in the NW direction	min. 28 km in the NW direction	min. 44 km in the NW direction	min. 56 km in the NW direction	medium cloudiness
Lubiatowo (beach) (visualization 10)	min. 31 km in the NW direction	min. 30 km in the NW direction	min. 47 km in theNW direction	min. 62 km in the NW direction	medium cloudiness
Białogóra (beach) (visualization 11)	min. 34 km in the NW direction	min. 34 km in the NW direction	min. 53 km in theNW direction	min. 68 km in the NW direction	slight cloudiness
Dębki (beach) (visualization 12)	min. 43 km in the NW direction	min. 42 km in the NW direction	min. 60 km in the NW direction	min. 77 km in the NW direction	total cloudiness
Karwia (beach) (visualization 13)	min. 49 km in the NW direction	min. 49 km in the NW direction	min. 68 km in the NW direction	min. 83 km in N direction	medium cloudiness

Visualization 7. Visualization taken from the beach near Ustka for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer

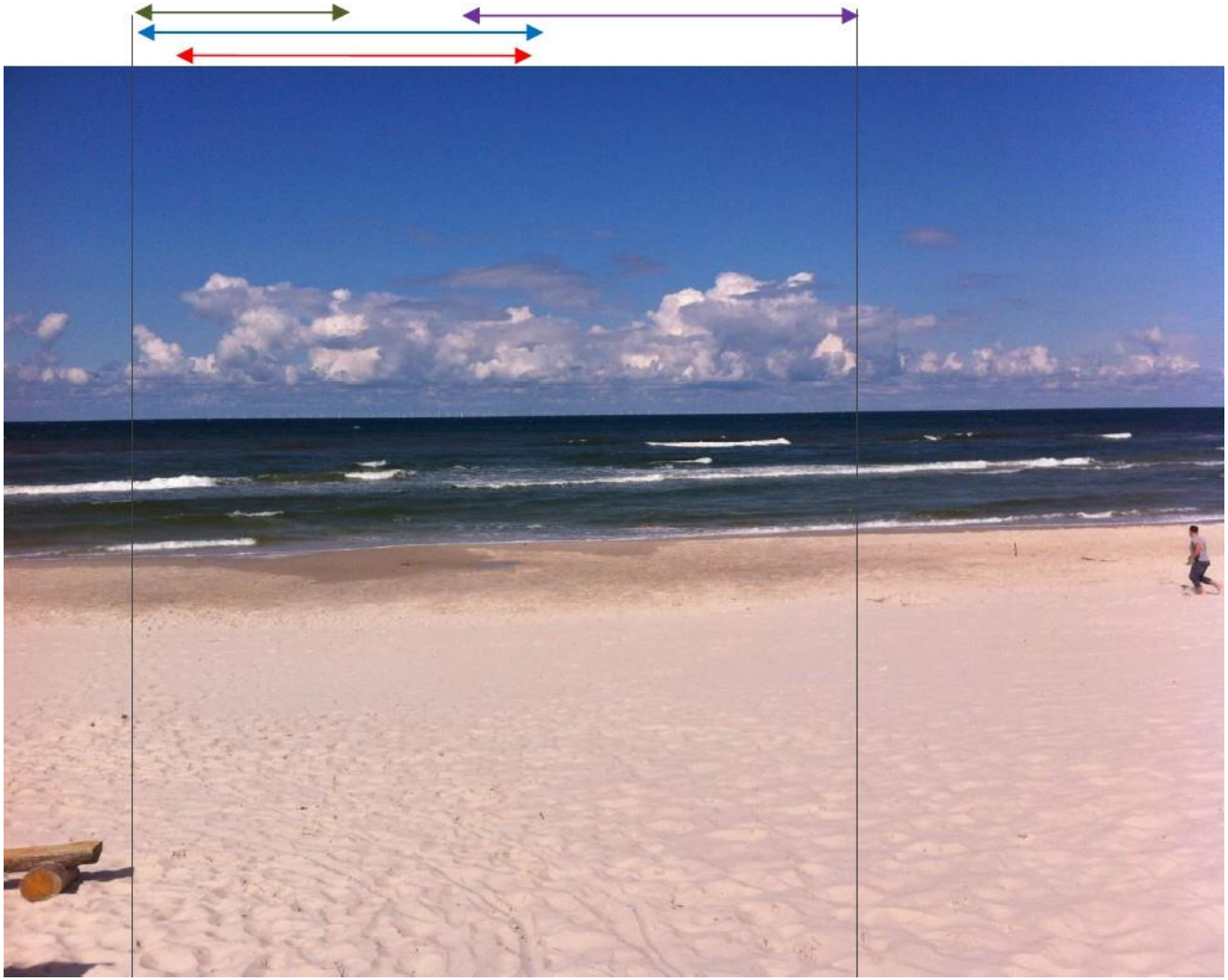
Visualization 8. Visualization taken from the beach near Rowy for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



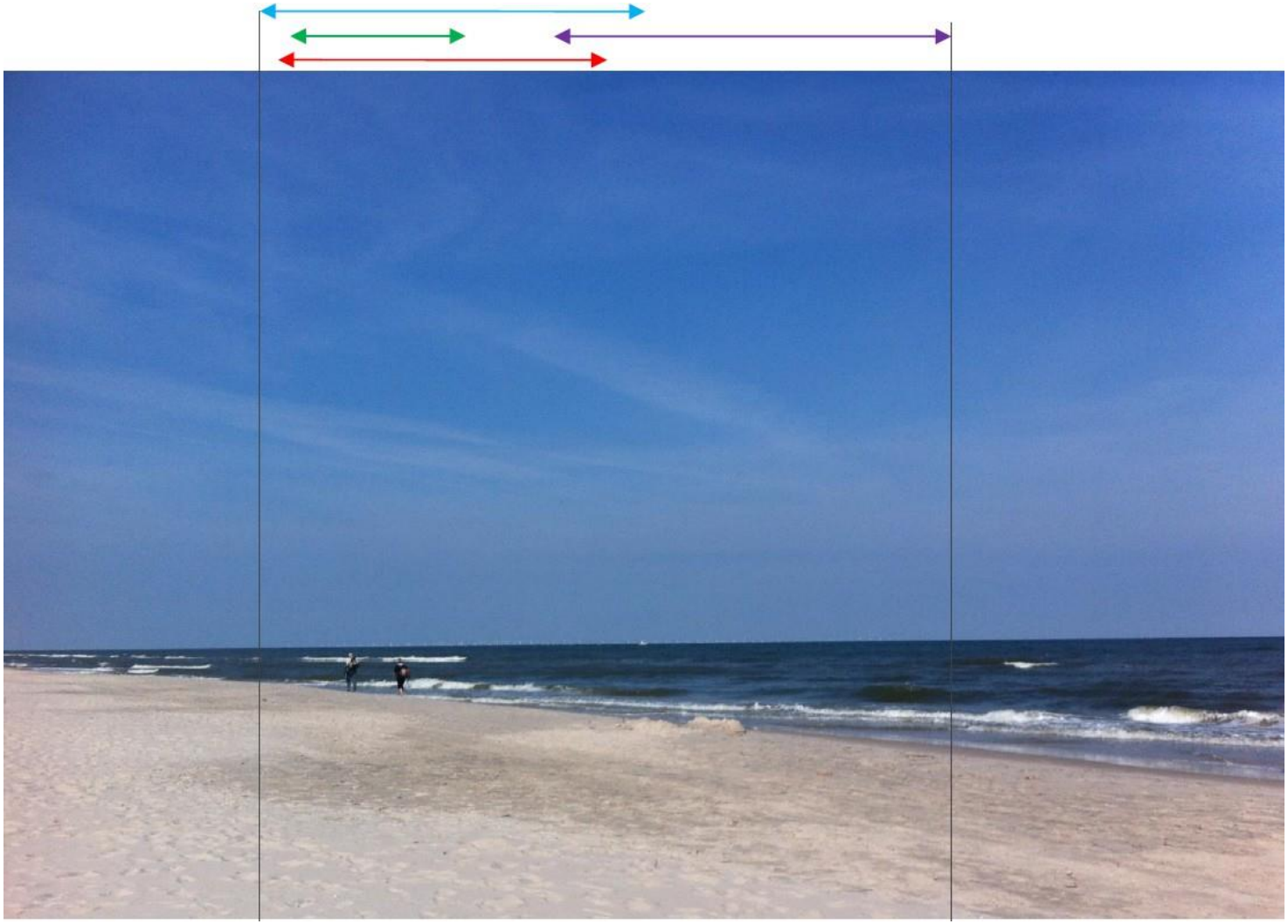
Visualization 9. Visualization made from the lighthouse near Stilo for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



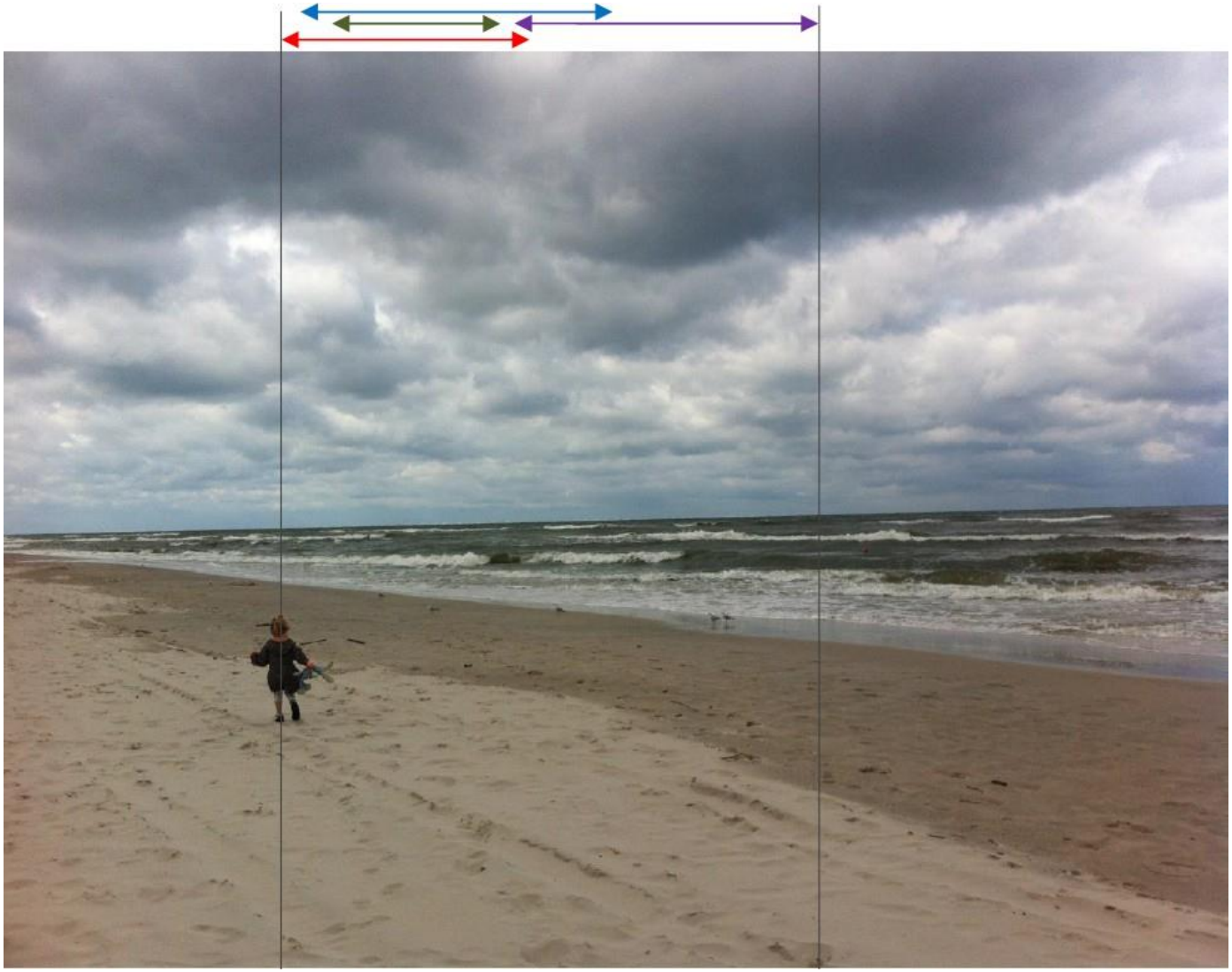
Visualization 10. Visualization taken from the beach near Lubiatowo for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



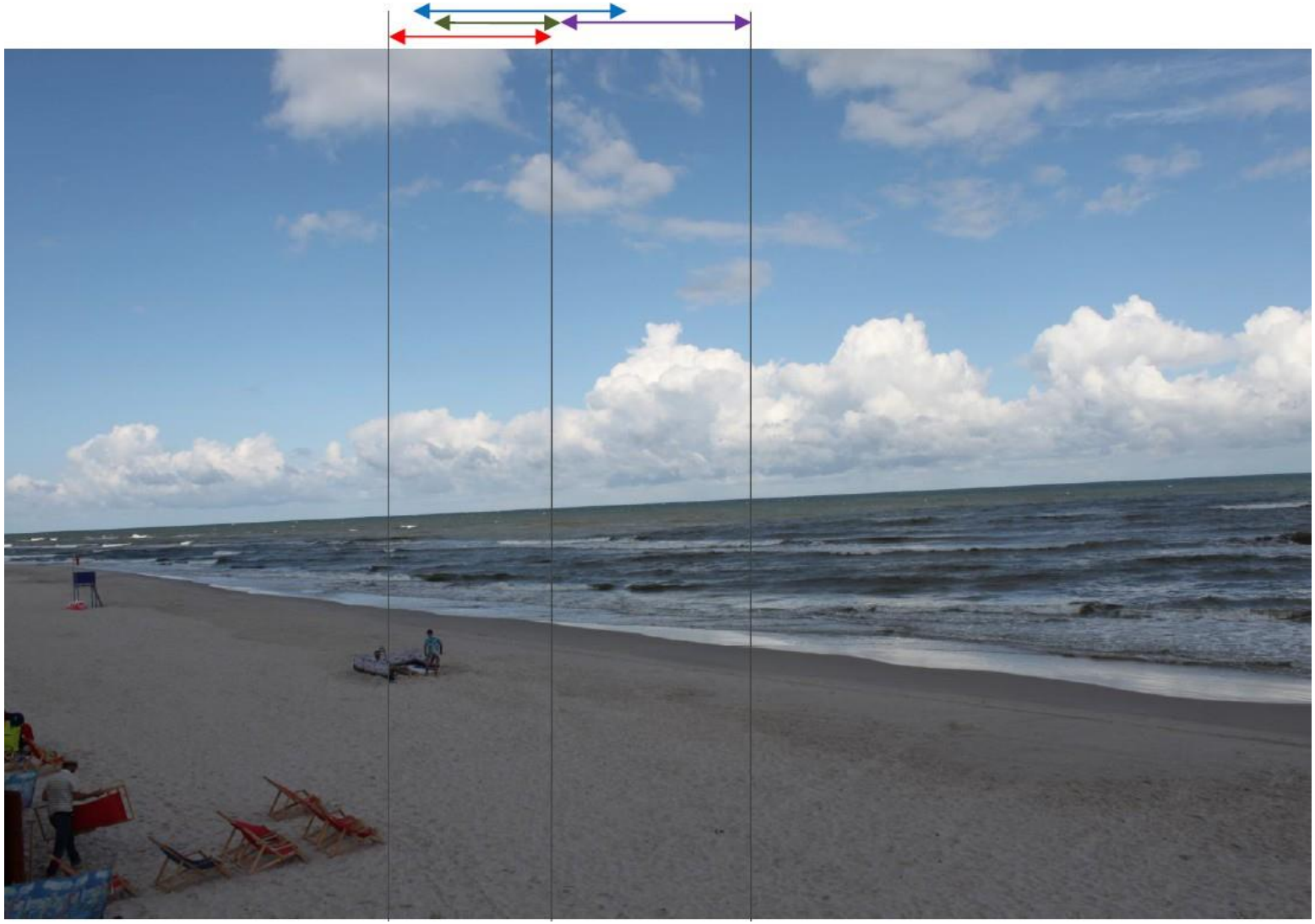
Visualization 11. Visualization taken from the beach near Białogóra for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



Visualization 12. Visualization taken from the beach near Dębki for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



Visualization 13. Visualization taken from the beach near Karwia for OWF BIII, OWF Baltica 3, OWF BII and OWF Baltica 2 - turbines positioned facing the observer



Other impacts on the landscape during the operation stage

During the operation stage of the project, the seascape will also be impacted by vessels used to service the planned project. Planned use:

- substation inspection vessels;
- cable inspection vessels;
- power plant inspection vessels.

Helicopters may also be used. If the need for major repairs, such as replacing rotor propellers, is identified, it may be necessary to mobilize appropriate equipment, such as ships or jack-up barges.

Ships will be used to service the foundations, as well as ROVs and divers.

Small research vessels will be used to service the cables, as well as ROVs and divers. If a cable is found to be damaged or uncovered, it may be necessary to use specialized equipment, such as a ship-cable carrier.

Given the limited number and different types of vessels that may be involved in servicing the OWF components, the remoteness of the vessels in relation to each other, the location of the servicing ports, and the intensity of existing maritime traffic in the area of interest, it should be concluded that the impact will be insignificant and there is no need to further assess it.

Cumulative impacts

It is expected that in the case of the implementation of the other OWFs discussed in this study, due to the limited number of individual service units, there will be no cumulative visual impacts on the landscape of vessels servicing the individual projects.

Cumulative impacts on the landscape of the planned project and the external connection infrastructure at the operational stage are also not expected.

9.3. Stage decommissioning

The project's expected lifetime is several decades. After that time, it may be eliminated (e.g., as a result of technological advances that will make other energy sources applicable). More likely, however, is an offshore wind farm redevelopment scenario, in which newer-generation turbines will be installed on existing sites, enabling greater energy production. During the decommissioning phase of the project, there will be a temporary reduction in the aesthetic value of the landscape as a result of the demolition work being carried out. Similar to the construction phase, the impacts will consist of increased traffic of vessels involved in the decommissioning of the farm. However, the dismantling of wind turbines and associated infrastructure in the long term will have a positive impact on the landscape due to the removal of visually intrusive landscape dominants.

The scale of such impacts will be for the variant selected for implementation (W60) less than for the variant approved by the environmental decision (W120) - a 50% smaller number of power plants.

Taking into account the impact on the landscape of moving vessels, analogous to the construction stage, based on the impact magnitude assessment matrix, the magnitude of impact associated with vessel traffic at the decommissioning stage of the BIII OWF (for both variants considered) was classified as insignificant. As the significance of the landscape (as an affected resource) was classified as medium, the significance of the impact was assessed as negligible.

Cumulative impacts

It should also be noted that it is possible that the impacts described above may cumulate in the event that at the same time demolition work would be carried out on other wind farms (e.g. OWF Baltica 3, OWF Baltica 2, OWF Baltic II) located in the immediate vicinity of the project. A scenario involving the decommissioning of undersea cables and a cable bringing power ashore seems unlikely.

However, taking into account the limited number and different types of vessels that may be involved in this type of work for different farms (in particular, their different sizes, which affect the visibility of vessels from the shore), the distance of vessels in relation to each other and the intensity of existing marine traffic in the area of interest, it should be concluded that at the stage of decommissioning of OWF BIII, regardless of the considered variant preferred by the Contractor (W60) or the variant currently approved by the environmental decision (W120), there will be no or negligible cumulation of impacts with other projects in this area.

9.4. Summary of the project's impact assessment on landscape

The visualizations presented show, in an illustrative manner, the visibility of the planned investments from the most important vantage points along the Polish coastline from which exposure to the Project will be possible.

It should be noted that the visibility of the IMF will depend on a number of factors, in particular weather conditions, the location of the observer or the acuity of his or her eyesight.

The impact assessment was presented for each of the selected points, from which photographic documentation was taken.

Table 7. Impact assessment of the planned offshore wind farm Baltic Central III

Point (receptor)	Category of importance of the resource	Magnitude of impact	Significance of impact for the implementation variant			Significance of impact for the alternative option		
			No cloud cover/small cloud cover	Medium cloudiness	Total cloud cover	No cloud cover/small cloud cover	Medium cloudiness	Total cloud cover
Ustka (beach)	very large	little	moderate	-	-	moderate	-	-
Ditches (beach)	average	little	-	small	-	-	small	-
Slowinski PN (dunes)	very large	little	moderate	-	-	moderate	-	-
Slowinski PN (beach)	very large	little	moderate	-	-	moderate	-	-
Leba (beach)	very large	little	moderate	moderate	moderate	moderate	moderate	moderate
Stilo (lighthouse)	average	little	-	small	-	-	small	-
Lubiatowo (beach)	average	little	-	small	-	-	small	-
Białogóra (beach)	average	little	small	-	-	small	-	-
Dębki (beach)	average	little	-	-	small	-	-	small
Karwia (beach)	large	little	-	small	-	-	little	-

The analysis showed that regardless of the variant currently under consideration, the Project's visual impacts on the landscape will be similar.

The visibility of OWF BIII decreases as the distance of the observer from the project increases and disappears within a radius of up to about 45-50 km.

The greatest visual impact of the discussed project will generate on observers located within the boundaries of the Slovinski National Park and on the beach near Leba. However, even from these points, the significance of the impact was assessed as moderate.

9.5. Assessment of impacts cumulative

The assessment of cumulative impact was carried out for each receptor and was expressed on a scale: none, negligible, small, moderate, large, very large.

This assessment takes into account other projects planned for implementation, which include:

- OWF BII - located a minimum of about 37 km from the coast and about 17 km west of OWF BIII;
- OWF Baltica 2 - located at least about 31 km from the coast. It is immediately adjacent to OWF BIII to the north and is located approximately 10 km to the east of OWF BII;
- OWF Baltica 3, located at least about 25 km from the coast. It is directly adjacent to OWF BIII to the north.

Various stages of the implementation of the various investments are included.

Table 8. Assessment of cumulative impacts with the impacts of the planned OWF Baltic Central III

Point (receptor)	Category of importance of the resource	Magnitude of impact	Significance of cumulative impact		
			No cloud cover/small cloud cover	Medium cloudiness	Total cloud cover
Ustka (beach)	very large	little	moderate	-	-
Ditches (beach)	average	little	-	small	-
Slowinski PN (dunes)	very large	little	moderate	-	-
Slowinski PN (beach)	very large	little	moderate	-	-
Leba (beach)	very large	little	moderate	moderate	Small
Stilo (lighthouse)	average	little	-	small	-
Lubiatowo (beach)	average	little	-	small	-
Białogóra (beach)	average	little	Small	-	-
Dębki (beach)	average	little	-	-	Small

Point (receptor)	Category of importance of the resource	Magnitude of impact	Significance of cumulative impact		
			No cloud cover/small cloud cover	Medium cloudiness	Total cloud cover
Karwia (beach)	large	little	-	small	-

The assessment carried out showed that in the case of implementation of all the indicated projects, their visual impacts will be cumulative. The degree of accumulation will depend on the observation point. For no receptor, however, cumulative impacts were indicated to be high or very high.

In the period after the Environmental Decision for OWF BIII was obtained, another Baltic Power Offshore Wind Farm was built on the eastern side of OWF BIII and, in this way, added to the cumulative impact on the landscape. The developer of the BP offshore wind farm has received an approved environmental decision for the 126 EW project.

In the current preferred variant for implementation, OWF BIII is requesting 60 EW units, which results in a 50% reduction from the variant approved by the Environmental Decision.

The investor plans to increase the macro height of the structure by 12.72%, increase the macro diameter of the rotor by 13.63% and the effect of the change in these parameters results in a decrease in the macro total area of the rotor zone by 21.83% compared to the parameters approved by the Environmental Decision.

The change in these paramentals will not be visible to an observer from onshore locations due to the considerable distance of the BIII OWF location.

Changing the parameters of the BIII offshore wind farm in W60 reduces the cumulative impact that was shown in the EIA Report for the Baltic Power offshore wind farm by reducing the number of power plants at the wind farm adjacent to the BP offshore wind farm to the west. According to the analyses conducted in the Environmental Impact Report for the Baltic Power OWF, these impacts will not be significant. The pre-mitigated rant indicated that the Baltic Power, Baltica, Baltic II and Baltic Central III offshore wind farms will not be visible at the same time in the case of Jastrzebia Gora. In the case of the FEW Baltic II project, its shortest distance from the shore is about 51 km (according to the EIA report for the FEW Baltic II project. This means that the project is outside the range of visibility from the shore. Thus, it cannot further cumulate impacts.

It may also be that not all projects will be implemented. These projects may also be implemented in a different shape than assumed for the purposes of this analysis, e.g., different (smaller) turbine parameters or fewer turbines may be adopted as in the case of OWF BIII. It should also be taken into account such a possibility that other projects, which cannot be foreseen and taken into account in this analysis, may be built in place of the unrealized projects.

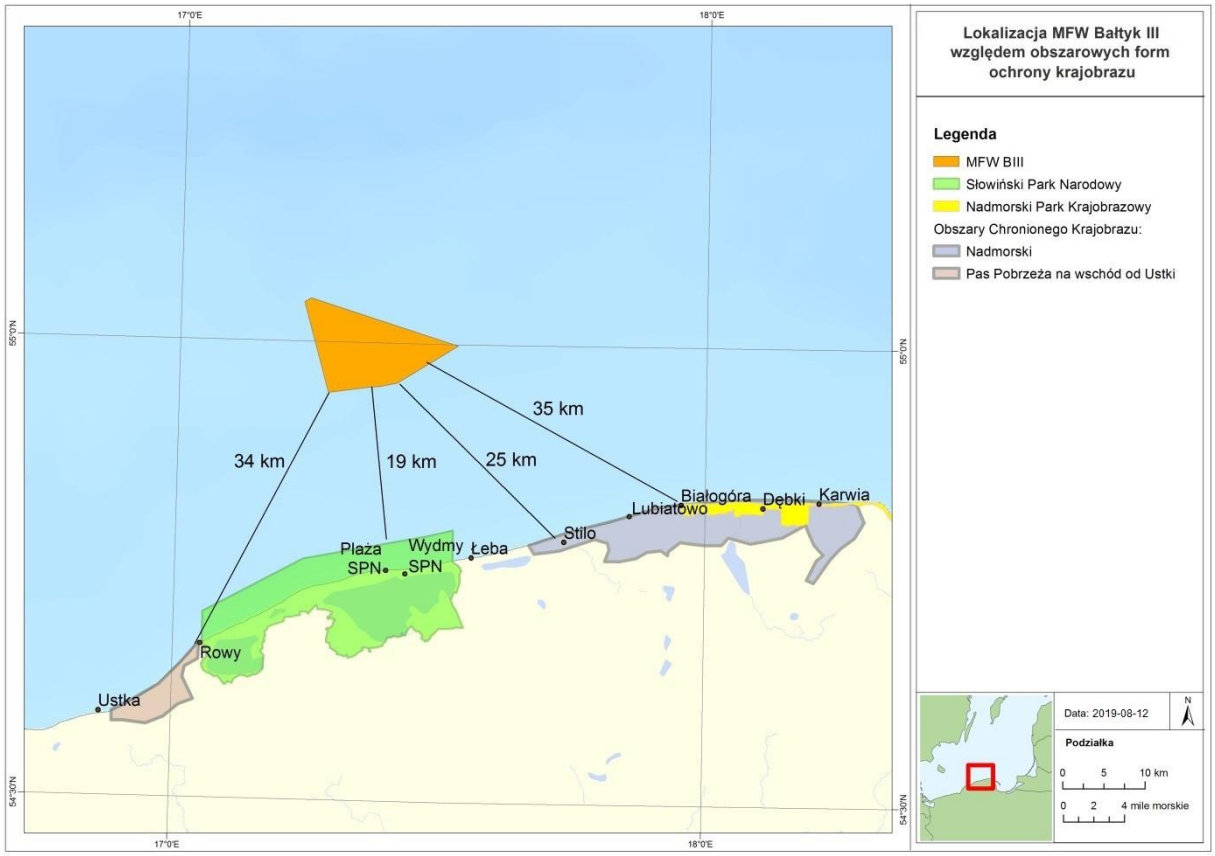
9.6. Impact of the project on legally established conservation areas landscape

This chapter analyzes the project's impact on areas established for landscape protection. These include protected landscape areas and scenic parks:

- Slowinski National Park;
- landscape parks (Seaside PK);
- areas of protected landscape (Nadmorski OCHK, OCHK Pobrzeża na wschód od Ustki).

The location of the nearest area forms of landscape protection in relation to the BIII OWF is presented in the figure below.

Figure 9. Location of OWF BIII in relation to the nearest area forms of landscape protection



Ustka	Ustka
Rowy	Ditches
Plaża SPN	SPN beach
Wydmy SPN	Dunes of the SNP
Łeba	Leba
Stilo	Stilo
Lubiatowo	Lubiatowo
Białogóra	Bialogóra
Dębki	Dębki
Karwia	Karwia
Lokalizacja MFW Bałtyk III względem obszarowych form ochrony krajobrazu	Location of the OWF Baltic III in relation to area forms of landscape protection
Legenda	Legend
MFW BIII	IMF BIII
Słowiński Park Narodowy	Slowinski National Park
Nadmorski Park Krajobrazowy	Seaside Landscape Park
Obszary Chronionego Krajobrazu:	Protected Landscape Areas:
Nadmorski	Seaside
Pas Pobrzeża na wschód od Ustki	Coastal strip east of Ustka
Data: 2019-08-12	Date: 2019-08-12
Podziałka	Pitch
Mile morskie	Sea miles

However, it should be emphasized that it is the landscape within the protected landscape areas that is protected, not the landscape visible from the areas. Thus, the construction, operation and decommissioning of the BIII OWF, regardless of the variant considered (W60 or W120 turbines), alone and in cumulation with other projects, will not have any impact on this area form of nature conservation.

10. Impacts unplanned

At each stage of the project, there is a potential unplanned risk associated with the possibility of ship and helicopter collisions and the release of hazardous substances into the environment. The causes, probability of occurrence of various types of unplanned events and failures, and the estimated scale of impacts that may then occur, in the most far-reaching scenarios, are discussed in Chapters 4 - 6 of Volume II, respectively, for each phase (construction, operation and decommissioning).

Due to the distance of the planned project from the coastline, the types of potentially possible failures and the point scale of impacts that would occur when vessels collide on or over the marine area, it is not expected that such unplanned events and failures, would generate impacts on the seascape.

11. Impacts related

Visual impacts on the seascape may be indirectly related to impacts on tourism. The OWF as new anthropogenic elements of the seascape, visible from the heavily used beach by tourists and from specially created points with sea exposure, may cause a feeling of disharmony in the seascape for some observers. This will translate into a potential reduction in tourist interest in the regions from which the IMF will be most visible. However, with the identified low and periodic visibility of the Project from the beaches of tourist destinations, the impact will be insignificant (a relevant impact assessment was performed in Chapter 11 of Volume IV).

Much more likely, however, is a scenario in which the development of pioneering OWF projects in Polish maritime areas will entail an increase in interest from tourists who want to learn more about wind power and renewable energy sources.

Experience at existing offshore wind farms shows that the promotional and informational activities undertaken, i.e. education centers, boat tours to offshore wind farms, sightseeing flights, boards and exhibitions on offshore wind energy, etc., are of great interest to the public, including tourists (see Chapter 7.2 of this study and Volume IV Chapter 11 of the EIA).

Therefore, it can be assumed that a similar situation may also occur in the case of the implementation of OWF BIII. Thus, it should be considered that the negative impact of the OWF on the seascape will be balanced with the positive impacts on the development of tourism on the Polish coast.

12. Impact transboundary

Due to the long distance of OWF BIII from the borders of other countries, it is concluded that there will be no cross-border impact of the investment on the landscape.

13. Measures to minimize and mitigate the impact of the investment on the landscape

From the analyses made in the earlier part of the study, it appears that the wind farm, at each stage of the project, will have an impact on the landscape.

While this impact cannot be clearly defined in terms of neutral, positive or negative (it depends on the observer), nor can it be assessed in terms of legal compliance/non-compliance, nevertheless, without any doubt, wind turbines will be new elements of the seascape.

The assessment showed that visual impacts on the seascape of OWF BIII will be of minor to moderate significance. The assessment also looked at cumulative impacts with other OWFs.

In none of the cases analyzed were the impacts found to take on the character of significant or even major impacts. Therefore, no minimization measures were found necessary.

Minimizing impacts on the landscape will be facilitated by the RAL7035 color used as standard for the turbines, chosen to minimize the contrast between the turbines and the background as much as possible, regardless of the prevailing visibility conditions. In doing so, it should be remembered that it is mandatory to paint the ends of the rotors in accordance with the requirements of aerial obstacle markings, as mentioned above.

14. Proposal monitoring

In view of the lack of significant impacts of OWF BIII on the seascape, there is no justification for monitoring.

15. Summary and conclusions

- Wind turbines will add a new element to the landscape. Its assessment is dependent on the observer, as of today there are no legal conditions to explicitly assess the degree of visual impacts on the landscape;
- The main audiences exposed to the visual impacts of the OWF include residents of coastal towns located near the project and tourists. It should be noted that the OWF will not be visible from the buildings of individual villages, but only from the beach, places of special exposure to the sea (e.g., promenades, hotels), ports, tourist paths or from points at a considerable height (e.g., lighthouses);
- The planned project will generate visual impacts on the landscape at the stage of its operation. Impacts on the landscape during the construction phase and its potential decommissioning can be considered negligible;
- It is expected that under the right conditions, the planned project can be seen at a maximum distance of about 45 - 50 km;
- The BIII OWF, despite the fact that it will be visible from the coastline for about 80 kilometers, including from the beaches adjacent to tourist destinations such as Ustka and Leba, as well as from other coastal towns, i.e., Ustka and Leba. Rowy, Białogóra, Lubiatowo, Dębki, Karwia and viewpoints (SNP, Stilo Lighthouse), for no viewpoint will be a landscape dominant. Therefore, the impact of OWF BIII on the seascape has been determined as moderate for the receptors of Leba, Ustka, the beach and the dunes of Slowinski PN, and as low for the other receptors (Rowy, Stilo, Lubiatowo, Białogóra, Dębki and Karwia);
- The visibility of the planned development will depend on a number of factors, which include the coastal terrain. IMF visibility from highly elevated points, such as lighthouses, dunes and cliffs, will increase. From points in depressions in the terrain or behind the forest complex located behind the beach, visibility will be significantly reduced. Therefore, the visibility of the wind turbines included in the Central Baltic III OWF will depend on the observation point;
- The visibility of the project will depend on current meteorological conditions. Under favorable conditions, such as sunshine, visibility will increase; under cloudy or foggy conditions it will decrease. Visibility data for 2013 obtained from IMGW allow us to estimate that the BIII offshore wind farm may be visible from observation points located on land for about 40-80% of the time each month of the year;

- In the context of cumulative impacts on the landscape with other projects, it is concluded that such impacts may occur for the OWF Baltic Central III with: IMF Baltica 2, IMF Baltica 3, and IMF BII. However, the scale of accumulation will be small and will not significantly change the visual perception of these projects from the indicated receptors;
- The BIII offshore wind farm will not affect forms of nature conservation that protect the landscape, i.e. national parks, landscape parks and protected landscape areas;
- The visibility of the turbines may be different than shown in this report. Actual visibility will depend, in particular, on the final adopted parameters of the turbines and their spacing;
- The visibility of the OWF also depends on the orientation of the turbines relative to the wind direction. Turbines facing sideways to the observer are less visible than forward-facing turbines. Since westerly and southwesterly winds prevail on the Polish coast, it should be assumed that the visibility of the turbines from the receptors (vantage points) in question will be lower for turbines positioned sideways to the observer;
- Due to the pioneering nature of the project in question in Poland, the planned investment may be a tourist attraction (see Volume IV Chapter 11 Other Users).

16. Shortcomings in technology and gaps in modern knowledge

It should be noted that due to the preliminary stage of offshore wind energy development in Poland, there are no generally accepted schemes or guidelines for landscape analyses that take into account national conditions.

Another complication is how to analyze the cumulation of visual impacts with other projects. Due to very general information about other projects, their stages of implementation or likely parameters, it is difficult to say at present which of these projects will be implemented and in what shape.

In this regard, it is important to remember that the visualizations presented in this study represent the likely parameters of the projects and the hypothetical spacing of the turbines. The actual visibility of completed investments may therefore be slightly different from those shown in this report (however, these differences should not be large and should not affect the evaluation results).

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 10

Fisheries impact assessment

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
DWA	Decision on environmental conditions for the implementation of the project
ICES	International Council for the Exploration of the Sea
Fishing square	The smallest statistical unit for reporting the activity of Polish fishing vessels, with an area of about 390 km2 (interchangeably referred to as the Baltic square in the report)
MEW	Offshore wind power plant
IMF BII	Offshore wind farm Baltic II
OWF BIII/ Project	Bałtyk Środkowy III Offshore Wind Farm
IMF Baltica 2	Baltica 2 offshore wind farm
IMF Baltica 3	Offshore wind farm Baltica 3
MPA	Marine Protected Area
NIS 2015	The most far-reaching scenario according to the 2015 Report.
POM	Polish maritime areas
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
Report/ EIA/ RIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
EU/Union	European Union

1. Summary

A non-specialist summary of the results of the assessment of the impact of the OWF Baltic Central III on fisheries for the purpose of amending the decision on environmental conditions for the project was included in Item 5.10 of Volume VI of the Report

2. Introduction

The report complements and updates the environmental impact report[1] for the investment, which consists in the construction of an offshore wind farm designated as Baltic Central III in parameters updated in relation to the variant for which the Environmental Decision was issued. Since this report is prepared for the purposes of the proceedings to amend the Environmental Decision, thus the environmental impact report that was the basis for the issuance of the Environmental Decision is the point of reference for both the comparison of alternatives and the basis for conducting the environmental impact assessment. The changes in the project description are primarily related to the refinement of the approved variant, resulting from the progress of design work, including the development of a preliminary farm layout plan and the selection of foundation technology. The presented changes - modifications to the parameters of the BIII OWF approved by the Environmental Decision are the subject of both the description of the project and the basis for conducting an impact assessment.

The assessment refers to changes in the conditions for implementation and operation of the Project in relation to the variant, which is the subject of the currently valid Environmental Decision, and analyzes whether they will have the potential to increase the previously identified impacts. The assessment uses the Environmental Impact Assessment conducted in 2015 as part of the Report[2], on the basis of which the current Environmental Decision[3]was issued.

This section of the report analyzes the potential impacts of the BIII OWF on fisheries. The assessment was based on data from fishing vessel catch reports submitted to the Fisheries Monitoring Center, taking into account fish species, month of catch and vessel size (vessels up to 12 meters and over 12 meters). The scope of the analyzed data covers the years 2015-2020.

3. Description of the planned project

The parameters of the BIII OWF that are relevant to the analysis of the project's impact on fisheries are:

1) the location of the farm area in relation to existing fisheries,
2) area of the farm - total and buildable,
3) the number of wind turbines and elements constituting the accompanying infrastructure (the total number of all elements of the farm) and the distance between these elements (e.g., power plants),
4) the length of the cable sections constituting the internal infrastructure of the farm,
5) the number of ships and the volume of ship traffic at each stage of the project.

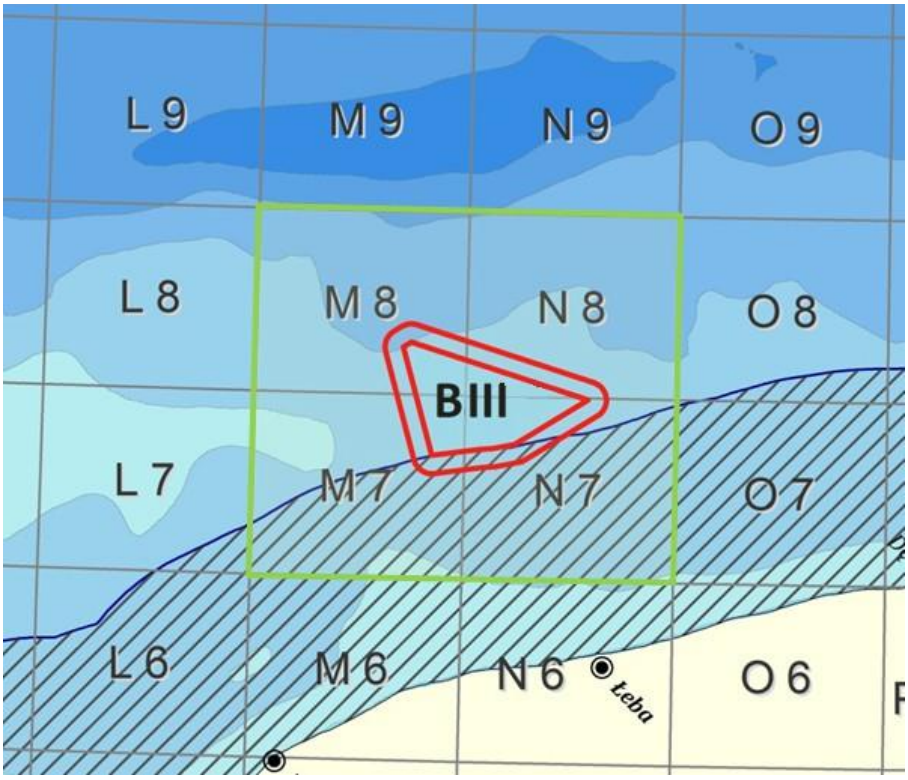
[1] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015
[2] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015
[3] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, as well as their changes from the variant specified in the Environmental Decision, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

The BIII OWF will be located on the eastern slope of the Slupsk Shoal, at a distance of about 23 km north of the coastline, at the height of the Smoldzino municipality (Pomeranian voivodeship). The total area of the farm is about 117 km2, and the area of the farm allowed for development according to the provisions of the PSZW is, depending on the variant, about 83.2 km2 (taking into account the creation of a corridor free of development between the OWF Baltica)

In order to determine with as much accuracy as possible the impact of the investment on fisheries (to determine potential losses of fisheries) in the area occupied by the BIII OWF (in the case of the most far-reaching scenario of complete exclusion of the farm area from the possibility of fishing), the relative share of the area that the farm will occupy in relation to the total area of fishing squares was taken into account. The area of OWF BIII is about 117 square kilometers, while the area of fishing squares M7, M8, N7, N8, on parts of which the farm will be located, is 1.58 thousand square kilometers. Thus, IMF BIII occupies about 7% of the total area of the four quadrants.

Figure 1. Location of OWF BIII on the background of fishing squares



Łeba	Leba

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

3.1. Projects whose impacts may cumulate with those of BIII offshore wind farm on fisheries

Information on existing, ongoing and planned projects, the impacts of which may cumulate with the impacts of the BIII OWF, causing their amplification, and the basic assumptions for the analysis of cumulative impacts of the planned farm are presented in Chapter 10 of Volume II of the Report.

In the BIII offshore wind farm area, no existing, ongoing projects for which an environmental decision has been issued have been identified. In the BIII offshore wind farm area, proposed projects have been identified for which an environmental decision has been issued:

- OWF Baltic II

- IMF Baltica

- Baltic Power OWF

that could potentially, along with the BIII OWF, cause cumulative impacts on fisheries.

A potential cumulative impact, related to impeding the movement of fishing vessels from ports to fisheries located in the Slupsk Trough area, could be caused by the Baltic II offshore wind farm project and the Baltic Power offshore wind farm project. However, in the case of the Baltic II OWF project only, there is no such impact, due to the 17 km distance between this project and the BIII OWF. In the case of construction also of the Baltica offshore wind farm, in the version specified in the environmental decision, such an impact will also not occur, due to the designation of a 4-kilometer-wide corridor between the Baltica 2 and Baltica 3 offshore wind farm areas, along the route of the main movements of fishing vessels.

In the case of construction of the Baltic Power offshore wind farm, the impact will also not occur due to the 2 km distance between the extreme western corner of the Baltic Power area and the eastern corner of the BIII offshore wind farm area

The cumulation of these impacts will furthermore be minimized by the expected permitting of vessels to pass through offshore wind farm areas, as discussed in more detail in Chapters 13 and 14 of Volume III and Section 9 below.

4. Existing pressures anthropogenic

Fishing has been identified as the main anthropogenic pressure affecting ichthyofauna in the area. In general, it can be concluded that fishery productivity (catch per area) in the area of the planned wind farm, as well as in its immediate vicinity (fishing squares M8, N8, M7, N7), is low in relation to the average fishery productivity in the Polish Marine Areas. The area was also found to have significantly lower fishing fleet activity. Other existing anthropogenic pressures have a very low impact on ichthyofauna (sea angling, underwater tourism, noise and vibration from ship traffic, climate change). While there are no data on the distribution of the fishing fleet, it can be concluded that the study area is unlikely to be a place of particular interest to anglers, due to the economic calculus that generally allows for sailing in a zone up to 10 Mm from the shore.

Information on ship traffic in the area of the planned farm, which is presented in Chapter 14 of Volume III of the Report, indicates that the BIII OWF area is a place of traffic of various types of ships in all directions. Vessel traffic definitely thickens in the area to the south of the planned project, which is due to the recommended shipping route there, and to the east and north of the OWF, where the shipping route for the largest commercial vessels and for tankers (the planned deepwater route D) and the TSS traffic separation zone pass through. Commercial vessels (1,740 units) account for the largest volume of shipping in the area, with the second group noticeably larger than the others being tankers (389 units), fishing vessels (123 units), recreational vessels (128 units) and passenger vessels (50 units).

5. Description of the expected consequences if the project is not undertaken project

This chapter analyzes the effects on fisheries if the project is not undertaken. In doing so, three scenarios were considered:

- offshore wind energy will not be developed in the Polish maritime areas, and therefore the evaluated BIII OWF project, or similar ones, will not be implemented,
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind power are not being made, but the mining industry is developing.

The results of the analysis are shown in the table below.

Table 1 Effects on fisheries if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy will not be developed	No action related to the construction, operation or decommissioning of offshore wind farms would mean no impacts on fisheries, the state of the environment will theoretically remain unchanged. The area designated for the planned offshore wind farm will not change its use and will continue to be used as before, i.e. used for fishing. However, changes in the amount of fishing pressure on the area, caused by the dynamics of the size of Baltic fish stocks, are possible. It can be presumed that in the event of abandonment of the investment, catches and the amount of fishing effort in the area under study will similarly be subject to annual fluctuations, related to various factors (fishing quotas, technical restrictions, stock status, weather conditions, etc.). An indirect considered impact of placing power plant foundations on the bottom is the creation of new habitats (the "artificial reef" effect). This effect will increase the abundance and biomass of fish living within the structures, as a result of a kind of "diversification" of the homogeneous underwater environment of the southern Baltic. If the investment is abandoned, this effect will not occur.
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	In the event that the BIII OWF is not built, but other wind farms are built in neighboring locations as a result of offshore wind energy development, no significant impact on fisheries is expected in the BIII OWF area. The area allocated for OWF BIII will remain unchanged and continue to be used as before. However, changes in the amount of fishing pressure on the area, caused by the dynamics of the size of Baltic fish stocks, are possible. It can be presumed that in the event of abandonment of the investment, catches and the amount of fishing effort in the area under study will similarly be subject to annual fluctuations, related to various factors (fishing quotas, technical restrictions, stock status, weather conditions, etc.). The development and exclusion of neighboring areas from fishing opportunities and flows may make the pressure from this in the BIII OWF area higher (individuals will move from other areas to the BIII OWF area), although it should be remembered that the fishery productivity (surface catch) in the area of the planned wind farm, as well as in its immediate surroundings, is low in relation to the average fishery productivity in the Polish Maritime Areas. However, due to the lack of detailed data on ichthyofauna, fisheries and vessel traffic in the neighboring fields, it is

Lp.	Script	Environmental implications
		impossible to determine conclusively whether another location for the project would be more favorable. An indirect considered impact of placing power plant foundations on the bottom is the creation of new habitats (the "artificial reef" effect). This effect will increase the abundance and biomass of fish living within the structures, as a result of a kind of "diversification" of the homogeneous underwater environment of the southern Baltic. If the investment is abandoned, this effect will not occur. Instead, it will appear in areas occupied by other offshore wind farms.
3.	Offshore wind power will not develop, but mining industry will grow	Potential impacts on ichthyofauna and fisheries of the BIII offshore wind farm area may also result from other forms of marine resource use in its immediate vicinity, such as aggregate extraction from the seabed or oil/gas extraction. Impacts will be similar to those of wind farm construction.

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

6. Impact assessment methodology for fisheries

The analysis of the project's impact was carried out in accordance with the framework methodology adopted by the project, as described in Section 5 of Volume I of the report, with some modifications or refinements, as discussed below.

The impact analysis took into account the size of fishing vessels (up to 12 meters and over 12 meters) and the type of gear used (set gear, active gear).

The subject of the impact assessment in this section of the report was exclusively issues of an economic and social nature. It has been assumed that in the case of impacts causing changes in fishery resources, the scale of the impact on fisheries will be proportional to the effects of the farm's impacts on these resources, as detailed in Chapter 4 of Volume IV of the report.

6.1. Framework methodology for assessing impact

First, all theoretically possible impacts of offshore wind farms on fisheries during the various stages of the project are described (Chapter 7).

The 2015 Report's assessment of the potential impacts of the BIII OWF, referenced here, was based on an analysis of the project's most far-reaching scenario ("NIS 2015"), i.e., the one with the highest negative impact on fisheries. The 2015 Report recognized that the 2015 NIS could occur under a reasonable alternative option, involving the construction of 200 wind turbines and 8 foundations of supporting infrastructure. It was considered that every other scenario considered for the Project, including the variant selected for implementation, would result in environmental impacts equal to or less than the 2015 NIS, e.g., the variant selected for implementation consists of 60 power plants, about 70% less than in the 2015 NIS.

The analysis was carried out on the basis of the available current literature and the experience of the report's authors.

This was followed (Chapter 8) by a characterization of the object of impact, i.e. the fisheries sector. The same chapter classifies the subject of the impact into one of the adopted categories, for the subsequent

assessment of the significance of the impacts. The classification of the subject of the impact has been modified relative to the impact assessment framework methodology, as detailed in Section 6.3.1 below.

A proper assessment was conducted in Chapter 9. First, it was indicated which of the theoretically possible impacts, listed in Chapter 7, may also occur in the BIII OWF area. These impacts are then described in relation to fisheries in the BIII OWF area and assessed in terms of their magnitude, using a classification modified from the Impact Assessment Framework methodology, which is described in Section 6.3.2 below. The final assessment - the significance of the impact - was based on a matrix modified from the framework impact assessment methodology, which is presented in Section 6.3.3 below.

6.2. The most far-reaching scenario - NIS 2015

The benchmark for assessing the potential impacts of the BIII OWF was the analysis of the most far-reaching scenario of the project ("NIS 2015"), i.e. the one with the highest negative impact on fisheries. This is the alternative option used for analysis in the 2015 Report on the basis of which the most adverse environmental impacts were identified, and the option currently under consideration is the implementation of 60 power plants and one substation. As the most far-reaching scenario (NIS 2015), it was assumed that the area occupied by the farm would be completely excluded from fishery use from the start of construction[4]. This will result in the loss of revenue that fisheries have received from the area to date. Losses of existing users of the area planned for construction of OWF BIII will probably be minimized by moving the fleet to other fishing grounds. However, if this is the case, as a result of increased fishing pressure, a reduction in fishing efficiency (lower fishing revenues per unit of effort) can be expected in the areas to which the fleet has shifted. This reduction is assumed to be proportional to the amount of effort displaced from the BIII OWF area. With this in mind, the amount of existing revenues earned by fishing vessels in the area of the planned investment can be taken as the quantifiable scale of the investment's impact on Polish fisheries. The methodology for calculating the resulting losses to fisheries is described in the Fisheries Monitoring Results Report (Volume III, Chapter 13 of the report).

6.3. Modifications to the framework assessment methodology impact

6.3.1. Fisheries vulnerability assessment

Instead of the meaning of the subject of the impact assessment, the concept of vulnerability was introduced.

The vulnerability of the fishery to the described impacts was assessed taking into account the source of the impact and the vulnerability of the fishery, using the classification as in Table 2 below. Fisheries sensitivity is understood as the ability to avoid adverse impacts, mainly by moving to alternative fishing grounds.

[4] Even if the entire area of the farm is made available for fishing, the possibility of fishing there will be greatly reduced. Due to the nature of fishing with towed gear (bottom trawls and pelagic trawls), their use in the farm area will be practically impossible (due to the high risk of snagging the gear on the windmill tower). Active gear accounted for about 12% of the value of catches in the L8 fishing quadrant between 2011 and 2013. The possibility of using ponding tools will depend on whether the internal cable network is buried in the seabed. If the cables are left uncovered, due to the risk of snagging the clinging elements of nets or bottom hooks, fishing with these tools should also be ruled out. Between 2011 and 2013, they accounted for about 85% of the value of total catches in the L8 quadrant.

Table 2 Classification of vulnerability of fisheries

Sensitivity	Description
Insignificant	It is not susceptible to the impact of investments and/or has a high capacity for restoration. A very large selection of alternative fishing sites and/or adaptation of fisheries to change.
Small	In general, it is not affected by investments and/or has a high capacity for restoration. A large selection of alternative fishing sites and/or a wide range of available fishing opportunities.
Average	To some extent, it is vulnerable to the impact of investments and/or has a high capacity for reconstruction. Moderate choice of alternative fishing sites and/or limited scale of available fishing opportunities.
Large	Generally susceptible to the impact of investments, it has little or expensive restoration capacity. Small selection of alternative fishing sites and/or small scale of available fishing opportunities.
Very large	Highly susceptible to the impact of investment, long-term or no restoration capacity. No alternative fishing sites.

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

6.3.2. Assessment of the magnitude of impact

The magnitude of the investment's impact on fisheries was assessed taking into account the size of the area, the duration of the impact, the frequency of the impact and its sustainability. The magnitude of the impact was classified as "no change," "insignificant," "small," "moderate" or "large." Definitions of each impact size category are provided in the table below. It should be noted that the nomenclature of the impact magnitude categories has not been modified from the impact assessment framework methodology adopted for the project.

Table 3 Impact size categories

Magnitude of impact	Description
No change	No change from the conditions found.
Insignificant	Non-substantial changes from the conditions found. The physical impact of the factor is insignificant and short-lived (e.g. <3 years).
Small	Minor changes from the existing conditions, leading to an acceptable reduction in fishing activities. The physical impact of the agent is spatially limited and short-lived (e.g. <3 years).
Moderate	Loss or alteration of a significant portion of important fisheries currently being exploited or in the future (in the next 3 years). Moderate area of impact for a medium period of time (<20 years).
Large	Total exclusion from fishing opportunities. Wide area of influence, long-lasting effect (50 years and more).

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

6.3.3. Assessment of the significance of impact

The combination of the magnitude of the impact and the sensitivity of the fishery yields an overall impact assessment - the significance of the impact. The impact significance assessment matrix used in the fisheries impact assessment is shown in the table below. It should be noted that the nomenclature of impact significance categories has not been modified from the impact assessment framework methodology adopted for the project. The impact assessment took into account the size of fishing vessels (up to 12 meters and over 12 meters) and the type of gear used (set gear, active gear).

Table 4 Impact significance assessment matrix

Sensitivity	Magnitude of impact				
	Large	Moderate	Small	Insignificant	No change
Very large	Very large	Large	Moderate	Small	No change
Large	Large	Moderate	Small	Small	No change
Average	Moderate	Small	Small	Skip	No change
Small	Small	Small	Skip	Skip	No change
Insignificant	Small	Skip	Skip	No change	No change

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

6.3.4. Assessment of impacts cumulative

The assessment of cumulative impacts was carried out using the expert (descriptive) method.

7. Potential impacts of offshore wind farms offshore wind farms

In this chapter, potential impacts of offshore wind farms at different stages of investment are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding the potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report (SMDI 2015).

Offshore wind farms will be a new offshore user that has not occurred in Poland before. Their direct impact on fisheries will be related to the occupation of parts of previously used fishing grounds, which may negatively affect fishermen's fishing income. An indirect effect of the farm's construction will be its impact on fish, mainly species exploited by fisheries or that constitute their food base. The chapter with the analysis of the impact on ichthyofauna (Volume IV Section 4 of the report) notes that knowledge regarding this topic is limited to studies of individual investments. The cited example of the Danish farm (Horns Rev) shows that it had a negligible or completely negligible impact on fish[5]. However, it also mentions the positive impacts of the farm, which becomes an effective refuge for fish by excluding them from fishing. Beneficially for both commercial and recreational fishing, the farm area can provide refuge for predatory fish (cod), including large-sized individuals. Thus, the periphery of the OWF may be an attractive fishing region from the point of view of fisheries. However, it is mentioned that this benefit is

[5] Leonhard, S.B.; Stenberg, C. & Støttrup, J. (Eds.), Effect of the Horns Rev 1 Offshore Wind Farm on Fish Communities. Follow-up Seven Years after Construction. DTU Aqua, Orbicon, DHI, NaturFocus. Report commissioned by The Environmental Group through contract with Vattenfall Vindkraft A/S, 2011

not significant enough to compensate fisheries for the losses resulting from the closure of the area[6]. Similar relationships have been observed for many years in so-called Marine Protected Areas (MPAs) created in waters around the world. Ongoing studies show that the density of fish and their larvae in closed areas is higher than in publicly accessible areas, resulting in the positive spillover effect of fish and larvae migrating out of the closed area. Other possible benefits highlighted in the literature include reduction of conflicts between users, preservation of biodiversity, diversification of fishing opportunities, reduction of fluctuations in catches, increase in productivity and fishing profits[7]. At the same time, it is mentioned that in order for the mentioned side benefits to occur, the closed area must be large enough[8].

In summary, the following potential impacts of an offshore wind farm on fisheries can be distinguished:

- total or partial (limited, for example, to fishing with specific gear, or limited to some part of the area) closure of the farm area to fishing (from the moment of construction until the decommissioning of the farm);
- movement of vessels from the project area to other fishing areas (increase in effort in these areas) (from construction to decommissioning of the farm);
- leaving lost structural elements in the sea - the danger of hooking nets (at the stage of construction and decommissioning of the farm);
- relocation, displacement of fish species important for fisheries from the project area (during the construction and decommissioning stages of the farm)[9];
- extension of the road to the fishing grounds (from construction to decommissioning of the farm);
- increased vessel traffic, interfering with the conduct of fishing activities (especially during construction and decommissioning);
- changes in the stock of commercially exploited fish species (from construction to decommissioning of the farm)[10].

For a detailed description of the potential impacts of offshore wind farms on fisheries, see the tables in sections 7.1. - 7.3. below.

[6] Ward T.J., Heinemann D., Evans N., The role of marine reserves as fisheries management tools. A review of concepts, evidence and international experience, 2001, p. 75

[7] Sweeting C.J., Polunin N.V.C., Marine Protected Areas for Management of Temperate North Atlantic Fisheries. Lessons learned in MPA use for sustainable fisheries exploitation and stock recovery. A Report to the Department for Environment, Food and Rural Affairs, School of Marine Science and Technology University of Newcastle, 2005

[8] Attwood, C.G., Harris J.M., Williams A.J., International experience of marine protected areas and their relevance to South Africa, South African Journal of Marine Science 18: 311-332, 1997; Bohnsack J.A., Application of marine reserves to reef fisheries management, Australian Journal of Ecology 23: 298-304, 1998

[9] Discussed in detail in Chapter 4 of Volume IV with an analysis of impacts on ichthyofauna.

[10] as above

7.1. Stage construction

Table 5 Potential impacts of OWF III on fisheries - construction phase

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Total or partial closure of the farm area to fishing	The farm area will occupy part of the previously used fishing grounds, which may negatively affect the fishing income of fishermen fishing in the area. The most important factors affecting the level of impact are: • the location of the farm area in relation to existing fisheries, • the size of the restricted area during construction; • duration of construction; • the scale of fishing in the existing fisheries located within the boundaries of the area of the planned farm, the importance of the area in total catches, • the possibility of relocating existing fishing activities outside the farm area (access to alternative fishing grounds).
Increase in fishing effort in alternative fisheries	The relocation of existing fishing activities outside the farm area to alternative fisheries may lead to an increase in fishing effort in these fisheries, i.e. an increase in competition for the fishing fleet that has previously fished in alternative fisheries. On the one hand, the relocation of fishing vessels from the farm area to alternative fishing grounds provides an opportunity for these vessels to continue their fishing activities despite the exclusion of the farm area from fishing (a positive aspect). On the other hand, however, an increase in the number of fishing vessels in alternative fisheries results in greater pressure on the resources of these fisheries and lower individual revenues for fishing vessels (lower catch values due to greater competition for the same limited ichthyofauna resources) (negative aspect). The most significant factors affecting the level of impact are: • the number of fishing units in existing fisheries located in the farm area that continue fishing activities in alternative fisheries, • the availability of alternative fisheries and their existing level of use by other fishing entities,
Extension of the road to the fishing grounds	Due to the exclusion of the farm area from fishing and the use of alternative fishing grounds, it may be necessary to change existing flow routes to the fishing grounds. Usually, the consequence of excluding a farm area from fishing opportunities is the lengthening of flow routes, which can translate into an increase in the cost of doing business and thus a reduction in income (when higher fuel and wage costs are not offset by an increase in the value of fishing in alternative fisheries). The most significant factors affecting the level of impact are: • the location of the farm area and the ports used by fishing vessels in relation to alternative fisheries, • existing routes for the flow of fishing vessels to the fishing grounds.

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Increased vessel traffic interfering with fishing operations	Increased vessel traffic involved in the construction of the farm may lead to reduced fishing opportunities outside the project area as well (e.g., increased risk of damage to deployed nets by vessels sailing toward the farm). However, the impact can be largely minimized by proper network signage and ongoing communications regarding planned construction activities in the farm area. Please note that installation vessels will follow existing navigation routes wherever possible. The most significant factors affecting the level of impact are: • location of fishing grounds, trawling routes relative to the flow routes of vessels involved in the construction of the farm, • the number of ships involved in the construction of the farm and the number of flows, • duration of construction
Destruction, loss of fishing gear	Items accidentally left on the bottom from the construction of the farm (including along the route of the flow of construction vessels from the port to the construction area) can cause damage to fishing gear. The most significant factor affecting the level of impact is the type of fishing gear used by fishing vessels in the area.
Changes in stocks of commercially exploited fish species	Construction work may cause the displacement of fish species important for fisheries from the area/area of the project. On the one hand, the impact may be negative (reduction of resources in the project area). On the other hand, however, it can be positive - an increase in resources in neighboring fisheries, translating into an increase in the value of catches. Potential impacts of the OWF on fish stocks (both those associated with planned construction activities and in emergency situations, due to oil spills, contamination of the seabed and bottom sediments with antifouling agents, accidental release of municipal waste or domestic sewage, accidental release of chemicals and waste from the construction of the farm) and factors affecting the level of these impacts are discussed in Chapter 4 of Volume IV of the Ichthyofauna Impact Analysis Report.

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

7.2. Stage operation

Table 6 Potential impacts of OWF on fisheries - operation stage

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Total or partial closure of the farm area to fishing	See description for construction phase
Increase in fishing effort in alternative fisheries	See description for construction phase

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Extension of the road to the fishing grounds	See description for construction phase
Increased vessel traffic interfering with fishing operations	Increased traffic of service vessels may lead to reduced fishing opportunities outside the project area as well (e.g., increased risk of damage to deployed nets by vessels heading towards the farm). However, the impact can be largely minimized by proper network signage and ongoing communications about planned activities in the farm area. It should be borne in mind that the volume of vessel traffic during the operation stage will be significantly lower compared to the construction or decommissioning stage, in addition, service vessels will, as far as possible, travel along existing navigation routes. The most significant factors affecting the level of impact are: • location of fisheries in relation to the flow routes of vessels engaged in servicing the farm, • the number of vessels involved in servicing the farm and the number of flows.
Changes in stocks of commercially exploited fish species	During operation, the farm area may provide refuge for predatory fish (cod), including large-sized individuals. The periphery of the OWF may be an attractive fishing region from the point of view of fisheries interest (fish migrations outside the area excluded from fishing). Potential impacts of the OWF on fish stocks (both those associated with planned works and in emergency situations, due to oil spills, contamination of the seabed and bottom sediments with antifouling agents, accidental release of municipal waste or domestic sewage, accidental release of chemicals and waste from the construction of the farm) and factors affecting the level of these impacts are discussed in Section 4 of Volume IV of the report with the analysis of impacts on ichthyofauna.

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

7.3. Stage decommissioning

Table 7 Potential impacts of OWF III on fisheries - decommissioning phase

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
Total or partial closure of the farm area to fishing	The impact of the farm's decommissioning process on fisheries will be similar to the construction phase described earlier. If the structural elements are completely removed from the seafloor and the occupied area is restored to the state prior to the foundation of the farm, fishing can be expected to return. Deciding to leave some of the structures in place, for example to create artificial reefs, will result in the inability to trawl in the area and the need to limit pound net fishing. The most significant factors affecting the level of impact are: • the size of the area with the remaining elements of the wind farm structure,

Type of impact	Rationale for selection and key parameters and factors affecting the level of impact
	• the depth of leaving structural elements (threatening/not threatening the navigation of ships).
Increase in fishing effort in alternative fisheries	See description for construction phase
Extension of the road to the fishing grounds	See description for construction phase
Increased vessel traffic interfering with fishing operations	Increased vessel traffic involved in the decommissioning of the farm may lead to reduced fishing opportunities outside the project area as well (e.g., increased risk of damage to deployed nets by vessels sailing toward the farm). However, this impact can be minimized to a large extent by proper network signage and ongoing announcements regarding planned dismantling activities in the area farms. Please note that ships will navigate along existing navigation routes as much as possible. The most significant factors affecting the level of impact are: • the location of fisheries in relation to the flow routes of vessels involved in the decommissioning of the farm, • the number of ships involved in the decommissioning of the farm and the number of flows.
Destruction, loss of fishing gear	Items accidentally left on the bottom from the dismantling of the farm's components (including along the route of the flow of ships from the port to the construction area) can cause damage to fishing gear. The most significant factor affecting the level of impact is the type of fishing gear used by fishing vessels in the area.
Changes in stocks of commercially exploited fish species	Decommissioning work may cause the displacement of fish species important for fisheries from the area/area of the project. On the one hand, the impact may be negative (reduction of resources in the project area). On the other hand, however, it can be positive - an increase in resources in neighboring fisheries, translating into an increase in the value of catches. If the farm's facilities are removed, the potential habitat, feeding, shelter and reproduction of many fish species (the so-called "artificial reef") will be destroyed. Potential impacts of the OWF on fish stocks (both those associated with planned construction activities and in emergency situations, due to oil spills, contamination of the seabed and bottom sediments with antifouling agents, accidental release of municipal waste or domestic sewage, accidental release of chemicals, and waste from the construction of the farm) and factors affecting the level of these impacts are discussed in Section 4 of Volume IV of the report with an analysis of impacts on ichthyofauna.

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

7.4. Potential impacts on related sectors fisheries

Fishery-related sectors include fish processing, trade, transportation, vessel and gear maintenance, recreational fishing and port operations.

Polish processing and trade does not depend on domestic supplies, and relies heavily on imported supplies, so existing relationships between fishing and processing and trade are not significant.

The potential reduction in fishing in the Baltic Sea would have a significant impact on the income of small local shipyards and ship repair service companies. A reduction in demand for fishing gear would have a negative impact on the operation of manufacturers of nets and other fishing gear. The revenue of local ports, particularly those that base their operations on serving fishing vessels, would also be reduced. This could lead to economic collapse and closure of some of them. Commercial activities for fresh fish would be restricted, further limiting the earning potential of local people.

Recreational fishing activities are carried out by specialized units and by fishing units adapted for this purpose. Restricting the fishing area could lead to a reduction in the number of units, an increase in the price of services, and consequently a decrease in demand for them.

8. Characteristics of the subject of the impact assessment impacts

8.1. Characteristics of fisheries in the area of OWF BIII

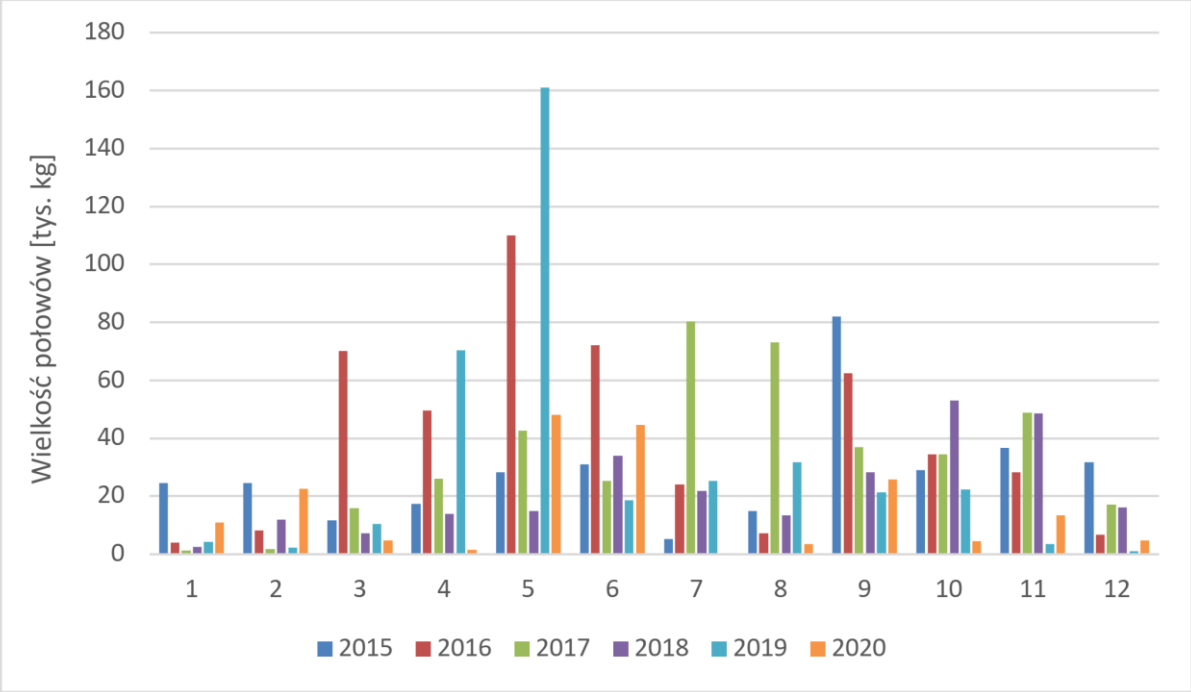
In relation to the average size of Polish Baltic catches, converted to area (fishery productivity), realized in squares lying (partially or fully) in the Polish economic zone, the fishery productivity observed in the analyzed square can be assessed as low. Between 2015 and 2020, it accounted for about 3.1% to about 7.9% (from about 116 kg/km2 in 2020 to about 302 kg/km2 in 2016) of the productivity observed in the POM. The average fishery productivity in fishing squares M7, M8, N7, N8 for 2015-2020 was about 215 kg/km2 (which accounted for about 5.4% of POM productivity).

The main fish species caught in the areas of the analyzed fishing squares M7, M8, N7, N8 were cod, herring, sprat and flounder. The volume of catches of Baltic cod of the Polish fishing fleet in 2015-2020 fluctuated between 0.47-13.6 thousand tons, herring 37.4-50.9 thousand tons, Baltic sprat 60.1- 74.5 thousand tons and flounder 9.4-16.7 thousand tons.

The smallest fishing vessel catches in 2020 were found in the winter month (December, March), in the spring month of April, and in the summer months (July, August). The highest catch values in fishing squares M7, M8, N7, N8 in 2020 were recorded in the months of May-June, and in the months of February and September.

The chart below shows the activity of fishing units by month in quadrants M7, M8, N7, N8 from 2015 to 2020.

Figure 2. Seasonality of fish catch in the areas of squares M7, M8, N7, N8 in 2015-2020



Wielkość połowów [tys. kg]	Catch volume [thousand kg]

Detailed characteristics of fisheries in the area of OWF BIII are described in Chapter 13 of Volume III of the Report

8.2. The most important species fished in the investment area[11]

In 2020, the Polish Baltic fishing fleet consisted of 823 vessels with a capacity of 32385 thousand GT and engine power of 80.37 thousand kW[12]. These values have changed slightly compared to 2019.

The catches of the Baltic fleet were in 2020. 130 thousand tons in the Baltic Sea area and 61.5 thousand tons from the Atlantic and Pacific Oceans[13].

For 2019, this represents a reduction in total catches (in the Baltic Sea and other areas) of 40.6 thousand tons.

The most important, in terms of share of catch value, fish species in the Baltic fishery in 2020 in fishing squares M7, M8, N7, N8 remained herring, accounting for 35.6% of the total value of Baltic catches (65.7 tons). Most of the time, the fishing results in the sprat fishery are strongly similar to those of herring vessels. In 2020, 34.8 tons of sprat were harvested, accounting for 18.8%, and 45.7 tons of skate, accounting for 24.7%, and 5.8 tons of cod, accounting for 3.1%, and other species of 32.8 tons, accounting for 17.7%.

In the survey catch, sprats (77.9%) were the most abundant species found in the OWF and buffer zone (Appendix F to the Report), followed by cod (9.5%), herring (7.6%) and flounder (4.4%). Sprats and

[11] Chapter developed based on the results of the project's fish impact assessment (Chapter 4 Volume IV of the report). The methodology for assessing impacts on fisheries (a non-environmental component) differs in detail from that used in the assessment of impacts on ichthyofauna.

[12] CSO data for 2020 https://stat.gov.pl/obszary-tematyczne/transport-i-lacznosc/transport/gospodarka-morska-w-polsce-w-2020-roku,7,18.html

[13] CSO data for 2020 https://stat.gov.pl/obszary-tematyczne/transport-i-lacznosc/transport/gospodarka-morska-w-polsce-w-2020-roku,7,18.html

herring dominated the pelagic trawl fishery, while cod and flounder dominated the pound net fishery. In terms of weight, cod clearly dominated the survey catch (56.2% of the total weight of fish caught), followed by flounder (18.7%), sprat (17.6%) and herring (5.5%). Commercial fishing, in the area of the four Baltic quadrants M7, M8, N7, N8 (i.e., wider than the research fishing region), was dominated by cod (54%), flounder (21%), sprat (16%) and herring (8%) in 2011- 2013.

In comparison, in 2013-2018, commercial fishing, in the area of the four Baltic quadrants M7, M8, N7, N8, was dominated by cod (51% of the total weight of fish caught), flounder (31%), herring (10%) and sprat (6%).

As can be seen, the species structure of the research catches made in 2012-2013 was similar to the commercial catches made, both in the same period and in 2013-2018.

According to the importance of resources, the individual species selected for evaluation are classified below.

Table 8 List of target fish species selected for impact assessment, with assigned resource importance

Species	Importance of the resource	Justification
Cod	Large	A commercially exploited species of one of the key importance for the functioning of the ecosystem, it is abundant in the Baltic Sea, although heavily subjected to anthropogenic pressure, hence the marked fluctuations in the status of the stock over recent years.
Orchid	Medium	A commercially exploited species. An abundant, ecosystem-important key bentophage in the southern Baltic Sea zone.
Sprat	Medium	A commercially exploited species. Abundant, of ecosystem importance. A pelagic, thermophilic species, distinguished by its relatively high mobility, determined mainly by water temperature.
Herring	Medium	A commercially exploited species. Abundant, of ecosystem importance. It is among the species with the greatest migratory tendencies between breeding and feeding sites.
Salmon	Medium	A commercially exploited species, a declining population, of ecosystem importance, a predator, a dioecious species that feeds in the open zone of the Baltic Sea and migrates to rivers to spawn.

Source: fish impact assessment report (Chapter 4 of Volume IV of the report)

See Volume IV, Chapter 4 of the report for detailed information on the impacts of OWF BIII on ichthyofauna resources, including commercially fished species.

9. Assessment of the impact of OWF BIII on fisheries

Only issues of an economic and social nature were the subject of the impact assessment in this chapter. It has been assumed that in the case of impacts causing changes in fishery resources, the scale of the impact on fisheries will be proportional to the effects of the farm's impacts on these resources, as detailed in Chapter 4 of Volume IV of the report.

Assuming that at the stage of construction, operation and decommissioning of the BIII OWF, its area will be closed to fishing opportunities, most of the impacts that the project may cause at the different stages, i.e. construction, operation and decommissioning, are the same. Accordingly, the impacts of the BIII offshore wind farm and the factors that determine them are discussed without dividing them into subsections devoted to the various stages of project development.

At the same time, it should be emphasized that the adopted most far-reaching scenario, consisting in the complete closure of the BIII OWF area to fishing, is an unlikely scenario in light of the formed approach of the maritime administration to this issue. The area of MF B III is not located in the zones permanently or periodically closed to navigation and fishing, established by the Minister of Defense by decree in accordance with the Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration(ie. OJ. U. of 2022, item 457)

According to the FMPMP, it was assumed for the POM.45E basin, where the BIII OWF is located, as permissible functions include aquaculture, scientific research, cultural heritage, technical infrastructure, exploration, prospecting of mineral deposits and extraction of minerals from deposits, fishing, artificial islands and structures, transportation, tourism, sports and recreation.

Decisions regarding restrictions on navigation through the creation of a restricted vessel traffic zone can be made by the Maritime Administration. According to the POM.45E aquatic charter, it is indicated as follows:

- at the time of commencement of the investment of erection of artificial islands and structures, it is required to impose, by a decision of the competent director of the maritime office, a ban on navigation in the body of water occupied by construction in terms of safety, along with a 500 m safety zone around the body of water for the duration of construction;
- during the operation of offshore wind power plants, it is required to introduce, by decision of the competent director of the maritime office, restrictions on the execution of navigation in the safety zones established for each turbine and in places that threaten the safety of the internal technical infrastructure.

In basin 45.E, it is recommended that a 100-meter safety zone be established around any functioning offshore wind turbine structure, and that the development be laid out in such a way as to allow a transport corridor for vessels up to 150 meters in length.

The approach presented above, allowing fishing boats to move through the wind farm area, and not precluding fishing activity in the area, excluding bottom-interfering gear, assuming low density of power plants in the BIII farm area, will significantly reduce the scale of potential impacts described below.

9.1. Total or partial closure of the farm area to fishing (stage of construction, operation, decommissioning)

For the purpose of the impact assessment, it was assumed that at the stage of construction, operation and decommissioning, the entire area of the BIII OWF (about 117 square kilometers) will be completely excluded from fishing (due to the safety of navigation), according to the information contained in Section 6.2, so assumptions were made in accordance with the 2015 NIS from the 2015 Report. If, during the construction phase, it becomes necessary to carry out installation work in a larger area than the target area to be occupied by the wind farm, the extent of the impact will have to be increased proportionally and cover the time required for construction activities. Conducting an impact assessment of these works (if they take place) depends on the size of the excluded area and the period of exclusion.

In addition, increased vessel traffic involved in the construction of the BIII offshore wind farm may impede fishing outside the area of the project itself. An analysis of fishing activity shows that in the area of fishing quadrants M7, M8, N7, N8 there were between 37 (2020) and 66 (2015) fishing units out of 803 (2020) and 816 (2015) total Baltic vessels registered in the Polish register. During the period under review, a steady decline in the number of units involved could be observed. The main gear used for fishing in the study area in 2015-2020 was set nets. The average annual fishing effort (sum of fishing days of all fishing vessels fishing in squares M7, M8, N7, N8) in the analyzed area was 421 days. This

accounted for just over 0.6% of the average effort of the Polish Baltic fleet overall (about 68,000 days per year) in 2015-2020. Like the number of vessels, it varied from year to year, with a marked decline over the years analyzed, particularly sharp in 2019 and 2020. The volume of catches realized in squares M7, M8, N7, N8 in 2015-2020 is shown in Table 1 of Volume III of Section 13.

The impact of the farm's decommissioning process on fisheries will be similar to the construction phase described earlier. If the structural elements are completely removed from the seafloor and the occupied area is restored to the state prior to the foundation of the farm, fishing can be expected to return. Deciding to leave some of the structures in place, for example to create artificial reefs, will result in the inability to trawl in the area and the need to limit pound net fishing.

In contrast, it is difficult to predict the changes that will take place in fisheries in 20 years. Leaving some of the wind turbine structures offshore to build artificial reefs will undoubtedly be attractive from a recreational fishing perspective.

In view of the need for maritime safety rules, it was assumed that information on the planned scope of work, traffic volume and the need for caution in the project area would be published. The impact assessment was conducted for a scenario that includes the implementation ofsuch measures as a means of minimizing negative impacts.

Total or partial closure of the area to fishing is a direct negative impact at all stages of implementation of the BIII OWF , spatially limited, leading to an acceptable reduction in fishing activities.

An assessment of the significance of this impact for the most far-reaching scenario, the 2015 NIS, is presented in the table below.

Since it is assumed that regardless of the variant of the project the same area will be excluded from the possibility of fishing (i.e. the whole area of the farm is assumed to be excluded), it is considered that all considered variants of the project will cause the same impact.

Table 9 Impacts associated with full or partial closure of the farm area to fishing (construction, operation and decommissioning phases, NIS 2015)

Fleet	Sensitivity	Rationale for impact assessment	Magnitude of impact	The significance of the impact
<12 m	Average	The complete or partial closure of the farm area to fishing may negatively affect fishermen's fishing income.	Low (impact, spatially limited, acceptable level)	Small (sensitivity of the resource - medium, magnitude of impact - small)
>12 m (jointed tools)	Small			Negligible (sensitivity of the resource - low, magnitude of impact - low)
>12 m (trawls)	Small			

In the variant that is the subject of this Report, 60 power plants and one substation will be built. The variant adopted for implementation involves the construction of 70% fewer power plants than envisaged in the 2015 NIS and the construction of twice as many power plants as specified in the Environmental Decision issued, thus, according to the assessment made above, this variant will not cause a greater impact than the variant approved in the Environmental Decision.

9.2. Increase in fishing effort in alternative fisheries (construction, operation,

decommissioning stage)

For the purpose of the impact assessment, it was assumed that at the stage of construction, operation and decommissioning, the entire area of OWF BIII (about 117 ^{km2}) will be completely excluded from fishing (due to the safety of navigation).

The number of fishing vessels fishing in the area of the four fishing squares each year ranged from 66 in 2015, 56 units in 2016 and 2017, 52 units in 2018, 40 units in 2019. and only 37 units in 2020. However, the actual number of fishing units likely to be noticeably affected by the shutdown of the area designated for the construction of the BIII offshore wind farm will be much smaller. This will be due to the fact that the BIII OWF area itself will occupy only 7% of the area of the aforementioned Baltic squares, as well as to the fact that the vessels' dependence on fishing in these squares is relatively low. For example, in 2018, of the mentioned 52 vessels fishing in squares M7, M8, N7, N8, only 1 vessel spent more than 10% of the annual number of fishing days in the area, 49 vessels spent less than 5% of the total number of fishing days in the area. Fishing vessels previously fishing in the BIII OWF area can be expected to move to other fishing regions - to alternative fisheries.

Smaller units, less than 12 meters in length, have a more limited range of operation, however, also in their case, excluding such a small area from use should not cause significant financial losses, especially given the expected conditional approval of fishing activities in the farm area, especially small units.

No action was found necessary to minimize this impact.

An increase in fishing effort in alternative fisheries is a direct negative impact at all stages of the project, spatially limited, leading to an acceptable reduction in fishing activity.

Since it is assumed that regardless of the variant of the project the same area will be excluded from the possibility of fishing (i.e. the whole area of the farm is assumed to be excluded), it is considered that **all considered variants will** cause the same impact.

An assessment of the importance of exclusion from fishing opportunities across the farm and the significance of the impact, is presented in the table below.

Table 10 Impacts associated with increased fishing effort in alternative fisheries (construction, operation and decommissioning phases, NIS 2015)

Fleet	Sensitivity	Rationale for impact assessment	Magnitude of impact	The significance of the impact
<12 m	Small	The transfer of existing fishing activities to alternative fisheries may lead to an increase in fishing effort in these fisheries, i.e. an increase in competition for the fishing fleet that has previously fished in alternative fisheries.	Low (spatially limited impact with acceptable level)	Negligible (sensitivity of the resource - low/significant, magnitude of impact - low)
>12 m (jointed tools)	Small			Negligible (sensitivity of the resource - low/significant, magnitude of impact - low)
>12 m (trawls)	Small			

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

In the variant that is the subject of this Report, 60 power plants and one substation will be built. The variant adopted for implementation involves the construction of 70% fewer power plants than envisioned in the 2015 NIS and the construction of twice as many SHPPs as specified in the

Environmental Decision issued for the 2015 report, thus, according to the assessment made above, this variant will not cause a greater impact than the variant approved in the Environmental Decision.

9.3. Extension of the road to the fishing grounds (construction phase, operation, decommissioning)

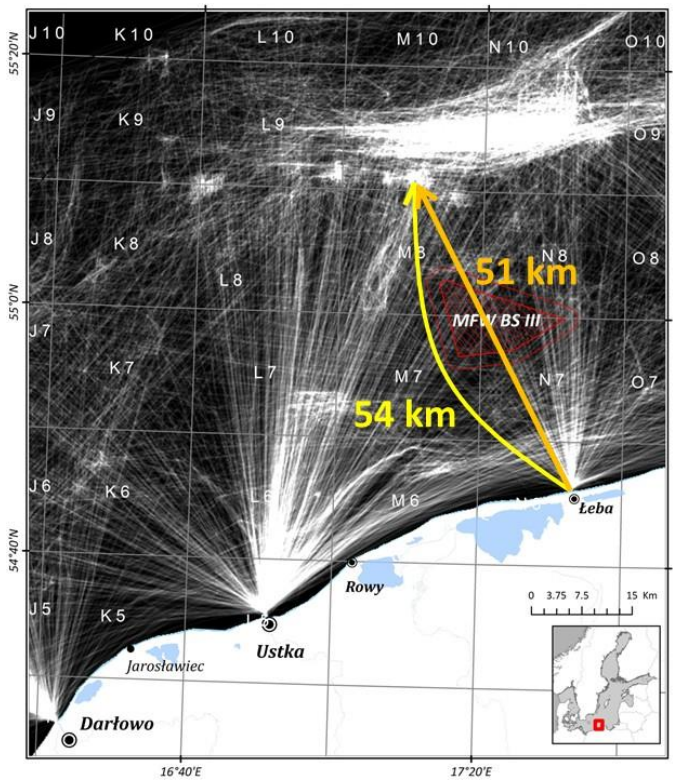
For the purpose of the impact assessment, it was assumed that at the stage of construction, operation and decommissioning, the entire area of OWF BIII (about 117 km2) will be completely excluded from fishing (due to the safety of navigation).

The location of the wind farm in the area of fishing squares M7, M8, N7, N8 will make it difficult for vessels stationed in the port of Leba and Ustka to reach the fishing grounds lying to the north of the farm site (mainly fishing squares M9).

The number of fishing vessels passing through the project area is estimated at 123 per year (based on Chapter 14 of Volume III of the Report). Lengthening flow routes can translate into increased costs of doing business and thus reduced revenues (when higher fuel costs are not offset by an increase in the value of fishing in alternative fisheries).

The BIII offshore wind farm will slightly affect the lengthening of the route of fishing vessels (this applies mainly to vessels from Leba), which in order to bypass the farm will have to make up only about 3-4 km, compared to the currently used through routes (see figure below).

Figure 3 Extension of the passage route of vessels stationed in Leba to the fishing grounds located in fishing quadrant M9



MFW BS III	IMF BS III
Darłowo	Darlowo
Jarosławiec	Yaroslavl
Ustka	Ustka
Rowy	Ditches

Łeba	Leba

Source: Compiled by Lena Szymanek based on Fishery and new concepts of the use of sea space - an example of the Polish Marine Areas, E. Andrulewicz, W. Pelczarski. E. Kuzebski, L. Szymanek, W. Grygiel (ICES-ASC, 2012)

No action was found necessary to minimize this impact.

Extension of the road to the fishing grounds is a **direct negative impact** at all stages of the project **, resulting in insignificant changes to current existing conditions or a spatially limited impact with an acceptable level.**

An assessment of the significance of this impact is presented in the table below.

Since it was assumed that regardless of the variant of the project the same area would be excluded from the possibility of fishing (i.e. the whole area of the farm is assumed to be excluded), it is considered that **all considered variants of the project** will cause the same impact.

Table 11 Impacts associated with the extension of the road to the fishery (construction, operation and decommissioning phases, NIS 2015)

Fleet	Sensitivity	Rationale for impact assessment	Magnitude of impact	The significance of the impact
<12 m	Insignificant	Extension of flow routes can translate into an increase in the cost of doing business, thereby reducing revenues.	Insignificant (insignificant changes from current existing conditions)	No change (sensitivity of the resource - insignificant, magnitude of impact - insignificant)
>12 m (jointed tools)	Small		Small (impact, spatially limited, acceptable level)	Negligible (sensitivity of the resource - low, magnitude of impact - low)
>12 m (trawls)	Small			

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

In the variant that is the subject of this Report, 60 power plants and one substation will be built. The variant adopted for implementation involves the construction of 70% fewer power plants than envisaged in the 2015 NIS and the construction of twice as many power plants as specified in the Environmental Decision issued, thus, according to the assessment made above, this variant will not cause a greater impact than the variant approved in the Environmental Decision.

9.4. Increased vessel traffic interfering with the conduct of fishing activities (construction, operation, decommissioning stage)

Increased vessel traffic in the area of OWF BIII (due to its construction, operation or decommissioning, especially intense at the stage of construction and decommissioning) may hinder fishing outside the area of the project itself. The magnitude of the factor's impact will depend on the frequency of vessel traffic involved in the construction and operation of the wind farm and the flow routes.

Due to the priority of the movement of vessels engaged in fishing over other vessels with normal maneuvering ability, the possible negative impact of the farm service vessels will be significantly limited

and may interfere with the activity of fishing vessels not directly engaged in fishing activities (on their way to or from the fishery).

In view of the need for offshore safety, it was assumed that information on the planned scope of work, traffic volume and the need for caution in the construction area would be published. The impact assessment was conducted for a scenario that includes the implementation of such measures as a means of minimizing negative impacts.

Increased vessel traffic interfering with fishing activities is a **direct negative impact** at all stages of the project. During the construction and decommissioning phases, this will be a **spatially limited** impact **, leading to acceptable setbacks.** At the operational stage, when the volume of ship traffic will be noticeably lower, this will be an impact **that will cause insignificant changes from current existing conditions.**

An assessment of the significance of this impact **for the most far-reaching scenario, the 2015 NIS** (which assumes the construction of 200 wind turbines; a larger number of turbines determines more vessel traffic), is presented in the table below.

The variant approved in the DWA stipulates that about 70% fewer power plants will be built than envisioned in the 2015 NIS, and half as many as in the approved Environmental Decision for OWF BIII.

Table 12 Impacts associated with increased vessel traffic interfering with fishing operations (construction, operation and decommissioning phases, NIS 2015)

Fleet	Sensitivity	Rationale for impact assessment	Magnitude of impact	The significance of the impact
<12 m	Small	Increased vessel traffic may interfere with the flow routes of fishing vessels	Minor for the construction/ decommissioning phase (impact, spatially limited, of acceptable level); insignificant for the operation phase (insignificant changes from current existing conditions)	Negligible (sensitivity of the resource - small, magnitude of impact small or insignificant)
>12 m (jointed tools)				
>12 m (trawls)				

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

In the variant that is the subject of this Report, 60 power plants and one substation will be built. The variant adopted for implementation assumes the realization of fewer power plants than envisaged in the 2015 NIS and the realization of twice the number of SHPPs as specified in the Environmental Decision issued, thus, according to the assessment made above, this variant will result in less ship traffic associated with the operation of the farm than the variant approved in the Environmental Decision.

It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

9.5. Destruction, loss of fishing gear (construction stage, decommissioning)

Items accidentally left on the bottom from the construction or decommissioning of the BIII OWF (potentially also along the route of the flow of vessels involved in the construction/decommissioning from the port to the farm area) may cause damage to fishing gear.

In addition, there are two scenarios to consider when decommissioning a farm: (1) complete removal of structural elements from the seabed and restoration of the occupied area to the state prior to the foundation of the farm - possible return of fishing; (2) determination to leave part of the structure on the bottom - no possibility of trawling in the area and the need to limit fixed net fishing. The share of demersal and pelagic trawl fisheries in the area of the 4 fishing quadrants M7, M8, N7, N8 was about 21% in 2018. However, it is difficult to predict the changes that will take place in the fishery in 20 years. Leaving part of the construction of elements of OWF BIII in the sea, in turn, may be attractive from the point of view of recreational fishing (underwater elements forming the so-called "artificial reef").

A measure to minimize the risk of encountering accidentally left on the seabed or intentionally left underwater structure elements in the farm area that will not be removed during decommissioning of the project is to check the seabed to determine the exact location of objects that could pose a threat to other users of the maritime areas and inform the relevant services of the existing danger.

Destruction of fishing gear by items accidentally or intentionally left on the bottom of the farm is, at the stage of construction and decommissioning of the project, a direct negative impact, spatially limited, leading to an acceptable reduction in fishing activities or causing insignificant changes from the current existing conditions. The threat will affect bottom trawling vessels (due to the fishing technique of dragging nets along the bottom).

An assessment of the significance of this impact for the most far-reaching scenario - NIS 2015 (which assumes the construction of 200 wind turbines; higher number of turbines, potentially higher risk of accidentally leaving components on the bottom, potentially higher number of underwater structures left at the project site after decommissioning of the farm), is presented in the table below.

The variant approved in the DWA assumes that about 40% fewer power plants will be built than envisioned in the 2015 NIS. In the variant that is the subject of this Report, 60 power plants and one substation will be built.

Table 13 Impact of loss or destruction of fishing gear by items left on the bottom (construction and decommissioning phase, NIS 2015)

Fleet	Sensitivity	Rationale for impact assessment	Magnitude of impact	The significance of the impact
<12 m	Insignificant	Items accidentally left on the bottom can cause damage to fishing gear.	Insignificant (insignificant changes from current existing conditions)	No change (sensitivity of the resource - insignificant, magnitude of impact insignificant)
>12 m (jointed tools)	Insignificant			
>12 m (trawls)	Small		Low (impact, spatially limited, acceptable level)	Negligible (sensitivity of the resource - low, magnitude of impact low)

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

The variant adopted for implementation assumes the implementation of fewer power plants than envisaged in the 2015 NIS and the implementation of twice as many power plants as specified in the Environmental Decision issued.

The use of gravity foundations (excluding the possibility of its use for the substation) under the power plants was also ruled out, with less risk of elements being left on the bottom during the construction or decommissioning of the farm. Thus, it is considered that the project will not cause a greater impact from both the 2015 NIS and the variant approved in the Environmental Decision.

10. Impacts cumulative

10.1. Offshore wind farms wind farms

Assumptions for analyses of cumulative impacts of the BIII OWF and other projects on fisheries are presented in Chapter 3.1 of this section.

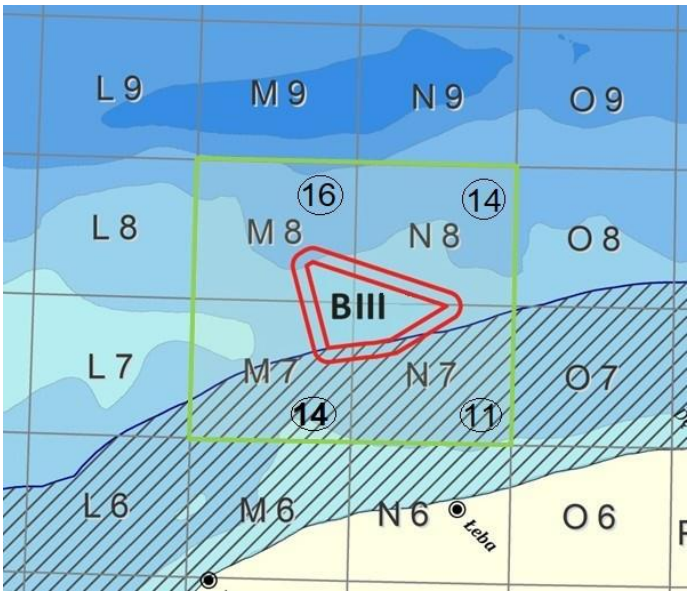
As can be seen from these descriptions, **the most far-reaching scenario from the 2015 NIS report** for assessing cumulative impacts was the construction of wind power plants under four projects, namely. BIII offshore wind farm, Baltica 2 and Baltica 3 offshore wind farms, Baltic Power offshore wind farm and the closure to fishing of entire areas designated for these projects. These are projects for which there is a very high probability associated with their implementation, and they are, for the moment, the only projects with an environmental decision. This is the most far-reaching scenario (NIS 2015) of cumulative impacts that was analyzed in 2015 and is still valid.

Between 2014 and 2020, 37 (2020) and 66 (2015) fishing units out of 823 (2020) and 875 (2015) total Baltic vessels registered in the Polish register fished in the area of fishing squares M7, M8, N7, N8. During the period under review, a steady decline in the number of units involved could be observed.

Table 14 Number of vessels involved in fishing in squares M7, M8, N7, N8 (2015-2020)

Year	2015	2016	2017	2018	2019	2020
Number of ships	66	56	56	52	40	37

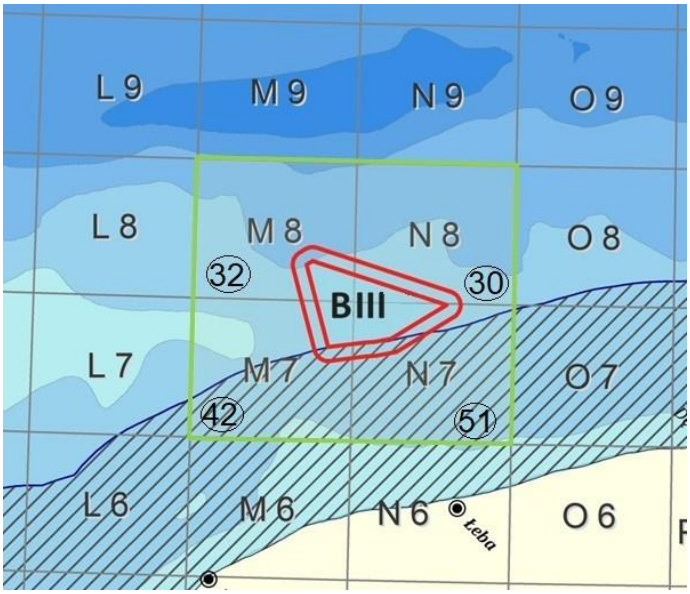
Figure 4 Distribution of the number of fishing vessels in quadrants (L8, M7, M8, N7, N8) in 2020



B III	B III
Łeba	Leba

Source: Own elaboration based on materials of the Ministry of Agriculture and Rural Development.

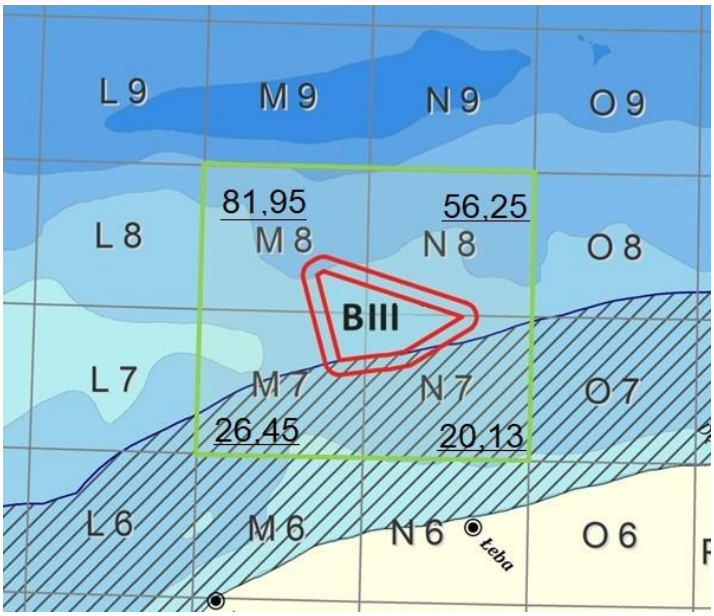
Figure 5 Number of fishing days in squares (L8, M7, M8, N7, N8) in 2020



B III	B III
Łeba	Leba

Source: Own elaboration based on materials of the Ministry of Agriculture and Rural Development.

Figure 6 Catch volume in tons in squares (L8, M7, M8, N7, N8) in 2020



B III	B III
Łeba	Leba
81,8	81.8
56,25	56.25
26,45	26.45
20,13	20.13

Source: Own elaboration based on materials of the Ministry of Agriculture and Rural Development.

The main gears used for fishing in the study area in 2015-2020 were set nets .

The largest number of fishing vessels was present in quadrant M8, in whose area a significant part of OWF Baltica 2 will lie, and to a small extent OWF BIII and OWF Baltica 3. The number of fishing days the said fishing vessels fished in 2020 ranged from just 16 (M8 square) to 14 in the M7 and N8 quadrants and in the N7 quadrant. Thus, it was not significant in relation to the total number of fishing days realized by the Polish Baltic fleet in 2020. The size of the catches obtained also varied from one Baltic square to another. The most fish were caught in quadrant M8 (almost 82 tons), in quadrant N8- 56 tons, in quadrant M7- 26 tons, in quadrant N7- 20 tons.

OWF B III will in the future cover only a small extent of the areas of all four designated fishing quadrants, which will entail the need to shift effort to other fisheries, such as those located in quadrants L7, O7 or others operated by the same fishing vessels. Since most of the fishing units fishing in the area of the squares to be partially occupied by OWF BIII also fish in many other Baltic squares, the transfer of fishing activities will not involve additional costs due to the need to identify fishing conditions in the new fishing grounds. In the area of the squares, pond gear is the dominant catch. Moving these tools to other areas may cause conflicts with existing users of the fishery, where the number of tools on display will increase. Given the fact that the fishing potential of the Polish fleet was significantly reduced after accession to the EU, including a reduction due to scrapping of the fishing effort of vessels using pond gear by almost 40%[14], excessive concentration (above that observed so far) of pond nets should not be expected after shifting the effort from the area occupied by the wind farm. Given the above arguments, the significance of the cumulative negative impact of fleet reallocation can be considered moderate.

Locating other wind farms adjacent to the BIII OWF on the eastern side, without designating a shipping corridor, will lengthen the path of fishing boats to productive fishing grounds below the Central Shoal. This could result in additional losses, mainly for vessels stationed in the ports of Ustka and Leba, due to higher fuel costs and time to reach the fishing grounds. Increased traffic of fishing vessels sailing from Leba to the fishing grounds of the Slupsk Trough can be seen in the area of square M8, planned to be occupied by the Baltica 2 OWF. Locating the four farms (OWF BIII, OWF Baltica 2 and 3, OWF Baltic Power) in close proximity will create an obstacle to the navigation of fishing vessels stationed in Ustka (about 40 vessels, of which about 30 fish in the squares above the farm), lengthening the route to the fishing grounds located in squares M9 and N9 by about 20%. Given the above information, the significance of the cumulative negative impact associated with the need to extend the travel route of fishing vessels to the fishing grounds should be considered high. In order to reduce the negative impact on fisheries in this area, it would be necessary to leave a navigation corridor of the necessary width for the safety of navigation. In this case, the significance of the cumulative impact of the investment on fisheries will be considered moderate. Note that according to the PSZWs issued for the OWF, a buffer of 500 meters from the farm boundary to inside the area is excluded from the development area of each farm, which between two adjacent wind farms gives a corridor free from development of farm elements with a width of 1 km. This space could be the aforementioned navigation corridor. In addition, a 4km wide corridor from south to north between the offshore wind farms Baltica 2 and Baltica 3 has been designated by the investors.

10.2. Transmission infrastructure OWF

According to information received from the Maritime Office in Slupsk, there are no restrictions on fishing activities (including trawling) at the location of the current submarine cables (SwePol), as no one has applied for such restrictions. The investor, however, may submit proposals for the introduction of a zone with restrictions on the operation of fishing vessels. These zones may be established after the

[14] Kuzebski E., Marciniak B., Less ships - more fish? Socio-economic impacts of fishing fleet reductions in the Baltic Sea, WWF 2009, p. 49.

maritime administration takes into account the conclusions of the navigation analysis submitted by the investor. If the connections to OWF BII and OWF BIII are buried in the seabed, it can be assumed that they will not have any impact on fisheries. With this in mind, potential adverse impacts on fisheries may occur at the stage of the cable laying itself and will be short-lived (hampering fishing activities). Another indirect effect on fisheries will be the impact of electromagnetic fields caused by the flow of electricity in the connection cables on fish. The report with the analysis of the impact on ichthyofauna (Volume IV Section 4 of the report) notes the considerable uncertainty of the research on this problem, but nevertheless classifies the said impact as long-lasting, but with a small and spatially limited scope. Given the above, the magnitude of the impact of transmission infrastructure on fisheries can be considered insignificant, and the significance of the impact is classified as negligible.

10.3. Shipping routes sea

Increased vessel traffic involved in the construction of the OWF may impede fishing outside the area of the project itself. With proper information to fishermen about the planned activity of transport vessels serving the investments, the significance of the impact can be considered negligible.

11. Impacts related

As described in an earlier chapter (7. Potential impacts of offshore wind farms), the exclusion of the wind farm area from fishery use may have a positive effect on the protection of resident fish and cause a positive so-called "side effect" in the form of higher fishing yields on the periphery of the closed area. The need to relocate the tools exhibited so far in the area of the planned project outside its perimeter may interfere with the increased traffic of vessels supporting the construction of wind turbines and servicing them.

As shown in the study, the volume of catches from the wind farm plan area represents about 0.143% of the catch of the Polish Baltic fisheries (136,500 tons per year).

In 2020, the total value of catches of the Polish Baltic fleet amounted to 128 thousand tons, while the value of catches in the four fishing squares in question was only 187 tons-accounting for 0.143% of the total fishing value attributable to the Baltic fleet.

In 2018, about 940,000 tons of fish were imported to Poland, six times more than the catches of the Baltic fleet (Szajner P. 2018). From the market's point of view, fishing from the area is of no importance to the country's supply of fish products and raw materials for fish processing.

The potential reduction in landings by catches from the study area will not adversely affect the operation of the nearest ports and the fish and marine-related businesses located there. A possible factor influencing the decision of shipowners to abandon fishing may be an increase in the cost of doing business due to a longer route to the fishery or a change in fishing gear and the species of fish caught, but an analysis of the volume of catches of individual vessels in the area indicated indicates that this factor is insignificant.

Those involved in the trade of fishery products are not expected to suffer noticeable losses due to the closure of the area to fishing. All buyers are aware of the risks associated with the uncertainty of the fishery, so fluctuations in supply are included in estimates of sales opportunities. Closure to fishing of the area planned for the investment should be treated as part of such a risk, and earlier information about the lack of possibility of its use will result in adaptation to changes in sources of supply. The ability of vessels fishing in the closed area to move to other fishing grounds virtually eliminates this risk.

The fish processing industry has a very low dependence on supplies from domestic fisheries. When looking for raw material for production, the most important factor is quality and price on the global market. Production growth in fish processing is based mostly on imported raw material (Szostak 2013). Most of the plants are located outside the port areas and even outside the localities with the largest fish landings, indicating a lack of interdependence between where the fish is landed and where the raw material is processed.

Shipbuilding and repair services are not dependent on the local market. The shipowner's choice of ship repair location is mainly determined by the price of the repair. Located near the planned development, the shipyard in Ustka is focused on yacht construction and repair. Also, the production of fishing equipment is mostly trans-local in nature. The market is dominated by manufacturers operating all along the coast, as well as in neighboring countries. A change in the catch volume of several fishing entities will not affect the operation of these entities. Both repairs and modernization of units, as well as periodic replacement of fishing gear, are included in the costs of fishing operations and are performed according to needs, which will not be affected by the investment in question.

The investment will have a negligible impact on the activities of recreational fishing vessels from the ports of Ustka, Rowy and Leba (closest to the planned investment). Fishing has so far been carried out in more productive fisheries (in deeper waters) than those covered by the planned investment, so it should not be a development obstacle for this activity of fishermen. It can be expected that the BIII OWF wind turbines (the first such structures in Polish waters) can be an additional tourist attraction for organized fishing trips.

In summary, it should be stated that the restriction of fishing opportunities in fishing squares M7, M8, N7, N8 will not have a significant impact on the activities of fishery-related sectors or the operation of local ports.

12. Impacts unplanned

Unplanned impacts mainly include leakage of toxic substances into the water due to a collision between two vessels or a collision with a wind farm. These will mainly be fuels, engine oils or hydraulic fluids.

The maximum option assumes a spill of 200 to 100^{m3} of fuel, 30 to 10 $m3^{of}$ oil, or about 10 $m3^{of}$ hydraulic fluid. The probability of an event that will be a source of negative impact is low. In such cases, a plan is created to deal with collisions and spills. In the technical concept made for the BIII offshore wind farm, Royal HaskoningDHV cites the possibility of discharging waste in exceptional cases (3 to 5^{m3} / day), only in random cases, related to inclement weather or during transfers between units.

The magnitude of the impact on fisheries will be proportional to the negative impacts on fish, as assessed in detail in a separate study (Volume IV Section 4 of the EIA).

In terms of navigational risks, vessel contact with a wind turbine structure under construction or under construction, vessel collisions or other accidents, such as the snagging of fishing nets or other fishing gear on a structural component of a wind turbine, are treated as hazards that can result in the destruction or loss of property (e.g., vessel sinking) and risks to the health and lives of those on board.

A positive aspect is the presence of the IMF as an artificial island, which under certain circumstances can provide a place of refuge for survivors. Each wind turbine has its own individual markings that allow for flawless localization of an incident that may occur near it, thus facilitating evacuation or search and rescue operations.

The above figures are based on analyses carried out in the 2015 Report for the most far-reaching scenario, which assumes the construction of 200 power plants, with the variant finally approved in the

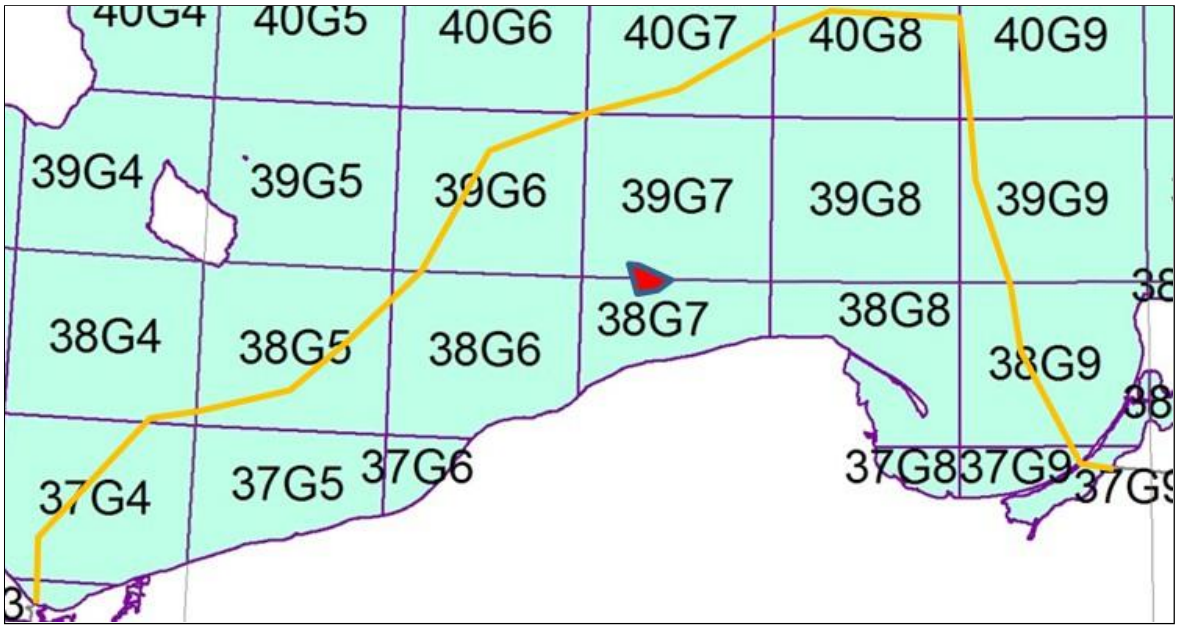
environmental decision reducing this number to 120. In the variant that is the subject of this Report, about 70% fewer foundations will be built than envisioned in the 2015 NIS, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which involves less change in morphology during their decommissioning. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

13. Impacts transboundary

The BIII offshore wind farm area is about 52 kilometers from the border of the Swedish economic zone. According to the conclusions of the analysis of the impact on ichthyofauna (Volume IV. Section 4 of the report), the negative impact will be local.

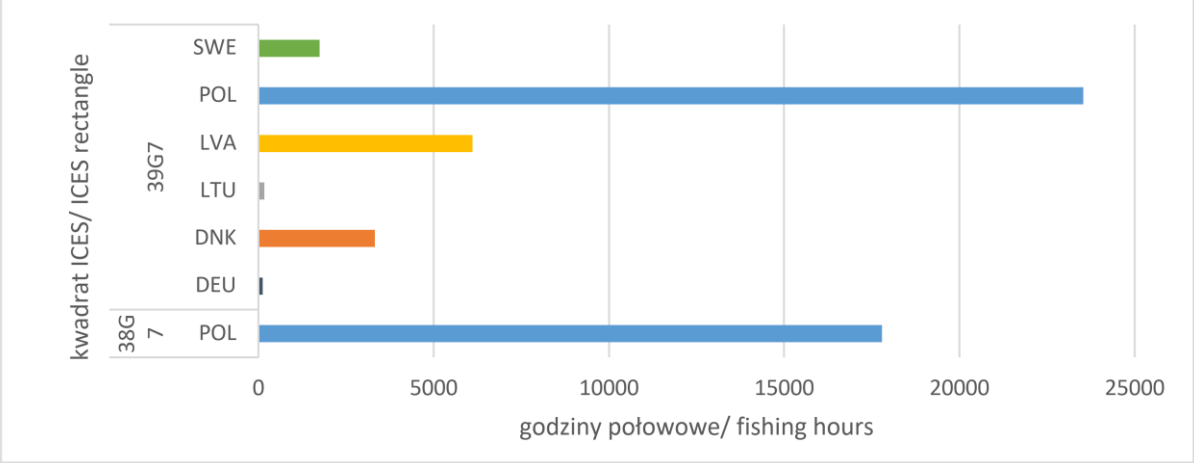
Data on the fishing activity of non-Polish fishing fleets in the area of the planned farm are available only by ICES quadrants (9 times the size of the Baltic quadrants). The BIII offshore wind farm area lies within square 38G7and 39G7 (Figure 7).

Figure 7 Location of OWF BIII on the ICES grid of squares



In 2016, there was no involvement of non-Polish-flagged vessels in fishing in square 38G7 (see figure below). Square 39G7 lies closer to the border of the Polish economic zone, hence the presence of foreign-flag vessels fishing in its area. In 2016, the activity of foreign-flagged vessels in Quadrant 39G7 amounted to about 11,000 hours (compared to 23,500 hours of activity by Polish vessels). The majority (about 3,000 hours each) were Latvian (about 6,000 hours) and Danish vessels (about 3,000 hours) fishing with bottom trawls and nets (set nets). Given the location of the BIII offshore wind farm area (the shallower part of the square) and its small area relative to the area of the square, it is unlikely that the part planned for the investment is of interest to foreign ships.

Figure 8 Fishing effort (in fishing hours) of EU fishing vessels in ICES quadrants 38G7 and 39G7 (own compilation based on STECF data, European Commission, DG Maritime Affairs)



Given the above, no transboundary impacts of the BIII OWF on the fisheries sector of other countries have been identified.

14. Proposal monitoring

The fishing activities of the fleet are monitored on an ongoing basis by the fisheries administration. There is no need to collect additional information. It would be reasonable to analyze these data after the third year of operation of the BIII OWF to verify its actual impact on fisheries.

15. Summary and conclusions

According to the results of the 2015 Report's environmental impact assessment, offshore wind farms will be a new offshore use not previously found in Poland. Their direct impact on fisheries will be related to the occupation of parts of previously used fishing grounds, which may negatively affect fishermen's fishing income. An indirect effect of the farm's construction will be its impact on fish, mainly species exploited by fisheries or that constitute their food base. However, positive impacts of farms are also mentioned, with areas becoming effective refuges for fish through exclusion from fishing. Beneficially for both commercial and recreational fishing, the farm area can provide refuge for predatory fish (cod), including large-sized individuals. Thus, the periphery of the OWF may be an attractive fishing region from the point of view of fisheries.

In order to determine (quantify) with as much accuracy as possible the impact of the investment on fisheries, the relative proportion of the area the farm will occupy to the total area of the fishing square was taken into account. According to the PSZW, the area of the BIII OWF is about 117 square kilometers, while the area of the M7, M8, N7, N8 fishing square, on parts of which the farm will be located, is 1.58 thousand square kilometers. Thus, IMF BIII occupies about 7% of the total area of the four quadrants. The assessment assumed that during both the construction and operation and decommissioning phases, the entire wind farm area (i.e., about 117 square kilometers) would be completely excluded from fishing operations (due to the safety of navigation), which made it possible to determine the worst-case scenario. However, the maritime administration's position to date indicates that in the area of offshore wind farms it will be possible not only to move fishing vessels, but also to conduct non-bottom-invasive fishing methods.

In 2020, 36 fishing vessels, including 12 boats up to 12 meters and 23 vessels over 12 meters in overall length, were fishing in the area of the four Baltic squares (M7, M8, N7, N8). In the catch structure of fishing vessels operating in the area in 2015-2020, the main fish species in the areas of fishing squares M7, M8, N7, N8 were cod, herring, sprat and flounder. The volume of catches of Baltic cod of the Polish fishing fleet in 2015-2020 fluctuated between 0.47-13.6 thousand tons, herring 37.4-50.9 thousand tons, Baltic sprat 60.1- 74.5 thousand tons and flounder 9.4-16.7 thousand tons.

In the percentage breakdown of 2015-2020 commercial catches, Baltic squares M7, M8, N7, N8 were dominated by cod (42% of the total weight of fish caught), flounder (23%), sprat (16.0%) and herring (14%).

The most important, in terms of share of catch value, fish species in Baltic fisheries in 2020 in fishing squares M7, M8, N7, N8 were herring with a share of 35.6% of the total catch value (65.7 tons). Most of the time, the fishing results in the sprat fishery are strongly similar to those of herring vessels. In 2020, 34.8 tons of sprat were harvested, accounting for 18.8%, and 45.7 tons of skate, accounting for 24.7%, and 5.8 tons of cod, accounting for 3.1%, and other species of 32.8 tons, accounting for 17.7%.

Comparing 2020 to the 2015-2020 average shows a significant decrease in cod catches (from a 42% share in 2015-2020 to a 3.1% share in 2020) and an increase in herring catches from 14% to 35.5%. The main fish species caught by the fishery in the area of the 4 fishing squares (M7, M8, N7, N8), on which part of the area the farm will be located, were cod, flounder, herring and sprat. The significance of the project's impact on the above-mentioned fish species was quantified as low, negligible or no change (see Chapter 4 Volume IV of the report).

Both at the stage of construction and decommissioning of the farm, increased vessel traffic involved in activities at the BIII offshore wind farm may hinder fishing outside the area of the project itself, in the path of the movement of construction and transport vessels. After the OWF BIII excludes part of the area of the fishing squares, fishing vessels previously fishing there will have the opportunity to relocate their current fishing activities outside the farm area. There was no danger of major conflicts arising from excessive densities of exposed nets in areas to which vessels previously fishing in OWF BIII will move. Deciding to leave some of the structures in place, for example, to create artificial reefs, will result in the inability to trawl in the area and the need to limit pound net fishing, but on the other hand will create favorable conditions for fish habitat. Taking into account the above, the significance of this investment's impact on fisheries at the stage of construction and decommissioning of the BII OWF is classified as negligible.

Excluding the area of the wind farm from fishing use may have a positive effect on the protection of fish living in the area and cause a positive so-called "side effect" in the form of higher fishing yields on the periphery of the closed area. The need to relocate the tools exhibited so far in the area of the planned project outside its perimeter may interfere with the increased traffic of vessels supporting the construction of wind turbines and servicing them.

The BIII offshore wind farm area is about 52 kilometers from the border of the Swedish economic zone. According to the conclusions drawn from the chapter with the fish impact assessment (Chapter 4 Volume IV of the report), the potential greatest impact will be noise and vibration accompanying the works associated with the construction or decommissioning of the farm. Given the location of the BIII OWF area (the shallower part of the squares) and their small area relative to the area of the squares, it is unlikely that the part planned for the investment, is of interest to foreign fishing vessels. Thus, the possibility of transboundary impacts of the BIII OWF on fisheries is not expected.

A summary of the assessment results is presented in the tables below. It should be remembered that the impact assessment was performed for the most far-reaching scenario that could occur in a reasonable alternative with the complete closure of the farm to fishing. It is considered that the option selected for implementation will cause an impact equal to or less than the NIS.

Table 15 Summary of the results of the assessment of the impact of OWF BIII on fisheries (all phases, NIS 2015)

Impact	Sensitivity	Minimization measures	Magnitude of impact	The significance of the impact	The impact of modifying the parameters of the Project on the significance of the impact
Total or partial closure of the farm area to fishing	Medium (for ships <12 m) or small (for ships >12 m)	Information on the planned scope of work, traffic volume and the need for caution in the construction area	Small	Small (for ships <12 m) or negligible (for ships >12 m)	No impact
Increase in fishing effort in alternative fisheries	Small / Insignificant (for vessels >12 m trawling)	No	Insignificant (for ships <12 m) or small (for ships >12 m)	No change (for ships <12 m) or small (for ships >12 m)	No impact
Extension of the road to the fishing grounds	Insignificant (for ships <12 m) or small (for ships >12 m)	No	Insignificant (for ships <12 m) or small (for ships >12 m)	No change (for ships <12 m) or small (for ships >12 m)	No impact
Increased vessel traffic interfering with the conduct of m fishing activities	Small	Information on the planned scope of work, traffic volume and the need for caution in the construction area	Small for the construction/ decommissioning stage or insignificant for the operation stage	Skip	No impact
Destruction, loss of fishing gear	Insignificant (for vessels <12 m and vessels >12 m using set nets) or small (for vessels >12 m using trawls)	Checking the bottom and information on the location of objects that may pose a threat	Insignificant (for vessels <12 m and vessels >12 m using set nets) or small (for vessels >12 m using trawls)	No change (for <12m vessels and >12m vessels using set nets) or negligible (for >12m vessels using trawls)	No impact

Source: Kuzebski E., Rakowski M., Monitoring of fisheries in the area of the offshore wind farm Baltic Central III. Final report with impact assessment, Maritime Institute of Fisheries - National Research Institute, Gdynia, 2015.

The variant that is the subject of this Report will construct about 70% fewer foundations than envisioned in the 2015 NIS, and twice as many as specified in the Environmental Decision, and the use of gravity foundations under the power plants has been ruled out, which involves less change in morphology during their decommissioning. Thus, it is considered that the project will not cause greater impacts relative to those identified in the 2015 NIS, as well as from the variant approved in the Environmental

Decision. Due to the number of SHPPs being implemented, it should be assumed that the impact will be at most equal with an indication of less than that shown in the 2015 NIS.

16. Shortcomings in technology and gaps in modern knowledge

Precise determination of the maximum fishery losses that can be caused by shutting down existing fisheries and allocating them for renewable investments is limited by the ability to identify the exact location where the fish are caught. The data makes it possible to calculate the revenue that the exploitation of each area brings to the fishery, with the accuracy of a fishing square (about 390 square kilometers). The planned development will cover an area of about 117 square kilometers. Depths and the type of bottom vary considerably both between and within the four squares. The method adopted in the study assumes proportional distribution of catches and fishing effort over the entire square footage (including that occupied by OWF BIII). However, due to the aforementioned differences in depth distribution, it can be expected that fishing interest in different parts of the squares may vary (more in deeper waters). On the other hand, it should be borne in mind that the activity of a fishing vessel in the course of a given fishing operation (distance traversed, length of nets deployed) is large enough to refer to more than one fishing square. A similarly spatially dynamic situation applies to fish stocks, moving over a much larger area than the farm area itself. Accurate quantification of the magnitude of losses (loss of revenue) to fisheries is also not possible because the exclusion of an area from fishing will result in the movement of the fleet to other areas, characterized by different and variable fishing productivity over time. Thus, the value of catches from the area occupied by the BIII OWF should be considered as the highest hypothetical cost/loss of fishing caused by the closure of the previously exploited fishing area. The shipowner's theoretical loss will result from the difference in fishing productivity achieved in the area of the planned wind farm and the nearest alternative fishery providing the most similar productivity to the existing fishery.

There is also no precise data on the activities of foreign ships exactly in the BIII OWF area. Based on the information on ICES squares 38G7 and 39G7, parts of which the farm will be located, it is not possible to say precisely how many vessels move within the farm area. It is likely (but not 100% certain) that the intensity of exploitation of the BIII OWF area by foreign fishing vessels is not higher than the average in the two quadrants, and this assumption was made in the analysis of transboundary impacts.

Precise estimation of the actual losses from the restriction of fishing and passage through the BIII offshore wind farm area will be possible at the stage of operation of the farm, if an appropriate system of monitoring the use of the farm area by specific fishing units is implemented in the period of at least a year before the start of the farm construction. Launching such a monitoring system would require the investor to communicate with interested fishermen, especially those using fishing vessels less than 12 meters in length.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 11

Assessment of the impact on other users of marine areas

Analysis of social conflicts

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Abbreviations and definitions

AIS	Automatic identification system for ships (Automatic Identification System)
AIS-PL	AIS system in the territory of Poland
HEALTH AND SAFETY	Occupational health and safety
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
DGPS-PL	A GPS measurement technique that allows greater accuracy through the use of a reference station (Differential Global Positioning System)
DSC	Digital Selective Calling system (Digital Selective Calling)
EW	Wind power plant/wind turbines
EWEA	European Wind Energy Association
GMDSS	Maritime Distress and Safety Communication System (Global Maritime Distress and Safety System)
GPS	Global Positioning System (GLS)
Km	Kilometer
KSBM	National Maritime Security System
M	Metre
m above sea level.	Meters above sea level
MF	Medium Frequency
IMF	Offshore wind farm/offshore wind farms
IMF BII	Offshore wind farm OWF Baltic II
OWF BIII / Project	Bałtyk Środkowy III Offshore Wind Farm
MIP	Offshore transmission infrastructure
MSE	Offshore substation
MW	Megawatt
NGO	Non-governmental organization (NGO)
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting an environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision.
GMDSS Area A1	An area of the sea remaining within range of at least one VHF shore station in which continuous emergency communication is provided by a DSC device (VHF channel 70 - 156.525 MHz)
GMDSS A2 area	Sea area remaining within range of at least one MF shore station where continuous alerting by DSC (2187.5 kHz) is possible, excluding area A1
EIA	Environmental impact assessment
PEM	Electromagnetic field(s)
PSZW	Permit for the erection and use of artificial islands, structures and devices in Polish maritime areas
PZP POM	Spatial development plan for Polish maritime areas

Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report/EIA Report	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
RHDHV	Royal HaskoningDHV (contractor for the preliminary technical concept of the BII OWF)
SAR	Search and Rescue services (Search and Rescue)
SG	Border Guard
UHF	Ultra High Frequency (Ultra High Frequency)
V/m	Volt per meter - unit of intensity of the electric component of the electromagnetic field
VHF	Very High Frequency (Very High Frequency)
W/m2	Watts per square meter - unit of power density of electromagnetic field (amount of power/rate of energy transfer) per unit area)
ZSRN	Automated Radar Surveillance System

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of updating the conditions for the implementation and operation of the Project - BIII offshore wind farm, for which the Environmental Decision was issued, on other users of the maritime areas, together with an analysis of social conflicts is included in Item 5.11 of Volume VI of the Report

2. Introduction

This section of the Report assesses the potential impacts of the proposed changes in the conditions for implementation and operation of the BIII OWF Project, as defined by the Environmental Decision, on other users of the maritime areas, together with an analysis of social conflicts. It is based on the studies and analyses and findings made for the impact assessment made in the 2015 Report on the basis of which the Environmental Decision was obtained. It should be pointed out at this point that these data also remain valid for the variant currently indicated for implementation. In the case of the variant proposed for implementation on the basis of an amendment to the Environmental Decision, they should also be considered adequate, which is due to the fact that the scale of the planned Project changes, where its parameters related to the number of wind power plants are reduced by 50% in relation to the variant for which the Environmental Decision was issued, a large part of the parameters remain the same, and some of the parameters identified as possible in the Environmental Decision are clarified, for example, the method of foundation of the power plant foundations. some of the parameters that increase, i.e. the total height of the power plant, rotor diameter and the area occupied by foundations for associated infrastructure, either remain unaffected by the nature and significance of the impacts, or have the character of unitary changes, which are repeatedly compensated by a change in the amount of infrastructure planned for implementation. At the same time, it should be emphasized that these recently indicated changes are the result of technological advances as a result of which solutions have emerged to optimize the planned IMF.

The assessment refers to changes in the conditions for implementation and operation of the Project in relation to the variant, which is the subject of the currently valid Environmental Decision, and analyzes how the variant currently adopted for implementation will affect the previously identified impacts. The assessment used the environmental impact assessment conducted in 2015 as part of the 2015 Report, on the basis of which the Environmental Decision was issued[1].

The previous sections of Volume IV (Sections 8-10) assessed the impacts of the Central Baltic Offshore Wind Farm III ("OWF BIII") on cultural heritage, landscape and fisheries (commercial), respectively. This chapter assesses the impact of the BIII offshore wind farm on other marine users, which includes:

- coastal tourism,
- recreational fishing,
- water sports (windsurfing, kitesurfing, sea sailing, wreck diving),
- military operations,
- radiolocation and communications systems,
- civil aviation,

[1] Decision of the Regional Director of Environmental Protection in Gdansk RDOŚ-Gd-WOO.4211.12.2015.KP.22 dated July 7, 2016.

- military aviation,
- shipping,
- exploration, identification and exploitation of mineral resources of the seabed and the interior of the earth beneath it,
- maritime industry,
- people's health and lives.

The impact assessment was carried out for the rational alternative (the Project in the parameters approved by the Environmental Decision) and the variant selected for implementation, for all stages of project implementation, i.e. construction, operation and decommissioning. User-specific analyses are included as separate subsections in this document.

Finally, an analysis of potential social conflicts in the coastal municipalities that are within the project's social impact range was also performed.

3. Description of the planned project

The parameters of the BIII offshore wind farm that are relevant to the assessment of the project's impact on other marine users are, in particular:

- location of the farm (in particular, relative to areas used by other users, distance to such areas),
- area of the farm - total and buildable,
- the number of wind power plants and their technical parameters.

All of the above parameters, for the construction, operation and decommissioning phases of the Project, as well as their changes from the variant specified in the Environmental Decision, are presented and characterized in terms of potential emissions and environmental disturbances in Volume II of the Report.

3.1. Accumulation of impacts in a given area area

Information on existing, ongoing and planned projects, the impacts of which may cumulate with the impacts of the BIII OWF, causing their amplification, and the basic assumptions for the analysis of cumulative impacts of the planned farm are presented in Chapter 10 of Volume II of the Report.

In the area of the BIII OWF, no existing, ongoing or planned projects for which an environmental decision has been issued have been identified that could potentially, together with the BIII OWF, cause cumulative impacts on other users of marine areas, except for coastal tourism in the context of landscape.

4. Existing pressures anthropogenic

Existing anthropogenic pressures that affect the condition and operation of users of the marine areas covered in this chapter of the report include, in particular:

1) shipping,

2) commercial fishing,

3) the offshore mining industry ("Oil & Gas") and

4) military operations.

Shipping

The Baltic Sea is one of the most crowded seas in the world. It provides an avenue of connection between the Baltics and the rest of the world, allowing the constant movement of commercial vessels, ferries, passenger ships and recreational vessels (see Chapter 14 Volume III).

Intense maritime traffic and existing shipping routes (including customary routes) condition the sites for recreational fishing (according to current regulations, this should be done off the fairways) and water sports. Maritime shipping, due to the existing risk of various types of accidents (e.g., collision between two ships, ship grounding or sinking), is also a primary potential source of various types of hazardous substance spills into the water, which can indirectly affect the possibility of recreational fishing and water sports, as well as coastal tourism, particularly if an oil spill patch were to reach close to the shoreline or the shore itself.

Commercial fishing

Commercial fishing conditions the possibility of recreational fishing, including, in particular, permissible recreational fishing sites (for example, recreational fishing may not be carried out in areas excluded from the possibility of commercial fishing) and fishing gear (it is forbidden to use fishing gear used for commercial fishing for recreational fishing), as well as the available stock of fish species caught. The characteristics of the fishery are presented in Chapter 13 of Volume III).

Offshore mining industry

Activities carried out by the offshore mining sector (exploration, prospecting and extraction activities) condition the places where recreational fishing can be practiced. This sector, due to the existing risk of various types of accidents (e.g., a collision between a ship and a mining platform), may pose a potential environmental risk due to the risk of hazardous substances leaking into the water. Spills indirectly affect recreational fishing and water sports, as well as coastal tourism, particularly if an oil spill patch were to reach close to the shoreline or to the shore itself.

Military operations

Military training grounds condition the use of both sea and land space: active training grounds - are used continuously for exercises with permanent limited access for outsiders, temporary open training grounds - open training grounds are temporarily closed for exercises, such as for shipping or fishing, in which case it is also not possible to use the stretch of beach that is within the boundaries of the training ground. The possible scale of military exercises is worth illustrating using the example of the largest cyclical exercise of the Polish Armed Forces, which has been held annually in the spring for more than 14 years. These exercises are conducted in Poland most often in an international arrangement with the participation of the Czech Republic, Estonia, the Netherlands, Canada, Lithuania, Hungary, the United Kingdom and the United States, on all types of training grounds (including the Central Air Force training ground Ustka and the Navy's naval training grounds). About 12,500 soldiers participated in the 2018 exercise for example. In 2020, however, the exercise was carried out in a modified format due to the prevailing SARS-CoV-2 virus pandemic.

Photo 1. Photos from the ANAKONDA exercise - 20

Source: https://www.wojsko-polskie.pl/dorsz/articles/anakonda-2020-1/2020-06-046-navy-day-na-anakonda-20/#gallery-9

5. Description of anticipated effects on the environment if the project is not undertaken project

This chapter analyzes the effects on other users of marine areas if the project is not undertaken. In doing so, three scenarios were considered:

- offshore wind energy will not be developed in the Polish maritime areas, and therefore the assessed project or a similar one will not be implemented,
- offshore wind energy will be developed in the Polish maritime areas, but the assessed project - BIII OWF - will not be implemented,
- in Polish maritime areas, investments in offshore wind power are not being made, but the mining industry is developing.

The results of the analysis are shown in the table below.

Table 1. Effects on other users of marine areas if the project is not undertaken

Lp.	Script	Environmental implications
1.	Offshore wind energy will not be developed	The absence of activities associated with the construction, operation or decommissioning of offshore wind farms would mean that there would be no impacts associated with the construction, operation and decommissioning of such projects and that the area would be available for other users (e.g., marine traffic, recreational fishing), in accordance with their existing use, as long as the areas were not occupied for other types of projects.
2.	Offshore wind energy will be developed, but OWF BIII will not be realized	The non-implementation of the BIII OWF would mean that there would be no impacts associated with the construction, operation and decommissioning of this project, and the availability of the farm area for other users (e.g., marine traffic, recreational fishing), in accordance with their existing use, as long as the area is not occupied by another project.

Lp.	Script	Environmental implications
		The scale of impacts due to the development of other OWFs is difficult to determine due to the unpredictability of the sector's direction. For the areas of other planned farms, there is not enough data to draw complete conclusions in this regard. Taking into account that the OWF projects that are considered the most feasible (i.e., OWF BIII, OWF BII, OWF Baltica 3 and OWF Baltica 2) are located in the vicinity and their scale is similar (similar total planned installed capacity), assuming some simplifications, it can be tentatively thought that the other farms will be the source of similar impacts as OWF BIII. This, however, will only be able to be reliably assessed once analyses have been performed on how other users have used these areas to date. It can be presumed that if the BIII OWF is abandoned, commercial fishing and the amount of fishing effort in the analyzed area will similarly be subject to annual fluctuations, due to fishing quotas, technical limitations, stock status, weather conditions, etc. Commercial fisheries and the status of ichthyofauna stocks will similarly condition recreational fisheries.
3.	Offshore wind power will not develop, but mining industry will grow	The development scenario for the extraction of raw materials from offshore deposits is also difficult to predict. The exploration licenses cover significant areas, but the extraction stage is already more point-based, and impacts will ultimately depend on the location of the extraction platforms. However, impacts from offshore mining are mainly local, except for possible unplanned events, such as a collision between a ship and a mining platform.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

No significant changes are expected in the layout of military training grounds.

In addition to the situation in marine areas, coastal tourism is also very much influenced by land-based activities. Considering the area of special interest in the analysis of the BIII OWF (i.e., the section between Ustka and Leba), decisions on the location of the nuclear power plant may be of great importance[2].

Failure to develop the BIII offshore wind farm, while other offshore wind farm projects (viable) are being developed and the existing forms of offshore development are not very dynamic, will result in impacts on marine users affected by this Section remaining at a similar level.

6. Methodology for assessing the impact on other users of the areas marine

The assessment of the impact on users of the marine areas affected by this chapter of the EIA was conducted in accordance with the general methodology adopted for the project (described in Section 5 of Volume I of the report).

[2] Currently, the village of Lubiatowo-Kopalino in the commune of Choczewo, Wejherowo county, Pomeranian voivodeship, has been identified as the location of a nuclear power plant.

Where the extent of information and the quality of available data, or the nature of the user in question and potential impacts, made it impossible to perform the assessment in accordance with the generally accepted methodology, the assessment was then descriptive in nature, although the significance of the impact was categorized as far as possible in accordance with the classification adopted in the general methodology.

The results of the impact assessments on individual users for the two project variants under consideration (the variant selected for implementation - construction of 60 power plants, and the alternative variant approved by the Environmental Decision - construction of 120 power plants), including cumulation, are described in the form of separate subsections.

Unplanned impacts, associated impacts and transboundary impacts are described comprehensively (within common chapters covering all users).

7. Tourism seaside

7.1. Coastal tourism - general characteristics, status current

Coastal tourism is an important part of Poland's tourism industry. Of the 2,477[3] municipalities in Poland, 55 are included in the so-called coastal areas[4] (municipalities bordering the sea or municipalities not bordering the sea, 50% of whose area is within about 10 km of the sea). Due to their proximity to the sea coast, they are considered to be areas of high natural value, which are an attraction for both domestic and foreign tourists. The high volume of tourist traffic in the coastal strip during the holiday season is confirmed by published statistics.

According to statistics from the Central Statistical Office for 2019[5], in coastal municipalities, tourists using facilities in the coastal area accounted for 21.3% of all overnight tourists nationwide during the holiday season. Coastal municipalities are home to 24% of all tourist accommodations included in the reporting. The accommodation on offer in the region is very diverse and includes hotels of various categories, hotels, holiday resorts, guesthouses, private accommodation, campgrounds and campsites.

The users of the accommodation base in the coastal municipalities are mainly domestic tourists (80.5% in 2019). Foreign tourists are mainly Germans, Russians, Norwegians, British, Czechs and Swedes, (about 19.5% of total overnight stays). Overnight stays granted in July and August predominate.

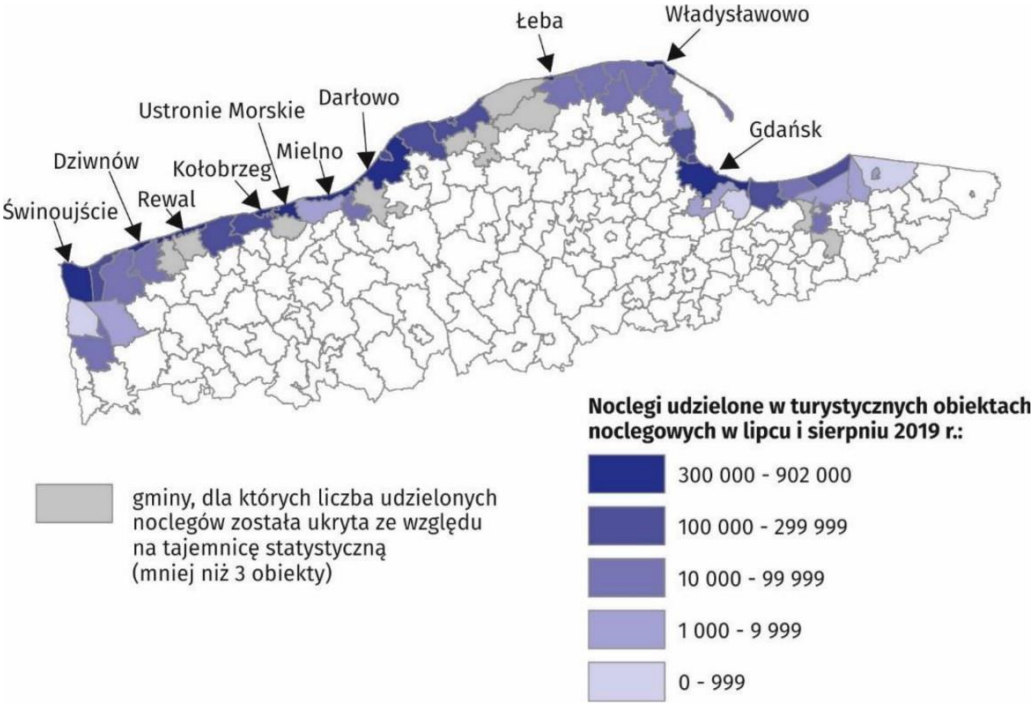
According to the number of nights provided, the rural municipality of Ustka, the rural municipality of Słupsk, Główczyce, Choczewo and Gniewino fall into the category of low-visited seaside destinations in Poland. It is estimated that only up to 1,000 overnight stays were provided in each of these municipalities in 2019. Between 1,000 and 10,000 were provided in the Smoldzino municipality, between 10,000 and 99,000 in the Wicko municipality, and between 100,000 and 902,000 overnight stays in the Leba municipality and the Ustka municipality.

[3] Status as of 01.01.2019. Area and population by territory in 2019. CSO

[4] According to the Eurostat methodology adopted for tourism statistics.

[5] Tourist accommodation facilities in coastal areas in July and August 2019, CSO, Warsaw 11.2019

Figure 1. Coastal municipalities by number of nights provided



Świnoujście	Swinoujscie
Dziwnów	Dziwnów
Rewal	Rewal
Kołobrzeg	Kolobrzeg
Ustronie Morskie	Ustronie Morskie
Mielno	Mielno
Darłowo	Darlowo
Łeba	Leba
Władysławowo	Wladyslawowo
Gdańsk	Gdansk
Gminy, dla których liczba udzielonych noclegów została ukryta ze względu na tajemnicę statystyczną (mniej niż 3 obiekty)	Municipalities for which the number of nights provided was hidden due to statistical secrecy (less than 3 facilities)
Noclegi udzielone w turystycznych obiektach noclegowych w lipcu i sierpniu 2019 r.:	Overnight stays provided in tourist accommodation facilities in July and August 2019:

Source: Tourist accommodation facilities in coastal areas in July and August 2019, CSO, Warsaw 11.2019

7.2. Potential impacts of offshore wind farms on tourism coastal

In this chapter, potential impacts of offshore wind farms are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report.

7.2.1. Stage construction

Potential impacts of offshore wind farms on coastal tourism during the construction phase include:

1) impact on the landscape due to the increased traffic of vessels involved in the construction of the farm and the appearance of individual farm facilities as part of the progressive construction process of the project,

2) surface noise emissions from construction activities.

At the construction stage, there is also a risk of unplanned impacts - emergency situations, which may result in the release of hazardous substances (especially petroleum-based substances, such as various types of oil or fuel) into the environment. Such situations include, in particular, the collision of two vessels, the collision of a vessel with a farm facility, the stranding of a vessel or its sinking.

All of the above-mentioned impacts could potentially reduce the attractiveness of coastal areas to tourists during the period of the farm's construction. Ultimately, however, the scale of such an impact is closely dependent primarily on the following factors:

1) the distance of the project from the shoreline - determines the visibility of the farm construction area from the shore, the extent of construction-related noise, and the potential extent of the oil spill stain in case of an accident (in the area of the farm); the shorter the distance, the greater the visibility and potentially the possibility of surface noise or oil spill stain reaching the shore;

2) the location of the project and the location of construction and assembly ports and ship flow routes in relation to the coastline and tourist attractions of the region - determines the visibility of the farm construction area and the vessels involved in its construction from places of tourist attraction, as well as the extent of surface noise emitted by vessels and the extent of the oil spill stain in the event of an accident (collision of two vessels on the flow route); the shorter the distance, the greater the visibility and potentially the possibility of surface noise or oil spill stain reaching places of tourist attraction;

3) terrain (on land), including the elevation of observation points above sea level. - determines the visibility of the farm and vessels involved in its construction from the shore; the higher the altitude, the potentially greater the likelihood that the farm and vessels will be visible from these points;

4) the time of year, day and hydrometeorological conditions (in particular, cloud cover, precipitation) - condition the visibility of the farm and vessels involved in its construction from the shore; the better the weather conditions, the better the visibility of the farm and vessels from the shore; the strength and direction of the wind, as well as the state of the sea and wave action affect the extent of oil pollution; the illumination of elements of the farm will be more visible at night than during the day.

It should be noted that visual issues are very subjective - what will be perceived by some as a disturbance of the landscape leading to a reduction in the tourist attractiveness of the region, by others may even be perceived as an attraction in itself. Offshore wind farms are still new technologies, pioneering in Poland, which may attract completely new groups of tourists to coastal areas, during the construction phase, especially those interested in new technologies or environmental issues (e.g., marine waters), and lead to the separation of a new segment of tourism. For local travel agencies, shipping companies and ship owners, therefore, there is an opportunity for an additional source of revenue due to the possibility of organizing and operating such tours. A detailed assessment of the landscape impact of OWF BIII is presented in Section 9 of Volume IV.

7.2.2. Stage operation

Potential impacts of offshore wind farms on coastal tourism at the operational stage include:

- the impact on the landscape of wind turbines and other elements of the farm (e.g., transformer stations),
- surface noise emissions from wind turbines and farm service vessels,

- light phenomena (shadow flicker, light markings).

At the stage of operation, as at the stage of construction, there is also a risk of unplanned impacts - emergency situations that may result in the release of hazardous substances (especially petroleum-based substances, such as various types of oil or fuel) into the environment. Such situations include, in particular, the collision of two vessels, the collision of a vessel with a farm facility, the stranding of a vessel or its sinking.

All of the above-mentioned impacts have the potential to reduce the attractiveness of coastal areas to tourists during the life of the farm. However, as in the case of construction, the scale of such impact is closely dependent primarily on the following factors:

- the distance of the project from the shoreline - determines the visibility of the elements of the farm and the perception of light phenomena from the shore, the extent of noise and the possible extent of the oil spill patch; the shorter the distance, the greater the visibility and potentially the possibility of surface noise or oil spill patch reaching the shore;

- the location of the project and the location of operating ports and ship flow routes in relation to the tourist attractions of the region - determines the visibility of the farm and the farm service units from places of tourist attraction, as well as the extent of surface noise emitted by the farm service units and the extent of the oil spill stain in case of an accident (collision of two ships on the flow route); the shorter the distance, the greater the visibility and potentially the possibility of the surface noise or oil spill stain reaching places of tourist attraction;

- the number of wind turbines, their technical parameters (height of the tower, rotor diameter, color and type of coating with which the elements of the farm are covered, type of lighting) and the manner of spacing (including the ratio of density of power plants per unit area) - determine the visibility of the farm and the perceptibility of light phenomena from the shore; the greater the number of power plants spaced closer together, the greater the height and diameter of the rotors, the greater the visibility of the farm from the shore and the greater the range of visibility (more points from which the project is visible);

- terrain (on land), including the height of observation points - determines the visibility of the farm and farm service units from the shore; the higher the altitude, the potentially greater the likelihood that the farm and vessels will be visible from these points;

- the time of year, day and hydrometeorological conditions (in particular, cloud cover, precipitation) - determine the visibility of the farm and vessels involved in its construction, as well as the perceptibility of light phenomena from the shore; the better the weather conditions, the better the visibility of the farm and vessels from the shore; the strength and direction of the wind, as well as the sea state and wave action affect the extent of oil pollution; the illumination of elements of the farm will be more visible at night than during the day.

It should be remembered that visual issues are very subjective - what is perceived by some as a disturbance of the landscape leading to a decrease in the tourist attractiveness of the region, by others may even be perceived as an attraction in itself. Offshore wind farms are ventures that can attract entirely new groups of tourists to coastal areas and thus lead to the development of a new segment of tourism, as evidenced by examples of existing foreign offshore wind farms, which have become an integral part of long-term tourism development concepts of coastal regions, thanks to:

- offshore wind energy information centers (temporary and permanent exhibitions on offshore wind energy and/or specific projects) (e.g., Nysted OWF, Lillgrund OWF, Scroby Sands OWF, Bremerhaven OWF),

- information boards dedicated to offshore wind energy or specific projects (e.g., Blekinge OWF),

- offshore wind farm viewing platforms with telescopes (e.g., Nysted OWF),
- boat trips to the offshore wind farm area (e.g., Alpha Ventus OWF),
- scenic flights over an offshore wind farm (e.g., Alpha Ventus OWF),
- educational lectures, dedicated to offshore wind energy (e.g., in the context of technology, environmental protection, energy security, etc.).

The communication and promotional tools chosen by investors are preceded by in-depth analyses that enable them to be tailored to the situation in specific coastal regions and to specific target groups, which include, in particular, representatives of local, regional and national authorities and administrative offices, energy concerns, consulting companies, school students (elementary, middle and high school) and university students, as well as private individuals.

Thus, for local travel agencies, freight companies, sightseeing flight companies, shipowners or port operators, there is an opportunity for an additional source of revenue due to the possibility of organizing and operating such tours and events. Experience in other countries shows that such attractions are very popular with the public. For example, the information center dedicated to the Scroby Sands IMF averages about 35,000 visitors annually[6].

7.2.3. Stage decommissioning

The potential impacts of offshore wind farms on coastal tourism at the decommissioning stage are analogous to those for the construction stage, with the caveat that at the construction stage, new visual objects appear offshore as part of the work progress, and at the decommissioning stage of the farm, their removal occurs (see section 7.2.1. above).

The decommissioning of the offshore wind farm may lead to the disappearance of the specialized tourism sector, for which it was the main attraction and destination of excursions (see section 7.2.2. above).

7.3. Receptors under evaluation impact

Taking into account the sources of potential impacts of offshore wind farms on coastal tourism and the factors affecting the magnitude of these impacts, which were discussed in Chapter 7.2. above, in particular the distance of the planned OWF BIII from the coastline (23 km), as well as the results of the landscape analysis (Section 9 of Volume IV of the EIA) and data on the actual impacts of foreign offshore wind farms in operation, it should be concluded that:

- surface noise at any stage of the project will not be audible from the shore and can only be heard from ships in close proximity to the farm,
- light phenomena (at the stage of operation) will not be felt on the shore, and can only be seen from ships in close proximity to the farm,
- the most likely extent of a point oil spill (for the furthest-reaching scenario), taking into account the wind distributions of the South Baltic, at any stage of the project will not reach the shoreline even after 24 hours,

[6] https://uk-ireland.rwe.com/locations/scroby-sands-offshore-wind-farm, access date: 05.2022

- visibility of the OWF in the seascape may reach up to 50 km, but it will not be a dominant landscape feature from any of the viewpoints located on the seashore (see Chapter 9 of Volume IV).

The impacts of OWF BIII on coastal tourism are therefore mostly related to the project's impact on the landscape.

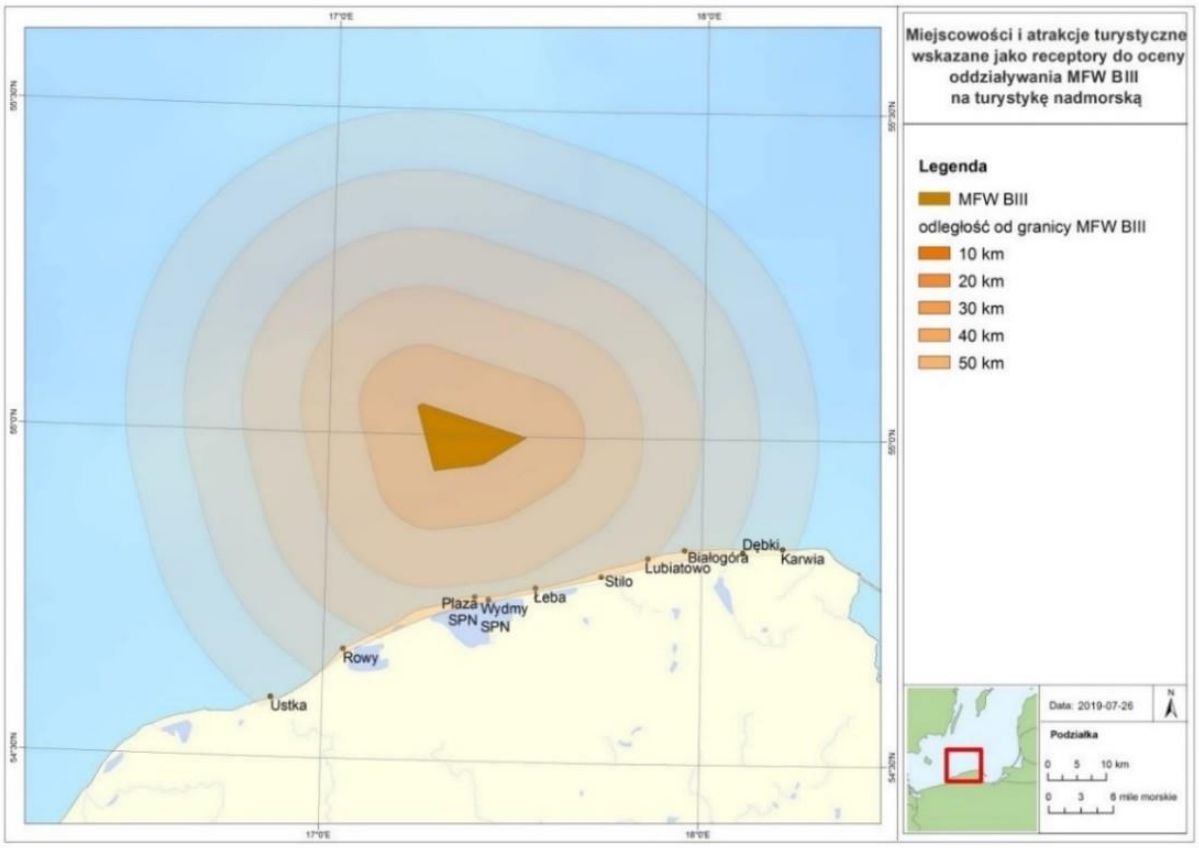
OWF BIII could potentially have a visual impact on the section of the coast stretching from Ustka on the western side to Karwia on the eastern side. The main values of the area are the coastal beaches and surrounding forests, the specific microclimate and unique landscapes that predestine these areas for various leisure activities. These include, in particular, sunbathing and swimming in the sea, recreation on foot, bicycle and horseback, hang gliding and paragliding from cliff-side locations (such as Rowy). Some restrictions on tourist and recreational functions result from the proximity to military areas and the presence of areas covered by legal forms of nature protection.

Coastal tourism throughout this section was considered a receptor for the impact of OWF BIII. Since coastal areas are used by tourists with varying intensity, and within the boundaries of the indicated section of the coast it is possible to distinguish both such points that are particularly popular with tourists and places that are still "virgin" in nature, this analysis is based on selected towns and attractions that are an important part of the tourist industry in the area during the holiday season:

1. city of Ustka (municipality of Ustka) - minimum distance from OWF BIII approx. 48 km;
2. Rowy (rural municipality of Ustka) - minimum distance from OWF BIII approx. 34 km;
3. Leba (commune of Leba) - minimum distance from OWF BIII approx. 23 km;
4. beach and dunes within the boundaries of the Slovinski National Park - minimum distance from IMF BIII approx. 23 km;
5. stilo lighthouse (located in Osetnik, Choczewo commune) - minimum distance from OWF BIII approx. 28 km;
6. Lubiatowo (Choczewo municipality) - minimum distance from OWF BIII approx. 31 km;
7. Białogóra (Krokowa municipality) - minimum distance from OWF BIII approx. 34 km;
8. Dębki (Krokowa municipality) - minimum distance from OWF BIII approx. 43 km;
9. Karwia (Wladyslawowo municipality) - minimum distance from IMF BIII approx. 49 km.

The location of the aforementioned tourist destinations and attractions is shown in the figure below. The following section provides a general description of the sites and the data that formed the basis for determining the significance of the receptor for the impact assessment.

Figure 2. Localities and tourist attractions identified as receptors for assessing the impact of OWF BIII on coastal tourism



Miejscowości i atrakcje turystyczne wskazane jako receptory do oceny oddziaływania MFW BIII na turystykę nadmorską	Localities and tourist attractions identified as receptors for assessing the impact of OWF BIII on coastal tourism
Legenda	Legend
MFW BIII	IMF BIII
Odległość od granicy MFW BIII	Distance from the border of the OWF BIII
Ustka	Ustka
Rowy	Ditches
Plaża SPN	SPN beach
Wydmy SPN	Dunes of the SNP
Łeba	Leba
Stilo	Stilo
Lubiatowo	Lubiatowo
Białogóra	Bialogóra
Dębki	Dębki
Karwia	Karwia
Data: 2019-07-26	Date: 2019-07-26
Podziałka	Pitch
Mile morskie	Sea miles

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

City of Ustka (municipal commune of Ustka)

Ustka is a port city and spa (spa status since 1988) located at the mouth of the Slupia River into the Baltic Sea. Ustka is characterized by a climate with medicinal properties and natural therapeutic resources (brine from the deposit "Ustka IGH-1"), deposits of medicinal peat - peat bog. In Ustka there are many monuments that preserve the atmosphere of an old port and fishing settlement (the old town

with fishermen's houses, the harbor with a pier, the Red Shed (former base of marine lifeguards), the lighthouse (with a 21.5-meter high tower that sends white light at a distance of about 30 km).

To the east of the port, a seaside promenade stretches across the dunes, along which exclusive guesthouses and restaurants have sprung up.

To the east and west of Ustka extend protected landscape areas, respectively, "Belt of the coast east of Ustka" and "Belt of the coast west of Ustka."

There are 2 marine bathing areas in the city: Ustka East (500 m of coastline) and Ustka West (200 m of coastline).

In 2021, the municipality of Ustka had a population of 15,047. It is difficult to indicate how many tourists show up in Ustka during the summer season, but it is estimated that during the peak season up to 100,000 people may rest in the city at one time[7].

Rowy (rural commune of Ustka)

Rowy is a small holiday resort located between Leba and Ustka, in the immediate vicinity of the western border of the Slovinski National Park, at the mouth of the Łupawa River, with a small harbor that functions mainly as a tourist (during the holiday season) and fishing port (servicing fishing boats and boats moored in the harbor). Once a fishing settlement that turned into a tourist destination. To the west of Ditches there is a cliff coast (cliffs up to 30 meters high), and to the east - moving dunes.

At the seaside, 2 summer bathing areas have been designated: Ditches West (length of coastline 400 m), Ditches East (length of coastline 200 m).

Ditches have a population of approx. 413 residents[8], most of whom are engaged in fishing.

Leba (Łeba municipality)

Leba is one of the more popular resorts on the Polish coast, located at the mouth of the Leba River into the Baltic Sea.

To the west of the city stretches the Slowinski National Park with moving dunes and Lakes Lebsko and Gardno, to the east - Lake Sarbsko and the Sarbska Mierzeja nature reserve (partial reserve). On the territory of the municipality of Leba there are areas included in the Natura 2000 network (special areas of habitat protection: Ostoja Słowińska - PLH 220023, Mierzeja Sarbska - PLH 220018; special bird protection areas: Pobrzeże Słowińskie - PLB 220003).

Leba has wide sandy beaches divided into 3 parts: A - the main part of the bathing area located west of the port channel (extending to the "Neptun" hotel), descending from the very center of Leba, guarded beach, the most popular, B - bathing area located east of the port channel, outside the very center of Leba, also a guarded beach, C - unguarded beach, less frequented, being an extension of beach A in the eastern direction, located outside the very center of Leba.

Since 1998, there has been a marina "Marina" in Leba with a modern sailing base and facilities, which can accommodate 120 vessels of various classes.

In 2020, the municipality of Leba had a population of 3,52. It is estimated that more than 100,000 tourists come to Leba on weekends during the summer season, and about 60,000 during the week[9].

[7] Based on the statement of the Head of the Department of Promotion and Social Communication of the City Hall of Ustka in 2009

[8] https://www.polskawliczbach.pl/wies_Rowy_pomorskie based on CSO data

[9] Based on a statement by the mayor of Leba in August 2014, http://www.tvn24.pl/pomorze,42/jedna-karetka-na-100-tys-

Slowinski National Park (dunes)

Slowinski National Park is located on the territory of two counties, Lębork and Slupsk, within the administrative boundaries of five municipalities: Ustki, Smołdzino, Główczyce, Wicko and Leba.

Characteristic elements of the Park are the coastal lakes, marshes, meadows, peat bogs, coastal forests and forests, and above all the dune belt with moving dunes. There are dunes from different periods in the Park, differing in appearance and genesis. Today's wandering dunes are the youngest formations on the Leba Spit. The rate of dune movement is not uniform across the Leba Spit. Its western and eastern parts are occupied by parabolic dune complexes, characterized by low mobility of up to 3 m/year.

The park's main attractions include the Łącka dune - the highest of the dunes, with a height of about 42 meters above sea level, the Czołpino lighthouse, with a height of 25 meters, a German WWII training ground, numerous hiking trails and nature paths.

About 317,000 people visited the park in 2017 (Raven 2019)[10].

Stilo lighthouse (Choczewo municipality)

The lighthouse is located on the top of a dune in the village of Osetnik (Stilo) (Choczewo municipality), at a distance of about 1 km from the seashore, about 10 km east of the city of Leba. The height of the tower is 33.40 meters and the light range is about 43 kilometers. It is one of two (besides the lighthouse in Jastarnia) all-metal lighthouses.

The lighthouse is one of the points of the Lighthouse Route, which runs along the Polish coast. The facility is open to the public from the beginning of June until the end of August.

Lubiatowo (Choczewo municipality)

Lubiatowo is a Kashubian village located about 2.5 km from the seashore, through which the Lubiatowka River flows, flowing into the Baltic Sea. Formerly a typical agricultural settlement. The beach in Lubiatowo is one of two in Wejherowo County. The village is dominated by cottages and farmhouses.

Lubiatowo is located entirely within the boundaries of the Seaside Protected Landscape Area. To the north of the village stretches the Lubiatowska Dune with an altitude of up to 35 meters above sea level.

Białogóra (Krokowa municipality)

Bialogóra is a village located between Wladyslawowo and Leba, at a distance of about 1.1 km from the seashore.

The village is entirely within the boundaries of the Seaside Protected Landscape Area. From the eastern part of Bialogóra extends the Seaside Landscape Park, which includes all types of seashores characteristic of the southern Baltic (including the dune coast in Bialogóra). To the northeast of the Białogóra development is the Białogóra Nature Reserve (includes an area of dunes with interdune depressions, the goal is to protect fragments of coastal swamp forest and crowberry forest), and to the northwest is the Babnica Nature Reserve (includes areas of dunes, the goal is to protect beech-oak forest on the slope of the dune). Białogóra Special Habitat Protection Area, which is part of the Natura 2000 network (PLH 220003), is also located here.

Bialogóra has a population of about 400.

Dębki (Krokowa municipality)

osob-w-weekendy-w-lebie-bywa-dramatycznie,457019.html, [access date: 05.2022 r.]

[10] Data of the Slovinski National Park

Dębki is a summer resort located at the mouth of the Piaśnica River, which is situated within the boundaries of the Seaside Landscape Park and in the vicinity of the Widowo (dunes with forest communities are protected) and Piaśnickie Łąki (variegated wet meadows are protected) nature reserves, the Seaside Protected Landscape Area and special areas of habitat protection included in the Natura 2000 network: Piaśnickie Łąki and Widowo.

Once a fishing village, it is now a resort that is permanently inhabited by about 200 residents outside the holiday season.

In Dębki, 1 sea bathing site covering 100 m of shoreline has been designated.

Karwia (Wladyslawowo municipality)

Formerly a Kashubian fishing village, it is now a summer resort, with almost 3 km of access to the sea, within the boundaries of which 2 bathing beaches have been designated.

Karwia's coastal strip is part of the Seaside Landscape Park, and the rest of the area is located within the Seaside Protected Landscape Area.

Karwia has about 1009 permanent residents[11].

Based on the above information and data, it was concluded that in the coastal section from Ustka to Karwia, coastal tourism is important as a source of livelihood locally. Serving tourism in the towns and cities shown above is an important source of livelihood. Not without significance is also the fact that the holiday season in Poland in this part of the coast is severely limited in time, in fact to only two months (July - August), an exception here may be Ustka, where the season for servicing sanatorium traffic can last all year. However, it is estimated that the condition of coastal tourism in this part of the coast does not have a significant impact on the condition of coastal tourism regionally - i.e., on a province-wide basis. This is because the Pomeranian Voivodeship is home to major centers, particularly the Tri-City, which have year-round tourist traffic and offer jobs in industries other than tourism.

With this in mind, the importance of coastal tourism (as a receptor that OWF BIII may affect) is categorized as medium.

7.4. Assessment of the impact of OWF BIII on tourism coastal

The impact assessment in the 2015 Report began by identifying the investment scenario that will potentially have the greatest impact on NIS 2015 coastal tourism. As part of the assessment carried out in the 2015 Report, it was considered that the most far-reaching scenario could occur in the variant assuming the construction of 200 wind power plants with associated infrastructure (6 offshore substations), i.e. the maximum number of power plants allowed to be installed in the BIII OWF area according to the location decision (PSZW). The variant indicated for implementation and approved in the Environmental Decision involves the construction of 120 wind power plants with associated infrastructure (6 offshore substations). The current preferred option indicated for implementation, which is a proposed modification of the parameters of the Project, involves the construction of 60 wind turbines and one substation.

The project scenarios considered, including the one approved in the Environmental Decision assuming the construction of 120 power plants, i.e. about 40% less than the case of the set of parameters of the Project constituting in the 2015 NIS, and the variant that is the subject of this Report, i.e., the "Project".

[11] https://wladyslawowo.pl/cms/19300/gmina_w_liczbach [access date: 05.2022 r.]

60 power plants, i.e. 70% less than the Project's parameter set representing less than the 2015 NIS, will result in environmental impacts equal to or less than the 2015 NIS.

7.4.1. Stage construction

Taking into account the distance of OWF BIII from the coastline (23 km) and the results of the analysis of the project's impact on the landscape (see Section 9 of Volume IV of the EIA), it should be concluded that at the stage of construction, OWF BIII may affect coastal tourism indirectly through the impact on the landscape due to the increased traffic of vessels involved in the construction of the farm and the appearance of individual farm facilities as part of the progressive construction process of the project. Bearing in mind the location of potential construction and assembly ports (Gdansk, Gdynia, Ronne Havn, Swinoujscie; see Section 4 of Volume II of the EIA), it should additionally be stated that the movement of vessels involved in the construction of the BIII OWF in the analyzed area will not take place along the coastline - farm area, but along the coastline, at some distance from it, using mostly functioning shipping routes. Smaller ports, such as Ustka and Leba, do not meet the technical requirements and will not serve the farm's construction units.

With the above in mind, it was concluded that in the case of the set of paraments of the Project representing the most far-reaching scenario - NIS 2015, the movement of vessels involved in the construction of the farm is an impact on coastal tourism:

1) local scale,
2) discontinuous and repetitive over time - dependent primarily on weather conditions, which determine the ability of ships to go to sea and carry out construction work at sea,
3) instantaneous - occurs only when ships are moving through the maritime area in the zone of visibility from the shore,
4) low intensity - the ships involved in the construction of the farm will not be particularly distinguished from the existing maritime traffic taking place in the so-called "coastal traffic zone" (see Section 4 of Volume II, which discusses the expected types and traffic of ships),
5) reversible - it ceases to be perceptible as soon as ship traffic ceases (the factor that affects the landscape then disappears).

Considering the above, and based on the impact magnitude assessment matrix, the magnitude of impact related to vessel traffic during the construction phase of the BIII OWF, in the furthest project scenario - NIS 2015, was classified as insignificant. As the importance of coastal tourism (as an impacted resource) was classified as medium, the significance of the impact was assessed as negligible.

The adopted variant assumes the construction of 60 power plants, which is 70% less than the set of parameters of the Project constituting the 2015 NIS and 50% less than the variant approved by the Environmental Decision, so ship traffic associated with the construction of the farm will be lower. The total construction time of the project may also change, and it will be shortened, which will have a positive dimension.

Table 2. Vessel traffic involved in the construction of the farm - the significance of the impact on coastal tourism during the construction/ decommissioning phase (NIS 2015)

Subject	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Coastal tourism	Medium	Small	Vessel traffic involved in the construction of the BIII offshore wind farm will not be particularly distinguished from existing maritime traffic	Insignificant (scale of exposure - local, duration - temporary, intensity - low)	Negligible (importance of the resource - medium, Magnitude of impact - insignificant)

Source: own materials

It should be noted that at the stage of construction of the BIII OWF, we may also have a positive impact. The area where the farm is being built can become a tourist attraction and a tourist cruise destination (with established safety rules, of course).

Cumulative impacts

It is estimated that during the construction phase of OWF BIII, there could be a cumulative impact on the landscape of ships involved in the construction of OWF BIII and ships involved in the construction of OWF Baltica and possibly OWF BIII (depending on the cumulative scenario), as well as ships involved in laying export cables from both farms. Taking into account the limited number and different types of vessels that may be involved in the construction of the two farms and the laying of the cables (in particular, their different sizes, which affect the visibility of the vessels from shore), the remoteness of the vessels in relation to each other, the location of the potential construction and installation ports, and the intensity of existing maritime traffic in the area of interest, it is concluded that there will be no cumulative impacts to the extent analyzed. Only cable-laying vessels may be more noticeable against other vessels, especially in the section close to shore. Laying cables requires anchoring the installation vessel. It is estimated that an average of about 100 - 200 meters of cable can be laid at one anchor position, then the vessel must move and anchor again. Other ships will move some distance from the shoreline.

It should also be noted that during the laying stage of the cables included in the MIP, there may be a temporary restriction of the use of the beaches located at the landfall of the cables, as well as impediments to the use of the areas along which the land portion of these connections will run. This will only apply to areas whose coastline is adjacent to the boundaries of the corridors of this infrastructure and a limited strip along routes on land. As the MIPs are separate projects with separate proceedings on. issuance of decisions on environmental conditions, detailed analyses in this regard were made in the environmental impact reports for these projects. Considering the location of OWF BIII and its distance from the shore, and the fact that activities related to the laying of submarine cables constituting the farm's internal cable infrastructure do not affect coastal tourism, there can be no cumulative impacts due to the laying of MIP cables in the coastal zone.

Summary

In summary, in the variant that is the subject of this Report, about 70% fewer power plants will be built than envisaged for the set of parameters of the Project constituting the 2015 NIS, and twice as many as specified in the Environmental Decision. This is due to fewer power plant construction operations and the shorter total time required to carry out these operations. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts remains unchanged, and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

7.4.2. Stage operation

Taking into account the distance of OWF BIII from the coastline (about 23 km) and the results of the landscape impact analysis (see Section 9 of Volume IV of the EIA), it should be concluded that at the stage of operation, OWF BIII may affect coastal tourism indirectly mainly through landscape impact, due to the appearance of new permanent elements of the farm in the seascape (in particular, wind turbines, due to their height).

For the most far-reaching scenario that can occur in a reasonable alternative, this will be the impact:

1) regional scale - the range of visibility of the BIII OWF is limited and is up to 50 km,
2) permanent - elements of the BIII offshore wind farm will be permanently present in the maritime space throughout the life of the project,
3) long-term - it is assumed that the operation stage of the project will be many years, about 25-30 years.
4) low intensity - due to the distance of OWF BIII from the shoreline, elements of the project will be faintly visible from the shore, however, to a very limited extent (as discussed in detail in the landscape impact analysis - Chapter 9 Volume IV of the EIA),
5) reversible - interference with the landscape ceases after the end of the farm's operation and dismantling of the project's elements (as described in the course of the decommissioning stage of the farm in Section 6 of Volume II).

Considering the above, and based on the impact magnitude assessment matrix, the magnitude of the impact of OWF BIII on coastal tourism in the context of landscape impact for the set of parameters of the Project constituting the most far-reaching scenario in the 2015 Report - NIS 2015, which formed the basis for conducting the impact assessment, was classified as insignificant. As the importance of coastal tourism (as an impacted resource) was classified as medium, the significance of the impact was assessed as negligible.

Based on the results of the analysis of the impact of OWF BIII on the landscape (Section 9, Volume IV), it is expected that the change in the number of power plants from 120 (the variant approved by the Environmental Decision) to 60 units (currently the preferred variant) will not affect the scale of exposure, duration or intensity of the impact, the parameters considered for assessing the magnitude of the impact. A change in the total height of the power plant by about 13% compared to the parameters approved by the Environmental Decision and a change in the rotor diameter by about 20% compared to the parameters approved by the Environmental Decision will slightly affect the visibility of OWF BIII,

but at the same time, a 50% reduction in the number of wind power plants will result in the area designated for the construction of OWF BIII being filled to a much lesser extent with distinctive elements in the area, which will fully compensate for the slight increase in the parameters related to the height of the power plant and the rotor diameter. Changes in the parameters of the height of the power plant and the diameter of the rotor also due to the distance of the location of OWF BIII from potential observation points will be imperceptible in practice.

Taking into account the above, it was concluded that for the currently preferred variant (realization of 60 power plants) the magnitude and significance of the impact of OWF BIII on coastal tourism consisting in the impact of the project on the landscape will be analogous or slightly smaller than for the variant approved by the Environmental Decision.

Table 3. Landscape impact - the importance of the impact on coastal tourism during the operational phase (NIS)

Subject	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Coastal tourism	Medium	Small	Limited visibility of BIII OWF elements from the shore due to the distance of the project from the shoreline; high dependence of BIII OWF visibility on prevailing meteorological conditions	Negligible (scale of exposure - regional, duration - medium-term, intensity - low)	Negligible (importance of resources - medium, magnitude of impact - insignificant)

Given the low intensity of ship traffic at the operation stage (see Section 5 of Volume II of the EIA), it was concluded that this traffic will not be a source of impact of OWF BIII on coastal tourism in the context of landscape impacts (periodic additional traffic of single vessels cannot be considered an increase in marine traffic intensity in the context of existing marine traffic in the area).

In addition, it should be emphasized that visual issues are very subjective - what will be perceived by some as a disturbance of the landscape leading to a reduction in the tourist attractiveness of the region, may even be perceived by others as an attraction in itself. The BIII offshore wind farm may attract entirely new groups of tourists to the coastal areas and thus lead to the development of a new segment of tourism (as discussed in more detail in section 7.2.2. above, which discusses the potential impacts of offshore wind farms at the stage of operation, which will also be able to operate outside the holiday season.

Cumulative impacts

The various options considered for cumulating the impact of the BIII OWF on the landscape with other projects at the operation stage are described in detail in the analysis of the impact of the BIII OWF on the landscape in Section 9 of Volume IV of the EIA.

The assessment of cumulative impacts on the seascape took into account other OWF projects planned for implementation, which included:

- OWF BII - located at least about 37 km from the coast and about 17 km west of OWF BIII;

- OWF Baltica 2 - located at least about 31 km from the coast, directly adjacent to OWF BIII to the north;
- OWF Baltica 3 - located at least about 25 km from the coast, directly adjacent to OWF BIII from the northeast.
- Baltic Power offshore wind farm - located about 22 km from the coast and about 8 km east of the BIII offshore wind farm

Various stages of the implementation of the various investments are included.

The assessment carried out showed that in the case of implementation of all the indicated projects, their visual impacts will be cumulative. The degree of accumulation will depend on the observation point.

For no receptor, however, cumulative impacts were indicated to be high or very high. The cumulative impact significance for individual receptors was assessed at:

- small for receptors: Ditches, Stilo Lighthouse,
- moderate for receptors: Leba, Ustka, the beach and the dunes of the Slowinski PN.

It should be noted that not all the projects under consideration must be implemented. These projects may also be implemented in a different shape than assumed for the landscape impact analysis, for example, different (smaller or larger) turbine parameters may be adopted. One should also take into account such a possibility that other projects, which cannot be foreseen and taken into account at present, may be built in place of the unrealized projects.

Summary

In the currently preferred option that is the subject of this Report, approximately 70% fewer power plants will be built than envisioned for the set of parameters for the Project constituting the 2015 NIS, and twice as many as specified in the Environmental Decision. Although the parameter related to the total height of the power plant and the diameter of the rotor will also change, nevertheless, the change in the number of power plants will have a significantly smaller effect on filling the space with distinctive elements in the area, which will fully compensate for the visual effect associated with the increase in the parameter of the height of the power plant and the diameter of the rotor. While taking into account the distance of the BIII OWF from potential observation points, it is considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts remains unchanged, and their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

7.4.3. Stage decommissioning

It is estimated that the impacts of OWF BIII on coastal tourism at the decommissioning stage will be analogous to those for the construction stage. At the decommissioning stage, OWF BIII will affect coastal tourism indirectly through impacts on the landscape due to increased traffic of vessels involved in the decommissioning of the farm. The magnitude and significance of such impacts will be analogous to the construction phase (see Table 3 in Section 7.4.1.).

As part of the decommissioning of the BIII OWF, the dismantling of the farm's elements, i.e. the permanent visual objects that impacted the landscape, will take place. Visual issues are very subjective - for those who perceived elements of the OWF as a disturbance to the landscape, the removal of the BIII OWF will contribute to restoring the tourist attractiveness of the region. On the other hand, however, with the decommissioning of OWF BIII, the tourist attraction for dedicated cruise/ sightseeing trips to the area of this farm will disappear.

At this stage, when the offshore wind development scenario in Polish maritime areas is so difficult to predict, there is not enough data to determine whether the decommissioning of the BIII offshore wind farm will pose a threat to companies that have specialized in organizing trips to the farm's region. If there are other OWFs or other interesting marine facilities within the boundaries of the Polish EEZ, there will be an opportunity to adapt the offer to the current attractions at sea.

Cumulative impacts

It is estimated that during the construction phase of OWF BIII, there could be a cumulative impact on tourism, by affecting the landscape and disrupting the tourist attractiveness of the areas due to the movement of ships involved in the decommissioning of OWF BIII and ships involved in the decommissioning or construction of another farm. Taking into account the limited number and different types of ships that may be involved in this type of work for different farms (in particular, their different sizes, which affect the visibility of ships from the shore), the distance of ships from each other and the intensity of existing marine traffic in the area of interest, it is concluded that at the stage of decommissioning of OWF BIII there will be no or negligible cumulative impacts in this regard.

Summary

In the currently preferred option that is the subject of this Report, approximately 70% fewer power plants will be built than envisioned for the set of parameters for the Project constituting the 2015 NIS, and twice as many as specified in the Environmental Decision. It is therefore considered that the project will cause lesser impacts from both the 2015 NIS and the variant approved in the Environmental Decision

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity are smaller than in the case of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

8. Fishing recreational

8.1. Recreational fishing - general characteristics, status current

Recreational fishing in Poland is regulated by the Act of December 19, 2014 on Maritime Fisheries (consolidated text, Journal of Laws 2022, item 540) and its implementing acts.

Under the aforementioned law, recreational fishing in Polish sea areas may be carried out after obtaining a permit, which is issued by the District Sea Fisheries Inspector for an individual, the organizer of a sports competition or the owner of a vessel. Permits are issued for a period of 1 month or 1 year or for the duration of sports competitions. The permit specifies, among other things, the species to be targeted and the fishing area, as well as the type and number of fishing gear to be used. In certain cases,

the permit may also specify the obligation to prepare recreational fishing reports. The law prohibits the use for recreational fishing of gear used for commercial fishing, the catching of marine organisms in areas excluded from commercial fishing, and the marketing of marine organisms derived from commercial fishing.

The recreational fishing season lasts virtually all year round, although the greatest accumulation is during the summer season (especially weekends). Fishing depends primarily on weather conditions.

Recreational fishing is gaining in popularity. Those interested in recreational fishing can choose from a growing number of offerings. There are more than 100 boats and motor yachts providing services to sea anglers in Poland. These are units specially purchased for sports and recreational purposes, former commercial fishing boats reclassified as fishing boats, and boats engaged in commercial fishing and seasonal fishing (e.g., due to protective periods and limits in commercial fishing).

Given the location of OWF BIII, recreational fishing in the area can be served in particular by ports located in Ustka, Rowy and Leba. In 2018, a total of 260 recreational fishing permits were issued in the three former District Sea Fisheries Inspectorates (in Gdynia, Slupsk and Szczecin). It should be noted that for these fisheries, the requirement for individuals to obtain a permit was abolished as of March 4, 2015. By comparison, in 2013-2014, the District Sea Fisheries Inspectorates issued an average of about 34,000 permits to individuals per year.

Considering the characteristics of vessel traffic (see Section 14 of Volume III of the EIA), it cannot be ruled out that the BIII OWF area is a recreational fishing site. However, no such data are available to determine exactly what the intensity of such activity is. The analysis of impacts on commercial fisheries (see Section 10 of Volume IV of the EIA) did not reveal any particularly valuable fisheries within the boundaries of the BIII OWF. Based on this, it can therefore be concluded that it is also not a particularly attractive fishery for recreational fishing.

8.2. Potential impacts of offshore wind farms on fisheries recreational

In this chapter, potential impacts of offshore wind farms at different stages of investment are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report.

8.2.1. Stage construction

For safety reasons, the offshore wind farm area may be closed in whole or in part to all vessels that are not associated with the construction of the farm, including recreational fishing vessels. Entities excluded from fishing in an area are forced firstly to change their flow routes (in case the farm is located along the route), and secondly to move to other alternative fisheries, which may lead to increased pressure on available resources within those fisheries.

Noise emitted from construction and installation activities of the offshore wind farm may be heard by people on recreational fishing vessels traveling in the vicinity of the farm (taking into account the safety buffer designated around the area of the farm). However, the magnitude and perceptibility of such an impact are closely dependent on the value of the acoustic (surface) background. In addition, it should be noted that recreational fishing vessels are themselves a source of noise.

8.2.2. Stage operation

For safety reasons, the offshore wind farm area may be closed in whole or in part to all vessels that are not associated with the operation of the farm, including recreational fishing vessels. Entities excluded from fishing in an area are forced to firstly change their flow routes (in case the farm is located along the route), and secondly move to other alternative fishing grounds, which can lead to increased pressure on available resources within their area. Issues related to allowing fishing and passage through the farm area are subject to the decisions of the maritime administration and agreements with fishermen.

Noise emitted by operating wind turbines and the substation may be heard by people on recreational fishing vessels traveling in the vicinity of the farm (taking into account the safety buffer designated around the farm area). However, the magnitude and perceptibility of such an impact are closely dependent on the value of the acoustic (surface) background. In addition, it should be noted that recreational fishing vessels are themselves a source of noise.

However, the positive impacts of offshore wind farms should also be mentioned. Thanks to permanent underwater structures and the reduction of trawling in the farm area, we have the so-called "artificial reef effect" leading to an increase in biodiversity. In addition, farm areas, due to their partial or total exclusion from fishing opportunities, become effective refuges for fish, which in turn leads to an increase in abundance. All this together means that the fringes of offshore wind farms can become an attractive fishing region (including recreational fishing) from the point of view of fisheries.

8.2.3. Stage decommissioning

The potential impacts of offshore wind farms on coastal tourism at the decommissioning stage are analogous to those for the construction stage, with the caveat that during the construction stage, new facilities appear as part of the work progress, and during the decommissioning stage of the farm, their removal occurs (see section 8.2.1. above).

Once the decommissioning of the farm is completed, the area is opened back to fishing, including recreational fishing. Preservation of underwater elements that cause the so-called "artificial reef effect", which at the stage of operation can translate into an increase in biodiversity and abundance of ichthyofauna in the area, provides additional value for recreational fishing.

8.3. Receptors under evaluation impact

With this in mind, the assessment of the impact of the BIII offshore wind farm on recreational fishing considers recreational fishing as a whole as an impact receptor, without isolating the types of vessels serving this sector, the specific ports that these vessels serve, the types of fishing gear, the species caught or the most popular fishing grounds.

The recreational fishing sector is assessed as a low-impact sector in terms of livelihoods and revenues, with the ability to adapt to changes in marine space (ability to modify flow routes, alternative fishing grounds). Accordingly, its significance (as a receptor of impacts) for the purposes of assessing the significance of OWF BIII impacts was categorized as low.

8.3.1. Assessment of the impact of OWF BIII on fisheries recreational

8.3.2. Stage construction

In the assessment of the impact of the BIII OWF on recreational fishing, as the most far-reaching scenario, the assumption was made that the area of the planned project may be completely excluded

from the movement of vessels, including vessels offering marine angling services (so-called safety zones will be designated - see Section 4 of Volume II of the EIA).

The vessels excluded from fishing in the area will be forced to firstly change their flow routes (in case the BIII OWF is located on the existing flow route), and secondly move to other alternative fishing grounds.

The possible modification of the ship flow route will not be significant, taking into account the length of the route that the vessels have to take anyway to get from the ports to the area of OWF BIII (this would mainly apply to vessels from Leba, which in order to bypass the farm and reach the fishing grounds located north of the area, would have to make up only about 3 km, compared to the currently used flow routes). Changing the fishery should not be a problem either - the BIII OWF area is not a particularly valuable fishery, and there are a number of alternative fisheries to which units excluded from the farm area can move.

Noise emitted from construction and installation activities of the offshore wind farm may be heard by people on recreational fishing vessels traveling in the vicinity of the farm (taking into account the safety buffer designated around the area of the farm). The magnitude and perceptibility of such an impact, however, are closely dependent on the value of the acoustic (surface) background and the distance from the noise source. In addition, it should be noted that recreational fishing vessels are themselves a source of noise.

Changing flow routes, exclusion from existing fishing grounds, and surface noise emissions are estimated to be in the most far-reaching impact scenario:

- local scale,
- constants,
- temporary,
- low intensity,
- reversible.

Considering the above, and based on the impact magnitude assessment matrix, the magnitude of the aforementioned impacts on recreational fishing at the construction stage of the BIII OWF for the set of parameters of the Project constituting the most far-reaching scenario - NIS 2015, which forms the basis for conducting the impact assessment in the 2015 Report, is classified as insignificant. As the importance of recreational fishing (as an impacted resource) was classified as low, the significance of the impact was assessed as negligible.

Assuming the assumption of complete exclusion of the possibility of affecting the farm area boundaries, the significance of the impacts of the BIII OWF consisting in the change of flow routes and exclusion from the existing fishing grounds for both variants, i.e. the variant of the Project after the proposed modifications and the variant approved in the Environmental Decision, will be the same.

On the other hand, it should be noted that the Project variant after the update, and the currently preferred one, envisages the construction of about 50% fewer power plants than in the variant approved in the Environmental Decision, and 70% fewer than in the set of Project parameters representing the most far-reaching scenario - NIS 2015. The time during which annoyance from surface noise emissions can be experienced will therefore be reduced, which will have a positive dimension.

Table 4. Alteration of existing flow routes, exclusion from existing fisheries, surface noise - significance of impact on recreational fisheries during construction/decommissioning phase (NIS 2015)

Subject	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Recreational fishing	Small	Small	Ability to modify flow routes; alternative fishing grounds; as distance from source increases, noise becomes less audible	Insignificant (scale of exposure - local, duration - temporary, intensity - low)	Negligible (importance of the resource - small, magnitude of impact insignificant)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The impacts of OWF BIII on ichthyofauna resources, which may ultimately translate into the attractiveness of fisheries in the context of recreational fishing, are discussed in detail in Section 4 of Volume IV of the EIA.

Cumulative impacts

No projects with an environmental decision have been identified that could cause significant cumulative impacts of the BIII OWF on recreational fishing. The Baltica offshore wind farm project, adjacent to the Project, will not be built in parallel with the BIII offshore wind farm, nor will the Baltic Power offshore wind farm. In a small area, in the immediate vicinity of the BIII OWF, there may be cumulative impacts related to the exclusion of the sea area from fishing in the area of construction of the MIP - offshore connection infrastructure of the BIII OWF, which will be carried out in parallel with the construction of the farm. The study area is not a place of particular interest to anglers, due to the economic calculus that generally allows for boating in a zone up to 10 Mm from shore, so the impact will not be significant.

Summary

In the variant that is the subject of this Report, about 70% fewer power plants will be built than envisioned in the set of Project parameters that constitute the most far-reaching scenario - the 2015 NIS, and twice as many as specified in the Environmental Decision, but the key to this impact is the area excluded from existing fisheries. It is therefore considered that the project will cause analogous impacts compared to both the 2015 NIS and the variant approved in the Environmental Decision

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity are analogous to those of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

8.3.3. Stage operation

In the assessment of the impact of the BIII OWF on recreational fishing, as the most far-reaching scenario, it was assumed that the area of the planned project may be completely excluded from the possibility of vessel traffic, including vessels offering marine angling services (so-called safety zones will be designated - see Section 5 of Volume II of the EIA). At this stage, however, it cannot be ruled out that the movement of such units may be allowed. Such decisions will be made by the investor at a later stage. Issues related to allowing fishing and passage through the farm area will depend on the decisions of the maritime administration and agreements with fishermen.

The vessels excluded from fishing in the area will be forced to firstly change their flow routes (in case the BIII OWF is located on the existing flow route), and secondly move to other alternative fishing grounds.

The possible modification of the ship flow route will not be significant, taking into account the length of the route that the vessels have to take anyway to get from the ports to the area of OWF BIII (this would mainly apply to vessels from Leba, which in order to bypass the farm and reach the fishing grounds located north of the area, would have to make up only about 3 km, compared to the currently used flow routes). Changing the fishery should not be a problem either - the BIII OWF area is not a particularly valuable fishery, and there are a number of alternative fisheries to which units excluded from the farm area can move.

The rerouting of flows and exclusion from existing fisheries is estimated to be in the most far-reaching impact scenario:

- local scale,
- constants,
- temporary,
- low intensity,
- reversible.

Considering the above, and based on the impact magnitude assessment matrix, **the magnitude of the above-mentioned impacts** on recreational fishing at the stage of operation of the BIII OWF for the set of parameters of the Project constituting the furthest-reaching scenario - NIS 2015, which forms the basis for conducting the impact assessment in the 2015 Report, is classified as insignificant. As the importance of recreational fishing (as an impacted resource) was classified as low, the significance **of the impact** was assessed as **negligible**.

Assuming the assumption of complete exclusion of the possibility of impacts in the farm area boundaries, the significance of impacts of the BIII OWF consisting of changes in flow routes and exclusion from existing fishing grounds for the variant of the Project after the proposed modifications and the variant approved in the Environmental Decision will be the same.

Table 5. Change of existing flow routes, exclusion from existing fisheries - significance of impact on recreational fisheries during the operation phase (NIS 2015)

Subject	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
Recreational fishing	Small	Small	Modifiable flow routes;	Insignificant (scale of	Negligible (importance

Subject	Importance of the resource	Vulnerability to impact	Rationale for impact assessment	Magnitude of impact	The significance of the impact
			alternative fishing grounds	exposure - local, duration - temporary, intensity - low)	of the resource small, magnitude of impact - insignificant)

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

At the same time, it is worth noting that the "artificial reef" effect that will take place in the BIII OWF area due to the appearance of permanent underwater elements and the possible restriction of fishing and ship traffic within the boundaries of the area of the planned project (increase in biodiversity and abundance) may lead to an increase in ichthyofauna resources (including species subject to recreational fishing) in the area bordering the farm - so a new attractive fishery for recreational fishing may appear. The impacts of OWF BIII on ichthyofauna resources, which may ultimately translate into the attractiveness of fisheries in the context of recreational fishing, are discussed in detail in Section 4 of Volume IV of the EIA.

An additional attraction of such cruises will be the farm itself - this could lead to an increase in interest in recreational sea fishing if such cruises also include the opportunity to see the IMF up close.

Cumulative impacts

Taking into account the negligible significance of the impacts of OWF BIII on recreational fishing at the stage of operation and the high flexibility of units offering services in this area, it is concluded that at the stage of operation there will be no or negligible cumulation of the impacts of OWF BIII and other projects. The study area is not a place of particular interest to anglers, due to the economic calculus, which generally allows for swimming out in a zone up to 10 Mm from the shore.

Summary

In the variant that is the subject of this Report, about 70% fewer power plants will be built than envisioned for the set of parameters of the Project that constitute the most far-reaching scenario - NIS 2015, and twice as many as specified in the Environmental Decision, but the key for this impact is the area excluded from existing fisheries. Thus, it is considered that the project will cause comparable impacts both compared to the 2015 NIS and to the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity are analogous to those of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

8.3.4. Stage decommissioning

It is estimated that the impacts of OWF BIII on recreational fishing during the decommissioning phase will be analogous to those for the construction phase. The magnitude and significance of impacts at the

decommissioning stage of the farm will be analogous to those at the construction stage (see Table 5 in Section 8.4.1.)

As part of the decommissioning of the BIII OWF, elements of the farm will be dismantled, and access to the area for recreational fishing vessels will be restored. The area will be suitable for sea fishing, and it is not excluded that due to the "artificial reef" effect, the fishery resources will be better compared to the period before the construction of the farm.

Cumulative impacts

Taking into account the negligible significance of the impacts of OWF BIII on recreational fishing at the decommissioning stage and the high flexibility of units offering services in this area, it is concluded that at the construction stage there will be no or negligible cumulative impacts of OWF BIII and other projects. The study area is not a place of particular interest to anglers, due to the economic calculus, which generally allows for swimming out in a zone up to 10 Mm from the shore.

Once the BIII OWF is decommissioned, the area will be able to be restored for recreational fishing.

Summary

In the variant that is the subject of this Report, about 70% fewer power plants will be built than envisioned in the set of parameters for the Project that constitute the most far-reaching scenario - the 2015 NIS, and twice as many as specified in the Environmental Decision, but the key to this impact is the area excluded from existing fisheries. Thus, it is considered that the project will cause analogous impacts compared to both the 2015 NIS and the variant approved in the Environmental Decision.

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity are analogous to those of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

9. Sports water sports

For the purposes of this Report (as with the 2015 Report), the category of water sports includes windsurfing, kitesurfing, offshore sailing and wreck diving. Comparing the effects of the proposed modifications to the Project was based on the same categories.

Windsurfing/kitesurfing

The unquestionable center of Polish windsurfing and kitesurfing is the Hel Peninsula, far away from the area of the planned OWF BIII - the region of the Bay of Puck, due to the shallowness stretching along the Hel Spit, reaching deep into the bay, the small waves and the predominance of westerly winds blowing almost along the shore. The areas of Swinoujscie, Miedzyzdroje, Dziwnow and Rewal are also popular.

One of the more attractive sea spots is also Leba - the area of Beach B. There are also excellent conditions for these sports on Lake Lebsko, located near Leba (downhill from the village of Zarnowska),

and on Lake Sarbsko. There are also favorable conditions in Ustka, on Lake Gardno (near Rowy) and in Debki.

Windsurfing and kitesurfing are sports that are practiced in the coastal zone, usually within a maximum of 1 nautical mile of the shore. Taking into account the distance of OWF BIII from the shore (about 23 km) and the location of the most popular spots in relation to the planned route of the connection, it is concluded that there is a very low probability of interaction, basically only at the stage of laying submarine cables that are part of the MIP in the coastal zone towards the landfall. Bearing in mind that various vessels regularly move around the offshore areas in the coastal zone, the MIP is a separate project, and the cable-laying vessels laying marine cables are vessels that do not move at high speeds, it was concluded that the BIII OWF will not be a source of impacts on windsurfing and kitesurfing (also in cumulation with other projects) in any of the considered options. Given the above, no impact assessment of OWF BIII was conducted in this regard.

Offshore sailing

For the purposes of this report, offshore sailing is understood as the movement of sailing or motor yachts in maritime areas, of a recreational nature.

The impacts of OWF BIII on offshore boating are considered to be analogous to other types of vessels of similar size and similar navigational equipment. In this aspect, therefore, it is necessary to refer to the results of the marine traffic (shipping) impact assessment, which can be found later in this study, and the results of the analysis of impacts on radiolocation and communications systems, which are discussed in Chapter 11 below.

With this in mind, a separate assessment of the impact of OWF BIII on offshore boating was not conducted.

Wreck diving

Wreck diving is one of the most popular forms of diving. The popularity of the sport is determined by the historical value of the wreck and its availability for diving, the degree of preservation, as well as its visibility in the water (which is determined by sediments suspended in the water's depths).

The Baltic Sea is a unique body of water in terms of the number of wrecks lying on the bottom, to which the turbulent history has contributed, although a large part of the wrecks have not yet been discovered. Within the boundaries of the area of the planned offshore wind farm BIII, one wreck (a vessel, with a wooden structure clad with sheet metal) has been identified, but it is not considered a wreck of special historical value. No significant impacts of OWF BIII on this unit are also identified (see Chapter 12 of Volume III and Chapter 8 of Volume IV of the EIA).

Given the above, it was concluded that OWF BIII will not have a negative impact on wreck diving (including in cumulation with other projects) in any of the considered alternatives, and therefore no impact assessment was carried out in this regard. Possible interactions can actually only occur at the stage of transporting divers from land to the dive site and are related to the movement of vessels. It should also be emphasized that detailed studies of the seabed, which are carried out at the pre-investment stage for projects planned in marine areas, provide an opportunity to discover more wrecks that could potentially become attractions for wreck diving. The fact of the discovery of the wreck is reported to the relevant services. The possibility of exploring the wreck is strictly dependent on safety arrangements.

Summary

The proposed modifications to the Project will not change the availability of the basin for the above-described sporting activities, nor will they change the nature of the impacts, their extent or magnitude in a way that could alter the attractiveness or uses of the area occupied by OWF BIII.

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity will be comparable to the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

10. Operations military

For the purposes of this report, the assessment made in the 2015 Report is referenced.

The selection of the BIII OWF site was preceded by analyses of the potential impact of the investment on military operations, which showed that the planned project does not occupy bodies of water where naval maneuvers are carried out.

The application for a permit for the erection and use of artificial islands, structures and devices in Polish maritime areas ("PSZW permit") for the farm was reviewed by the Minister of Defense as part of the administrative proceedings conducted, which resulted in a positive decision for the project. In light of Article 23 (3) of the Act of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (consolidated text: Dz. U. of 2022, item 457) means that the planned BIII offshore wind farm has not been found to threaten state defense and security.

With a view to ensuring national defense and security, the PSZW permit issued ultimately required the investor to carry out additional analyses with regard to the impact of the farm on the Border Guard's radiolocation system and the operation of radiolocation systems, radio communications and other Navy equipment. With a view to ensuring the safety of navigation, the investor was obliged to carry out a technical expertise in assessing the impact of the project on Polish sea areas A1 and A2 of the Maritime Distress and Safety Communication System ("GMDSS") and the Operational Communication System of the Maritime Search and Rescue Service, as well as an analysis of the impact of the farm on the National Maritime Safety System. The issues of impact on radiolocation and communications systems and the results of the analyses mentioned above are discussed in detail in Chapter 11 below.

The location of the BIII offshore wind farm has been positively reviewed by the Head of the Air Traffic Service of the Polish Armed Forces ("SSRLSZRP"), assuming a maximum height of the wind turbines of 300 m (letter No. 4282/19 dated 13.08.2019). Based on the opinion obtained, it was concluded that OWF BIII will not affect military aviation.

With this in mind, a separate assessment of the impact of OWF BIII on military operations was not performed. Detailed analyses and conclusions on aspects affecting military operations, i.e. radiolocation and communications systems and military aviation, are provided in Chapter 11 and Chapter 12, respectively, later in this paper.

The proposed changes to the Undertaking must comply with the PWSZ and in no way affect changes to the location of wind turbines. The proposed changes to the maximum height of the power plant will require a renewed opinion of the "SSRLSZRP", no less, however, due to the minimal increase in height compared to the previously opinioned, as well as the fact that power plants of this height have already been positively opinioned, the validity of the conclusions of the 2015 Report should be recognized, i.e., no impact of the BIII OWF on military aviation.

11. Radiolocation and communications

11.1. Introduction

As part of the permit for the erection of artificial islands, structures and devices in Polish maritime areas for the project titled "Artificial islands. "Offshore Wind Farm Baltic Central III" the investor was obliged to perform analyses in the field:

- the impact of an offshore wind farm on the radiolocation system, communications and other equipment of the Navy (MW) and Border Guard (SG),
- to assess the impact of the project on Polish sea areas A1 and A2 of the Maritime Distress and Safety Communication System (GMDSS) and the Maritime Search and Rescue (SAR) Operational Communication System,
- the impact of an offshore wind farm on the National System of Maritime Security (KSBM).

In case of negative impacts on the aforementioned systems, the investor was required to submit compensation measures.

The above analyses are presented in the 2015 Report, and were performed by the Communications Institute - National Research Institute, Department of Wireless Systems and Networks in Gdansk (Z-8) (Bronk et al. 2014). Due to the common nature of the aforementioned analyses, which consists of assessing the impact of the OWF on radar and communications systems for various equipment used in SG, MW, GMDSS, SAR and KSBM, the aforementioned analyses were prepared as a single expert report.

Given the voluminous and strictly technical nature of the expert reports, and the fact that they are intended for marine authorities, this report only cites the most important conclusions for the environmental impact assessment and the results of the assessment in the 2015 Report.

11.2. Potential impacts on radiolocation and communications

Virtually every wind farm represents a potentially significant terrain obstacle along the propagation (propagation) path of a radio wave and can therefore impair reception conditions in the area around the farm. The BIII offshore wind farm is located offshore at a distance of about 23 kilometers from land, so the systems exposed to negative interaction with it include those of great importance to the safety of shipping at sea or even to national defense.

From the point of view of the impact on human health and life, illuminating an offshore wind farm with the radio signals of existing radio communication systems in the VHF band results in a secondary electromagnetic field (PEM). In addition, the source of PEM may be transmitting stations installed on selected turbines within the farm to compensate for the impact of wind turbines on the communications and radar systems of other users. Potential impacts on communications and radiolocation systems are:

1) lack of signals from shore and ship communications and radar systems due to the occurrence of the so-called radio shadow phenomenon - turbines are a physical obstacle to wave propagation thus blocking the signal of transmitting/receiving stations,
2) difficulties in the correct localization of ships by shore-based radar stations due to the occurrence of the phenomenon of radar echoes - the phenomenon consists in the fact that the signal sent from the radar station can reflect simultaneously from the ship and from wind turbines. The signal reflected from the turbine can bounce off the ship again and return to the shore station. The resulting false echo makes it difficult to locate the object at sea,

3) impediments to the correct operation of ship radar systems - the principle of operation is analogous to the point above, but the source of the signal is ship radars. In this case, the range of false radar echoes is greater due to the fact that the source of the radar signal (the ship) is closer to the offshore wind farm,

4) communication difficulties caused by interference in communication systems - interference is caused by radio waves secondarily reflected from wind turbines.

Potential impacts on human health and life:

1) exposure of workers operating-servicing wind turbines to PEMs exceeding the limits specified in the Regulation of the Minister of Labor and Social Policy of June 12, 2018 on the highest permissible concentrations and intensities of factors harmful to health in the work environment (Journal of Laws, item 1286, as amended).

11.3. Receptors under evaluation impact

The expertise analyzed the impact of the BIII OWF on the following systems identified in the PSZW, which are also the receptors under evaluation:

- gMDSS system for Polish sea areas A1 and A2, as well as the SAR operational communications system,
- radiolocation systems, radio communications and other MW and SG equipment, including:
  - Automated Radar Surveillance System (ZSRN),
  - sG communication systems,
  - sG ship radars,
  - mW radar systems,
  - mW ship radars,
  - mW communication systems,
- National Maritime Security System, including:
  - radar monitoring system,
  - automatic ship identification system,
  - vHF communication system of Maritime Offices,
  - differential Global Positioning System (DGPS-PL),
  - radio data transmission system along the coast.

A detailed characterization of the various systems, including the ranges and devices included in them, is presented in the expert report.

In addition, in the context of PEMs emitted by transmitting equipment mounted on wind turbines to compensate for the negative impacts of OWFs on radar and communications systems, workers operating and servicing wind farms should be considered.

11.4. Assessment of the impact of OWF BIII on radiolocation and communication systems communications

For the purposes of this report, the assessment made in the 2015 Report is referenced.

Simulations were performed for all the systems (receptors) indicated earlier. As a result of these simulations, the following impacts were identified and areas requiring corrective action were identified:

KSBM:

- KSBM system radars - no corrective action required (OWF B III does not affect the radio shadow for KSBM system radar stations);
- AIS system - recommended corrective action at the northern edge of the farm due to the radio shadow phenomenon and at the southern edge of the farm due to the interference phenomenon (the area devoid of coverage extends beyond the recommended 2 km zone);
- VHF KSBM system - recommended corrective action at the northern edge of the farm due to the radio shadow phenomenon and at the southern edge of the farm due to the interference phenomenon (the area devoid of coverage extends beyond the recommended 2 km zone). The B III OWF was found to have no significant impact on the DGPS-PL system, which is a subsystem of the KSBM.

GMDSS systems:

Recommended to take corrective measures at the northern edge of the farm due to the radio shadow phenomenon (the area devoid of coverage extends beyond the recommended 2 km zone).

SAR Systems:

Recommended corrective measures at the northern edge of the farm due to the radio shadow phenomenon and at the southern edge of the farm due to the interference phenomenon (the area devoid of coverage extends beyond the recommended 2 km zone).

SG and MW systems:

- USSN radar system (Border Guard) - no corrective action required (IMF BIII does not affect the formation of radio shadow for radar stations of the USSN system),
- Mobile Radar Station (Border Guard) - no remedial action required (OWF BIII is not within the range of the Mobile Radar Station),
- Border Guard communication system - recommended to take corrective measures at the northern edge of the farm due to the radio shadow phenomenon and at the southern edge of the farm due to the interference phenomenon (the area devoid of coverage extends beyond the recommended 2 km zone),
- Navy radar systems (S-band) - recommended to take corrective action at the northern edge of the farm due to the radio shadow phenomenon (the area of no coverage extends beyond the recommended 2 km zone),
- Navy communications systems - recommended corrective action due to the phenomenon of interference (at the southern edge of the farm) for all subsystems under consideration, as well as due to the phenomenon of radio shadow (at the northern edge of the farm) for the MW VHF communications system and the RST VHF 160 MHz and RST UHF 500 MHz subsystems.

In addition, the effects of radio shadow and interference on shipboard communications systems and shipboard radar systems were subjected to simulation analysis. As the simulations indicated, the areas deprived of coverage significantly exceeded the recommended 2 km zone, but in this case no corrective action was taken. This is because it would be essentially pointless to install an additional repair station at the edge of the farm when, under real-world conditions, a ship can navigate near the farm on virtually either side of it. In addition, significant interference or significant radio shadow would only affect the analyzed systems under very specific - and assuming a pessimistic scenario - circumstances (e.g., maximum interference - only when the signal is reflected from the rotors at right angles). Therefore, it can be concluded that a moving ship will (in most cases) be influenced by these intensified phenomena only for a relatively short period of time.

Summary

As noted above, the referenced analyses were prepared for the 2015 Report and were based on analyses of several variants of the Project that differ in the number and spacing of the power plants - from 120 to the construction of 200 power plants, a variant treating the farm as a block was also analyzed to simulate the impact of all possible ways of spacing the turbines. Nevertheless, from the point of view of possible impacts, the most significant is the very fact of the existence of a terrain obstacle in the path of radio wave propagation, although reducing the number of power plants may have some impact in this regard, it will not cancel out the mere fact of the appearance of obstacles. Consequently, it is therefore considered that the Project will cause analogous impacts to both the baseline variant for the assessment conducted in the 2015 Report and the variant approved in the Environmental Decision

Thus, it should be considered that both the nature of the impacts remains unchanged, as well as their scope and intensity are analogous to those of the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

11.5. Impacts cumulative

No projects with issued DSUs have been identified whose impacts could cause cumulative impacts of OWF BIII in the subject area (See Volume II Section 13).

11.6. Proposal of minimization and compensation measures compensation

In terms of impact on communications and radiolocation systems, the following measures have been proposed:

- installation of additional radio/radar stations. The proposed repair stations are shown in the table below. The corrective actions presented here are for the variant of maximum wind turbine spacing in the BIII offshore wind farm area, which was adopted in the expert report, that is, the variant including 200 wind turbines (the most far-reaching scenario). The proposed hardware solutions (corrective actions) ensure the smooth operation of all communications and technical observation systems beyond the 2 km zone.

Table 6. Parameters of the proposed repair equipment

Lp.	User	System	Type of corrective action	Coordinates		Device specifications
				N	E	
1	Maritime Authority	AIS	radio shadow	55.023	17.351	R40 AIS Base Station
2	Maritime Authority	VHF KSBM	interference	55.023	17.351	Rohde&Schwarz XT4410a
3	Navy	MW VHF	radio shadow	55.023	17.351	Rohde&Schwarz XT4410a
4	Navy	MW RST VHF160 MW RST UHF500	radio shadow	55.023	17.351	Rohde&Schwarz XT4410a
5	Navy	MW RST VHF150 MW RST UHF400	radio shadow	55.023	17.351	Rohde&Schwarz XT4410a
6	Border Guard	USSN Radar X-band	radio shadow	55.023	17.351	TERMA Scanter2000
7	Navy	MW Radar S-band	radio shadow	55.023	17.351	Sperry Marine Vision Series
8	Navy	MW VHF	interference	54.954	17.301	Rohde&Schwarz XT4410a
9	Navy	MW RST VHF160 MW RST UHF500	interference	54.954	17.301	Rohde&Schwarz XT4410a
10	Navy	MW RST VHF150 MW RST UHF400	interference	54.954	17.301	Rohde&Schwarz XT4410a
11	Navy	MW RST VHF85	interference	54.954	17.301	Rohde&Schwarz XT4410a
12	Border Guard	SG	interference	54.991	17.492	Rohde&Schwarz XT4410a
13	Maritime Authority	KSBM Radar X-band	radio shadow	55.038	17.259	TERMA Scanter2000

Source: Communications Institute - National Research Institute, "Expertise Stage IIa," Gdansk, July 2014.[12]

- covering the BIII offshore wind farm with a 500-meter safety zone excluded from navigation,

[12] "Bronk K., Gencza S., Grzybkowski M., Lipka A., Niski R., Wereszko B., Żurek J., Expert opinion on: assessment of the impact of OWF on Polish sea areas A1 and A2 GMDSS system and SAR operational communication system; assessment of the possibility of mutual negative impact of planned OWF on the functioning of radiolocation systems, radio communication and other MW and SG equipment; assessment of the impact of OWF on the National Maritime Safety System. Stage IIa: Detailed expert opinion for area no. 2 (Central Baltic III) (Work no. 08400043), Communications Institute - National Research Institute, Gdańsk, July 2014

- establishment of an additional zone up to 2 km from the BIII OWF turbines dictated by safety considerations in navigation and the risk of interference and limiting the range of communication and radar systems,
- maintaining a distance of 2 km from traffic separation zones,
- wind farm - along with a zone of 2 km - protected by a monitoring system (perimeter protection), which will provide access to all functions and information collected by it for all state services, whose activities in the area of farm locations are justified by separate regulations. It should be emphasized here that from the point of view of specific institutions or services, corrective actions may be required only in the area of the Polish territorial sea - not in the entire exclusive economic zone. In such a situation, the final scope of necessary corrective actions may turn out to be less than the expert report would suggest,
- using ship's radars only in the X-band - such action allows to significantly reduce the phenomenon of false radar echoes.

12. Civil aviation and military

12.1. Potential impacts of offshore wind farms on aviation

In this chapter, potential impacts of offshore wind farms are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report.

The offshore wind farm has the potential to affect civil and military aviation primarily at the operational stage, to the following extent:

1) wind turbines (under construction or built), due to their height, can be a physical obstacle to aviation, including for SAR helicopters participating in rescue operations at sea (especially at the stage of takeoff and landing approaches in difficult weather conditions with limited visibility),
2) elements of an offshore wind farm, as fixed elements in the maritime space, may pose an obstacle to existing helicopter traffic (e.g., serving offshore mining platforms),
3) elements of an offshore wind farm, as fixed elements in the maritime space, may impede rescue operations at sea with helicopters,
4) elements of an offshore wind farm (in particular, turbines) may cause interference with radar systems used in aviation (an analysis of the impacts of OWFs on radar systems and communications is the subject of a separate expert report, a summary of which is included in Chapter 11 of this study).

It should be noted that objects that are air obstructions are subject to notification and proper marking. In Poland, under Article ^{871} (1)(2) of the Act of July 3, 2002. Aviation Law (t.j. OJ. 2019 item 1580, as amended) *"aerial obstacles are objects with a height of 100 m or more above the level of the surrounding land or water, located on the territory of the Republic of Poland and in the exclusive economic zone of the Republic of Poland,"* while the provision of Article ^{871} (6)(4) imposes an obligation to report an aerial obstacle to the President of the Civil Aviation Office and the Minister of National Defense and the minister responsible for internal affairs by *"an entity that has obtained a permit for the erection or use of artificial islands, structures and devices in Polish maritime areas, issued under* the *law of March 21, 1991 on maritime areas of the Republic of Poland and maritime administration (Journal of Laws of 2019,*

item 2169 and of 2020, items 284 and 1378) - for projects located in maritime areas of the Republic of Poland." The form of notification, as well as the method and type of marking, are specified in the Regulation of the Minister of Infrastructure of January 12, 2021, on air obstacles, obstacle surfaces and devices of a hazardous nature (Journal of Laws, item 264). Notification must be made at least two months in advance of the day on which the object reaches an altitude beyond which it will become an aerial obstacle.

12.2. Assessment of the impact of OWF BIII on aviation civil

The Civil Aviation Authority ("CAA") has positively agreed on the location of OWF BIII (letter ref. ULC-LOŻ- 3/5311-2673/10/13, dated 19.08.2019). Based on the opinion obtained, it was concluded that OWF BIII (assuming a maximum height of wind turbines of up to 300 m) will not affect civil aviation.

The ULC confirmed that the planned project is not located within the boundaries of the areas limiting the height of buildings, which are defined in the Decree of the Minister of Infrastructure of June 25, 2003 on the conditions to be met by building and natural objects in the surroundings of the airport (Journal of Laws 2003 No. 130, item 1192, as amended).

The ULC, in its opinion, also confirmed that the planned project will not affect aviation ground facilities.

With regard to possible restrictions on helicopter rescue operations at sea, it should be pointed out that helicopter landing pads may be optionally installed on components of the BIII offshore wind farm (e.g., on power plant nacelles or transformer stations), which may be important for rescue operations near the farm. At this stage, it is not known whether helicopter landing pads will be installed on the elements comprising the BIII OWF. Decisions in this regard will be made at a later stage - the construction project.

The developer will make a notification to the ULC and proper marking of air obstacles in accordance with the Decree of the Minister of Infrastructure dated January 12, 2021 on air obstacles, obstacle bounding surfaces and devices of a hazardous nature (Journal of Laws, item 264).

With this in mind, the 2015 Report concluded that the BIII OWF will not affect civil aviation in any of the Project alternatives considered in the report.

Proposed modifications to the Undertaking must be consistent with the PWSZ and in no way affect changes in the scope of the location. The proposed changes to the maximum height of the power plant will require a renewed opinion of the ULC, no less, however, due to the minimal increase in height compared to the current opinion, as well as the fact that power plants of this height have already been positively opinioned, the validity of the conclusions of the 2015 Report, i.e. no impact of the BIII OWF on civil aviation, should be recognized.

12.3. Assessment of the impact of OWF BIII on aviation military

With a view to ensuring national defense and security, the PSZW permit issued obliged the investor to supplement the project documentation in the scope of projects concerning the elimination of safety hazards to the implementation of air tasks carried out by Air Force aviation, resulting from the collision of the location of wind turbines with the EPD-304 danger zone and to agree on the project with the Air Force Command.

The Head of the Air Traffic Service of the Armed Forces of the Republic of Poland ("SSRLSZRP") gave a positive opinion on the location of the BIII offshore wind farm, assuming a maximum height of wind turbines of up to 300 m (letter No. 4282/19 dated 13/08/2019) and the fulfillment of the comments and recommendations made by the Minister of Defense in the course of the opinion on the application for the PSZW (decision No. 16/DI dated 02/02/2012). Based on the opinion obtained, it was concluded

that the BIII OWF will not affect military aviation in any of the Project alternatives considered in the 2015 Report.

The proposed modifications to the Project must be consistent with the PWSZ and in no way affect the changes in location or any other comments and recommendations made by the Minister of Defense during the review of the application for the PSZW. The proposed changes to the maximum height of the power plant will require a renewed opinion of the "SSRLSZRP", no less, however, due to the minimal increase in height compared to the previously opinioned, as well as the fact that power plants of this height have already been positively opinioned, the validity of the conclusions of the 2015 Report should be recognized, i.e., no impact of the BIII OWF on military aviation.

The developer will notify the SSRLSZRP of the final approved detailed location and total height of the wind turbines included in the subject BIII OWF, in accordance with the Decree of the Minister of Infrastructure dated January 12, 2021 on air obstacles, obstacle limitation surfaces and devices of a hazardous nature (Journal of Laws, item 264).

12.4. Impacts cumulative

No projects with issued DSUs have been identified whose impacts could cause cumulative impacts of OWF BIII in the subject area.

13. Shipping sea

In connection with the formal requirements of the permit for the erection and use of artificial islands, structures and devices in Polish maritime areas (PSZW), the Investor commissioned a so-called navigation expertise. The study was carried out by the Maritime Institute in Gdansk in 2015. The PSZW requires that such an expert study be provided to the permit-issuing authority (i.e., the minister in charge of maritime affairs) prior to submission of the ROIA.

It should be emphasized that it is too early in the project preparation process for such a document to meet the formal requirements of a Formal Safety Assessment (FSA), as defined by the International Maritime Organization (IMO). A full and final assessment can be made only at the stage of the construction project, when the parameters of the project, including the actual locations and number of power plants, are known in more detail. Since the technical data of the BIII offshore wind farm available to the investor at this stage was insufficient, the analysis relied, among other things, on the example of the Triton Knoll offshore wind farm in the UK, a project with comparable parameters to the BIII offshore wind farm, currently at the stage of issuing the last construction permits. Among other things, data were used on the number and traffic of vessels planned to serve this farm, as determined by an analogous navigational expertise.

The analysis for the BIII offshore wind farm was made for a variant of 200 wind turbines, while the variant approved in the Environmental Decision assumed that there would be no more than 120. Several likely scenarios have been analyzed. For the proposed modifications to the Project, the number of planned power plants has been reduced to 60. This change does not affect the relevance of the analyses conducted for the 2015 Report, for which reason the 2015 results are used later in this chapter.

Since the baseline data is only an estimate and unverifiable at this stage, this analysis should be considered only as a preliminary document, as the authors emphasize, pointing out that only two of the five steps of the IMO-required FSA have been fully completed. Stage three has been partially implemented. The evaluation contractor was not aware of the relevant parameters determining the construction and operation of the BIII offshore wind farm. Knowledge of these parameters is required in order to determine scenarios and estimate actual navigation safety risks. As a result, it was not

possible to identify either specific risk control measures or to group them into risk control options. The analysis contractor was only able to identify hypothetical risk areas.

This chapter discusses the potential impacts of OWF BIII on shipping, understood as another user of maritime areas. The assessment does not include an analysis of navigational risk, and therefore does not take into account the results of the Formal Safety Assessment. Issues of navigational safety and countermeasures to mitigate such risks can only be the subject of agreements between the Investor and the relevant maritime administration authorities at a much later stage, when the final shape of the project and the logistical and organizational assumptions for the various stages (i.e., construction, operation and eventual decommissioning) are known. The EIA report is not a document that resolves such issues.

13.1. Ship traffic in the area of the OWF BIII

The Baltic Sea is one of the most crowded seas in the world. It provides a route of connection between the Baltics and the rest of the world, allowing the constant movement of commercial vessels, ferries, passenger ships and recreational vessels.

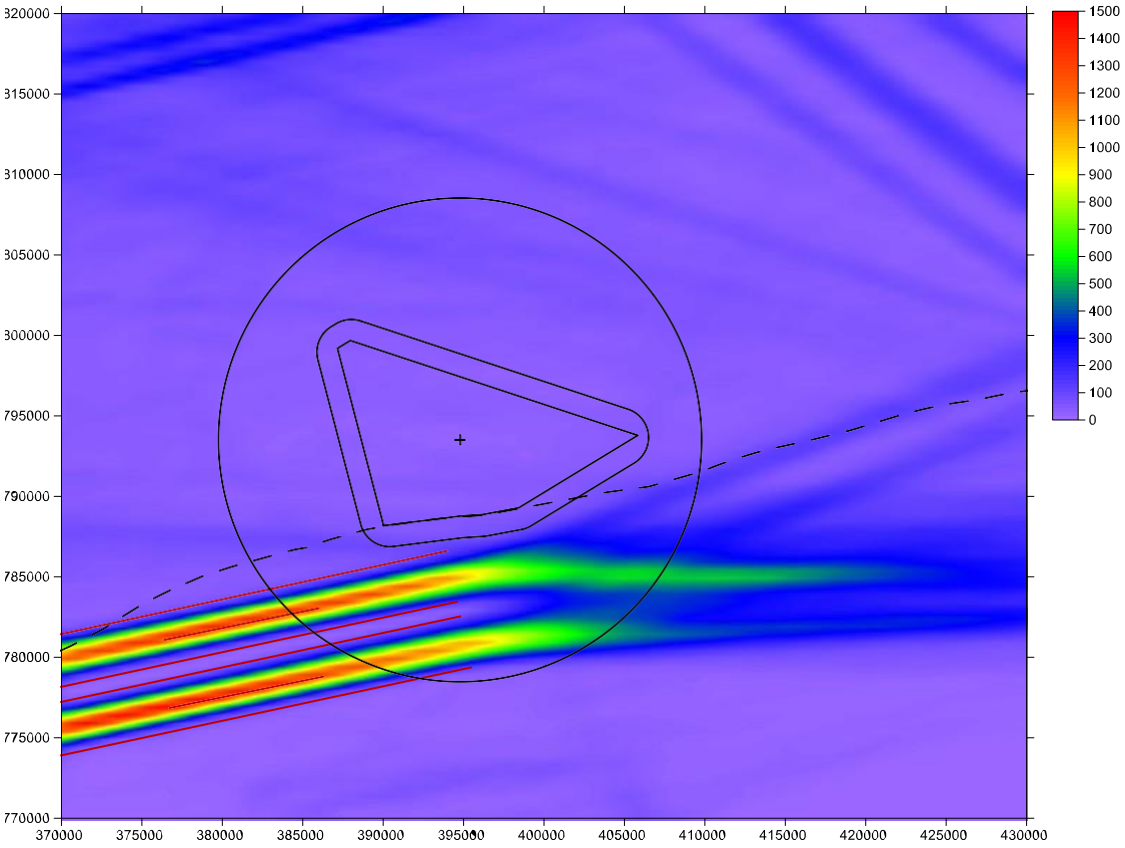
Based on the results of vessel traffic monitoring in the area of OWF BIII, which are presented and discussed in detail in Section 14 of Volume III of the EIA, it is concluded that the planned project lies outside the area of intensive shipping traffic.

Registrations of AIS (Automatic Ship Identification System) reports of vessels in the area of the proposed OWF BIII were conducted from January 2013 to February 2014. These included areas of the BIII OWF field, the one-mile buffer zone and the adjacent area (up to 15 km from the central point of the area). A measurement set, including an AIS sensor with a recorder, has been installed in the OWF area to measure and record AIS signals from vessels visible to the receiver.

As a result of the measurements made (over a one-year period from January 2013 to February 2014), information was collected on the positions, movement and berthing of 2653 vessels of various types and destinations that temporarily stayed in the area bounded by a radius of 15 km from the focal point. These included commercial vessels (1,740 units), tankers (389 units), recreational vessels (128 units - their share is significantly higher during the summer season), fishing vessels (123 units), passenger vessels (50 units - mainly during the tourist season, i.e. from May to September) and all others that do not meet the main characteristics for the first five groups, which were referred to as special vessels.

Many ships passed through the BIII offshore wind farm area in all directions, although the distribution thickened noticeably in the area south of the planned project, which is related to the establishment of the Traffic Separation Scheme - Slupsk Shoal by the International Maritime Organization (IMO) in this area in 2010, and to the east and north of the offshore wind farm, where the usual shipping route for tankers and large bulk ships passes through (planned as the future deepwater route D, designated for the largest commercial ships and for tankers).

Figure 3. Intensity - the number of passages of a single ship through a square of 500 meters in one year. All vessels excluding IMOR, Baltic-i and Safira - vessels involved in environmental studies in the area of OWF BIII



All vessels excluding IMOR, Baltic-i and Safira - vessels involved in environmental studies in the BIII offshore wind farm area Source: results of vessel traffic monitoring in the BIII offshore wind farm area (Section 14 of Volume III of ROOŚ)

According to information from the Maritime Offices in Gdynia and Slupsk, there are no plans to establish any other official shipping route or traffic separation zone in the area of the planned investment.

13.2. Potential impacts of the OWF on shipping at the stage of construction, operation and decommissioning decommissioning

Each of the phases of OWF development (construction, operation and decommissioning phases) requires the participation of an additional number of vessels, which has an impact on the change in vessel traffic in the wind farm area, in the vicinity of the wind farm and on shipping routes between supply/service ports and the wind farm. The emergence of elements included in the IMF or additional vessels is a negative phenomenon, as it disrupts the existing order and restricts or impedes navigation in maritime areas. Given that the probability of maritime events is proportional to the volume of ship traffic, we can speak of an increase in the level of navigational risk. This additional vessel traffic can take place along existing navigation routes, in which case the volume of traffic on these routes and the likelihood of collisions in longitudinal traffic simply increases. Cross traffic is also possible, causing a significant increase in the likelihood of cross collisions. There is also an emerging risk of collision on approach to ports. The consequences of a collision depend on the speed and mass of the colliding vessels. The result of a collision can be injuries, in the worst cases death of crew members, property damage and material losses (related to damage or sinking of the ship) and environmental pollution.

Disruption to the free movement of ships, may also have economic consequences, such as the need to change customary shipping routes and lengthen the existing route of ships.

The increase in vessel traffic is particularly evident during the construction (or eventual decommissioning) phase of the farm. During the operation stage, the situation stabilizes, the volume of vessel traffic involved in servicing the farm decreases, and the traffic is characterized by a certain regularity and predictability resulting from the schedule of maintenance work.

With the advent of submarine cables comes the danger of electrocution in the event of an emergency anchor drop by a ship and damage to the cable. However, such risks are minimized, as substations are equipped with automatic protection devices that shut down the cable in case of damage.

After the eventual decommissioning of the farm and dismantling of elements of the project, the area can be restored for navigation.

It should also be noted that the increase in vessel traffic serving the OWF may also have a positive aspect:

- the greater number of ships handled by the ports is an additional source of revenue for the ports on this account,
- elements of the IMF can provide a place of refuge for survivors under certain circumstances,
- each wind turbine has its own individual markings that allow for flawless localization of an incident that may occur near it, thus facilitating evacuation or search and rescue operations. The presence of IMF elements in the maritime space significantly assists navigation itself by allowing better orientation, especially in cases when modern technical means of navigation fail or when a sea user in distress is deprived of these means of navigation.

It should be emphasized that in order to ensure an acceptable level of navigational risk, and depending on the results of the navigation expertise or expertise on the impact on radar and radiolocation systems, it is possible to implement, in consultation with the maritime administration and in accordance with the applicable legislation , a number of measures to minimize such risks, among which can be mentioned:

- partial or complete closure of the OWF area to shipping,
- designation of safety zones,
- designation of safe passages,
- navigational surveillance,
- marking of the OWF area on navigation charts,
- navigational warning and message system,
- permanent lines of communication between the OWF and the onshore operation supervision center and communication with navigation supervision services,
- navigation support systems in the form of AIS transponders, RACON radar transponders, navigation lights and foghorns on key turbines,
- development of a security plan for the facility,
- development of rescue plans,
- crew training,

- constant monitoring of weather conditions (weather observations allow rapid and safe mobilization and demobilization of vessels working in the area of the project, which ultimately reduces the risk of possible accidents related to the process of construction, operation and decommissioning).

These are measures commonly used for offshore wind farm construction, operation and dismantling projects.

13.3. Assessment of the impact of OWF BIII on shipping at the stage of construction, operation and decommissioning decommissioning

At all stages of the project, the BIII OWF will be a source of impacts on marine shipping, including existing and planned shipping routes. An increase in vessel traffic serving the farm at particular stages could lead to:

- an increase in vessel traffic in the vicinity of the project site and adjacent areas,
- increasing ship traffic on the shipping route TSS Slupsk Shoal,
- increase in the intensity of marine radio communications (impact assessment is included in Chapter 11.5 of this document),
- potential disruption of marine events or commercial fishing activities (the impact assessment for commercial fishing is provided in Section 10 of Volume IV of the ROIA, and the assessment for recreational fishing is provided in Section 8.4 of this document).

Restriction of the right of free movement under UNCLOS[13] will result in the need to change the customary routes passing through the wind farm area and divert the flow of vessels to the north or south, depending on the planned destination.

The primary measure to minimize navigational risks, due to the appearance of the BIII offshore wind farm at all stages of the project, is proper navigational signage and continuous information to stakeholders and the public through the publication and broadcast of local announcements (NTMS) in cooperation with the captains of nearby ports and the maritime border service, as well as the introduction of navigational charts with the project area marked.

It should be emphasized that a full and final assessment of navigational risk can only be performed at the construction project stage, when the final parameters of the project, including the actual locations and number of power plants, are known in more detail and a full Formal Safety Assessment can be performed for the actual project assumptions. The results of the Formal Safety Assessment will form the basis for agreements between the Investor and the maritime administration on the implementation of specific measures to improve navigational safety (examples of such measures were indicated in an earlier chapter - 13.2).

In accordance with the Polish Maritime Spatial Plan, navigational safety will be ensured by maintaining an appropriate distance between areas with the primary function E - renewable energy generation and areas with the primary function T - transportation. The BIII offshore wind farm area is located within the boundaries of the POM.45E basin. The POM assumes 9 permissible functions for the POM.45E basin, including transportation and fishing. Possible decisions on shipping restrictions through the creation of a restricted zone may be made by the Maritime Administration.

[13] United Nations Convention on the Law of the Sea

Given the above, it is concluded that the BIII OWF **will not be a source of significant negative impacts on marine shipping.** The farm area lies outside the area of heavy shipping traffic. Vessels that have been passing through the farm area so far will be forced to change their existing flow routes, but it should be remembered that the farm area is a small section of marine areas.

Taking into account the proper signage of the farm area and the safety rules introduced through the FMP POM, it is assumed that possible collisions between vessels or between vessels and elements of the farm are unplanned events, caused mainly by human error, mechanical failure (resulting, for example, in loss of vessel steering) or severe weather conditions.

It should be remembered that the BIII OWF can also be a source of positive impacts. Farm elements can, under certain circumstances, provide a place of refuge for survivors, and the marking of farm elements can significantly assist navigation itself, allowing for better orientation in space, which can be particularly important when conducting rescue or firefighting operations.

As noted above, the referenced analyses were prepared for the 2015 Report and concern the assumption of building 200 power plants. Nevertheless, from the point of view of restrictions on the use of the basin, the change in the number of power plants will not significantly increase the accessibility of the basin, while on the other hand, the construction of the offshore wind farm itself and the requirements for its operation will also contribute to an increase in vessel traffic. Consequently, it is therefore considered that the project will cause analogous impacts to both the baseline variant for the assessment conducted in the 2015 Report and the variant approved in the Environmental Decision

Thus, it should be considered that both the nature of the impacts does not change, as well as their scope and intensity will not change in relation to the variant approved by the Environmental Decision, and thus the proposed change in the parameters of the project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

13.3.1. Impacts cumulative

No projects with issued DSUs have been identified whose impacts could cause cumulative impacts of OWF BIII in the subject area (see Volume II Section 13).

14. Opportunities to explore, identify and exploit mineral resources of the seabed the seabed and the interior of the earth beneath it

Issues relating to the possibility of exploring, exploring and exploiting the mineral resources of the seabed and the interior of the earth beneath it, which are analyzed in this chapter, are considered in the context of the operation of concession owners as other users of marine areas. To a certain extent, this analysis complements the considerations of the impacts of OWF BIII on mineral resources, which are described in Section 2 of Volume IV of the EIA (Abiotic Environmental Impact Assessment).

An important aspect of concurrent investment activity in a given body of water is ship traffic and related safety aspects - these issues are addressed in detail in Chapter 13 of this study on impacts on shipping.

In the PSZW permit issued for the BIII offshore wind farm area, the investor was obliged to submit to the minister in charge of maritime economy, prior to submitting the EIA report, an expert opinion on the safety impact of the project related to the exploration, prospecting and exploitation of mineral resources of the seabed, especially taking into account the issued geological licenses overlapping or adjacent to the farm area. In order to meet this requirement, the Investor commissioned such a study from the Maritime Institute in Gdansk. The expertise in question was performed in 2015 and delivered

to the competent authority. This is a document independent of the EIA report. Within the framework of this chapter, the conclusions of this expertise are presented.

14.1. Receptors affected affected by

Based on information made public on the website of the Public Information Bulletin of the Ministry of Climate and Environment - as of March 2022. - in the area of the planned OWF BIII and in its vicinity, there are no valid licenses for exploration, prospecting and extraction of hydrocarbons from deposits issued under the provisions of the PGG (see Chapter 4 of Volume III of the ROOŚ). However, this does not mean that such licenses cannot be issued in the future.

Potential impacts of the OWF on the ability to explore, identify and exploit the mineral resources of the seabed and the interior of the earth beneath it

In this chapter, potential impacts of offshore wind farms are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report.

The search for mineral resources, especially hydrocarbons under the seabed, primarily uses two types of exploration:

- geophysical surveys, including primarily deep 3D/4D seismic surveys (exploration stage),
- direct research - drilling (reconnaissance stage).

If a deposit is discovered, a decision may be made to exploit it, in which case a mining platform is installed.

For the purpose of assessing the impact of the BIII OWF on the possibility of exploration, prospecting and exploitation of mineral resources of the seabed, three scenarios of possible variants of parallel operation of the OWF and exploration or extraction activities were adopted, i.e.:

1) exploration and exploitation of hydrocarbon deposits prior to the construction of the OWF,
2) exploration of hydrocarbon deposits after the start of construction or during the operation of the OWF,
3) extraction of hydrocarbons after the development of water bodies with elements of the OWF. The table below compares the above scenarios.

Table 7. Scenarios of possible variants of parallel operation of OWF and exploration/extraction activities

Lp.	Specification	Comments
1.	Exploration and exploitation of hydrocarbon deposits prior to OWF construction	By far the best option from the point of view of the risks to the implementation of both projects. In practice, many examples of this variant are in operation. This is especially true in the North Sea and neighboring hydrocarbon production areas, as well as newly constructed OWFs off the UK coast.
2.	Exploration of hydrocarbon deposits after the start of Construction or during the operation of the OWF	The option is difficult to implement, causing a number of restrictions for the use of exploration methods or the need to dismantle the wind turbine structure, including the foundation

Lp.	Specification	Comments
		and part of the cabling. Nevertheless, reconciling the implementation of two projects is possible.
3.	Extraction of hydrocarbons after development of basins with OWF elements	The option is feasible with the fulfillment of safety conditions regarding the transport corridor for the platform and safety zones. An additional complication is the transportation of raw material to land, carried out by tanker and transshipment system or pipeline.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

The potential impacts of the OWF and the impact assessment of the BIII OWF are discussed and presented based on the above scenarios.

14.1.1. Exploration and exploitation of hydrocarbon deposits before construction begins OWF

When there are still no obstacles to surveying, there are virtually no restrictions on exploration work. It is possible to conduct geophysical surveys using a 3D multichannel seismic system without technical restrictions, that is, using any seismic source (miniGun, airGun or by detonation), while observing all procedures and meeting requirements related to marine safety and environmental protection.

Due to the length of the hydrophone units trawled behind the ship, ship traffic for such surveys requires at least a 4-kilometer buffer around the surveyed body of water. In this case, in addition to the primary seismic vessel, auxiliary and surveillance vessels also operate in the area, co-organizing the safe conduct of the seismic survey.

In the shallow waters of the Baltic Sea, especially in the area overlapping and directly bordering the Central Baltic III field area, it is envisaged that a maximum of 4 vessels should operate at any one time to conduct full 3D seismic surveys: a seismic vessel (80-120 m in length with a sweep set of up to 2 kilometers), a forward surveillance vessel (25-40 m in length), a biological surveillance vessel (25-40 m in length), and a high-speed rear surveillance vessel (25-40 m in length).

Seismic surveys conducted at this stage of the offshore wind farm project require only agreements between the two investors regarding the possible impact of seismic surveys on environmental sensors installed in the offshore wind farm area and on vessels operating these sensors. For the duration of the seismic survey, it is recommended to remove these sensors (the possibility of damaging the measurement membranes with the strong acoustic wave of seismic sources).

In the event of the discovery of hydrocarbon deposits by seismic surveys and the need to confirm them with exploratory drilling, there are no conflicts related to the mobilization and operation of the drilling platform at this stage of the construction of the OWF.

Transport of the drilling rig to the field requires a corridor of at least 1 Mm . The platform is towed by at least 2 tugboats, which must have the ability to perform appropriate maneuvers in case of emergency situations, such as the breaking of tow ropes, a sudden change in weather, the failure of the propulsion system of either tugboat. In addition to two offshore-class tugboats (80-150m long), surveillance vessels (forward and aft surveillance) are involved in the process. Procedures for dealing with oil rigs are governed by Noble Denton Recommendation No. 0028/ND. In the area of the drilling itself, a 1-mile free zone is set for the safe movement of vessels operating the rig (Regulation of the Minister of Economy of April 25, 2014 on detailed requirements for the operation of mining enterprises extracting minerals by boreholes, Journal of Laws. U. pos. 812, §379). Operation of the platform requires at least one surveillance vessel (30 to 150 m long) to be in the immediate vicinity of the platform, and free access

from either side of the platform for supply vessels (PSVs of 60 to 150 m long). These vessels, in the event of a platform failure, can also be used for rescue or firefighting operations.

In the case of the rig demobilization procedure, it is necessary to set aside a safe body of water in the same size as the rig installation.

14.1.2. Exploration of hydrocarbon deposits after the start of construction or during operation OWF

If the development process has started in the OWF area with individual farm components or the farm is already built, hydrocarbon exploration with traditional 3D seismic sets is not used. This is technically possible, but from the point of view of safety at sea and the increased risk of collision with infrastructure elements or OWF service units, it is not used. There are currently no known cases of prospecting using traditional 3D surveying techniques on already built wind farms.

An alternative to seismic exploration in areas already developed with OWF components is OBC (Ocean Bottom Cables, often referred to as 4D seismic).

The principle of conducting these surveys is similar to that of traditional seismic surveys: a strong acoustic wave is generated, which is reflected from the different horizons of geological layers and recorded in hydrophones. The difference is how the seismic recording system is organized, i.e. how the hydrophone units are installed. Towed hydrophone arrays in traditional systems are being replaced by hydrophone arrays mounted directly on the bottom. The source of the acoustic wave, as with traditional seismic systems, is the miniGun or airGun. For measurements in the vicinity of already existing OWF components, it is not possible to use detonation systems.

With such a seismic survey methodology, at least 3 vessels are involved. The first vessel is used for hydrophone cable development and seismic data acquisition. This vessel must be anchored (or held in position using the DP system) until the seismic data acquisition is completed. Due to the possibility of changing weather conditions, it must be a large vessel (80 to 120 meters long). A seismic source ship is a vessel that is 40 to 120 meters long. A workboat that also acts as a caretaker is also necessary. This vessel participates in the process of installing seismic cables, and then guards the cables installed on the bottom from accidental damage or being swept away by fishing boats.

A way to reduce vessel movement in OBC seismic surveys is to use, instead of hydrophone cables connected to the anchored vessel, single bottom hydrophones installed without a cable on the bottom, with an internal system for power supply, acquisition and synchronization with the seismic source. With this solution, it is possible to conduct seismic surveys using a single vessel (80-150 meters long) and possibly a single vessel supervising the survey set installed on the bottom of the water body. The unit installs individual hydrophones in a pre-designed geometry on the bottom in the first phase using special underwater vehicles. This installation is carried out with significantly reduced vessel traffic (the main maneuvers are carried out by underwater ROVs), which reduces the risk of collision with existing OWF infrastructure. The same vessel, after installation of individual hydrophones, serves as a seismic source carrier. Then, after the acquisition is completed, it collects the previously installed hydrophones.

In the event of the discovery of hydrocarbon deposits by seismic surveys and the need to confirm them with exploratory drilling in the area of the constructed OWF, a conflict may arise over the mobilization and operation of the drilling platform.

Transporting an oil rig to the field requires a corridor of at least 1 nautical mile. The platform is towed by a minimum of 2 tugboats, which must have the ability to perform appropriate maneuvers in case of emergency situations, such as the breaking of tow ropes, a sudden change in weather, the failure of the propulsion system of either tugboat. In addition to a minimum of two offshore class tugboats (80-150m long), surveillance vessels (forward and aft surveillance) are involved in the process. Procedures for dealing with oil rigs are governed by Noble Denton Recommendation No. 0028/ND. The area of the

drilling itself requires a 1-mile clear zone for the safe movement of vessels operating the rig. Operation of the platform requires at least one surveillance vessel (30 to 150 m long) to be in the immediate vicinity of the platform, and free access from either side of the platform for supply vessels (PSVs of 60 to 150 m long). These vessels, in the event of a platform failure, can also be used for rescue or firefighting operations. The period during which there is increased vessel traffic supporting a single exploration drill is about 60 days.

In the case of the rig demobilization procedure, it is necessary to set aside a safe body of water in the same size as the rig installation.

14.1.3. Hydrocarbon extraction after development of basins with elements OWF

During the operation of the OWF, it is possible to carry out extraction of hydrocarbon minerals, but this is associated with significant restrictions.

In order to maintain safety in ship traffic and safe exploitation of hydrocarbon deposits, it is necessary to keep the distance between the elements of the OWF development and the working exploitation platform at the same level as for the drilling platform. This applies to both the transportation corridor and the security area itself created around the mining platform.

Mobilization and demobilization of an operating platform requires the same set of vessels and the same safety zones as for an oil rig. Vessel traffic associated with the operation and maintenance of a platform, depending on its type, may be slightly less than with an oil rig, or significantly more (up to twice as much) in the case of a production platform.

A separate aspect, increasing vessel traffic in the area of the hydrocarbon field, is the reception of gas or oil from the production platform. For mobile reception, it is additionally necessary to assume ship traffic of 1 tanker per week for the Baltic Sea average size of the exploitation hole. If the form of receipt of the product is a pipeline, a safe corridor must be provided for the pipeline/pipeline route. This corridor should be designed in such a way as to minimize the need for service vessels for the OWF to pass over it, thereby reducing the risk of accidentally breaching the oil pipeline in the event of emergency anchor use by that vessel.

Important from the point of view of safety is the ability to carry out life-saving operations at sea and rescue operations related to marine pollution prevention and property salvage. Problems with regard to the safety of life at sea are the evacuation of victims from the offshore wind farm area, impaired navigation and communications in distress. A mining platform, regardless of how the extraction is transferred to land, is a potential source of oil pollution at sea. A good solution is to take advantage of the experience of operators of mining equipment, and the best is an advanced system of joint planning, or close coordination against threats to life and environmental pollution. Given the fact that rescue protection is required for each of these projects, such a solution allows for a higher degree of countermeasure preparedness and rational use of forces and resources.

It is important to realize that well-marked and monitored offshore structures are excellent navigational aids, and both an operating platform and a wind turbine can act as a place of refuge for a castaway. It is also possible to use turbine structures as attachment points for oil dams in case of oil contamination.

14.2. Assessment of the impact of the BIII OWF on the possibility of exploration, prospecting and exploitation of exploitation of mineral resources of the seabed and the interior of

the earth underneath it

Given the above, no significant impact of OWF BIII on the ability to explore, identify and exploit the mineral resources of the seabed and the interior of the earth beneath it has been found. The update of the Project, due to the lack of changes in the scope of the space covered by the BIII OWF and the restrictions related to the use of the body of water, does not affect the possibility of exploration, identification and exploitation of the resources of the seabed and the interior of the earth underneath it

14.2.1. Impacts cumulative

No projects with issued DSUs have been identified whose impacts could result in cumulative impacts of OWF BIII in the subject area (see Volume II Section 10).

15. Health and life of the people

For the purposes of this report, the assessment made in the 2015 Report is referenced. Impacts on human health and life are directly or indirectly related to most of the impacts that were discussed in earlier sections of Volume IV. Hence, there is no need to discuss them again.

The BIII OWF has the potential to affect human health and life in particular by:

- emissions: surface noise, radiation and electromagnetic fields, air pollution, waste and sewage,
- spills of hazardous substances (in particular, various types of oil),
- impact on the landscape,
- impact on maritime traffic,
- impact on radiolocation and communications systems,
- impact on aviation,
- impact on cultural heritage and
- material benefits or losses:
    - benefits or losses of fisheries (commercial and recreational),
    - the benefits or losses of coastal tourism,
    - benefits of the maritime industry.

Detailed analyses and conclusions on the above impacts are provided in the relevant sections of Volume IV. It should be noted that none of the above-mentioned impacts of OWF BIII have been considered, on the basis of the analyses conducted, as likely to significantly adversely affect human health and life. Threats to human health and life may arise mainly in the event of collisions between ships or vessels and elements of the OWF, but these types of situations are classified as so-called unplanned events, which are very unlikely to occur (see Chapter 16 below and Section 9 of Volume II of the EIA).

In doing so, it should be noted that for offshore wind farms, evacuation and life-saving plans (Emergency Response Plan) are developed, which first identify potential threats to the life and health of people (workers or other beneficiaries) at various stages of the project, and then develop a strategy to

counteract such threats and to communicate and respond in case they occur. Such documents are developed at a later stage and are only included in the construction project.

With regard to the protection of the population from PEM, according to the radiolocation expertise performed, it should be noted that:

- there are no sites accessible to the public in the vicinity of offshore wind farms,
- density and field strength values will not be exceeded.

Potential impacts of PEM on human health and life may only affect workers servicing wind turbines.

Thus, in the context of workplace protection, measurements are taken after the device is installed and, based on the measurements obtained, the appropriate zones in which workers can temporarily reside are determined. These procedures are governed by relevant laws. The following measures are proposed to protect people from the effects of PEM:

- in practice, due to the transmitting power of radiocommunication and radar equipment, each time work on antennas and transmitters requires the equipment to be turned off (especially when working with radar antennas, the factor of mechanical rotation of the antenna comes into play, which must additionally be taken into account when planning the work),
- when designing how to locate internal radio and radiolocation equipment, ensure that the occurrence of fields is minimized, in order to allow work to be carried out without having to shut them down or use other additional procedures that reduce the efficiency of operation,
- operation of equipment should be carried out by persons trained in the operation of equipment, in general and specific principles of occupational safety and health, and under the constant control of an occupational physician.

Due to the fact that none of the above impacts of the BIII OWF have been considered on the basis of the conducted analyses as likely to significantly adversely affect human health and life, and the proposed changes in the parameters of the Project do not lead to changes in the nature, extent or magnitude of the predicted impacts, thus it should be considered that the proposed change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings in the course of which the Environmental Decision was obtained.

16. Impacts unplanned

At each stage of the project, there is a potential, unplanned risk associated with the possibility of collisions between ships and helicopters and the release of hazardous substances (especially petroleum) into the environment. The causes and types of emissions, the likelihood of various types of unplanned events and failures, and the estimated scale of impacts that may then occur are discussed in Sections 4 - 6 of Volume II of the report for each phase (construction, operation and decommissioning), respectively. A "Hazard and Pollution Prevention Plan during Construction and Decommissioning/Operation of the Central Baltic III OWF" has been prepared for the project[14], which outlines the potential extent of oil pollution for various scenarios (see Section 12 of Volume II of the EIA). According to the analyses performed, the most likely extent of a point oil spill after 24 hours, taking into account the wind distribution for the Southern Baltic, will not reach the shoreline at any stage of the project (including if the spill occurred on the border of the OWF). The probability of such unplanned events and failures is very rare, ranging from once every 100 years (a 50% chance of an event occurring

[14] Pawelec Z. et al, Gdynia 2014

within 50 years) to as low as once every 10,000 years (a 1/200 chance of an event occurring within 50 years).

With the above in mind, it should be concluded that unplanned events and accidents in the area of OWF BIII do not pose a direct threat to coastal tourism (the oil spill stain at the most likely extent will not reach the coastline), although it cannot be ruled out that in such a situation the localities closest to the project area will enjoy less interest, but this will be more of a psychological effect than the effect of a real threat to the health and life of people resting on land.

Potential oil spills will be a direct constraint on recreational fishing and water sports and will prevent such activities from taking place in the area of the spill patch's range. However, it should be remembered that the probability of such situations is very low.

17. Impacts related

The matrix of interrelationships of potential emissions and disturbances that the BIII offshore wind farm will cause and their sources, direct and indirect impacts on the environment, as well as the factors determining them, is presented in Section 7 of Volume II of the report.

In the context of maritime users, who are the subject of the BIII OWF impact assessment in this chapter, the following links were found in particular:

1) an increase in the concentration of suspended solids in the water and the deposition of agitated sediment - affects water clarity. It may directly affect fish stocks in the project area, which may indirectly translate into recreational fishing. Deterioration of water clarity could also affect coastal tourism and contribute to a decrease in the attractiveness of some destinations, but this is not expected to increase in the coastal zone - tourists should not feel or notice any changes;

2) redistribution of pollutants deposited in the sediments and getting them into the water - taking into account the fact that the concentrations of persistent organic pollutants (ie. PAHs, PCBs, TBTs) and harmful substances such as metals or mineral oils in the investigated area of OWF BIII occurred at low levels and did not exceed values typical for sandy sediments of the southern Baltic Sea, and were characterized by low radioactive concentrations of 137Cs typical for sandy sediments, the scale of the phenomenon of redistribution of pollutants deposited in the sediments and getting into the water in the case of OWF BIII will not cause a threat to fish resources and thus to recreational fishing or to human health and life, and will not reduce the tourist attractiveness of the region;

3) the "artificial reef" effect due to the appearance of new underwater features in the project area - may contribute to an increase in biodiversity and the number of individuals of various species in the area of the planned project, which may indirectly translate positively into recreational fishing;

4) increased underwater noise - may be a source of negative impacts on fish stocks, and thus may indirectly translate into recreational fishing in the area;

5) emission of surface noise - surface noise may be perceptible only by people on ships passing in the vicinity of the farm (indirect impact of OWF BIII on shipping and recreational fishing); noise will not be perceptible on the shore - it will not contribute to the reduction of the tourist attractiveness of the coast;

6) air pollutant emissions - air pollutants emitted by construction and service units will not cause deterioration of living conditions for people living in coastal towns, and thus will not contribute

to a decrease in the tourist attractiveness of the part of the coast affected by such impacts, due to the scale, duration and distance of emission sources from the nearest residences.

18. Impacts transboundary

The BIII OWF is located at a considerable distance from the EEZ borders of other countries. The shortest distance (to the EEZ border of Sweden and Denmark) is about 52 km. Taking into account the fact that the analyses, which are the subject of this chapter of the EIA report, indicate the possibility of impacts of a maximum regional nature (in the case of impacts on the landscape), on this basis it is concluded that the BIII OWF will not be a source of transboundary impacts.

19. Analysis of potential conflicts social

19.1. Introduction

We speak of social conflicts when there is a conflict of interests between groups or parts of social groups. This Report assesses the project's impact on existing marine uses, which includes:

- commercial fishing (Section 10 of Volume IV of the ROOŚ),
- cultural heritage (Section 8 of Volume IV of the EIA),
- shipping (this study),
- exploration, prospecting and exploitation of seabed mineral resources (this study),
- coastal tourism (this study),
- recreational fishing (this study),
- water sports (windsurfing, kitesurfing, offshore sailing, wreck diving) (this study),
- military operations (this study),
- radiolocation and communications systems (this study),
- civil aviation (this study),
- military aviation (this study),
- human health and life (see Chapter 15 of this study for relevant sections of Volume IV).

As a result of the assessment, there was no risk of significant negative impacts of OWF BIII on any of the socio-economic areas indicated above. Thus, it can be concluded that there are no substantive grounds for conflicts of interest between the Investor's plans and local communities and other users of the maritime areas. However, this does not change the fact that one of the most significant problems associated with the preparation and implementation of infrastructure investments in Poland, especially in the field of energy, is the resistance of local communities. The reason is fear of negative impacts on health, living comfort, sources of existing income and the value of material goods, generally caused by insufficient knowledge of the planned investment and its actual impacts.

Given the above, it was deemed necessary to conduct an analysis of potential social conflicts related to the planned Project.

This chapter identifies, characterizes and evaluates those factors that, in addition to and often independent of the actual conflicts of interest of the various users of marine and coastal space, may affect the occurrence and scale of possible social conflicts associated with the preparation and implementation of the BIII OWF.

19.2. Methodology for analyzing potential conflicts social

The process of analyzing and assessing the risk of social conflicts took place in three stages.

The **first stage,** performed at the initial stage of project preparation, consisted of examining the possibility of significant negative spatial, environmental and economic conflicts in the site selection procedure for the BIII OWF.

In Poland, offshore investments are required to obtain a permit for the erection and use of artificial islands, structures and devices in Polish maritime areas ("PSZW"). To obtain such a permit, the authority conducting the proceedings (i.e., the minister in charge of maritime affairs) is required to request an opinion on the planned project from the ministers in charge of affairs:

- economies,
- culture and national heritage,
- fisheries,
- environments,
- internal affairs and
- agriculture and rural development.

The opinion is aimed at identifying obstacles or potential sources of conflict early in project preparation. A PSZW permit may not be issued if its issuance would entail risks to the environment, the interests of the national economy, the defense and security of the state, the safety of marine navigation, the safety of marine fishing, the safety of aircraft flight, the underwater archaeological heritage, or the safety associated with the exploration, identification and exploitation of mineral resources of the seabed and the interior of the earth beneath it. For the BIII OWF, which was the first in Poland to obtain a PSZW permit, this verification was positive

The second stage consisted of identifying all social, professional groups and areas of activity using marine resources that are exposed to potential impacts from the BIII offshore wind farm, and performing an assessment of the project's impact on existing uses of marine space in the areas:

1) commercial fishing,
2) cultural heritage,
3) shipping,
4) exploration, recognition and exploitation of seabed mineral resources,
5) coastal tourism,
6) recreational fishing,
7) water sports (windsurfing, kitesurfing, sea sailing, wreck diving),
8) military operations,

9) radiolocation and communications systems,

10) civil aviation,

11) military aviation,

12) maritime industry,

13) people's health and lives.

The results of these analyses, which are presented in the assessment sections of Volume IV of the ROIA, showed that the project's impacts on existing forms and uses of marine space and resources will be insignificant or small, and thus not warrant substantive public protests.

In the third stage , the sensitivity of local communities to potential conflict factors, related to subjective perceptions of the threat of changes in the quality and comfort of life, and the vulnerability of local communities to protests related to investment activity in their neighborhoods were analyzed.

The methodology of this part of the study is based on a discussion of the causes that may lead to various types of conflicts, an estimation of the level of risk that a conflict will occur, and the identification of measures to prevent or mitigate the identified potential conflicts. In estimating the risk of conflict, a modified general impact assessment methodology was used, which is described in detail in Section 5 of Volume I of the EIA. The modifications consisted of changing the criteria for categorizing the importance of impact receptors, as shown in the table below.

Table 8. Classification of the importance of receptors of the impact of OWF BIII in the context of social conflict analysis

Category of significance	Definition and criteria
Insignificant	It does not change local communities' perceptions of living conditions in the areas of comfort, health, amount and stability of income.
Small	It prompts a small portion of local communities to assess potential changes in living conditions, but does not risk negative results from this assessment.
Medium	It prompts an overwhelming majority of local communities, or influential, well-organized representatives of local communities, to assess potential changes in living conditions, with little risk of negative results from this assessment. It makes little or no difference to existing living conditions.
Large	It can change the living conditions of a small but influential and well-organized social group in a significant way or the majority of local communities in a moderately significant way. It prompts the preponderance of local communities, or influential, well-organized representatives of local communities, to assess potential changes in living conditions, with a high risk of negative results from this assessment. It is subject to the interest and interest game of influential local and regional political, professional groups or NGOs.
Very large	It changes the living conditions of influential and well-organized social groups and/or the majority of local communities in a significant way. It is subject to the interest and interest game of influential nationwide political, professional groups or NGOs.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

For the purpose of analyzing potential social conflicts for OWF BIII, the following conflict factors are identified, which were considered receptors of impact:

1) the comfort of life, which is primarily influenced by:
    a) visibility of the farm from permanent locations (exposure to the sea from places of residence, rest or work),
    b) noise emissions, PEM;
2) opportunities for the use of marine resources, which is primarily influenced by:
    a) restricting access to fishing areas,
    b) restricting access to tourist shipping areas,
    c) restriction of access to tourist use of beaches (related only to the laying of the export cable. IMF BIII alone will not result in restrictions on the use of beaches);
3) vulnerable sources of income - sources of existing livelihoods or factors in the development of the local community, such as tourism, fishing, for example; fear of job loss, reduced income, collapse of existing business, which is the main source of livelihood, is very often the direct cause of protests;
4) sensitive cultural assets - related to the protection of local natural and cultural values, such as protected areas, valuable natural elements or landscape. In the case of IMF BIII, these will be:
    a) coastal and marine protected areas (national parks, Natura 2000 areas),
    b) landscape protection areas.

An additional factor, affecting the possibility of social conflict, is the propensity of local communities to conflict. Based on an assessment of social activism and the socio-political climate, it can be determined to what extent the presence of risk factors can be used to initiate public protests against the investment. Indeed, it should be emphasized that even with the negligible significance of a given impact on local communities, the occurrence of conflict cannot be ruled out if there are conditions in a given local community that significantly increase the propensity to protest. Key elements in assessing the propensity of local communities to protest, are:

1) local socio-economic conditions,
2) the activity of environmental organizations,
3) the occurrence of protests against investments in the past,
4) around the investment political climate,
5) the level of knowledge about the investment, the technologies used, the impacts.

Each of the above factors can have an increasing, decreasing or neutral significance with regard to the risk of social conflict. The significance was evaluated according to the following principles:

1) Local socio-economic conditions:
    a) increasing - e.g., high local dependence on undiversified sources of income, which can be affected by the implementation of investments, high unemployment, low income,

b) reducing - e.g., large local benefits from the implementation of investments, creation of local and regional jobs, positive impact of investments on the most important and dominant forms of economic activity in the region,

c) neutral - e.g., well-developed, diverse local economies independent of areas that may be negatively affected by the investment, high revenues from sources that are not affected by the investment;

2) NGO activity:

a) enhancing - e.g., a high level of activity by organizations that oppose the technology or actively protect local or regional natural resources that may be affected by the investment,

b) diminishing - e.g., high activity of organizations supporting a particular technology,

c) neutral - no NGO activity;

3) The occurrence of protests against investments in the past:

a) increasing - e.g., numerous protests against investments, including investments of a similar nature and/or impact, protests not based on legitimate grounds,

b) reducing - such as protests against investments competing with the planned project,

c) neutral - no conflicts or protests;

4) All around investment political climate:

a) increasing - e.g., local and regional governments or influential local political leaders opposing programmatic investments of a particular type, strong local conflicts

b) political, investment contrary to existing regional and local development policies and strategies, election campaign period,

c) reducing - e.g., support of local and regional authorities for investments, stable authorities favorable to investments, compatibility of investments with existing development strategies and policies,

d) neutral - e.g., a stable political environment with a neutral approach to a given investment;

5) Level of knowledge about investments, technologies used, impacts:

a) increasing - e.g., innovativeness of the technology, lack of knowledge among local communities about the project, its scope, technologies used, their impacts, lack of dialogue between the investor and local authorities and the community, widespread false, biased information about the investment, technologies, impacts,

b) reducing - e.g., dialogue between the investor and the local community, presentation at early stages of the technology and the scope of the project and its impacts, easy access to knowledge about the investment and the technology,

c) neutral - widespread, established, reliable knowledge of the investment and technology.

Based on the results of the analysis performed, the proposed measures to prevent and minimize the risk of social conflicts for OWF BIII were indicated.

19.3. Potential impacts of the OWF that may cause social conflicts social

In this chapter, potential impacts of offshore wind farms are identified. The most important parameters and factors affecting the scale of impacts are also indicated. Since these are general data and information, regarding potential impacts of projects of this nature, independent of detailed solutions, the chapter directly refers to the description of impacts, which was presented in the 2015 Report.

According to a publication by the New Jersey Department of Environmental Protection[15], the development of offshore wind energy may raise questions and concerns from the public, particularly in the following area:

- visibility of the OWF for land-based observers (impact on the seascape and land landscape),
- iMF's impacts on beaches and shallows (impact on the ability to use beaches),
- the impact of the OWF on birds and marine animals,
- iMF's impact on tourism,
- commercial fishing impacts,
- impacts on marine vessel navigation,
- impacts on aviation and national defense,
- collisions with other offshore projects already underway (such as submarine cables).

According to the German Offshore Wind Energy Foundation (2013)[16], which conducted an analysis of the impact of OWFs on tourism development in the southern Baltic Sea, the main impacts of OWFs that may contribute to fears and prejudices against offshore wind energy are: landscape impacts, sea surface occupation, and risk of ship collisions.

According to the results of an OWF acceptance survey conducted in Scotland[17], the public protests mainly because of the visual impacts on the seascape, with some members of the public prioritizing the natural character of the landscape over the benefits of obtaining energy from a renewable source such as wind turbines. Other general causes that can lead to social conflicts include: social conditions, economic conditions or even historical heritage issues.

An important issue that emerged from the research is the need to ensure proper communication between all those involved in the investment process. In addition to the investor and decision-makers, the public is an important participant in the decision-making process. If it is uninformed and lacks a sense of influence over the decisions being made, then it may begin to take protest actions.

Similar conclusions are drawn from the work on the **existing Nysted OWF and Horns Rev[18]** (Denmark). Public concerns were mainly about negative impacts on the environment (including birds) and the

[15] New Jersey Department of Environmental Protection, Blue Ribbon Panel on Offshore Wind "Potential conflicts with offshore projects," 2005, https://www.nj.gov/dep/dsr/ocean-wind/Blue%20Ribbon%20Panel%20on%20Development%20of%20Wind%20Turbine%20Facilities%20in%20Coastal%20Waters_Background%20Information.pdf, [access date: 05.2022 r.]

[16] German Offshore Wind Energy Foundation, "The impact of offshore wind energy on tourism. Good practices and perspectives for the South Baltic Region," 2013, http://www.offshore-stiftung.de/sites/offshorelink.de/files/documents/Offshore_Stiftung_2013_04SBO_SOW_tourism_study_final_web.pdf [access date: 05.2022 r.]

[17] The University of Edinburgh, Briefing document "Social acceptance of offshore renewable energy," 2013,

[18] ECON Analyse, "Sociological Investigation of The Reception of Horns Rev and Nysted Offshore Wind Farms in the Local Communities," 2005, https://www.osti.gov/etdeweb/servlets/purl/20780434 [access date: 05.2022]

aesthetics of the landscape, which could also be associated with reduced attractiveness of the region for tourism. The issue of ignoring (mainly by the authorities) the public's anxieties and concerns was also raised. Initial public concerns, unaddressed in time, turned into public resistance. It was also noted that the debates held for the public tended to be attended by opponents of the implementation of the investment, rather than its supporters.

In addition to residents of areas likely to be directly affected by the investment, the most likely participants in the protests include:

- non-governmental organizations, especially environmental ones,
- local and supra-local business associations, scientific and cultural organizations,
- local municipalities.

The forms of activity used by residents in the vicinity of the planned project are primarily:

- formation of protest committees,
- publishing their demands in the media, including on the Internet,
- exerting pressure on local authorities and government administration not to grant the required decisions, arrangements and permits, in all phases of investment preparation and implementation,
- challenging the decisions obtained by the investor,
- organizing protest marches and pickets wherever these forms of protest will attract media attention,
- occupation of public buildings.

The ubiquity of the Internet has fostered a wider acquisition of knowledge on topics such as wind energy. The public is increasingly aware of its capabilities and rights. The Internet provides a wide range of opportunities for wind energy opponents to act - in particular, to reach out to the public and disseminate information about the harmful effects of wind farms on human health, life and nature.

Opponents of such projects use every means available to block investment. An example is the society opposing the construction of the Rampion IMF (UK) and setting up an account on the social networking site facebook: https://www.facebook.com/StopTheRampionOffshoreWindfarm which provided opportunities for direct contact and quick consultation on actions to block the investment. As a compromise, the developer decided to reduce the number of turbines in the project in order to mitigate impacts on the landscape[19]. The project has received the relevant administrative decision[20].

Opponents of the implementation of the planned Nativus Bay OWF (UK) have set up a special protest site http://www.challengenavitus.org.uk/. Resistance to the project was sparked by the existence of UNESCO national heritage areas in the vicinity of the site. The site provides a range of information about the planned project and its potential impacts, and identifies steps that can be taken to potentially influence the final design of the project. However, it was made clear that the opposing group is open to dialogue and creative discussion with the investor and decision-makers.

Public protests over the Atlantic Array offshore wind farm (located in the Bristol Channel between South Wales and North Devon) led to a significant (from 417 to 278) reduction in the number of turbines in

[19] http://www.4coffshore.com/windfarms/rampion-united-kingdom-uk36.html [access date: 05.2022 r.]

[20] http://www.4coffshore.com/windfarms/rampion-united-kingdom-uk36.html [access date: 05.2022 r.]

the project. Again, the reason for the public's protests was the impact of the planned project on the landscape. Eventually, the developer withdrew from the project, justifying his decision on technical grounds[21].

A large group of protesters are fishing communities operating in the North Sea, Baltic Sea and East Atlantic[22]. Protests internationally are coming from Dutch fishermen who are against the rapid growth of offshore wind development. Concerns are justified by the significant occupation of fishing waters in their best fisheries - currently at 0.5% with an upward trend to 25% within a decade[23].

New York State plans to build offshore wind farms with a total capacity of 2.4 GW by 2030. Fishermen there estimate the value of their catch at $15-17 million a year. They feel threatened by offshore windmill construction and have announced protests[24].

Protests against the implementation of the IMF also took place in Poland. In 2008, an offshore wind farm Pomorze consisting of 33 wind turbines, each about 120 meters high, was planned near Dębki (Krokowa municipality). The project was to be located approximately 5 km from the coastline, within the Natura 2000 SPA Przybrzeżne Wody Bałtyckie PLB990002 area, established to protect birds. The project's proximity to the coast and its location in a nature conservation area have led to numerous protests from community residents, local authorities and environmental organizations. Ultimately, this investment did not take place (the location of the farm within the boundaries of the so-called territorial sea, i.e. less than 12 nautical miles from the coastline, is currently incompatible with current Polish legislation).

The above examples clearly show that the construction of wind farms is not indifferent to the public, and the lack of proper communication between all participants in the process can cause unnecessary tensions resulting in, even if not blocking, significant difficulties in the implementation of the investment.

19.4. Local social and economic conditionseconomic

In order to identify local socioeconomic conditions, municipalities located in the coastal strip that could potentially be affected by the planned project were analyzed. These include:

- urban and rural municipality of Darlowo,
- Postomino,
- urban and rural municipality of Ustka,
- Smoldzino,
- Slupsk,
- Leba,
- Wicko,

[21] http://www.4coffshore.com/windfarms/windfarms.aspx?windfarmId=UK42 [access date: 05.2022 r.]

[22] https://www.msp-platform.eu/sector-information/offshore-wind-and-fisheries, [access date: 05.2022 r.]

[23] https://www.theguardian.com/environment/2018/jun/01/dutch-fishermen-to-sail-fleet-into-amsterdam-in-wind-turbine-protest, [access date: 05.2022 r.]

[24] https://oko.press/amputacja-pierwszej-nogi-przygody-ministerstwa-energii-z-wiatrakami-na-ladzie-i-na sea/, [access date: 05.2022 r.]

- Choczewo,
- Krokowa.

19.4.1. Participation / importance in the local economy of marine fishing and tourism, including the number of tourists visiting each municipality, distinguishing the season holiday season

Information on the importance of marine fishing and tourism in each municipality is tabulated below (Table 9).

The largest expenses related to tourism promotion were incurred in 2019 by the urban and rural municipality of Darlowo and the rural municipality of Ustka. (The years 2020-2021, due to the pandemic situation, may not be the right reference point). However, the revenue gained from tourism was less than the expenses incurred. The municipality in which the income from tourism exceeded the cost of its promotion was the municipality of Slupsk.

Only the municipalities of Darlowo and Ustka incurred fishing-related expenses.

19.4.2. Level unemployment

The unemployment rate in the Pomeranian and West Pomeranian regions in December 2020 was 5.8% and 8.4%, respectively, with the national figure at 6.3%.

The highest unemployment[25] is in the urban municipality of Darlowo (14%) and the rural municipality of Darlowo (13.8%) the municipality of Postomino (13.5%). Unemployment is also high in the rural municipalities of Postomino (13.5%) and Wicko (13.3%). The lowest unemployment is recorded in the urban and rural municipality of Ustka (7.1%).

[25] Share of registered unemployed in the working-age population

Table 9. Summary of revenues and expenditures of municipalities for fisheries and coastal tourism for 2019

Municipality	Revenue from tourism [thousand PLN]	Expenses related to promotion and tourism [thousand PLN]	Revenue from fishing and fisheries [thousand PLN]	Expenditures related to fishing and fisheries [thousand PLN]	Tourism potential of the municipality/remarks[26]
Darlowo - urban municipality[27]	209,926.12 (about 0.31% of total revenue)	923600.02	lack of income	51953.68	The municipality has an abundance of tourist accommodations - 73 facilities with 4,928 beds currently provide their services. In 2018, 69089 people used the sites, mainly during the holiday season. Occupancy rate The occupancy rate of lodging in 2018 was 43.1%. There are 3 fishing boats stationed in the Port of Darlowo.
Darlowo - rural municipality	166756,14[28]	1247237,08[29]	lack of income	lack of expenditure	The municipality has an abundance of tourist accommodations - 53 facilities with 6,055 beds currently provide their services. In 2018, 79610 people used the places, mainly during the holiday season The occupancy rate for 2018 was 64.5%.
Postomino-rural municipality	0,00[30]	129798,87[31]	lack of income	lack of expenditure	The municipality has 25 facilities with 4394 beds for tourists. In 2018, 52672 people used them, mainly during the holiday season. The occupancy rate in 2018 was 45.7%.
Ustka - urban municipality	469761.31 (about 0.54% of total income)[32]	646535,02[33]	lack of income[34]	331885,49[35]	The municipality has ample accommodation facilities for tourists - in 2018 there were 61 facilities with 4873 beds at their disposal. In 2018, 113156 tourists used them, mainly during the holiday season. Ustka's port is accessible to small commercial vessels, fishing and passenger ships, yachts and passenger service vessels. The occupancy rate in 2018 was 50.4% There are 20 fishing boats stationed in the Port of Ustka.

[26] Statistical Yearbook of the Maritime Economy, CSO 2018

[27] 2017 data.

[28] Rb-27S for2019.

[29] RB-28S for 2019.

[30] RB-27S for 2019.

[31] Rb-28S for 2019

[32] Budgetary income - execution for 2019. Annex No. 1 to the Order No. 0050.FN.64.2020 of the Mayor of the City of Ustka dated March 24, 2020

[33] Budgetary expenditures - execution for 2019. Annex No. 1 to the Order No. 0050.FN.64.2020 of the Mayor of Ustka dated March 24, 2020

[34] Budgetary income - execution for 2019. Annex No. 1 to the Order No. 0050.FN.64.2020 of the Mayor of the City of Ustka dated March 24, 2020

[35] Budgetary expenditures - execution for 2019. Annex No. 1 to the Order No. 0050.FN.64.2020 of the Mayor of Ustka dated March 24, 2020

Municipality	Revenue from tourism [thousand PLN]	Expenses related to promotion and tourism [thousand PLN]	Revenue from fishing and fisheries [thousand PLN]	Expenditures related to fishing and fisheries [thousand PLN]	Tourism potential of the municipality/remarks[26]
Ustka - rural municipality	424704,00[36]	1451258,00[37]	No specification	No specification	In 2018, there were 69 tourist accommodation facilities with 6724 beds in the rural municipality of Ustka. In 2018, 59039 tourists used them, mainly during the holiday season. The occupancy rate in 2018 was 47.3%.
Smoldzino- rural municipality	No income	34080,20[38]	lack of income	lack of expenditure	In 2018, there were 2 lodging facilities available in the municipality, with 67 beds.
Słupsk - rural municipality	173312,50[39]	9900,00[40]	lack of income	lack of expenditure	In the rural municipality of Slupsk, there is 1 accommodation facility with 235 beds.
Leba municipality - urban municipality[41]	lack of income	66231.81	lack of income	lack of expenditure	The municipality has very well developed tourist facilities. In 2018, 131 tourist accommodations provided their services in its territory, with 1,459 beds. During the summer season in 2018, 106657 people used them. The occupancy rate in 2018 was 41.5%. There are 8 fishing boats stationed in the Port of Leba.
Wicko- rural municipality	0,00[42]	67800,27[43]	lack of income	lack of expenditure	In 2018, 996 accommodations were available for tourists in the municipality, which were used, mainly during the holiday season, by 7470 people. The occupancy rate in 2018 was 47.1%.
Gmina Choczewo- rural municipality[44]	250.00 (<0.01% of total income)	94380.36	lack of income	lack of expenditure	In 2018, 4744 tourists used the 17 tourist accommodations operating in the municipality with 476 beds, mainly during the holiday season. The occupancy rate in 2018 was 28.9%.

[36] 2019 Budget Plan.

[37] 2019 Budget Plan.

[38] Form Rb-28S for 2019.

[39] Report on the implementation of the budget for 2019. Order No. 53/2020 of the Head of Slupsk Municipality dated March 27, 2020.

[40] Report on the implementation of the budget for 2019. Order No. 53/2020 of the Head of Slupsk Municipality dated March 27, 2020.

[41] 2017 data.

[42] Rb-28S for 2019.

[43] Rb-28S for 2019.

[44] 2017 data.

Municipality	Revenue from tourism [thousand PLN]	Expenses related to promotion and tourism [thousand PLN]	Revenue from fishing and fisheries [thousand PLN]	Expenditures related to fishing and fisheries [thousand PLN]	Tourism potential of the municipality/remarks[26]
Krokowa municipality - rural municipality	lack of income	14136,00[45]	lack of income	lack of expenditure	Within the municipality, 62 tourist facilities provide their services, with 2210 beds. In 2018, 16657 tourists used them. The occupancy rate in 2018 was 44.1%.

Source: own compilation based on publicly available data and CSO data

[45] Ordinance No. 0050.61.2020 of the Head of Krokowa Municipality dated March 12, 2020.

19.4.3. The most important locations of tourist facilities, recreational developments and settlements suburban

There are numerous historic buildings in the analyzed municipalities, as well as recreational developments and suburban neighborhoods.

Through the municipality of Darlowo runs the Route of Medieval Monuments (black) with a length of 104 km and a bicycle path with a length of 23 km, the so-called Cistercian Trail Loop.

In the area of the rural municipality of Darlowo there are hiking trails such as:

- Koszalin Seaside Trail (red) - a section of the international E-9 trail leading from Brest (France) to Braniewo,
- Trail of Reservations (blue) length of about 71.5 km,
- Windmill Trail (green) length of about 13 km,
- Route of Medieval Monuments (black) length of about 104 km,
- Bike path Dąbki - Dąbkowice - length of about 5.5 km,
- Loop Szlakiem Cystersów - a bicycle path with a length of about 23 km.
- Big Windmill Loop - a bicycle path with a length of about 39 km;
- The Big Seaside Loop - a bicycle path with a length of about 38 km;
- International bicycle route around the Baltic R-10.

Within the boundaries of this municipality there is a reserve "Słowińskie błota" and a spa resort Dąbki. There are also recreational plots in Kopan and a suburban settlement - Warszkowo.

On the territory of the Postomino municipality there are two landscape parks (manor park in Pienkowo and in Piecz on the Moszczeniczka River), three hiking trails ("Northern Route", "Green Route and bicycle route "Hanseatic Coastal Route"). Within the boundaries of this municipality there are also recreational plots in Rusinowo and single-family house estates (Rusinowo, Jaroslawiec).

Tourist facilities occurring in the urban area of the Ustka municipality include the palace in Wytown (about 8 kilometers from Ustka) and the observation tower in Orzechowo (about 7 kilometers from Ustka, by the Ustka - Rowy bicycle route).

In the municipality of Smoldzino are counted among the tourist attractions: the observation tower on Lake Gardno, Mount Rowokół (the Holy Mountain of the Slovinians), the Czolpin Dune, the observation platform in Czolpin and the Museum of the Slovinian Village in Kluki.

On the territory of the Słupsk city municipality there is a tourist trail "Kraina w kratę" (villages with preserved old Pomeranian architecture), a nature trail of the Moszczeniczka river valley, a salmon park in Włynkówko, the village of Swołowo - the capital of Kraina w Kratę (the entire village is under the supervision of the conservator of historical monuments) and a manor house in Swochowo (18th century). There is also recreational development in this municipality (Dolina Charlotty - agrotourism complex Zamełowo k. Strzelinka) and suburban settlements (in Siemianice, in Bruskow Wielki, in Jezierzyce, "Złoty Potok" in Bydlin and the Viktoria Park estate).

Tourist facilities located within the boundaries of the municipality of Leba include:

- an observation tower on Lake Lebsko,

- Łącka Mountain - the most attractive of all dunes in the Slovinski National Park,
- Rocket Launcher Museum in Rąbka,
- Natural History Museum of the Slovinski National Park in Rąbka,
- sarbska Spit nature reserve,
- stilo lighthouse.

The municipality is also home to the Dinosaur Park and the Sea Park Recreation and Education Park in Sarbsko, 8 km from Leba. There are pools with gray seals and South American kittiwakes. Sea Park is thematically related to the fauna and flora of the seas and oceans, as well as the culture and history of the Pomeranian region.

In the municipality of Wicko there are tourist attractions such as a fortified settlement with a craftsmen's sub-ground, an ornithological garden in Nowęcin, a floristic and landscape park "Sarbska Mierzeja", a floristic reserve "Nowe Wicko" on an overgrown lake, and a peat-forest reserve "Las Górkowski".

In the Choczewo commune there is a moving dune near Sasin and a barrow in Szklana Huta. There is also the "Relaks" Holiday and Training Center and the "Sasino Palace" resort. In the commune of Choczewo, a suburban settlement is located in Osieki Lęborskie.

Among the main attractions located within the boundaries of the Krokowa municipality are area forms of nature protection. These include:

Seaside Landscape Park,

- floristic nature reserve "Babnica" - includes coastal areas of parabolic dune covered with beech-oak forest on one side and pine forest on the other,
- nature reserve "Białogóra" - protects fragments of coastal swamp forest and crowberry forest,
- peat bog reserve "Bielawa" - the purpose of protection of the reserve is to preserve a high peat bog of the Baltic type with characteristic vegetation, which is a sanctuary for waterfowl,
- forest nature reserve Długosz Królewski in Wierzchucin - the reserve is protected by the remnants of the high and transitional bogs with the position of the royal longhorn,
- piaśnickie Łąki nature reserve - a floristic nature reserve on the Kashubian Coast in the area of the Seaside Landscape Park at the mouth of the Piaśnica River to the Baltic Sea. The reserve includes meadows (between the bed of the Piasnica River and its oxbow lakes) along with forest vegetation and an oak-birch forest,
- vidowo nature reserve - a forest nature reserve on the Kashubian Coast in the area of the Seaside Landscape Park; the reserve includes coastal forest communities and surrounding dune formations,
- zielone nature reserve - a floristic nature reserve located on the border of Pobrzeże Kaszubskie (Kashubian Coast) and Wysoczyzna Żarnowiecka (Żarnowiec Plateau); the reserve includes fragments of forest (mainly swamp birch) on the border of peatlands,
- wierzchucińskie B這ta reserve - a marsh and peat bog area in the buffer zone of the Nadmorski Landscape Park (on the edge of the Slovinski Coast); Wierzchucińskie B這ta is a staging point for birds during seasonal flights to Scandinavia.

19.5. The social and political climate political

For more than a decade, interest and support for offshore wind farms in the Baltic Sea has been steadily increasing. This includes both the social environment (local stakeholders) and the political environment (international, national and local levels).

Social environment

In 2013-2014, a more than year-long public education and communication campaign was conducted for the Central Baltic III offshore wind farm. It included preparatory activities, an information and education campaign, consultations with the fishing community, the maritime administration, local authorities and the residents themselves. The broad scope and appropriate selection of comprehensive activities allowed the dissemination of knowledge about offshore wind energy among local communities and the neutralization of potential conflicts.

The result of the activities carried out was a conflict-free course of formal public consultations carried out as part of the procedure for issuing a decision on environmental conditions for the Baltic Central III offshore wind farm project.

Fishing organizations

In the area of the municipalities included in the analysis, several fishing organizations are observed. To date, there have been no significant protests related to the OWF, which is not to say that fishing organizations are not interested in the issue.

The following fishing organizations operate in the study area:

- Darlowo Local Fishery Group in the basin of the Wieprza, Grabowa and Uniesta rivers;
- Darlowo Group of Fish Producers and Fishing Boat Owners;
- Slovinska Fishery Group;
- Local Fishery Group "Leba Valley";
- North Kashubian Local Fishery Group;
- Local Action Group "Leba River Basin";
- Local Group Association - Lebsk Fishermen;
- Association of Sea Fishermen Leba Branch;
- Union of Polish Fishermen;
- Central Pomeranian Fisheries Group;
- Wladyslawowo Fish Producers Organization Ltd;
- National Chamber of Fish Producers.

Fishermen's organizations tend to view OWF development in large majority as a threat to their interests. They are concerned about the loss of fisheries in areas planned for OWF construction and the negative environmental impact of this type of investment, which may contribute to the reduction of fish in other parts of the Baltic Sea. All of this is potentially linked to the loss of fishermen's livelihoods.

Political environment - national and international level

The political environment, domestically and internationally, is favorable. Offshore wind energy is part of the implementation of major plans and strategies in the areas of climate protection, energy security, energy market integration, economic development of the Baltic Sea countries. Offshore wind farms are also in the Polish government's strategic plans at 10.3 GW in 2040. During the May 2019 Baltic Offshore Energy Industry Forum, representatives of major political forces endorsed and presented their ideas for the rapid development of offshore wind farms, highlighting their strong commitment (FNEZ 2019).

Political environment - local level (local government units)

A pilot study conducted in 2017 indicates that authorities in coastal municipalities are highly aware of the opportunities for industrial development through offshore wind power. Local governments definitely see an opportunity for an increase in municipal income, and they also have specific needs that would be met through the benefits of investments (for example, the Choczewo municipality would like to improve the quality of tourist infrastructure). The defined expectations of representatives of municipalities testify to a high awareness of the benefits associated with this type of investment (Biniek 217).

19.6. Impact assessment of the BIII offshore wind farm - factors conflicting factors

The analyses described above were conducted as part of the 2015 Report for an offshore wind farm facility. They were not subject to differentiation due to the number of planned wind power facilities, which is of secondary importance from the point of view of the source itself for the possibility of conflict. Therefore, it was considered that the conflict assessments conducted in the 2015 Report remain valid also for the Project after the proposed changes.

19.6.1. Impact on comfort life

Visibility of IMF BIII from permanent locations (exposure to the sea from places of residence, leisure or work)

It is expected that the planned OWF will not be visible from permanent residences, i.e., places of residence (see Landscape Impact Analysis Section 9 Volume IV of the EIA). Instead, it can be seen from points having exposure to the sea. These points in particular include the beach, dunes, lighthouses, ports, fishing boats, cruise ships, cruise ships, tourist ships. If there are workplaces at such points, the IMF will be visible from them. However, it should be emphasized that the visibility of the OWF will be temporary, as fishing vessels are moving and land-based work is largely seasonal (temporary workers).

The assessment of the impact on living comfort should take into account the visual impact of the OWF on the seascape, which may indirectly affect tourism, from which local communities derive income. The loss of this income could significantly disrupt the current comfort of life. However, taking into account the considerable distance of the project from the coastline (about 23 km), it should be concluded that the planned OWF will not be a landscape dominant from any vantage point, including from points of permanent residence, even under very good visibility conditions. The exception will be observers on vessels passing in close proximity to the IMF.

Accordingly, the receptor's significance was considered **medium**.

It was considered that the visibility of OWF BIII from permanent locations would be an impact with the following characteristics:

- negative,

- scale of local exposure,
- frequency of impact: constant,
- duration: long-term,
- low intensity - a very small number of objects and people exposed: OWF BIII will not be a landscape dominant, wind turbines may be incidentally faintly visible, the number of people exposed is estimated to be small, a large proportion of beach workers are visitors (work is seasonal and short-term),
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - insignificant,
- receptor significance - medium,
- significance of impact - negligible.

Impacts (noise, PEM) from transmission infrastructure

At the outset, it should be emphasized that these impacts may affect living comfort only in the context of cumulative impacts of the BIII OWF with those of the MIP (i.e., the farm's transmission infrastructure).

The receptor's significance was considered medium.

The impacts (noise, PEM) from the transmission infrastructure were considered to be impacts with the following characteristics:

- negative,
- scale of local exposure,
- frequency of impact: constant,
- duration: long-term,
- impact intensity: low,
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - insignificant,
- receptor significance - medium,
- significance of impact - negligible.

19.6.2. Impact on limiting the use of resources marine

Restriction on access to fishing areas

Surveys conducted have shown that the area of the planned project is not a particularly valuable fishery. The results of the annual marine traffic monitoring (see Section 14 of Volume III of the report) did not show a high intensity of traffic of vessels and fishing boats or recreational craft within the area of the planned OWF BIII, which leads us to believe that the farm area is not intensively used by sea angling.

Analyses of commercial fishing also did not reveal the existence of productive fisheries within the boundaries of the area.

However, as fishing is an important source of income for residents of coastal communities, the importance of the receptor in the analysis of potential social conflicts was considered high.

It was considered that restriction in access to fishing areas (as a conflict factor) would be an impact with the following characteristics:

- negative,
- regional exposure scale,
- frequency of impact: constant,
- duration: long-term,
- impact intensity: medium,
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - moderate,
- receptor importance - high,
- significance of impact - moderate.

Restriction in access to tourist shipping areas

Tourist boating, for the purposes of this report, is understood as the movement of sailing or motor yachts in maritime areas, of a recreational nature.

The impacts of OWF BIII on offshore boating are considered to be analogous to other types of vessels of similar size and similar navigational equipment.

Due to the low use of the maritime space covered by the BIII OWF boundary by tourist shipping, the importance of this receptor was considered low.

It was considered that the restriction in access to tourist shipping areas would be an impact with the following characteristics:

- negative,
- scale of local exposure,
- frequency of impact: constant,
- duration: long-term,
- impact intensity: low ,
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - insignificant,
- receptor importance - low,
- significance of impact - negligible.

Restriction on access to tourist use of beaches

The restriction on access to tourist use of the beaches is solely related to the laying of the export cable. IMF BIII does not cause restrictions on the use of beaches. The exclusion area will be limited to the location of the cable laying work. In terms of impacts on tourists, this could be relevant if the construction work is done during the tourist season. Once the construction work is completed, the closed section of the beach will be reinstated for use by tourists.

Given the above, the receptor's importance was considered low.

It was considered that the restriction in access to tourist use of beaches would be an impact with the following characteristics:

- negative,
- scale of local exposure,
- frequency of impact: one-time,
- duration: instantaneous,
- impact intensity: low,
- reversibility: the impact will cease after the cable is laid,
- magnitude of impact - insignificant,
- receptor importance - low,
- significance of impact - negligible.

19.6.3. Impact on sensitive sources of income income

Impact on tourism revenues

Potential impacts of offshore wind farms on coastal tourism include both impacts classified as negative and positive.

Negative impacts include those mainly related to the impact on the seascape of vessels involved in the construction of the farm and the appearance of individual farm facilities (e.g., turbines, transformer stations). They have the potential to reduce the attractiveness of coastal areas to tourists, thereby reducing the income generated from tourism.

Positive impacts associated with offshore wind energy include the development of specialized tourism, targeting OWFs as a tourist attraction. Experience in other countries shows that such attractions are very popular with the public.

Given the above, the importance of the receptor was considered high.

It was considered that the impact on tourism revenues would be an impact with the following characteristics:

- mixed (negative/positive),
- regional exposure scale,

- frequency of impact: constant,
- duration: long-term,
- impact intensity: medium,
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - moderate,
- receptor importance - high,
- significance of impact - moderate.

Impact on fisheries revenue

For safety reasons, the offshore wind farm area may be closed in whole or in part to all vessels that are not associated with the construction of the farm, including commercial fishing vessels. Entities excluded from fishing in an area are forced to firstly change flow routes (in case the farm is located on an existing flow route), and secondly move to other alternative fisheries, which may lead to increased pressure on available resources within those fisheries. Any such changes could affect the amount of income earned from fishing.

It should be emphasized that the studies conducted have not shown that the area of the planned project is a valuable fishery. Nevertheless, since fishing is a large industry that exists in the coastal regions, and the residents of these regions rely heavily on income derived from fishing, the importance of the receptor was considered to be very high.

It was considered that the impact on fisheries income would be, in the context of potential social conflicts, an impact with the following characteristics:

- negative,
- regional exposure scale,
- frequency of impact: constant,
- duration: long-term,
- impact intensity: low,
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - small,
- the importance of the receptor - very high,
- significance of impact - moderate.

19.6.4. Impact on sensitive goods cultural

For the purposes of this study, area forms of nature conservation were considered sensitive cultural assets, which included:

- Slowinski National Park - located about 19 kilometers away, south of the planned IMF,
- natura 2000 areas (located wholly or partially in Polish maritime areas):

- Slupsk Shoal PLC990001 - about 5 km west of the planned OWF,
- Coastal Baltic Waters PLB990002 - about 8 km south of the planned OWF,
- Ostoja Słowińska PLH220023 - about 19 km south of the planned OWF,
- Pobrzeże Słowińskie PLB220003 - about 23 km south of the planned OWF,

- Coastal Landscape Park about 35 kilometers southeast of the planned IMF,
- areas of protected landscape (OCHK):
  - Coastal OCHK - located about 25 km southeast of the planned OWF,
  - OCHK Pobrzeża east of Ustka - located about 34 km southwest of the planned OWF.

Impact on coastal and marine protected areas (national parks, Natura 2000 sites)

The project will be located outside the boundaries of national parks and Natura 2000 areas, but in close proximity to the Slupsk Shoal Natura 2000 area. The results of the analysis showed that after the implementation of appropriate minimization measures, the planned investment will not significantly affect this area or the conservation objectives for which it was established, or the other areas mentioned above. However, in the context of social analysis, it is necessary to take into account the possibility of social conflicts on this background. Indeed, the public may be concerned about the negative impact of the investment on protected areas. Also, non-governmental environmental organizations can take action in their view to protect valuable natural areas.

Given the above, the receptor's significance was considered medium.

It was considered that the impact on coastal and marine protected areas (national parks, Natura 2000 areas) would be an impact with the following characteristics:

- negative,
- regional impact scale,
- frequency of impact: repetitive,
- duration: medium-term,
- impact intensity: low,
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - small,
- receptor significance - medium,
- significance of impact - low.

Impact on landscape conservation areas (landscape parks and protected landscape areas)

What is protected is the landscape on the territory of an area form of nature conservation, not the landscape visible from its premises. Thus, the BIII OWF will not have any impact on the area forms of landscape protection indicated above. It should be noted, however, that the planned investment visible, for example, from the dunes of the Slowinski National Park, may to some extent affect observers' visual perception of the landscape as less attractive. The impact of OWFs on the landscape is a frequent reason for protests against the implementation of such investments.

Given the above, the receptor's significance was considered **medium**.

It was considered that the impact on landscape conservation areas would be an impact with the following characteristics:

- negative,
- regional exposure scale,
- frequency of impact: repetitive,
- duration: medium-term,
- impact intensity: low,
- reversibility: the impact will cease after the decommissioning of the farm,
- magnitude of impact - small,
- receptor significance - medium,
- **significance of impact - low.**

19.7. Actions taken by the investor investor

Among the main allegations of individuals and institutions undertaking protests, the most frequently cited are:

- lack of public consultation before the investment;
- lack of clear and specific information from the investor on the parameters of the investment and its impact on the environment and human health and life;
- lack of clear and specific information from local authorities: the mayor, councilors, the district governor.

In order to minimize the risk of social conflicts, the Investor in late 2013-early 2014 conducted a professional information and education campaign, aimed at residents of selected municipalities, remaining in the zone of potential impacts of the Project, the objectives of which included:

- preparation and maintenance of the project website, including:
    - basic information about the Investor,
    - a general description of the project, including its purpose,
    - a description of possible and most likely technological solutions in key components,
    - description of the construction and operation process,
    - a description of the anticipated implementation schedule,
    - characteristics of the most significant impacts of the project,
    - a description of the economic benefits of the project;
- meetings with local authorities (mayors, aldermen, councilors);

- meetings with representatives of fishing communities;
- informational materials on offshore wind energy and a regional knowledge competition in elementary and middle schools;
- open days for residents;
- an information campaign using informational posters;
- an information campaign in the local media.

Work is currently underway to prepare the IMF BIII project site.

19.8. Risk assessment of potential conflicts social

Based on the analysis performed, it was concluded that the threat of potential social conflicts caused by the preparation and implementation of the BIII OWF may vary from municipality to municipality. A significant mitigating factor affecting the occurrence of social conflicts is the successful implementation of a comprehensive education and information campaign for the Central Baltic offshore wind farm III. As a result, the level of knowledge about wind power among the analyzed municipalities will increase significantly. Mitigating factors across all municipalities also include a favorable political climate.

The following table presents the results of the assessment, by municipality.

Table 10. Results of the analysis of potential social conflicts related to the implementation of OWF BIII

Municipality	Factors affecting the risk of social conflicts
Darlowo (municipality)	Strengthening factors: • fisheries and fishing expenses; • the municipality's high income from tourism; • rich accommodation for tourists; • a large number of businesses related to accommodation and food services; • high share of registered unemployed in the population; • the existence of hiking trails; • the existence of fishing organizations. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Darlowo (rural municipality)	Strengthening factors: • rich accommodation for tourists; • high share of registered unemployed in the population;

Municipality	Factors affecting the risk of social conflicts
	• the existence of hiking trails, protected areas, as well as a spa, recreational developments and suburban neighborhoods; • the existence of fishing organizations. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Postomino (rural municipality)	Strengthening factors: • rich accommodation for tourists; • high share of registered unemployed in the population; • the occurrence of area forms of nature conservation, hiking trails, recreational development and single-family house estates. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Ustka (municipality)	Strengthening factors: • rich accommodation for tourists; • the occurrence of tourist facilities; • a large number of businesses related to accommodation and food services. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • low share of registered unemployed in the population; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Ustka (rural commune)	Strengthening factors: • rich accommodation for tourists; • the existence of hiking trails and tourist facilities;

Municipality	Factors affecting the risk of social conflicts
	• a large number of businesses related to accommodation and food services. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • low share of registered unemployed in the population; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Smołdzino (rural municipality)	Strengthening factors: • rich accommodation for tourists; • the presence of hiking trails and tourist facilities. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • low share of registered unemployed in the population; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Slupsk (rural municipality)	Strengthening factors: • rich accommodation for tourists; • the presence of hiking trails, tourist facilities, suburban settlements. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • low share of registered unemployed in the population; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Leba (municipality)	Strengthening factors: • rich accommodation for tourists; • the presence of hiking trails and tourist facilities; • high share of registered unemployed in the population; • a large number of businesses related to accommodation and food services (more than 50%). Mitigating factors: • diversification of sources of municipal income;

Municipality	Factors affecting the risk of social conflicts
	• the activities of many business entities; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Wicko (rural municipality)	Strengthening factors: • rich accommodation for tourists; • high share of registered unemployed in the population; • the existence of tourist attractions and facilities. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • political climate; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Choczewo (rural municipality)	Strengthening factors: • rich accommodation for tourists; • the existence of tourist attractions and facilities and suburban settlements. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • the level of knowledge about wind energy. Neutral factors: • expenses related to promotion and tourism.
Krokowa (rural municipality)	Strengthening factors: • rich accommodation for tourists; • the presence of tourist attractions and facilities, mainly area forms of nature conservation. Mitigating factors: • diversification of sources of municipal income; • the activities of many business entities; • low share of registered unemployed in the population; • the level of knowledge about wind energy; • political climate. Neutral factors: • expenses related to promotion and tourism.

Source: Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

Since the change in the conditions of implementation and operation of the Project does not affect the risk factors for social conflicts, thus the proposed change in the parameters of the Project does not affect the outcome of the environmental impact assessment conducted as part of the proceedings during which the Environmental Decision was obtained.

20. Summary and conclusions

In assessing the impact of the proposed modification of the conditions for implementation and operation of the Project, as determined by the Environmental Decision, no users were identified for which the proposed modification of the conditions for implementation and operation of the Project would affect the outcome of the assessment for the Project in the parameters for which the Environmental Impact Assessment was conducted in the 2015 Report and the Environmental Decision was issued. For these reasons, the results of the 2015 Report's impact assessment of the BIII OWF remain valid. In the course of the assessment conducted in the 2015 Report, no significant impacts on selected users of marine areas were identified. The evaluation included:

- coastal tourism,
- recreational fishing,
- water sports (windsurfing, kitesurfing, sea sailing, wreck diving),
- military operations,
- radiolocation and communications systems,
- civil aviation,
- military aviation,
- shipping,
- opportunities to explore, identify and exploit mineral resources of the seabed,
- maritime industry,
- people's health and lives.

The analyses performed did not show that the BIII OWF would be a source of significant negative impacts on other users of marine areas, either alone or in cumulation with other projects.

Impacts on coastal tourism may be indirectly linked to visual impacts of the OWF on the seascape. Visual issues and perceptions of this type of investment are very subjective - what will be perceived by some as a disturbance of the landscape leading to a reduction in the tourist attractiveness of the region, may even be perceived by others as an attraction in itself. The IMF BIII could attract entirely new groups of tourists to the coastal areas and thus lead to the development of a new tourism segment. The significance of the impact on coastal tourism at the construction and decommissioning stages was assessed as negligible, and at the operational stage as low.

The area of the planned project is not a particularly valuable place for recreational fishing. At present, there are no known plans to exclude the OWF area from fishing vessels or possibly alter their shipping routes. The significance of the impact on recreational fishing at all stages was assessed as negligible.

The impact of the planned development on water sports opportunities was considered marginal.

The planned location of the OWF is not in military areas. It also poses no threat to civilian or military aviation.

The planned project could be a source of impacts on radiolocation and communications systems. Final conclusions in this regard can only be drawn at a later stage of the project, when the final number of wind turbines, their technical parameters and spacing are known. Then, in consultation with the relevant administrative authorities, decisions will be made on the need for countermeasures to minimize such interactions.

The planned project lies outside the area of heavy shipping traffic. However, due to the increase in ship traffic, the BIII OWF could be a source of impacts on shipping, including existing and planned shipping routes. However, these will not be significant impacts. If the right of passage through the farm area is restricted, it will be necessary to change the customary routes of some vessels and divert them to the north or south of the BIII OWF area, depending on the planned destination. Based on the results of a full navigational expertise, which will be developed at a later stage of the project, the developer will implement, in consultation with the maritime administration and in accordance with applicable laws, appropriate measures to minimize navigational risks (e.g., marking of farm elements, marking of the farm on maps, communications). Therefore, it is assumed that possible collisions between vessels or between vessels and farm components will be unplanned events, caused mainly by human error, mechanical failure (resulting, for example, in loss of ship steering) or severe weather conditions.

The scale of conflict between offshore wind energy and the mining industry in the BIII offshore wind farm area is small - there are no valid licenses for exploration, prospecting and extraction of hydrocarbons from deposits issued under the provisions of the PGG.

The BIII OWF may also be a source of positive impacts. Particular attention is paid to the opportunity for the domestic industry related to the construction of OWF components and vessels for their transportation, as well as the emergence of new jobs.

There is a possibility of unplanned events (e.g., ship collisions or accidents) at each stage of the project. However, the probability of such situations occurring is very low.

No significant negative impacts of OWF BIII on human health and life have been identified. No transboundary impacts have been identified.

There was no risk of social conflicts arising in connection with the implementation of the Project. A public awareness and education campaign has been conducted for the planned BIII OWF area. The public consultation process showed no public protests.

21. Shortcomings and gaps in modern knowledge

During the work on this report, difficulties and gaps in contemporary knowledge were encountered, as described below.

The main difficulty in assessing the impact on coastal tourism was the fact that the project was pioneering in Poland. Offshore wind farms are still new technologies, pioneering in Poland, which can attract entirely new groups of tourists to coastal areas and lead to the emergence of a new segment of tourism. Tourism can be affected, in particular, by visual issues of the project, which are very subjective in nature - what will be perceived as a tourist attraction by some, may be perceived by others as a disturbance of the landscape leading to a reduction in the tourist attractiveness of the region. The lack of objective standards and regulations directly addressing the assessment of visual impacts has proven to be a handicap for assessing impacts on coastal tourism.

Considering the characteristics of marine traffic (Chapter 14 of Volume III of the EIA), it cannot be ruled out that the BIII OWF region is a recreational fishing site. The analysis of impacts on commercial fisheries (see Chapter 10 of Volume IV of the ROIA) did not reveal any particularly valuable fisheries within the boundaries of the BIII OWF. Based on this, it can therefore be concluded that it is also not a particularly attractive fishery for recreational fishing. However, there is no detailed data to determine exactly what the intensity of recreational fishing activity is in the area of the planned project.

It is also difficult at this stage to estimate the impact on recreational fishing of the so-called "artificial reef effect," which at the stage of operation may translate into an increase in the biodiversity and abundance of ichthyofauna in the area.

A handicap, particularly for the shipping analysis, was the lack of data on the number of vessels that will be involved in the various stages of the project. At this stage, the area of the basin that can be excluded from flow is also unknown. There is a possibility that the movement of certain types of vessels may be allowed within the boundaries of the farm area - such decisions, however, will be made by the investor at a later stage and were not taken into account in the estimation of the scale of potential impacts of the project (the most pessimistic variant was taken into account, i.e. the total area of the farm only). For assessing the impact on shipping, the lack of information on the location of potential construction and servicing ports for the BIII offshore wind farm also proved to be a hindrance. Likely port locations are discussed in Chapters 4-5 of Volume II of the EIA, respectively, but final business decisions will be made at a much later stage. Thus, the assessment in many cases was based on certain hypothetical assumptions, which are subject to change.

The main limitation of the assessment of the impact on communications and radiolocation systems is that it was made on the basis of theoretical calculations based on specially developed models and software tools. Therefore, actual impacts may differ from theoretical assumptions. It should be noted, however, that in accordance with the precautionary principle, the models used are generally pessimistic and consider worst-case scenarios, so the actual impacts should be smaller.

In addition, the lack of knowledge of the final technical parameters of the BIII OWF and other planned OWFs made it impossible in many cases to draw precise conclusions about the scale of potential impacts.

22. Literature and other sources

22.1. Acts legislation

1. Convention "On the Law of the Sea" (United Nations Convention of the Law of the Sea - UNCLOS)
2. Ordinance of the Minister of Family, Labor and Social Policy dated June 12, 2018 on the highest permissible concentrations and intensities of factors harmful to health in the work environment (Journal of Laws item 1286, as amended)
3. Ordinance of the Minister of Agriculture and Rural Development of July 6, 2015 on the dimensions and protection periods of marine organisms caught in recreational fishing, and the detailed manner and conditions for carrying out recreational fishing (consolidated text: Journal of Laws 2021, item 2056)
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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 12

Assessment of the impact on biodiversity

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Abbreviations and definitions

Birds Directive	Directive of the European Parliament and of the Council 2009/147/EC of 30 November 2009 *on the conservation of wild birds* (OJ L 20, 26.1.2010, p. 7–25)
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.07.1992, p. 7–50)
OWF	Offshore Wind Farm
BIII OWF	Bałtyk Środkowy III Offshore Wind Farm
WCS 2015	The worst case scenario from the Report 2015, which is a set of project parameters causing the worst case impacts, and which was the basis for conducting the environmental impact assessment during the procedure concluded with the issuance of the Environmental Decision.
PSZW	Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas
Report/EIAR	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
Biodiversity	Diversification of all living organisms originating from terrestrial, marine and other aquatic ecosystems and ecological communities of which they are part. It concerns diversity within the species, between the species and ecosystems.
EIA Act	Act of October 3, 2008 *on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments* (consolidated text: Journal of Laws of 2022, item 1029)

1. Non-specialist summary

The non-specialist summary of the results of the assessment of the impact of the update of the conditions of implementation and operation of the Project – BIII OWF, for which the Environmental Decision was issued, on biodiversity is included in Point 5.12 of Volume VI of the Report.

2. Introduction

This chapter of the Report contains an assessment of potential impacts of changes and the update of the conditions of implementation and operation of the Project – the BIII OWF on biodiversity, defined pursuant to the Convention on Biological Diversity, done in Rio de Janeiro on 5 June 1992 as *"the variability among living organisms from terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. It concerns diversity within the species, between the species and ecosystems".* This assessment was carried out on the basis of the "Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment" (European Commission, 2013) prepared in 2013 at the request of the European Commission (hereinafter referred to as: the Guidance).

Unlike the assessments for the environmental elements described in Sections 1 to 11 of this Volume, the assessment presented in this section is not directly based on the assessment

carried out in the Report 2015[1]. This results from the fact that at the time of development of the Report 2015, the provisions of the EIA Act concerning the content of the environmental impact report did not require a separate assessment of the expected impact of the project options on biodiversity, and thus, without a clear indication of the authority issuing the decision on environmental conditions, it was not carried out. Currently, the legislation still does not explicitly mention such an obligation, but lists all the components of the notion of biodiversity as being the subject of a comparison of the options under consideration, also taking into account the wording used in Directive 2011/92/EU of the European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment, such an assessment is carried out. Therefore, it is included in this Report to ensure its completeness and consistency.

Therefore, the assessment carried out here was not carried out in relation to the impacts assessed for the Project in the parameters approved in the Environmental Decision and to the set of parameters of the Project, which is the WCS 2015, as it occurs in sections 1–12. However, since the conducted biodiversity impact assessment is based on the conducted assessment of the impact on individual biotic elements of the environment, it is indirectly related to it.

The EU biodiversity policy is based on the Natura 2000 network established by the Habitats Directive and Birds Directive, but it should be borne in mind that the concept of biodiversity is not limited to this network alone:

- The Birds and Habitats Directives also cover species and habitats outside Natura 2000 network sites;
- Pursuant to Article 6 section 3 of the Habitats Directive, any plan or project likely to have a significant effect on the Natura 2000 network site, even if carried out outside that site, requires “appropriate assessment”;
- the provisions of Article 10 of the Habitats Directive stress the importance of ensuring the ecological coherence of Natura 2000 network sites;
- finally, the EU biodiversity strategy for 2030, authorized by the European Parliament and the Council, covers the entire territory of the EU and highlights the benefits that the ecosystem brings us and threats related to the loss of biodiversity and ecosystem breakdown. It contains a package of measures necessary to stop the loss of biodiversity and the degradation of ecosystem services by 2030 and to restore them as much as possible (European Commission, 2020).

In the assessment of the impact of the BIII OWF on biodiversity, all the main problems occurring in relation to it, specified in the Guidance, were analyzed, i.e.:

- degradation of ecosystem services;
- loss of habitats, fragmentation (including the extent or quality of the habitat, protected areas, including Natura 2000 sites, habitat fragmentation or isolation, as impact on processes important for the creation and/or maintenance of ecosystems);
- loss of species diversity (including species protected under the Habitats Directive and the Birds Directive);
- loss of genetic diversity.

3. Biodiversity in the area of the BIII OWF

Information on the biodiversity found in the BIII OWF area and in the zone of its potential

impacts, in relation to individual biotic environment resources, is presented in Sections 6–11 of Volume III of the Report (characteristics of the resources). The list of information on the species diversity of the resources found in the BIII OWF area and in the surrounding buffer zone during the surveys carried out in the years 2012–2013 is presented in Table 1 below.

Table 1. Species diversity in the BIII OWF area and in its buffer zone based on the results of surveys carried out in 2012–2013

Resource	Species diversity
Phytobenthos	• 4 species of algae were recorded from the brown and red algae group, growing on the sandy seabed, cobbles and single boulders, the surface of which was very often overgrown with compact and dense colonies of mussels and Balanus; • one species is covered by the national protection system and is included in the so-called Polish Red List of plants and fungi: Furcellaria lumbricalis
Macrozoobenthos	• 27 macrozoobenthos species or clusters were recorded; • 2 communities were separated, inhabiting different types of the seabed; • The species composition in both communities was typical of the shallow and medium deep seabed of the open area of the southern Baltic Sea; no existence of rare and protected species were found. • Mytilus trossulus, the main component of the diet of benthivorous birds, dominated in community I in terms of population. In community II, the dominant species in terms of population in this community was the sand-loving polychaette Pygospio elegans.
Fish	• 15 fish species (adults, larvae and roe in total) were recorded: garfish, three-spined stickleback, saithe, common seasnail, great sand eel, cod, plaice, shorthorn sculpin, mackerel, fourbeard rockling, rock gunnel, turbot, European flounder, sprat, herring, lumpfish, lesser sand eel, vivaparous eelpout, sandeel fish, gobies (due to difficulties in identifying larvae by species, sandeel fish and gobies were identified by family). • No adult protected or endangered fish species were found; • A small number (25 pcs) of common seasnail larvae, covered by partial species protection in Poland, and 9 pcs of gobies larvae were found; with high probability belonging to the sand goby species, also covered by partial species protection.
Seabirds	• A total of 34 species of waterbirds were found, including 15 species of seabirds and 23 species not closely related to the aquatic environment; • The following species were identified in the group of seabirds: long-tailed duck, European herring gull, common scoter, razorbill, velvet scoter, common guillemot, lesser black-backed gull, little gull, great black-backed gull, black-throated diver, black guillemot, black-legged kittiwake, red-throated diver, common eider and parasitic jaeger; • All of the identified species of seabirds are covered by species protection in Poland – European herring gull is covered by partial protection, other species by strict protection);

Resource	Species diversity
	• The black-throated diver, red-throated diver and little gull are listed in Annex I to the EU Birds Directive, while two species – velvet scoter and long-tailed duck – were classified by the IUCN as endangered species in the vulnerable category – VU.
Marine mammals	• The monitoring indicated the presence of three marine mammal species in the area of the planned wind farm and adjacent waters – porpoise, gray seal and harbor seal; • All animals found during visual monitoring from the air were adult, no juveniles were observed.

Sections 8, 9 and 11 of Volume III of the Report contain information on the diversity of species moving over the water region in question – birds and bats during spring and autumn migrations. Table 2 below presents a list of information on the species diversity of birds and bats moving over the BIII OWF area.

Table 2. Species diversity of birds and bats moving over the BIII OWF area and its buffer zone during spring and autumn migration

Resource	Species diversity
Migratory birds	• 97 species (32 waterbird and 65 terrestrial bird species) were determined during spring migration and 56 species (25 waterbird and 31 terrestrial bird species) were identified during autumn migration; • The species composition included almost all seabird species found in the Baltic Sea region and all major terrestrial bird taxonomic groups; • Sea ducks dominated, in particular long-tailed ducks, common scoters and velvet scoters; • The presence of two species of divers was recorded – black-throated diver and red-throated diver, so was the presence of all three species of razorbills inhabiting the Baltic Sea area – razorbill, common guillemot and black guillemot.
Bats	• During two monitoring cruises carried out in the spring migration period in 2013, sounds emitted by the common noctule were recorded in the north-eastern part of the BIII OWF area; this was the only observation of bats throughout the whole survey campaign; • During the surveys of bat activity in the years 2016–2017 in the water region adjacent to the BIII OWF area, at listening points located closest to the area of the planned farm, the activity of Nathusius' pipistrelle was found in the period of spring and autumn migrations, while the activity of common noctule, Soprano pipistrelle and Leisler's bat was found in the period of autumn migrations.

Since the species moving over the analyzed water region are not directly related to it, they were not taken into account in the assessment of the impact of the planned BIII OWF on biodiversity in its area.

4. Assessment of the impact of the BIII OWF on biodiversity

Chapters 3–7 of Volume IV of the Report present the assessment of the impact of the BIII OWF in relation to individual biotic environment resources important from the point of view of the assessment of the impact of the planned project on biodiversity. In principle, the starting point for the assessment of the impact on individual resources of the biotic environment was a set of Project parameters causing the worst case impact, defined as the worst case scenario – WCS 2015. And it was this set of parameters that was the basis for carrying out the environmental impact assessment in the course of the procedure ending with the issue of the Environmental Decision. The worst case scenario – WCS 2015 was individual sensitivity determined for individual receptors – see sections 3–7 of Volume IV of the Report. The methodology of such assessments assumes that, if the considered options of the Project implementation are included in the set of parameters constituting the WCS (they are smaller or equal in terms of the nature and significance of the impact, thus the assessment carried out for the WCS 2015 will be adequate for all such options. Additionally, in Chapters 12 of each of the above-mentioned sections, the impact of the planned farm on the structure and function of Natura 2000 sites, conditioning the sustainable survival of populations of protected species in them, was assessed. The results of individual assessments were taken into account during the assessment of the impact of the BIII OWF on biodiversity. As part of the assessment, the impact of the planned farm was analyzed in the context of:

- the possibility of degradation of ecosystem functions, conditioning the sustainable existence of populations of species, benthic habitats and protected natural habitats;
- loss, fragmentation and isolation of species habitats, including benthic habitats and protected natural habitats;
- loss of species diversity;
- loss of intra-species genetic diversity.

4.1. Impact on ecosystem services

The implementation of the BIII OWF will not cause any changes in environmental conditions in its vicinity, which could result in the disturbance of the marine ecosystem functions, within which it will be located. During the construction and decommissioning of the BIII OWF, works will be carried out causing local disturbances in the bottom sediment structure, which will directly result in the increase and distribution (resuspension) of suspended matter in the water column and its re-deposition on the seabed. A change in habitat conditions related to the disturbance of the bottom sediment structure may affect the functioning of marine organisms within its range. However, it should be emphasized that this will be a short-term change (the expected duration of remaining of suspended matter in the water is from several to a dozen or so hours), with a locally limited range. The additional layer of sediments deposited as a result of suspended matter sedimentation will not significantly affect the habitat conditions of benthic organisms or their continuity in the area. As a result of disturbance of bottom sediments, some

amounts of pollutants will be released from them, however, it is expected that they will be insignificant and will not cause a significant deterioration of the quality of pelagic habitats. The results of sediment spread and precipitation modeling are presented in Section 4, Chapter 3.14 of Volume II of the EIAR). The modeling used was carried out for the purposes of the Report 2015, so it is based on the assumption of 126 gravity-base foundations in the option approved by the Environmental Decision and 208 gravity-base foundations in the WCS 2015, so currently, with a significant reduction in the number of foundations and their type (exclusion of gravity-base foundations for the foundation of the wind turbines), the impacts will be much smaller.

Disturbances occurring during the construction and decommissioning stages of the BIII OWF, related to vessel traffic and installation of farm components, will result in scaring away and temporary displacement of marine organisms from habitats. The emission of underwater noise at the construction stage of the BIII OWF generated during the installation of foundations may cause disturbances in the functioning of marine mammals and fish in the farm area. The greatest impacts in this respect will be those of the application of monopile foundations, as their installation potentially involves the highest emission of underwater noise (see Section 4, Chapter 6.13 of Volume II of the EIAR). However, it should be emphasized that any disturbance of the habitat function of the water region in relation to marine mammals and fish related to the construction of the planned farm will not be permanent and will cease after the completion of installation works. Moreover, at the farm operation stage, the attractiveness of its area for the above-mentioned organisms may be increased due to the expected occupation of underwater wind turbine structures by benthic organisms.

Works carried out at the OWF construction stage will cause physical destruction of benthic organisms (macrozoobenthos) which inhabit the bottom sediments in the construction areas and their immediate vicinity. This will cause some deterioration of the food base for marine organisms using benthic resources, however, the spatial scale of this disturbance will be insignificant. Additionally, in connection with the implementation of the BIII OWF, a new hard substrate will be introduced into the marine environment, which may serve as a habitat for benthic organisms and increase their resources in the area of the planned farm (see Chapter 3.2 of this Section). Since wind turbines cause a scarring effect in most seabirds, it is expected that at the operation stage of the BIII OWF, the number of birds staying in its area and its immediate vicinity will be significantly reduced (see: chapter 3.2 of this Section). However, due to the availability of other habitats, including habitats more favorable for seabirds (including the Słupsk Bank), this impact will not result in the loss of the habitat function of maritime areas in the BIII OWF area.

At the same time, it should be emphasized that, as indicated by the results of the conducted surveys, the BIII OWF area is not a water region particularly important for seabirds in any period of the year, therefore the implementation of the planned farm will not contribute to the loss of a habitat crucial for the maintenance of the population of seabirds present in its area.

The results of the impact assessment for the BIII OWF on particular environmental receptors indicate that it will not significantly affect the basic ecosystem functions in the water region, i.e. the function of providing habitats and the production function of providing food resources for living organisms in this part of the Baltic Sea. In the worst case scenario, the BIII OWF will not cause the degradation of the marine ecosystem functions, within which it will be located, which determine the sustainability of species populations and habitats in its area.

4.2. Impact on habitats of species, including benthic habitats and natural habitats

The execution of the BIII OWF will result in occupation of a part of the surface of benthic habitats and destruction of benthic communities inhabiting them. However, the area of the seabed occupied in the option being the subject of this Report will be small and will amount to a maximum of approx. 0.1% of the farm area. Therefore, the execution of the BIII OWF will not lead to a significant reduction in the availability of benthic habitats or benthic resources constituting the food base of locally occurring marine organisms.

In connection with the execution of the BIII OWF, a new hard substrate will be introduced into the marine environment in the form of underwater surface of the wind turbine structure and a scour protection layer made of stones, which may serve as a habitat for benthic organisms. Taking into account the domination of mussel in the number and biomass of benthos found in surveys performed in the BIII OWF area, this organism and other periphyton organisms are expected to attach to the turbine foundation structures relatively quickly, which, in turn, will create favorable feeding conditions for some flatfish and some gobies, as well as shelters for juvenile fish. New hard structures, whether artificial or created by periphyton organisms, can also create an additional substrate suitable for demersal eggs from fish found during the survey. The effect of attracting fish to a newly established habitat may lead to an increase in the ability of sea mammals to obtain food. The new benthic communities will constitute an additional food base for the species of seabirds feeding on them, however, they will be used by birds to a small extent due to the deterrent effect of structures with rotating rotors, described below.

The presence of wind turbines at the operation stage of the BIII OWF will cause changes in the manner of using the space by seabirds. As in the vast majority of cases turbines act as a deterrent to birds, the areas directly adjacent to wind turbines are much less used as feeding grounds and resting places. Therefore, it is expected that at the stage of operation of the BIII OWF, a significant percentage of birds currently present there will be displaced from its area and direct vicinity (see Section 5.1 of Volume IV of the EIAR). However, it should be emphasized that, as indicated by the results of the conducted surveys, the BIII OWF area is not a habitat particularly important for seabirds in any period of the year, so there will be no loss of a habitat crucial for the maintenance of the population of seabirds present in its area.

The natural habitats protected as part of the Natura 2000 network, closest to the BIII OWF area, are located within the boundaries of the Słupsk Bank Natura 2000 site, located at a distance of approx. 5.5 km west of the area of the planned farm. The construction of the BIII OWF will not result in destruction or transformation of the habitats in question. Since the expected amounts of suspended matter transferred at the construction stage of the BIII OWF to the Słupsk Bank Natura 2000 site are practically unmeasurable, the implementation of the planned project will not in any way affect the condition of protected natural habitats or the prospects of their protection either.

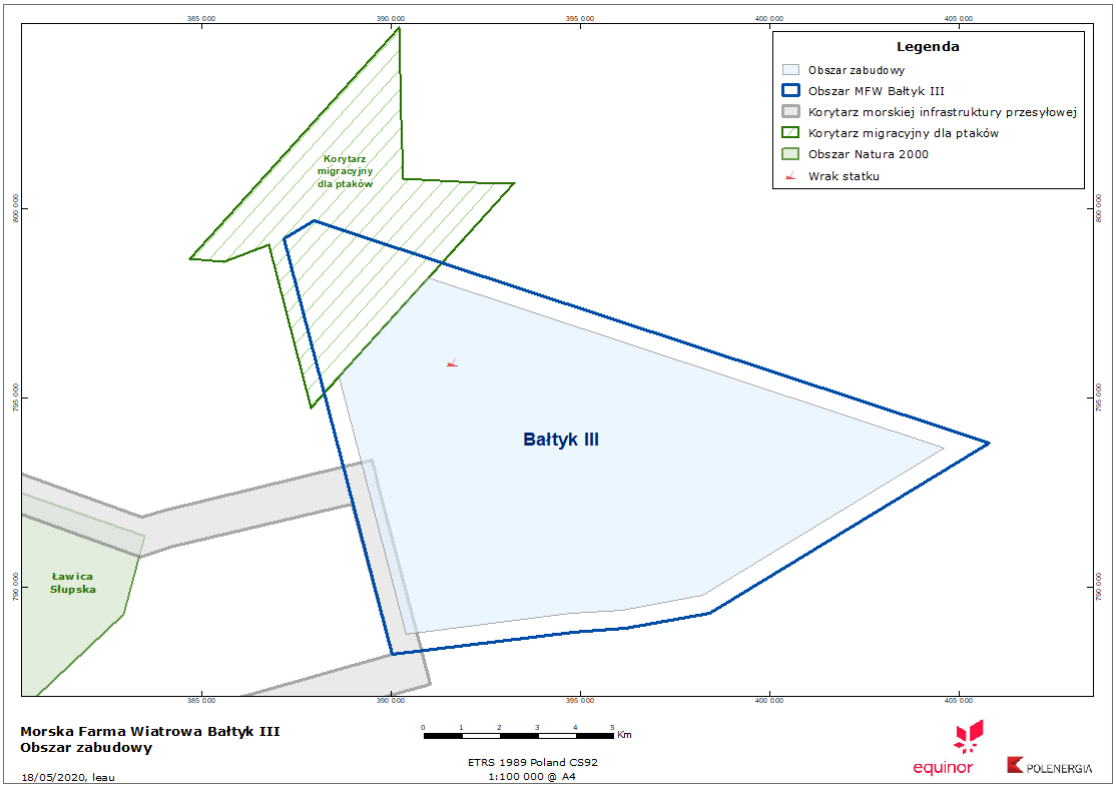
The execution of the planned farm will also not cause fragmentation or isolation of species habitats, including benthic habitats.

The only significant threat to the isolation of habitats important for seabird species occurring in the BIII OWF area during the overwintering period (long-tailed duck) may be the fact that a migration corridor to and from the important overwintering area, i.e. the Słupsk Bank, will be

developed with the group of OWF projects. It should be stressed that this is not an impact of the BIII OWF project considered individually or in combination with other projects for which decisions on environmental conditions were issued. In case of a long-term impact in the form of a barrier hindering the migration of protected species in the area of the Słupsk Bank on this area during autumn migration and from this area during spring migration, this area could lose its function of an overwintering area, especially for the long-tailed duck. This would be a significant impact on the integrity of this area. Such a barrier could be created by the BII OWF, BIII OWF and Baltica OWF projects in their original assumptions of equal development with wind turbines within all the areas covered by the possessed permits for erection and use of artificial islands, structures and devices in the Polish maritime area (PSZW).

Taking into account the above risk of a significant impact, the investor of the Baltica OWF project decided to leave the central, 4 km wide part of the farm uncovered with wind turbines. Such a corridor should provide ducks with the possibility of flying between two large groups of wind turbines (BII OWF and Baltica 2 in the west and BIII OWF and Baltica 3 in the east). However, the corridor was planned in such a place that its “exit” from the south-eastern side is partially occupied by the area of allowed development with wind turbines under the currently valid decision on environmental conditions issued for the Bałtyk Środkowy III OWF project. To avoid the risk of creating a barrier for migratory long-tailed ducks, the Investor decided to exclude from development with the elements of the Project the north-western corner of the area intended for its implementation, thanks to which the undeveloped water region located between the planned Bałtyk Środkowy III farm and the Baltica 3 farm and the Baltica 2 farm will ensure the possibility of movement of the long-tailed duck in and from the Słupsk Bank during migration (see Section 5.1 Volume IV of the EIAR). The migration corridor for birds is presented in Figure 1.

Figure 1. Proposal of an undeveloped corridor between the BIII OWF and Baltica 3 OWF and the Baltica 2 Offshore Wind Farm



PL	EN
Legenda	Legend
Obszar zabudowy	Development area
Obszar MFW Bałtyk III	Bałtyk III OWF area
Korytarz morskiej infrastruktury przesyłowej	Offshore grid connection infrastructure corridor
Korytarz migracyjny dla ptaków	Migration corridor for birds
Obszar Natura 2000	Natura 2000 site
Wrak statku	Shipwreck
Ławica Słupska	Słupsk Bank
Morska Farma Wiatrowa Bałtyk III	Bałtyk III Offshore Wind Farm
Obszar zabudowy	Development area

The creation of a corridor in order to further mitigate the occurrence of a barrier for migratory long-tailed ducks is the result of joint mitigation measures taken by investors in order to determine the passage of approx. 5 km of the corridor facilitating the movement of the long-tailed duck to and from the Słupsk Bank during migration (see Section 5 Volume IV of the EIAR).

4.3. Impact on species diversity

The potential impact on the species diversity of the BIII OWF could consist in permanent displacement of some species from the project area or permanent significant depletion of their populations as a result of mortality as a result of collisions with rotors (birds, bats) or as a result of the impact of underwater noise (fish). However, as shown by the analyses and modeling carried out (see Sections 3–7 of Volume IV of the EIAR), there is no risk of significant impacts of this type for any species.

Taking into account the expected impact of the BIII OWF on the functions of the marine ecosystem within which it will be executed and on the habitats of species, including benthic habitats and natural habitats described in Chapters 3.1. and 3.2. above, it is not expected that the execution of the planned farm could cause a decrease in the species diversity of the organisms in its area.

4.4. Impact on genetic diversity

The execution of the BIII OWF will not cause isolation of local populations of marine organisms by creating an impassable barrier for them or a permanent depletion of their numbers. Therefore, it will not reduce genetic variability within species populations (i.e. intra-species genetic diversity) within the marine ecosystem within which it will be implemented.

5. Summary and conclusions

It is not expected that due to the construction of the BIII OWF, biodiversity in the Baltic Sea region in which it will be located may be reduced. Taking into account the possible impacts of the planned farm, it was found that its implementation will not result in:

- degradation of ecosystem services on which the sustainable survival of local populations of species and benthic habitats and protected natural habitats would depend;
- significant loss of area and fragmentation of habitats of species, including benthic

habitats; and protected natural habitats;

- isolation of habitats of species, including benthic habitats and protected natural habitats;
- loss of species diversity of marine organisms;
- loss of intra-species genetic diversity of marine organisms.

References

European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 14

Climate and climate change impact assessment for the Project

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named “Construction of the Bałtyk Środkowy III Offshore Wind Farm”central Baltic III wind farm"
GHG	Greenhouse gases (greenhouse gases)
IMF	Offshore wind farm
OWF BII/ Project	Bałtyk Środkowy III Offshore Wind Farm
EIA	Environmental impact assessment
RES	Renewable energy sources
Report/EIA	Environmental Impact Assessment Report of Bałtyk Środkowy III OWF
UKK	Contractual Climate Categories
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (consolidated text, Journal of Laws of 2022, item 1029)

1. Summary non-specialist

A non-specialist summary of the results of the assessment of the impact of updating the conditions for implementation and operation of the Project - OWF BIII, for which the Environmental Decision was issued, on climate and climate change is included in Section 5 of Volume VI.

2. Introduction

This section of the Report assesses the potential climate and climate change impacts of updating and changing the conditions for implementation and operation of the Project - BIII OWF.

Unlike Sections 1-12 of this Volume, the assessment presented in this section is not based on the assessment conducted in the 2015 Report[1]. This is due to the fact that at the time the 2015 Report was prepared, the wording of the provisions of the EIA Law regarding the content of the environmental impact report was different and did not directly require separate addressing of climate and climate change impacts.

Accordingly, the assessment conducted here does not address the analysis of the impact of the Project update on the impacts it causes, as it does in relation to the impacts assessed for the Project in the parameters approved in the Environmental Decision and the set of Project parameters that constitute the 2015 NIS, as in Sections 1-12. This section conducts an impact assessment of the Project in the updated parameters.

An offshore wind farm is an energy investment aimed at generating electricity. This non-carbon technology, which generates electricity using a renewable energy source such as wind, owes its development primarily to climate policy, as laid out in a series of documents at the international, EU and national levels. The most important strategic documents whose environmental objectives (including climate) the BIII OWF may affect are presented in Section 2 of Volume I of the Report.

3. Characteristics

The characteristics of the climate in the area of the planned OWF Central Baltic III are presented in Section 14 of Volume II of this Report. The section also provides information on greenhouse gas emissions and discusses projected climate change scenarios.

4. Potential impacts

Spatially, climate depends on the latitude and longitude of the analyzed area, the altitude of the area and its terrain, as well as the presence, type and size of water bodies located in the analyzed area. These variables in the historical aspect for the area remain essentially constant, however, due to the indisputable trend in the global temperature increase of about 0.8°C (0.57 to 0.95°C) in the light of the evidence collected, it is necessary to reckon with a change in local weather conditions compared to those determined from historical data. In addition, when determining the climate of an area, it should not be forgotten that changes in spatial uncertainties, such as due to tectonic movements refer to a time scale of thousands of years according to the stratigraphic table. At the scale of reference to climate change that is recorded at the scale of anthropogenic activities, i.e. 1850-2019, it should be stated that changes in weather conditions, should be reflected in the design documents of these infrastructure projects, whose "life" period is calculated in many decades. From this perspective, the 25-30 year period

[1] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

of operation of the OWF seems short enough to justify not treating issues of climatic impacts as particularly important and central to the assessment of the BIII OWF.

Other climatic determinants, such as the thermohaline circulation, the type and density of vegetation cover, which affects the degree of absorption/refraction of solar radiation, local precipitation (snow, rain), water circulation and retention are examples of short-term dynamic variables reflected in the ensemble of factors determining the climate of an area. Another element that is closely related to the analyzed phenomenon, particularly affecting temperature changes, is the chemical composition of the ambient air and the concentrations of anthropogenic volatile chemicals dispersed in it, such as: water vapor/PM2.5, CH_4, CO, NH_3, SO_2,CO_2(e), N_2O, CCl_2F_2 (CFC-12), $CHClF_2$ (HCFC-22), CF_4 (tetrafluoromethane), C_2F_6, (hexafluoroethane), SF_6 (sulfur hexafluoride), constituting air pollutants with a greenhouse effect potential (equivalent) equivalent to that ofCO_2, the full list of which can be found in Annex II of Directive 2003/87/EC, the so-called "greenhouse gases". greenhouse gases (GHGs).

Emissions from anthropogenic sources, for which RES is an alternative, are a mixture of organic and inorganic, gaseous and volatile components, with different size, shape and properties, both chemical and physical. Air emissions of chemicals and solids (C, PM) from energy activities converted intoCO_2 equivalent emissions, the so-calledCO_2(e), account for 41% (World Bank, 2014/5, 85126) of total GHG emissions by sector, with an extremely high emission factor, virtually unchanged since the 1990s, which is particularly significant when one considers that more than 72% of energy comes from the combustion of coal (lignite, coal), i.e. the fuel with the highest GHG emission rate perCO_2 of about 880 g$_{CO_2}$ (e)/kWh. By comparison, GHG emissions from burning cold gas are half of those from burning coal. The amount of carbon stored in fossil energy sources and unconventional resources not yet mined and burned has the potential to raise the amount ofCO_2 in the atmosphere and the associated temperature increase, if burned over the coming centuries, to about 80°C compared to pre-industrial levels, for a GHG [ppm$_{CO_2\ eq}$] level of 1,000.

Bearing in mind the above threats and the directions for implementing GHG emission minimization, as one of a number of factors affecting climate change imposed on Poland by strategic documents, it becomes natural to apply zero-emission and low-carbon technologies such as wind power generation (see Section 2 of Volume I of the EIA).

In terms of climate change, the proper functioning of the broader energy sector (including RES), can only be guaranteed if climate factors are taken into account by adapting/designing infrastructure elements with extreme conditions in mind, i.e. designing/adapting design solutions based not on the past (weather patterns), but on predicted changes in weather trends in the future, as the assessment of the impact of climate change uses as a benchmark for the predicted climate values of those elements that currently form the basis of current technical regulations.

Analysis of projected climate change in terms of the operation of the energy sector indicates that in the future, the sector will have to face the following phenomena and trends:

- there will be a warming, expressed as an increase in the average daily temperature and a reduction in the number of cold days;
- the period of snow cover on the ground will decrease;
- precipitation will increase, expressed both by an increase in maximum daily precipitation and the number of days with extreme precipitation;
- the climate parameters indicated in the study will be characterized by high variability with respect to extreme values.

The analysis of the impact of climate change on the BIII offshore wind farm was carried out on the basis of several basic climatic elements, which were aggregated into Contractual Climate Categories ("CCAs"),

describing in the following paragraphs those climatic phenomena that are relevant to the analyzed Project, along with an assessment of the importance of each category.

It should be emphasized that although the fact of global climate change is negative, from the point of view of the issue under consideration, especially in terms of the increase in wind speed, it will be a benefit that will directly affect the amount of electricity generated and indirectly reduce the generation of energy from conventional sources and the associated climate consequences caused by greenhouse gas emissions. However, climate change, especially in terms of negative impacts in the coastal zone of marine coastal waters, may also potentially affect the planned Project, which must be taken into account when planning the Project.

According to the content of the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - *EU Climate Change* Adaptation *Strategy*[2], in terms of adaptation of infrastructure to climate change, the technical infrastructure of the coastal zone in terms of power transmission lines, wind turbines, associated ports and other supporting infrastructure will be particularly vulnerable to climatic factors manifested in extreme weather conditions, and especially related to the rise in the level of the Baltic Sea estimated at 0.18 to 0.58 meters in the year 2100, the change in ocean currents, and in connection with coastal zone marine erosion phenomena of increased severity due to an increase in the number of storm days and rising sea levels. In addition, it is expected that sea level rise will increase the likelihood of flooding and increase the effect of sea invasion on land during storms posing a threat to infrastructure elements. It should be noted that these phenomena constitute a syndrome, and therefore the occurrence of these phenomena will be a syndrome causing the exclusion of the infrastructure from operation for an indefinite period. This fact is taken into account in the construction project by using solutions and materials to minimize plant downtime.

4.1. Potential impacts of climate change on the OWF BIII

Taking into account the possible climate changes in the South Baltic area described above, the following theoretical impacts of the effects of these changes on the BIII offshore wind farm can be concluded:

- increasing the number of windy days and constant wind speed in the South Baltic area - will contribute to increasing the productivity of the wind farm and thus its positive climate impacts by increasing avoided CO2 emissions; it will also improve the economic effect of the Investment;
- an increase in the number and magnitude of extreme weather events, including hurricane winds, thunderstorms, precipitation - may contribute to periodic halting of power plant operations, with wind speeds exceeding design safety thresholds; in extreme cases, may lead to damage to power plants;
- a decrease in the number of frosty and very frosty days, and thus a decrease in the number of days with icing - will affect the reduction of loads on support structures (foundations) and wings, increasing the life of the project;
- increased wave action and speed of ocean currents - may contribute to a slight increase in impacts in the form of scouring of bottom sediments around the foundations;
- the rise in the mean sea level - with the projected values of this rise, will not be significant for the individual components of the power plant and their operation;

[2] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - The EU strategy for adapting to climate change /* COM/2013/0216 final (https://ec.europa.eu/transparency/regdoc/rep/1/2013/PL/1-2013-216-PL-F1-1.Pdf, access date: 22.04.2022 r.)

- increase in shoreline erosion - may cause an increase in cumulative impacts with possible erosion caused where the farm's export cables go ashore.

4.2. Potential impacts of OWF BIII on climate and climate change climate

Potential impacts of OWF BIII on climate should be considered in two aspects - as negative impacts and positive impacts.

Negative impacts on the climate of the BIII OWF will primarily be associated with air pollutant emissions, especially during the construction phase, when particularly intensive ship traffic is expected.

Sections 4 - 6 of Volume II of the Report describe in detail the processes of construction, operation and decommissioning of the OWF. Each has a chapter outlining the expected types and movements of ships. At the same time, the report stresses that they will depend on numerous factors that are currently unknown, such as the number, type and size of turbines installed at a given stage, the manufacturer, availability of construction and service vessels, economic conditions at the construction stage, etc. Thus, it presents only approximate data, based on past experience with similar investments, to illustrate the possible scale of the project. The final assumptions on ship traffic for the BIII OWF will be made at a later stage, when the construction project is developed and the final concept of organization during the construction phase is worked out. At the same time, it should be emphasized that reducing the number of construction and maintenance units and minimizing their time at sea is one of the main courses of action to reduce investment costs in offshore wind energy. Larger and larger vessels are being built, capable of transporting and building an increasing number of power plants and building them without the support of additional vessels (see Section 4 of Volume II of the EIA).

Due to the fact that at this stage the ports from which the construction, operation and decommissioning of the farm will be carried out have not yet been selected, it is also not possible to indicate the route along which the ships (or helicopters, which, especially at the stage of operation, may be an alternative means of transport) will travel.

As a result, more sophisticated analyses are not currently possible because there is a lack of precise data on which to base them. However, it should be emphasized that during construction, operation or decommissioning, only vessels that meet emission standards will be in operation, and will mostly operate along established customary shipping routes from/to ports. The project site itself is about 30 kilometers from the shore, so the sources of emissions during construction or maintenance activities alone will be significantly distant from the coast and human habitation.

The BIII offshore wind farm will have a positive impact on the climate by generating electricity from a non-carbon and renewable source that will replace the coal-fired sources currently operating in the electricity system. This will result in a process of avoiding emissions, associated with the burning of coal in power plants and thermal power plants.

The estimated productivity of the BIII OWF will be about 4,600 GWh per year, with a target maximum capacity of 1.2 GW. Thus, the BIII OWF will produce about 115,000 GWh during its full operation period. The levels of possible avoided emissions of major pollutants from combustion sources in the power industry, based on emission factors[3] are shown in the table below.

[3] Emission factors of CO_2, SO_2, NO_x, CO and total dust for electricity based on information in the National database of greenhouse gas and other substance emissions for 2020, KOBIZE, 2021.

Table 1. Possible avoided atmospheric emissions from energy sources as a result of 25 years of operation of the 1.2 GW BIII OWF [t]

CO_2	SO_2	NO_x	CO	Dust
80270000	58535	60030	23345	2990

5. Proposal for action adaptation

The following climate change-related adaptation measures are proposed to minimize potential impacts on the Project:

- construction design should take into account the increasing number of extreme weather events, including increased wind speeds, rising sea levels, increased number of storm days and changes in ocean currents. It is necessary to take these phenomena (both historical data and forecasts) into account, among other things, when designing the structural strength of individual power plant facilities, the clearance between sea level and the wing tip (in its lower position), and systems for de-icing power plant wings and lightning protection systems. It is necessary to use materials and technical solutions that will reduce the likelihood of accidents and construction disasters, thereby reducing the exposure of people and the environment to their consequences.

Justification:
The technical infrastructure of an offshore wind farm will be particularly vulnerable to climatic factors manifested in extreme weather conditions.

It is expected that the level of the Baltic Sea will rise from 0.18 to 0.58 m in the year 2100, while the expected lifetime of the power plant is about 25 to 30 years, i.e. until about 2050. With a projected minimum clearance of 20 m, this phenomenon will therefore not have a significant impact on the operation of the power plant. However, with the increase in the number of storms and sea level will also be associated with an increase in the maximum height of waves in the project area (currently about 6 m), so designers of power plant structures should take this element into account.

Strong winds, in turn, can put additional stress on power plant structures and foundations, which should also be taken into account in the construction project. It should be noted that wind turbines (both onshore and offshore) are designed to turn on and off automatically at certain wind speeds, and the wings are positioned to be subject to the least amount of stress. In this respect, increased wind speeds will not have a significant negative impact on power plants, but there will be a positive aspect, in the form of increased energy production from RES.

The increase in the number of storm days should be taken into account when designing onshore power lines that bring electricity out of the farm to the coast (which are, however, covered by a separate environmental decision procedure).

- During construction, operation or decommissioning, only vessels that meet emission standards, either domestic or those resulting from international agreements and conventions signed by Poland, should be used. Vessels sailing to the project area should use established or customary shipping routes to the greatest extent possible.

Justification:
During the construction, operation and decommissioning of the farm, ships and, alternatively, helicopters will be used, which is associated with air emissions. Ships and helicopters should meet the air emission standards that will be in effect at that time in Poland. Emissions from the farm itself will be

minimal and related in particular to the possible use of diesel generators in substation facilities and the use of air-conditioning equipment. As such, no minimization measures are expected to be required.

- During the planning and implementation of the project involving the construction of an offshore cable connecting the BIII OWF to an onshore substation, solutions should be used to minimize potential erosion impacts on the seashore.

Justification:
The export cable's landfall will most likely be carried out in the shoreline by steerable drilling. Proper planning and execution of this investment should properly protect the shoreline from erosion activities. However, if the number and strength of storms increase in the cable's coastal outfall area, storm-induced erosion impacts could amplify the potential impacts of the marine cable. Therefore, it is essential to take into account appropriate safety solutions when designing the cable landfall. It should be noted here that the OWF BIII export cable is covered by a separate procedure for issuing an environmental decision, and the above recommendation is indicated only in the context of potential cumulative environmental impacts of the OWF BIII.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions
for the project

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME IV Section 14

Assessment of impact on protected areas and sites and ecological corridors

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
IMF BII	Offshore wind farm OWF Central Baltic III
NIS 2015	The most far-reaching scenario from the 2015 Report, which is a set of parameters of the project causing the most far-reaching impacts, and which was the basis for conducting the environmental impact assessment during the proceedings that ended with the issuance of the Environmental Decision
PN	National park
POM	Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
SPN	Slowinski National Park
Uop	Law of April 16, 2004 on nature protection (consolidated text Dz.U. of 2020, item 55, as amended)

1. content non-specialist

A non-specialist summary of the results of the assessment of the impact of updating the conditions for the implementation and operation of the Project - OWF BIII, for which the Environmental Decision was issued, on protected areas and objects, and ecological corridors is included in Section 5 of Volume IV

2. Introduction

This section of the Report assesses the potential impact of the update and clarification of the conditions for implementation and operation - BIII OWF on areas and objects protected under the Law of April 16, 2004 *on Nature Protection* (Journal of Laws of 2022, item 916; hereinafter: "uop"), i.e. the forms of nature protection listed in Article 6, paragraph 1 in items. 1-9 of the said Act. The section does not include an assessment of the impact on Natura 2000 sites, on which the impact of the planned farm has been assessed in relation to individual environmental resources in Sections 2-7 of Volume IV of the Report, and a summary of the assessment is presented in Volume V.

Unlike Sections 1-11 of this Volume, the assessment presented in this section is not based on the assessment conducted in the 2015 Report[1]. This is due to the different wording of the provisions of the EIA Law at the time of the 2015 Report regarding the content of the environmental impact report.

Accordingly, the assessment carried out in this section does not address the most far-reaching scenario adopted in the 2015 Report (NIS 2015), which is addressed in the impact assessments on other environmental elements presented in sections 1-11. The option that was approved in the Environmental Decision was analyzed here as an alternative.

Information on existing and planned projects whose impacts may cumulate with those of OWF BIII, as well as basic assumptions for the analysis of cumulative impacts, are presented in Section 13 of Volume II of the Report. In the area of the BIII offshore wind farm, no existing or planned projects for which an environmental decision has been issued that could potentially, together with the BIII offshore wind farm, cause cumulative impacts on protected areas and objects, excluding Natura 2000 areas, have been identified.

The section also addresses the issue of the impact of the planned BIII OWF on the continuity of ecological corridors linking protected areas under the OPA.

3. Characteristics of protected areas and objects and ecological corridors in the the zone of influence of the OWF BIII

3.1. Areas and objects protected

Protected areas and objects listed in Article 6 (1) of the Uop, in addition to Natura 2000 areas, include:

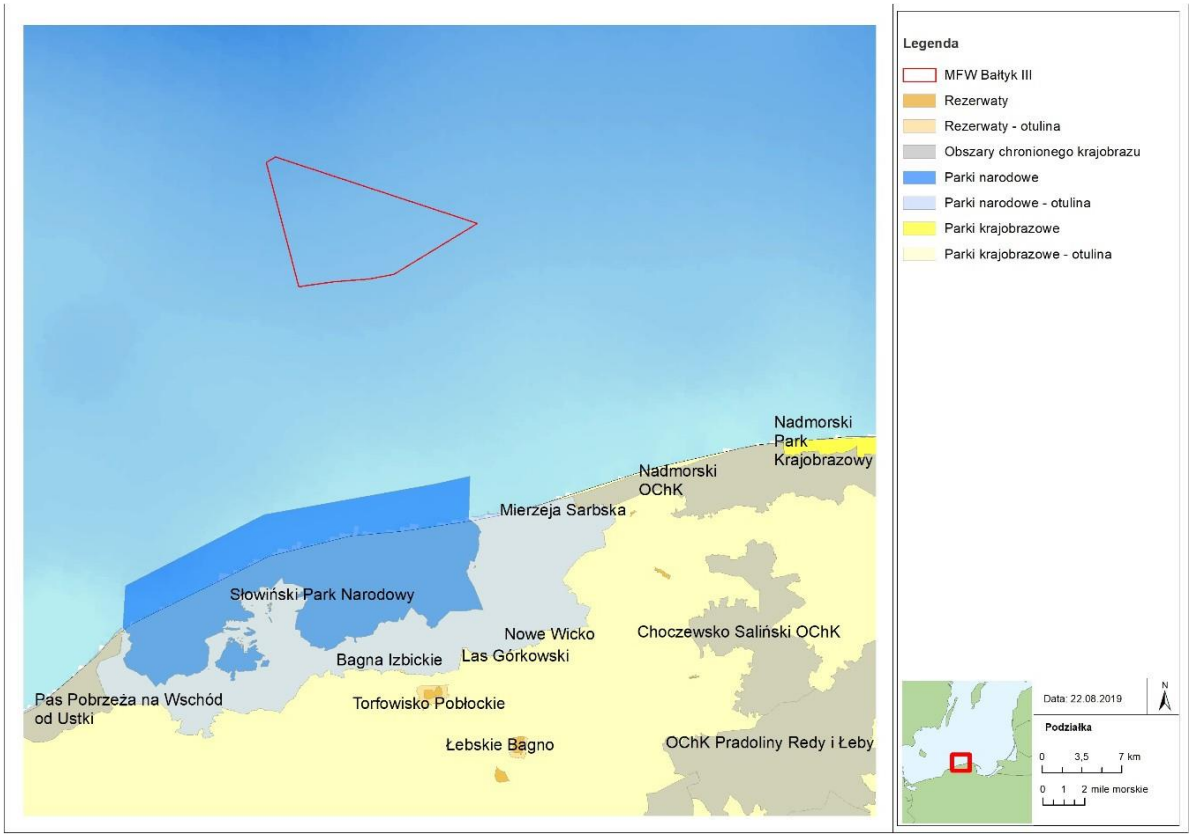
- national parks;
- nature reserves;
- landscape parks;
- protected landscape areas;

[1] Offshore wind farm Central Baltic III. Environmental impact report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

- natural monuments;
- documentation posts;
- ecological uses;
- nature and landscape complexes.

The location of the planned BIII OWF against the background of protected areas and objects, excluding Natura 2000 areas, is shown in the figure below.

Figure 1. Location of the planned offshore wind farm BIII against the background of protected areas and objects, excluding Natura 2000 areas



Pas Pobrzeża na Wschód od Ustki	Coastal strip east of Ustka
Słowiński Park Narodowy	Slowinski National Park
Bagna Izbickie	Izbica marshes
Torfowisko Pobłockie	Poblockie bog
Łebskie Bagno	Lebskie Bagno
Las Górkowski	Górkowski Forest
Nowe Wicko	New Wicko
Mierzeja Sarbska	Sarbska Spit
Nadmorski OChK	Seaside OChK
Nadmorski Park Krajobrazowy	Seaside Landscape Park
Choczewo Saliński OChK	Choczewo Salinski OChK
OChK Pradoliny Redy i Łeby	OChK of the Reda and Leba Proglacial Valley
Legenda	Legend
MFW Bałtyk III	OWF Baltic III
Rezerwaty	Reserves
Rezerwaty – otulina	Reserves - lagging
Obszary chronionego krajobrazu	Protected landscape areas
Parki narodowe	National parks

Parki narodowe – otulina	National parks - lagging area
Parki krajobrazowe	Landscape parks
Parki krajobrazowe – otulina	Landscape parks - lagging
Data: 22.08.2019	Date: 22.08.2019
Podziałka	Pitch
Mile morskie	Sea miles

The only one of the protected areas potentially within the range of the impact of OWF BIII (underwater noise impact) is the Slowinski National Park (hereinafter interchangeably: "SNP").

Nature conservation in the SNP aims to:

- maintenance of ecological processes and stability of ecosystems;
- biodiversity conservation;
- preservation of geological and paleontological heritage;
- ensure the continued existence of - plant, animal and fungal species, along with their habitats;
- preservation of landscape values;
- maintaining or restoring to an appropriate state of conservation of natural habitats and objects of protection;
- formation of proper human attitudes towards nature.

In the area of the SNP, two precincts have been separated:

- land, within the boundaries of which six protection districts have been designated;
- water, which includes protective circuits: Gardno, Lebsko and Baltic.

The Baltic protection zone is a section of the Baltic Sea, located between Leba and Rowy with a width of 2 nautical miles into the sea and a maximum depth of 20 meters. The length of the maritime border in this oblast is 36.7 km and the length of the coastline is 33 km. The total area of the circuit is 11,171 hectares. The predominant area of the coastal bottom is covered by sandy sediments, which are intensively displaced by currents and wave action in the zone from 3 to 5 meters deep, so that this zone is referred to as shoals of moving sand. Therefore, the Baltic protection perimeter is characterized by strong water dynamics, which positively affects the self-purification of the area, but also causes erosion of some sections of the shores.

The main sources of pollution in this circuit are the tributary rivers Leba and Lupawa, which carry significant amounts of nutrients from the catchment area, as well as the port of Leba and the fishing harbor in Rowy. Potential threats, however, include lying wrecks on the bottom, although there are relatively few in this part of the coastal zone. Pollutants introduced by the rivers are mainly moved inland (perpendicular to the coastline). This has a favorable effect on shallow bottom sediments, as evidenced by their good condition in almost all of the basin included in the SNP. These sediments can be classified as poorly zeutrophic.

The type of bottom in the shallow water central part of the Baltic coastal zone, due to the shoals of moving sand present here, is not favorable for the development of the bottom flora, especially vascular plants that root in the bottom. In places, however, there are clusters of post-glacial boulders and single stones on the bottom, on which the so-called macroalgae - brown algae (seaweed), red algae (forkbeard) and green algae (branchwort) - can settle and persist, as well as being a habitat for representatives of the bottom fauna - mollusks (blue mussel), armadillo (Baltic gudgeon), anthozoans

(Baltic barnacle) and others. A rich concentration of this type of habitat and aquatic epiphytic organisms is located in the northwestern part of the marine body of water protected within the SNP, near Ditches.

The most common marine fish species found in the marine part of the SNP include cod, flounder, plaice, devil hen, sprat, herring (spawns in the spring from February to May), tobias, sandeel, turbot, haddock and eel. Migratory fish are represented here by salmon, eel, sea trout and smelt. The high natural values of this part of the basin are also evidenced by the presence of marine fishes under partial species protection in Poland, in accordance with the provisions of the Decree of the Minister of Environment of December 16, 2016 *on the protection of animal* species (Journal of Laws of 2016, item 2183, as amended): small goby, sand goby, bottomfish or parrotfish.

The coastal zone of the SNP is also visited by marine mammals, both pinnipeds: the grey seal, ringed seal and common seal, as well as porpoises belonging to the cetaceans - species under strict species protection in Poland.

The Order of the Minister of Climate of January 21, 2022 *on the protective tasks for the Slovinski National Park* for 2022-2023 (Official Gazette. Min. of Climate and Environment pos. 3) for the SNP established conservation tasks for 2022-2023. The Ordinance identifies and assesses existing and potential internal and external risks, as well as ways to eliminate or reduce these risks and their effects. Among the threats to the SNP, no threats relating directly were identified. Threats that may indirectly apply to the marine portion of the area include:

- as an internal threat existing - Disappearance and transformation of habitats of animal species;
- as an external threat existing - Water pollution;
- as an internal potential threat - Depletion of the number of animal and plant species;
- as an external potential threat - . Disruption of the ESL's natural links with the environment.

The boundaries of the SNP area largely coincide with the boundaries of the Natura 2000 area Ostoja Słowińska PLH220023, established, among other things, to protect two species of marine mammals - the shark and the porpoise, as well as species of fish and lampreys residing periodically in open marine or coastal waters and/or in estuarine zones of rivers and estuaries - the parrotfish, the blowfish, the sea lamprey and the river lamprey (SDF 2021).

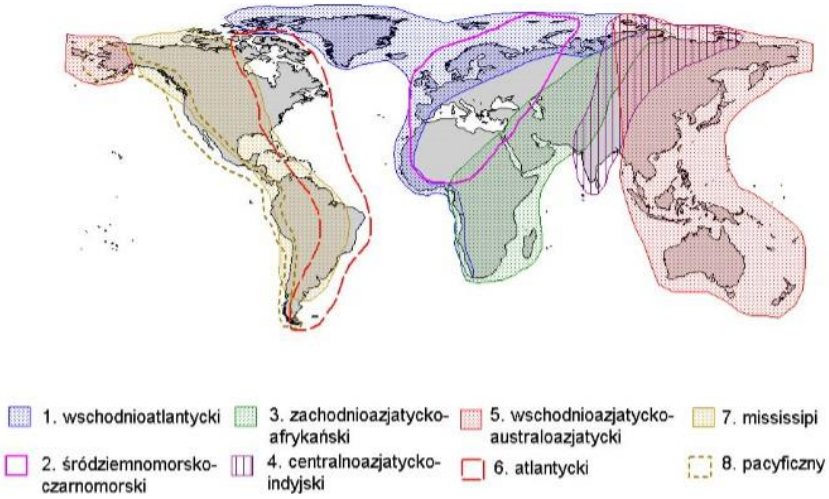
3.2. Corridors ecological

As defined in Article 5(2) of the EIA, an ecological corridor is an area that allows the migration of plants, animals or fungi. The map of the course of ecological corridors in Poland was developed under the direction of Prof. dr. hab. Włodzimierz Jędrzejewski by the Mammal Research Institute of the Polish Academy of Sciences in Białowieża - now the Institute of Mammal Biology (Jędrzejewski et al. 2011). The map in question deals with ecological corridors important for populations of large forest mammals and the coherence of forest and wetland habitats on a national and continental scale, but does not indicate the course of ecological corridors in POM (the location of OWF BIII).

Nevertheless, Poland, including POM, according to the general classification of the wetland bird migration system in Eurasia, w is located within two major migration corridors: the East Atlantic and the Mediterranean-Black Sea[2], shown schematically in the figure below.

[2] Gromadzki M., Opinion on flights in Poland of wild birds originating from Western Siberia, the Urals and the European central part of the Russian Federation, Department of Ornithology of the Polish Academy of Sciences

Figure 2. Diagram of the course of the main migratory routes of wetland birds in the world[3]



Wschodnioatlantycki	East Atlantic
Śródziemnomorsko-czarnomorski	Mediterranean-Black Sea
Zachodnioazjatycko-afrykański	West Asian-African
Centralnoazjatycko-indyjski	Central Asian-Indian
Wschodnioazjatycko-australoazjatycki	East Asian-Australian
Atlantycki	Atlantic
Mississipi	Mississipi
Pacyficzny	Pacific

Accordingly, the impact of the planned project on the continuity of migration corridors is assessed in Section 5 of Volume IV of the Report with regard to seabirds (Part 1) and migratory birds (Part 2), particularly in the context of the coherence of the Natura 2000 network.

4. Assessment of the impact of OWF BIII on areas and objects protected

According to Article 8 (1) of the Uop, all nature and scenic qualities are protected in the NSA area. Due to the distance separating the BIII OWF area from the SNP area, which is about 19 kilometers, the planned farm will not cause physical transformation of the area within the park's boundaries or deterioration of its landscape values.

The only impacts of the BIII OWF that could potentially occur in the SNP area are the impacts of underwater noise generated during foundation installation on marine mammals and fish. For both the variant approved in the Environmental Decision and the variant that is the subject of this Report, the source of the greatest impacts are operations related to the installation of monopile foundations, since their driving into the seabed will potentially cause the greatest underwater noise emissions.

Taking into account the information contained in Sections 4 and 9 of Volume II of the Report on the expected underwater noise levels at the stage of construction of OWF BIII, in particular their spatial distribution (directions of propagation), as well as the planned use of noise mitigation measures (bubble curtain), it is not expected that noise emissions during the construction of OWF BIII will cause significant disturbance to animals in the SNP area, which could threaten the continuity of their occurrence within its borders. On the other hand, it cannot be completely ruled out that in some cases, e.g. during pile-driving in the southern part of the BIII offshore wind farm area or in parallel in two locations in its area, marine mammals and fish residing in the northeastern part of the SNP area will not have a behavioral response to noise (avoidance response). Since the occurrence of the disturbance in question may take

[3] Gromadzki M., Opinion on flights in Poland of wild birds originating from Western Siberia, the Urals and the European central part of the Russian Federation, Department of Ornithology of the Polish Academy of Sciences

place only in a relatively small part of the SNP area, juxtaposed with the high daily mobility of fish and marine mammals, it can be considered that the significance of potential impacts of OWF BIII on marine mammal and fish populations residing within the park boundaries will be negligible. In addition, the use of minimization measures in the form of an air curtain or other technology to minimize the impacts of underwater noise on fish and marine mammals will help ensure that the BIII OWF in the parameters approved by the Environmental Decision, and thus for the variant proposed for implementation in this Report, where the total piling time is reduced due to the smaller number of foundations, will not cause negative impacts on protected areas.

5. Summary and conclusions

The implementation of the BIII offshore wind farm in the variant currently proposed for implementation will not have a significantly negative impact on the areas and objects protected under the Uop, other than Natura 2000 areas. The proposed change in the parameters of the Project in relation to the parameters approved by the Environmental Decision will not change the nature, extent or magnitude of impacts on protected areas and ecological corridors, on the contrary, due to the reduction in the number of power plants and the application of additional minimization measures related to the expansion of undeveloped spaces between neighboring farms, as well as solutions limiting noise propagation, the impact of the Project in modified parameters will be less, including in the case of impacts on birds, including those in migration (see Section 5, Volume IV).

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2. https://slowinskipn.pl/pl/
3. https://dziennikurzedowy.mos.gov.pl/

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME V

Summary

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Abbreviations and definitions

Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 07, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
DEC	Decision on environmental conditions for the project
OWF	Offshore Wind Farm
BIII OWF/ Project	Bałtyk Środkowy III Offshore Wind Farm
WCS 2015	The worst case scenario from the Report 2015, which is a set of the parameters of the Project causing the worst case impacts, and which was the basis for conducting the environmental impact assessment during the procedure concluded with the issuance of the Environmental Decision.
EIA	Environmental Impact Assessment
PSZW	Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Director for Environmental Protection of July 7, 2016, ref. No.: RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report/EIA Report	Environmental Impact Assessment Report for the change of the decision on environmental conditions issued for the Bałtyk II OWF
RDEP	Regional Director for Environmental Protection in Gdańsk
EIA Act	Act of October 3, 2008 *on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments* (consolidated text, Journal of Laws of 2022, item 1029).
Disturbances	Any interference with the environment caused by the project, which may cause changes in the functioning of the ecosystem (both negative and positive), other than emission

1. Introduction

This volume contains a summary of the most important findings of the Environmental Impact Assessment Report prepared for the amendment to the decision on environmental conditions for the Bałtyk Środkowy III OWF construction project (hereinafter referred to alternatively as: the "BIII OWF" or the "Project") related to the amendment to and update of some of the conditions of the previously obtained decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 07, 2016, ref. No.: RDOŚ-Gd-WOO.4211.12.2015.KP.22. (the "Environmental Decision").

Since the procedure in question is a procedure for the change of the decision on environmental conditions, the environmental impact assessment conducted in this Report is aimed at the assessment of the proposed changes in the conditions of the Environmental Decision. This means that the purpose of the procedure is to verify the impact of the proposed changes and updates of the parameters of the project for which the decision on environmental conditions was issued, but has not been implemented yet, and to indicate how the proposed changes affect the result of the originally conducted environmental impact assessment of the project and what consequences this has for the entire content of the decision on environmental conditions.

The purpose of the environmental impact assessment in question determines the methodology of conducting the assessment, whereas the provisions of the Act of October 3, 2008 *on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments* (Journal of Laws of 2022, item 1029, EIA Act) do not provide for a different content of the Environmental Impact Assessment Report for a specific situation, i.e. an amendment to the decision on environmental conditions. The need to meet the requirements of Article 66 of the EIA Act and to refer to the shape of the Project approved by the Environmental Decision causes that the content of the submitted Report refer, to a significant extent, to the documentation used for the purpose of obtaining the Environmental Decision, i.e. the Report 2015, and a significant part of the information is derived from this document. Nevertheless, the environmental impact assessment of the Project change carried out in this Report takes into account changes in the legal status, actual status, including, in particular, changes relating to the new knowledge in the scope of impacts of offshore wind farms and relating to the development of other offshore wind farm projects in the Polish maritime areas. However, modifications of the Project parameters are mainly related to the development of the project and the development of technologies in the area of offshore wind farms and methods of their implementation, which allows for significant clarification of the technical parameters of the Project, but also their cost optimization and reduction of environmental impacts. All these factors make the procedure in question for the change of the Environmental Decision not only justified, but necessary from the point of view of reasonable development of the BIII OWF project.

This summary is intended to present the key elements from the point of view of the procedure for which this Report was prepared, and thus focuses on the summary of the change of the Project parameters, their impact on the results of the original Project environmental impact assessment and on the conditions of implementation, operation and decommissioning of the Project specified in the Environmental Decision.

2. Summary of the current parameters of the Project

The current parameters of the Project which were modified and specified in more detail in relation to those specified in the Environmental Decision, can be assigned to three groups. The first one concerns the parameters of wind turbines and technology of their foundation. The second one concerns the elements of the accompanying infrastructure. The third one is associated with the use of space intended for the planned Project in the course of its implementation and operation.

With respect to the parameters and technology of wind turbine foundation, the following changes were made:

I. determination of the number of wind turbines to be no more than 60;
II. determination of the maximum height of the wind turbine at 310 m;
III. determination of the maximum rotor diameter at 250 m;
IV. determination of the maximum total zone for rotors at 2,945,244 m^2;
V. determination of permissible technologies of the wind turbine foundation, i.e. monopile or jacket foundations and determination of the maximum seabed area occupied by 1 wind turbine foundation, specifying it at 79 m^2;

Re.: I – IV. The reduction of the number of wind turbines in relation to the one specified in the Environmental Decision, with a slight increase in the maximum total height of the wind turbines and the maximum rotor diameter, is caused by the development of the wind turbine technology, and thanks to this, the achievement of the assumed capacity of the BIII OWF with the use of a smaller number of wind turbines. It should be emphasized that despite slightly larger dimensions of individual wind turbines, the scale of reduction of the number of wind turbines allows for a significant reduction of the total spatial area used at the operation stage of the offshore wind farm. These changes will allow, on the one hand, for optimization of the costs of the BIII OWF implementation and, on the other hand, for significant reduction in the impacts of the BIII OWF at each stage, i.e. implementation, operation and decommissioning.

Re.: V. The determination of permissible wind turbine foundation technologies is associated with better geotechnical investigation of the area and will allow for elimination of gravity-base and tripod wind turbine foundations, which have significantly higher impacts relating to disturbance of the seabed and habitats created thereon. This update limits the Project environmental impacts.

With respect to the parameters and technology of construction of the accompanying infrastructure, the following changes were made:

I. determination of the maximum number of substations as 1 piece, which translates into a reduction in the number of foundations constructed for the accompanying infrastructure and a simultaneous separate determination of the maximum seabed surface area occupied by 1 foundation of the accompanying infrastructure, determining it at 1,964 m^2;
II. determination of the condition of cable protection by indicating that if the technical conditions do not allow for their burial, they will be provided with other permanent protections.

Re.: I. Reduction in the maximum number of substations resulting in simultaneous reduction of the number of foundations constructed for the accompanying infrastructure from 6 specified in the

Environmental Decision to 1 is currently related to the development of technology and development of the BIII OWF project itself to the stage which allows for detailed determination of the number of substations. The reduction in the number of foundations results in the mitigation of the environmental impact by reducing the occupation/transformation of the seabed and related habitats as a result of the Project implementation, as well as the reduction in disturbances caused by the preparation and installation of foundations. A slight change in the unit surface area intended for the construction of the foundation for the substation is compensated many times by reducing the number of foundations from 6 to 1. The change of parameters of the substation itself, such as power output, dimensions and weight of the AC transformer stations and AC/DC converter stations, does not affect the level and impact significance of the planned Project on the environment. These parameters may be determined only at the stage of the building permit design.

Re.: II. The change in the condition concerning cable protection consists in replacing the indication that if the technical conditions do not allow for burying the cables, they will be covered with a layer of stones or other specially adapted loads with the provision that was indicated in the spatial development plan for internal sea waters, the territorial sea and the exclusive economic zone. This change is of specifying nature and ensures compliance with the provision of the plan in the part concerning the water region under which the Project in question is planned. It is intended to eliminate any possible interpretation doubts that may be caused by the term "covered" used in the Environmental Decision and replace it with the expression "provided with permanent protections", which guarantees the achievement of the purpose of this provision of the decision, without causing an insignificant, in terms of achieving the objective, focus on the physical form of protection in the form of "covering".

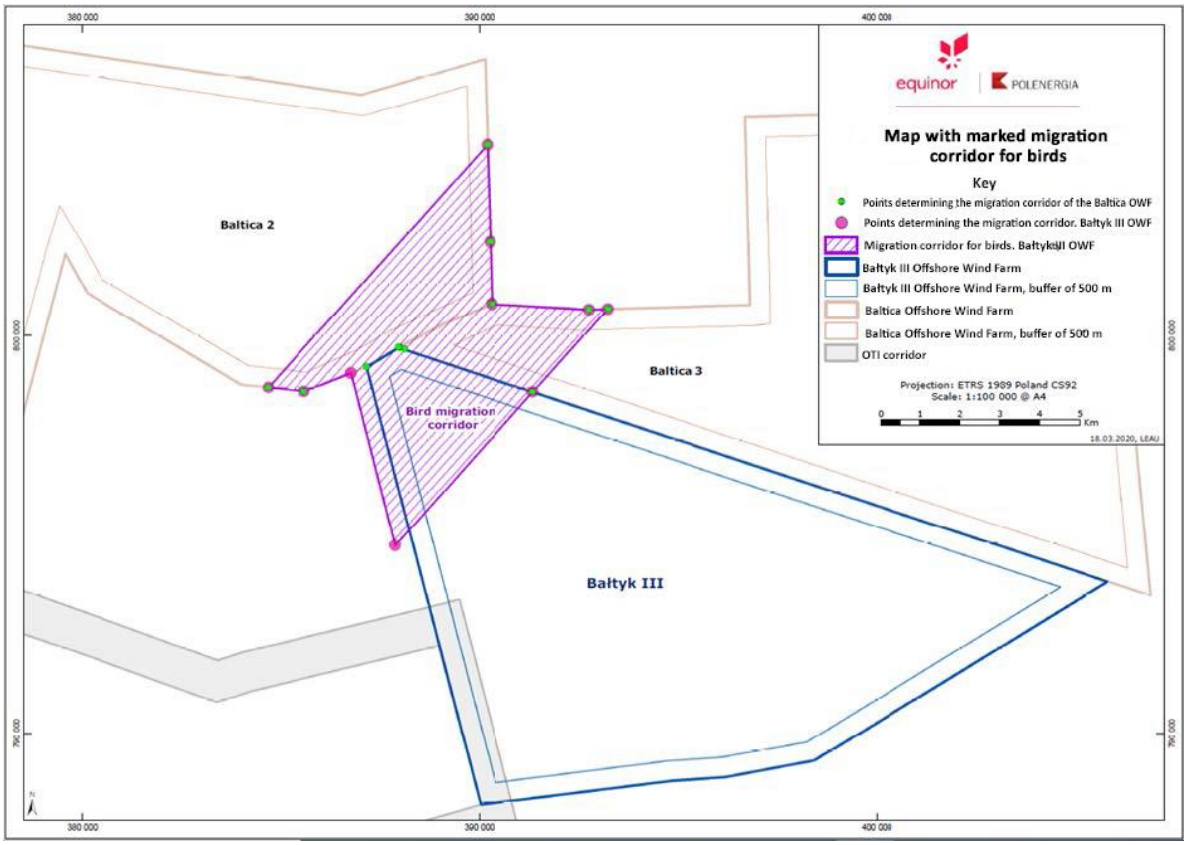
With respect to the development/use of the water region intended for the Project implementation, the following changes were made:

I. determination of an additional area excluded from the development area by the above-water elements of the farm, i.e. wind turbines, by excluding the north-western corner of the water region intended for the implementation of the Project, in accordance with Figure 1, in such a way as to create a passable 5 km wide corridor, undeveloped with wind turbines, crossing the areas of the Bałtyk Środkowy III OWF and Baltica OWF in the SW-NE direction.
II. determination of the minimum distances between the wind turbines to be 800 m and abandonment of the parameter specifying the maximum density of the wind turbines expressed in pcs/km^2;
III. determination of the location of internal offshore substation (OS) in the central part of the BIII OWF;
IV. determination of the method of laying inner array connection cables along corridors radiating from the OS to individual wind turbines, whereas within one corridor these cables will connect from 5 to 6 wind turbines; laying the export cable in corridors connecting the internal OS with the crossing points of the corridor created for the export cable with the BIII OWF boundary specified by the permit for erection and use of artificial islands, structures and devices, without crossing the export cable with the farm inner array cables;

Re.: I. The update of the Project assumes additional exclusion from development with above-water elements of the farm, i.e. wind turbines of the north-western corner of the BIII OWF area in

accordance with Figure 1. The said exclusion was only agreed with the Investor of the Baltica 2 OWF (exclusion of the west-south part of this farm) and with the Investor of the Baltica 3 OWF (exclusion of the western corner of this part of the farm). The exclusion of the indicated farm areas from development will allow for the creation, between the OWF projects, of a corridor free from development with wind turbines with a minimum width of 5 km. The introduction of the said change of the Project is motivated by the introduction of additional solutions that minimize cumulative impacts relating to the formation of the OWF complex located on the east-west axis along the north-eastern slope of the Słupsk Bank. This action is aimed at ensuring the possibility of migration of birds to and from the Słupsk Bank, and thus the lack of impact on the integrity of the Natura 2000 site of the Słupsk Bank and the coherence of the Natura 2000 site network. This solution is consistent and constitutes a continuation for the undeveloped corridor implemented to the conditions of the decision on environmental conditions issued for the Baltica OWF, and provided for leaving a 5 km corridor free from development with wind turbines between the areas of Baltica 2 and Baltica 3 – condition II.3.9 of the decision on environmental conditions, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37.

Figure 1. Proposal of the undeveloped corridor from the north-western side of the BIII OWF in the option selected for implementation



source: provided by the Employer

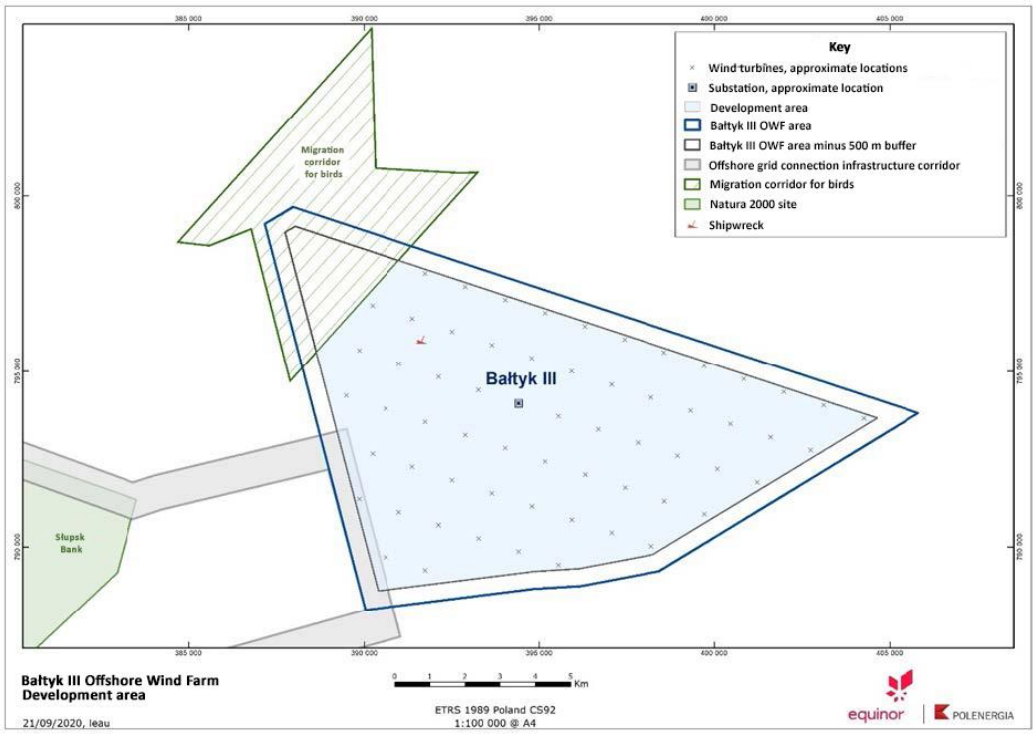
Re.: II. The amendment proposed for introduction to the Environmental Decision, and not directly associated with the actual update of the Project parameters, is the proposal to change the condition specified in point I.1 and I.3.3 of the Environmental Decision. In accordance with the content included in these points, the maximum wind turbine density adopted for the arrangement of the wind turbines in the water region intended for the construction of the BIII OWF was determined to

be 1.35 pcs/km^2. Since the density parameter specified in the Environmental Decision describes the number of wind turbines per km^2 of the farm surface area, but does not determine the distance between individual wind turbines, it is proposed to replace this parameter by defining the minimum distances between wind turbines to be 800 m. At the same time, it should be indicated that the proposed approximate spacing of the wind turbine elements presented in Figure 2 meets the guidelines in question – the turbines are spaced in the wind turbine development area of the BIII OWF at distances of not less than 800 m.

Re.: III. The current stage of development of the BIII OWF project also allows for determination of the approximate location of the substation – Figure 2. Since the update of the Project assumes a reduction in the number of foundations constructed for the accompanying infrastructure, the distribution of foundations constructed for this infrastructure applies to one such facility. It is proposed to place it in the central part of the BIII OWF area.

Taking into account the key assumptions for development of the water region intended for the implementation of the Project described in points I to III for the BIII OWF, in the currently requested option selected for implementation (assuming the construction of the maximum requested number of wind turbines), a preliminary spacing of the BIII OWF components (development plan) was prepared, presented in Figure 2 below.

Figure 2. The planned spacing of the BIII OWF components in the option selected for implementation, assuming the construction of the maximum requested number of wind turbines (development plan)



It should be emphasized that the presented development plan for the BIII OWF may be subject to amendment (if a decision is made to build less than 60 wind turbines) or addition of further details and modifications, due to the specific requirements of adjusting the project to the selected generators, the geotechnical conditions in the locations of the planned farm components as set forth in the complete geological survey, the arrangements on the building permit design with competent

authorities and institutions, including technical expert opinions in terms of maritime safety. However, the key assumptions for the arrangement of farm components, as set out above, will be maintained.

Re.: IV. Determination of key assumptions concerning the distribution of wind turbines in the farm area (areas excluded from wind turbine development, minimum distances between turbines) and the location of the substation allows for defining the method of laying inner array connection cables. Due to the limitation of the number of substations to one piece, it is assumed that inner array cables will be laid along corridors; these cables will connect from 5 to 6 wind turbines; laying the export cable in corridors connecting the internal OS with the points of the corridor created for the export cable with the BIII OWF boundary specified by the permit for erection and use of artificial islands, structures and devices, without crossing the export cable with the farm inner array cables.

Re.: V. The last of the proposed verifications of the Project parameters relating to the use of the water region intended for the implementation of the BIII OWF is, in fact, a change in the provisions concerning the requirements for the use of the water region, and not an actual update of the Project parameters. The total surface area of the BIII OWF is approx. 117 km^2. The farm development surface indicated in the Environmental Decision was determined taking into account the provisions of the permit for erection and use of artificial islands, structures and devices (500 m buffer from the undeveloped farm boundary) and an additional buffer with a width of 100 m (corresponding to the maximum rotor radius in the option selected for implementation) and was indicated as approx. 89 km^2. The parameter determined in this way was included in point I.1 of the Environmental Decision.

In accordance with the interpretation of the provisions of the Construction Law, the area intended for civil structure development must include all elements of this structure, also in such a case when the outline or surface of civil structures in the place of contact with the ground is different than that above this surface or underground. Translating the above into expressions used in the permit for erection and use of artificial islands, structures and devices and used in condition I.3.8 of the Environmental Decision, this means that 500 m buffer may not be treated as a development area. Consequently, the area intended for development is the area of approx. 117 km^2 less 500 m buffer with a surface area of approx. 23 km^2. This means that the area where it is possible to locate the farm components is an area of approx. 94 km^2, whereas the area within which actual installation of wind turbine foundations will be possible will be additionally reduced by the buffer with the rotor radius width. However, taking into account the proposed additional exclusion from the development of the north-western corner of the BIII OWF area in order to determine the migration corridor for birds with a width of 5 km, which was created between the Baltica 2 OWF farm from the west and, from its east, there are Baltica 3 OWF and BIII OWF farms, the area within which the actual foundation of wind turbines will be possible will be approx. 88 km^2.

3. Summary of the assessment of impact of the current parameters of the Project

3.1. Conditions of the environmental impact assessment

This Report contains an environmental impact assessment of the proposed changes in the conditions of Project implementation and operation approved by the Environmental Decision. The assessment

referred to both the Project parameters approved by the Environmental Decision and to the set of the Project parameters constituting the worst case scenario – WCS 2015. This set of parameters (WCS 2015) was the subject of assessment of the largest possible impacts of the Project in the Report 2015. Since the option selected for implementation in the Report 2015 was determined in such a way that none of its parameters exceeds the parameter of the worst case scenario – WCS 2015, in consequence, this means that this option causes impacts not higher than the WCS 2015, and in the vast majority of cases – smaller impacts. Therefore, in principle, when conducting the assessment, this Report referred to both the set of parameters of the Project constituting the WCS 2015, and to the parameters approved by the Environmental Decision. Such a reference point allows for the assessment of the change in the nature, range and magnitude of the impact caused by the proposed changes in the conditions of Project implementation and operation approved by the Environmental Decision.

The proposed changes in the conditions specified in the Environmental Decision described in the above chapter were the basis for the assessment of environmental impact of the proposed changes. However, the assessment carried out was not limited to such specific changes, but had to include several additional factors. Firstly, changes in the legal status were taken into account, which applies, for example, to a situation in which legal regulations specifying the parameters or methods of determining environmental parameters have changed and which must be met by individual components of the environment or regulations concerning the detailed content of the Environmental Impact Assessment Report. Secondly, this environmental impact assessment took into account the change in knowledge about the environment and the impacts caused by the implementation, operation and decommissioning of offshore wind farms. Since the date of obtaining the Environmental Decision, environmental surveys have been carried out for the purposes of implementation of projects of other OWFs within the Polish maritime areas, which significantly enhanced the condition of the environment and its resources, also in relation to the direct vicinity of the water region intended for the implementation of the BIII OWF. At that time, new scientific studies concerning impacts relating to the implementation or operation of offshore wind farms appeared, which in some aspects changed not only the previous knowledge, but also influenced the practice of estimating environmental effects of impacts associated with offshore wind farms. The third area of events which are the source of factors affecting the basis for conducting the environmental impact assessment in this Report, may be referred to as the regulatory environment of the BIII OWF project. This term does not mean amendments to law, but decisions made by public administration authorities, which indirectly affect the situation of the BIII OWF project. These decisions are both strategic documents – policies, programs, plans, specifying in more or less detail the objectives, policies and principles of achieving them, which may affect the project. They also include decisions in other administrative procedures, which, although not addressed to the addressee of the Environmental Decision, create a certain factual situation that may significantly affect the Project, e.g. by determining the parameters of other projects whose impacts may accumulate with the Project, or by specifying or, on the contrary, not specifying mitigation measures, determining the manner and purposefulness of taking mitigation measures in other projects, e.g. by specifying corridors undeveloped with wind turbines. All these groups of factors were also taken into account during the assessment and a failure to take them into account would be a methodological error resulting in a distortion of the assessment results.

3.2. Summary of the assessment of impact on environmental elements

When summing up the results of the environmental impact assessment of the changes proposed to be introduced in the conditions of the Environmental Decision, they can be presented as part of three sets of types of impacts.

As part of the first of these sets, there are types of emissions or environmental disturbances that depend on the size of the water region intended for the planned Project, and additionally, they are not significantly associated with other parameters of the Project, whereas the proposed modifications of the conditions of the Environmental Decision do not affect the duration of a given type of emissions or disturbance. In the case of such impacts, the proposed modifications do not result in a change in the range and magnitude of impact, and thus it should be concluded that the results of the impact assessment carried out in the Report 2015 remain valid. Exclusion of feeding grounds may be indicated as an example of such impacts. In principle, the proposed modifications of the conditions of the Environmental Decision will not affect the size of the area of the feeding grounds excluded as a result of construction of the BIII OWF, and thus the impact magnitude will remain unchanged, similarly to the period of its occurrence, i.e. the operation period of the farm. However, it should be noted that as part of the change of the Project implementation conditions, additional measures are proposed to mitigate the barrier effect during bird migration consisting in the exclusion of the north-western corner of the water region intended for the implementation of the BIII OWF from the development with wind turbines.

The second set of types of emissions or disturbances includes those for which the modification of the conditions of the Environmental Decision affects the duration of the disturbance or emission. In the case of such impacts, the magnitude of the unit impact itself remains unchanged compared to the Project with the parameters approved by the Environmental Decision, however, the total duration of the events causing emission or disturbance was limited, and thus the significance of the impact is reduced. The main reason for such changes in the impact significance is the change in the number of wind turbines. Due to the fact that the number of wind turbines is significantly reduced – by 50% in relation to the Project parameters approved by the Environmental Decision and by 70% in relation to the set of Project parameters constituting the WCS 2015, although the unit emission or disturbance remains unchanged, the duration of emissions or disturbances will be significantly shortened. An example of such effects of the proposed modifications of the Project are, in particular, the impacts relating to the stage of Project implementation and decommissioning, e.g. the creation of a barrier for birds associated with the presence of vessels. A specific example of this type of impact is also noise emission relating to foundation piling. Due to the smaller number of foundations, the total time of exposure to noise related to foundation piling will be significantly shorter. However, in the case of planned modifications of the Project with respect to foundation piling, the possibility of using a hammer with higher energy, i.e. 4500 kJ, was assumed (such equipment was not available at the time of preparation of the Report 2015). However, the noise emission modeling carried out for such changed parameter showed that the Project, after modification, will not cause any impacts greater than it did in the case of the parameters of the Project assessed in the Report 2015 and approved by the Environmental Decision, whereas the duration of the impact will be limited and, at the same time, the impact significance will be reduced.

The third group of types of emissions or disturbances concerns those of the assessed impacts for which the modification of the conditions of the Environmental Decision results in a reduction of the unit impact magnitude. In principle, this type of impacts are associated with the proposed modification concerning the method of wind turbine foundation, i.e. limitation of the types of foundations planned to be used to monopile or jacket foundations. The exclusion of the foundations causing the largest, in terms of surface area, interference with the seabed, including in particular gravity-base foundations, as an acceptable technology for the wind turbine foundation, significantly reduces the area of the seabed subject to transformation and thus leads to a reduction of the unit impact. In the case of impacts from this set of emissions or disturbances, the change in the significance of the unit impact is multiplied due to the change in the number of constructed wind turbines – the proposed reduction in the number of wind turbines to 60 compared to 120 in the case of the Project parameters approved by the Environmental Decision and 200 for the set of the Project parameters constituting the worst case scenario – WCS 2015, which is the basis for conducting the environmental impact assessment in the Report 2015. The scale of changes in the emission source or impact in such cases is illustrated by the change in the area occupied by the BIII OWF foundations in individual sets of Project parameters. For the Project, with the updated parameters, the seabed area occupied by foundations is 6,676 m^2, for the Project parameters approved by the Environmental Decision, this area is 158,382 m^2, whereas for the set of Project parameters constituting the WCS 2015, it is 261,456 m^2. However, it should be emphasized that the change of the rotor diameter to not more than 250 and the change of the total height of the structure to not more than 310 m do not affect the assessment of the impact significance. The key value is the maximum total zone for rotors, depending on the diameter of a single rotor and the number of wind turbines making up the OWF. As a result of the proposed changes, the maximum zone for a single rotor is increased from 31,400 m^2 to 49,088 m^2, however, as a result of simultaneous reduction by half in relation to the parameters approved by the Environmental Decision, the maximum total zone for rotors is reduced from 3,768,000 m^2 to 2,945,244 m^2 – i.e. by approx. 22% in relation to the Project parameters approved by the Environmental Decision. In consequence, the change in the impact significance in this set of emissions or disturbances was considered significant and the impact was considered significantly smaller in relation to that assessed in the Report 2015. Examples of such impacts also include the loss of benthic habitats, disturbance of the seabed structure and disturbance of the sediment structure in the case of impacts on abiotic elements of the environment, impacts on organisms, e.g. ichthyoplankton, relating to the increase in suspended matter concentration.

It should be emphasized that in the course of the environmental impact assessment of the proposed modifications of the conditions of the Environmental Decision, no impact was identified, the significance of which would increase in relation to the assessment carried out in the Report 2015. In consequence, the proposed modifications of the conditions of the Environmental Decision result in changes significantly reducing the Project impact compared to the Project parameters assessed in the Report 2015 and approved in the Environmental Decision, to changes reducing the impact and to changes not resulting in a change in the impact significance assessed in the Report 2015. In the context of all impacts caused by the implementation, operation and decommissioning of the BIII OWF, it should be considered that the proposed modifications of the Project result in a reduction in the significance of environmental impacts of the BIII OWF, and their introduction will clearly be beneficial for the environment compared to both the Project in the parameters constituting the worst case scenario in the Report 2015 and in the parameters approved by the Environmental

Decision.

3.3. Summary of impact assessment for Natura 2000 sites

In the course of the impact assessment carried out in the Report 2015, the possibility of impact of the BIII OWF on bird and mammal species being the subject of protection of Natura 2000 sites, located within the boundaries of potential impact areas related to the implementation, operation or decommissioning of the BIII OWF, was assessed. The proper assessment was conducted in relation to 4 bird species, i.e. razorbill, long-tailed duck, common scoter and velvet scoter subject to protection in at least one of the nearby Natura 2000 sites (Słowińska Refuge, Słupsk Bank, Coastal Waters of the Baltic Sea or the Pomorska Bay) and 2 mammal species protected by the Natura 2000 site Słowińska Refuge.

When assessing the impact of the proposed changes in the conditions of the Environmental Decision, it should be noted that they do not result in changes in the conditions specified in the Environmental Decision aimed at minimization and mitigation of environmental impacts. None of the proposed modifications results in the increased significance of the impact on the aforementioned subjects of protection of Natura 2000 sites (but also on any other subjects of protection of Natura 2000 sites), while some of them have a positive impact through reducing impacts or introducing solutions which will have an additional action to mitigate the resulting impacts. In particular, it should be indicated that:

a) reduction in the number of wind turbines will lead to:
   - shortening the time of exposure of mammals to noise emission related to piling of foundations at the construction stage;
   - reduction in the probability of bird collision with wind turbines at the operation stage;
b) limitation of the types of foundations used for the wind turbine foundation to monopile or jacket foundations will lead to:
   - reduction in the area of destroyed benthic habitats;
   - reduction in the significance of impacts relating to disturbance of seabed sediments and increased concentration of suspended matter in water caused thereby.

Moreover, it should be indicated that the proposed mitigation measures in the form of leaving the area located in the west-north corner of the farm undeveloped with wind turbines, in such a way as to create a passable 5 km wide corridor, undeveloped with wind turbines, crossing the areas of the Bałtyk Środkowy III OWF, Baltica 2 OWF and Baltica 3 OWF in the SW-NE direction, will lead to mitigation of the barrier effect for migratory birds, while guaranteeing, that the impacts on the integrity, coherence and subject of protection of Natura 2000 sites through impacts on migratory birds on overwintering areas being the subject of protection of the Słupsk Bank area will not be significant.

The assessment performed in the Report 2015 concluded that there was no significant negative impact on the objects of the Natura 2000 sites protection, whereas the proposed modifications of the conditions of the Environmental Decision contribute to further reduction in the impact relating to the implementation, operation and decommissioning of the BIII OWF. Thus, the proposed modifications will not result in the possibility of significant adverse impacts on Natura 2000 sites.

3.4. Summary of the cumulative impact assessment

When summing up the assessment of the impact of the proposed changes in the Project parameters on cumulative impacts, first of all, it is necessary to emphasize the specificity of the environmental impact assessment relating to the accumulation of impacts and the impact of the sequence of issuing the decision on environmental conditions on the result of the conducted assessment. Since the provisions of the EIA Act require taking into account in the cumulative impact assessment only such impacts which result from the projects for which the decision on environmental conditions was issued; therefore, when conducting the environmental impact assessment in the course of changing the decision on environmental conditions (assuming that the change itself does not increase the project parameters), one should limit oneself to examining the cumulative impact of only those projects, which had the decision on environmental conditions during the original environmental impact assessment. Otherwise, a situation would occur, in which the cumulative impact of projects, which obtained the decision on environmental conditions after issuing the decision on environmental conditions for the project covered by the amendment, would affect the conditions of implementation and operation of the project, which was approved before obtaining the decision on environmental conditions by those projects. Such a situation would mean, firstly, that erroneous environmental decisions were issued for subsequent projects, because the cumulative impact with the amended project should already be reflected in the assessment carried out for those projects, and secondly, it would lead to a secondary verification of the right acquired by the addressee of the decision on environmental conditions as a result of issuing subsequent decisions addressed to a different entity, and thus a violation of acquired rights.

Irrespective of the above reservations, the cumulative impacts were analyzed also for the projects which were granted the decision on environmental conditions after obtaining the Environmental Decision, as well as those which are in the course of obtaining the decision on environmental conditions. However, due to the nature of the proposed changes in the conditions of the Environmental Decision, and in particular as a result of a significant reduction in the number of wind turbines, i.e. up to 60, compared to 120 in the case of the Project parameters approved by the Environmental Decision and 200 for the set of the Project parameters constituting the worst case scenario – WCS 2015, being the basis for conducting the environmental impact assessment in the Report 2015, as well as a result of limiting the permissible types of foundations for the foundation of the wind turbines, it should be emphasized that the cumulative impacts with other projects, including in particular offshore wind farms, are reduced in relation to the set of the Project parameters constituting the WCS 2015 and the Project parameters approved by the Environmental Decision. An additional element that further affects the mitigation of the cumulative impacts is the introduction of solutions ensuring a minimum 5 km wide corridor free from any development with elements of wind farms between the BIII OWF and the Baltica 2 and Baltica 3 OWF infrastructure. This solution is consistent and constitutes a continuation for the undeveloped corridor implemented to the conditions of the decision on environmental conditions issued for the Baltica OWF – condition II.3.9 of the decision on environmental conditions, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37. Consequently, the proposed changes in the Project parameters should be considered as contributing to the mitigation of the cumulative impacts of the

implementation, operation and decommissioning of the BIII OWF.

4. Impact of current parameters of the Project and results of the impact assessment on the conditions of Project's implementation, operation and decommissioning specified in the Environmental Decision

The current parameters of the Project affect the result of the impact assessment, and thus, on their basis, it is possible to formulate a proposal to amend individual provisions of the Environmental Decision. The proposed amendments to the individual provisions of the Environmental Decision are presented below in a layout consistent with that used in the Environmental Decision.

1. In point I.1 of the Environmental Decision it is proposed to change the parameters of the BIII OWF by indicating that it shall consist of a maximum 60 wind turbines ("WT") and maximum 1 internal offshore substation ("OS"). The proposed change also includes the change of the maximum total height of the wind turbine above sea level to 310 m and the maximum rotor diameter to 250 m, while reducing the maximum total zone for a rotor to 2,945,244 m^2 and determining the maximum zone for a single rotor to 49,088 m^2.
   In this point, it is also proposed to separately indicate the maximum seabed area occupied by 1 foundation of the wind turbine, specifying it at 79 m^2, and separately the maximum seabed area occupied by 1 foundation of the accompanying infrastructure, specifying it at 1,964 m^2, and at the same time determining the total seabed area occupied by all foundations at 6,676 m^2. At the same time, it is also proposed to indicate in this point that monopile or jacket type foundations may be used for the foundation of the wind turbine. I also request that the area of the farm intended for development be determined without taking into account the buffer area determined by the rotor radius, i.e. 100 m in its value determined in the Environmental Decision. The conclusion of the Environmental Decision does not specify the buffer itself, but the specified value of the development area (89 km^2) clearly indicates that the 100 m buffer was used when determining it. In accordance with the contents of the Environmental Decision, the area intended for development has a surface area of 117 km^2 – in accordance with the permit for erection and use of artificial islands, structures and devices, the area of the farm up to approx. 119.52 km^2, however, the Environmental Decision refers to the area verified during the measurements carried out in the course of preparation of the environmental impact assessment report – reduced by the 500 m buffer with the surface area of approx. 24 km^2. This means that the area where it is possible to locate the farm elements is an area of approx. 94 km2. Due to the fact that, in accordance with the interpretation of the provisions of the Construction Law, the development area must include all elements of the designed civil structures, including above-surface elements, i.e. in this case the rotor blades, the farm development area, in relation to the conditions specified in the permit for erection and use of artificial islands, structures and devices (500 m from the boundary of the farm area), should not be additionally reduced by the buffer surface area with a width determined by the maximum rotor diameter, and in order to make the contents of point I.1 of the Environmental Decision consistent with point I.3.8, I request for indication that the surface area possible for development is approx. 94 km^2.
   It is also proposed in part of point I.1. of the Environmental Decision regarding the spacing of the wind turbines to indicate that the wind turbines shall be spaced to allow maintaining

the minimum distances between individual wind turbines of 800 m from the axis of individual structures, while the substation shall be placed in the central part of the farm area.

It is also proposed to delete the parameters describing the capacity, dimensions and weight of AC transformer stations and AC/DC converter stations. Since the planned maximum number of offshore substations has been reduced from 6 to 1, the final substation parameters may differ from the parameters indicated in the Environmental Decision, whereas these parameters do not affect the level and impact of the planned Project on the environment. These parameters may be determined only at the stage of the building permit design.

In addition, it is proposed to change the provision on cable protection to a formula consistent with the draft spatial development plan for internal sea waters, the territorial sea and the exclusive economic zone, indicating that if technical conditions do not allow for burial of cables, then they shall be secured by means of permanent protection.

2. Appropriate changes in accordance with those indicated for change in point I.1 are proposed in point I.3.1. of the Environmental Decision, i.e. it is proposed to replace the number of 120 wind turbines with 60, whereas the maximum rotor diameter of 200 m should be replaced with the maximum rotor diameter of 250 m and the total height of the structure not higher than 275 m above sea level should be replaced with the total height of the structure not higher than 310 m above sea level.
3. In point I.3.2. of the Environmental Decision, the number of 6 substations is proposed to be changed to 1.
4. In point I.3.3. of the Environmental Decision, it is proposed that instead of the density parameter of 1.35 pcs/km^2 the minimum distances to be kept between individual wind turbines of 800 m from the axis of individual structures should be indicated.
5. In point I.3.4. of the Environmental Decision it is proposed to assume a maximum zone for a single rotor of no more than 49,088 m2 and a total maximum zone for all rotors of no more than 2,945,244 m2.
6. In point I.3.5. of the Environmental Decision, it is proposed to indicate that for 60 foundations for wind turbines it is possible to apply two types of foundations: monopile or jacket type, while for a foundation for a substation it is possible to apply one of four types of foundations: monopile, gravity-base foundation, jacket type or tripod type.
7. In point I.3.6. of the Environmental Decision, it is proposed to indicate that the maximum seabed area occupied by one foundation (without a possible scour protection layer) for a wind turbine may not exceed 79 m^2 and for an offshore substation not more than 1,964 m^2, and the total maximum seabed area occupied by all foundations – not more than 6,676 m^2.
8. In point II.1.A.1 of the Environmental Decision, it is proposed to introduce a differentiation of the parameter determining the effectiveness of technical solutions to minimize the impact of underwater noise depending on the species/group of species requiring the introduction of the solutions in question. This means that the limits necessary to be complied with at the boundary of the nearest marine mammal Natura 2000 site, i.e. Słowińska Refuge PLH220023, were set at 140 dB re 1 µPa2s SELcum and weighted for cetaceans with high sensitivity to very high frequencies (VHF) for porpoise and 170 dB re 1 µPa2s SELcum and weighted for seal (PCW) for seals. A detailed rationale is provided in Volume IV, Section 6, Chapter 9.1.1.4 of the Report.
9. In point II.1.B1:
    a) it is proposed to change the number of 120 wind turbines to 60.

b) it is proposed to change the rotor diameter not larger than 200 m to the rotor diameter not larger than 250 m.

c) it is proposed to change the height of the total structure not exceeding 275 m above sea level to the height of the total structure not exceeding 310 m above sea level.

10. In point II.1.B, it is proposed to add another letter and in this newly added point to indicate the obligation to leave the possibility of locating the farm above-water elements at the north-western end of the water region intended for the BIII OWF implementation, thus indicating the area allowed for development with above-water elements in accordance with the coordinates presented in the table below.

Table 1. Geographic coordinates of the boundaries of the BIII OWF development area with above-water elements

Point	ETRS89_Poland_CS92	
	Longitude	Latitude
1	17° 21' 21,473" E	54° 57' 21,518" N
2	17° 17' 17,639" E	54° 57' 0,529" N
3	17° 15' 28,399" E	55° 0' 39,156" N
4	17° 17' 36,907" E	55° 2' 5,406" N
5	17° 30' 31,280" E	54° 59' 50,060" N
6	17° 24' 36,771" E	54° 57' 39,861" N
7	17° 22' 38,491" E	54° 57' 25,473" N
8	17° 21' 23,133" E	54° 57' 21,632" N
9	17° 21' 22,998" E	54° 57' 21,625" N
10	17° 21' 22,510" E	54° 57' 21,596" N
11	17° 21' 22,023" E	54° 57' 21,562" N
12	17° 21' 21,537" E	54° 57' 21,524" N

11. An additional letter is proposed to be added to point II.1.E to include an obligation to carry out visual observation for the presence of marine mammals during the preparation and execution of seabed clearance (detonation) operations. Observations should be made from suitable observation platforms on vessels and allow a wide field of observation in the direction ahead of the vessel, and should be made during periods of good visibility. If marine mammals are recorded within the zone of potential impact, the operation should be ceased until the individuals concerned are not present within the zone.
12. In point II.1.E, it is proposed to add an additional letter and include an obligation for the deployment of marine mammal scaring devices prior to the start of seabed clearing operations by controlled explosive ordnance disposal by the relevant services. The range and effectiveness of the device should be adapted to the range of potential impacts related to the explosive detonation, detonation place and season, and allow for effective scaring away of marine mammals from the area where they could be exposed to a permanent threshold shift – PTS.
13. In point II.2.a, concerning the monitoring of seabirds and birds flying over the farm area (including migratory birds) at the operation stage, it is proposed to delete the part of the condition concerning the shutdown of turbines located on the route of registered bird flocks during migration periods. The provision requested to be repealed does not refer to the scope and conditions of monitoring, i.e. the subject of point II.2.a of the Environmental Decision,

and is inconsistent with the condition specified in point I.2.31 and I.3.12 of the Environmental Decision concerning the shutdown of turbines, which raises interpretation doubts, at the same time this change does not affect the contents of points I.2.31 and I.3.12 of the Environmental Decision.

14. In point II.2.a, concerning the monitoring of bats at the operation stage, it is proposed to make the condition more precise by indicating that at least 6 recorders of bat activity will be located in the first line of the wind turbine on the western and southern boundary of the BIII OWF area, which is justified by the characteristics of the bat observations so far in the area of the planned farm and the infrastructure of offshore wind farms planned by other investors. It is also proposed to waive a part of the condition concerning the bat mortality survey as part of post-development monitoring during the Project operation. Monitoring must be carried out using verified survey methods. It should be noted that in the case of the bat mortality survey, there are no methods giving reliable results in the scope of conducting such surveys in maritime areas. The nature of the environment, including wave motion, sea currents, activity of animals taking dead specimens, makes it impossible to reliably design the monitoring of bat mortality within the BIII OWF area. This change is also consistent with the grounds for the Environmental Decision, which indicate that bat monitoring should be based only on the bat activity survey and should be carried out on the same principles as monitoring prior to the implementation of the Project. It should also be emphasized that the conditions concerning the monitoring of bat mortality have not been specified in other decisions on environmental conditions for the OWF.
15. It is proposed to repeal the provision of point IV of the Environmental Decision and state that it is not necessary to carry out the environmental impact re-assessment as part of the procedure for issuing the building permit decision. Regarding:
    a) determination, at the current stage of the project development, of further details concerning the development of the farm area and significant narrowing down of the foundation technologies planned to be used,
    b) proposed modifications of the conditions of implementation and operation of the Project and changes in the state of facts covering new knowledge about the marine environment and the regulatory environment of the BIII OWF,
    c) fulfillment of the recommendations of the Authority specified in point IV of the Environmental Decision and presentation of relevant results and conclusions in the attached project environmental impact assessment report, in particular the analysis of solutions related to the mitigation of cumulative impacts provided for in the decisions on environmental conditions issued for other offshore wind farm projects planned to be implemented on the north-eastern slope of the Słupsk Bank,

    there are no conditions requiring the environmental impact re-assessment as part of the procedure for issuing the building permit decision for the Bałtyk Środkowy III OWF project.

5. Impact of the current parameters of the Project and the results of the impact assessment on the necessity to carry out the environmental impact assessment as part of the procedure for the issuance of a building permit decision

Point IV of the Environmental Decision states that it is necessary to carry out the environmental impact assessment as part of the procedure for the issuance of the building permit. This point indicates that the re-assessment is to be carried out with particular emphasis on:

A. Determination of the width and significance of the designated safety zones around individual wind turbines for migration of birds and bats;
B. Determination of the width and significance for birds and bats of migration corridors between the water regions intended for the construction of offshore wind farms of different investors; if the results of analyses indicate a scientifically justified need to determine migration corridors along the boundaries between the water regions intended for the construction of offshore wind farms of different investors, the proposals concerning this corridor included in the environmental impact re-assessment report should be based on a guideline that the axis of the indicated corridor would coincide with the line, which divides these water regions, or if the course of the corridor due to scientific reasons is different, the axis of this corridor should be determined so that it would cause similar or comparable economic results for the farms in these water regions, with possibly the lowest costs for the environment;
C. Analyses of adopted methods of foundation and assessment of the process on individual components of the natural environment;
D. Determination of the impact of individual turbines and other farm elements' layout on the surface, on the availability of this area for animals, including, in particular, seabirds and marine mammals, and determination of the impact on long-distance and local bird flight paths;
E. Proposal of solutions minimizing the impact of noise and reducing the range of this impact;
F. Determination of the number and location of bat activity recorders in the farm area.

In the justification for the Environmental Decision, it was indicated that the factual circumstances that support the imposition of the obligation for the environmental impact re-assessment were: multiple options of the technical solutions adopted in the program and spatial concept being the basis of the assessment in the Report 2015, and therefore the need to confirm the conclusions regarding the scale and intensity of the environmental impact, as well as the lack of significant negative impacts of the project on the Natura 2000 sites on the basis of the final solutions adopted in the building permit design and in the process design, and additional survey results – no detailed hydrogeological surveys at the stage of the assessment carried out prior to the issue of the Environmental Decision.

In accordance with the statement included in the last point of the previous chapter of this Volume, it is requested that the content of point IV of the Environmental Decision be amended and stated that it is not necessary to carry out the environmental impact assessment as part of the procedure for the issuance of the building permit. When analyzing the validity of the change in the content of point IV of the Environmental Decision, it is necessary to take into account the scope of specification of the parameters of the Project and the results of the environmental impact assessment of the specified parameters of the Project for the validity of the preconditions indicated as the grounds for imposing the obligation to perform the re-assessment, and the validity of the guidelines for environmental impact re-assessment.

First of all, it should be emphasized that the introduced Project modifications not only fall within the previously defined environmental conditions of its implementation, but result in the limitation of the Project impacts by significantly reducing the number of infrastructure elements comprising the Project, both wind turbines and substations, and also in further specifying the remaining parameters of the Project. In particular, it should be emphasized that the types of foundations possible to be used for the purposes of the wind turbine foundation have been specified, i.e. monopile and jacket foundations. Due to the seabed varying depths in the water region intended for the implementation of the BIII OWF and the diversified geological conditions of the seabed, it is necessary to allow the use of both monopile and jacket foundations. At the same time, it should be emphasized that the conducted environmental impact assessment took into account the impact of the technology with more far-reaching effects, i.e. monopile foundations. Both in the case of noise emission caused by foundation piling and due to seabed occupation by the foundation, monopile foundations cause more far-reaching impacts from among the types of wind turbine foundations considered in the currently proposed Project option. It should be emphasized that leaving it possible to use one of four types of foundations in relation to the substation foundation, i.e. apart from monopile and jacket foundations, also gravity-base foundations and tripod foundations, in combination with the reduction in the number of substations from 6 pieces to one, is irrelevant from the point of view of the results of the environmental impact assessment of the entire BIII OWF. The assessment of the foundation process for selected foundations carried out in this report implements one of the guidelines for conducting the re-assessment from among those indicated in the Environmental Decision.

Among the specific parameters of the Project, there are also those used to determine spatial distribution of individual infrastructure elements of the BIII OWF, both above-surface and subsurface elements – this applies to the wind turbines, substation and cables connecting individual elements of the BIII OWF. This report prepared for the purpose of amending the Environmental Decision specifies the approximate location of the substation, the laying of cables connecting individual components of the OWF and the planned layout of the wind turbines in the OWF area intended for the development of above-water components of the farm. It should be emphasized that in accordance with the results of the conducted assessment, the spatial arrangement of individual farm elements within the water region intended for the implementation of the OWF is irrelevant from the point of view of the effect on the impact magnitude and significance. What is important in this case is the number of wind turbines, which in the case of the proposed modifications was reduced by 50% in relation to the parameters of the Project approved in the Environmental Decision and by 70% in relation to the set of parameters of the Project constituting the worst case scenario in the Report 2015 – WCS 2015.

When analyzing the significance of migration corridors for birds between the water regions intended for the implementation of offshore wind farms of different investors, and their widths, it should be indicated that the decision on environmental conditions for the project named Baltica Offshore Wind Farm, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 of January 24, 2020, provides for leaving a corridor of 5 km undeveloped with wind turbines between the Baltica 2 and Baltica 3 areas and assumes leaving such a corridor as far as the boundaries of the Słupsk Bank Natura 2000 site. This action was considered as an effective measure to minimize the impact of the Baltica OWF project (which includes two separate areas indicated in the permit for erection and use of artificial islands,

structures and devices – Baltica 2 and Baltica 3) on the objects of protection of the Słupsk Bank Natura 2000 site, in relation to both the impacts caused by this project individually and cumulation with the impacts caused by other OWFs located on the north-eastern slope of the Słupsk Bank. When issuing the decision on environmental conditions for the Baltica OWF project, the authority did not impose the obligation to carry out an environmental impact re-assessment in the course of the building permit procedure. Consequently, it should be considered that the information collected in the course of all procedures concerning the decision on environmental conditions for the OWF planned to be implemented on the north-eastern slope of the Słupsk Bank allowed for precise determination of the location of the corridor optimal from the point of view of protection of bird migration routes being the subject of protection of the Słupsk Bank Natura 2000 site, which should remain undeveloped with wind turbines.

As part of the proceeded amendment to the Environmental Decision, additional measures are proposed to mitigate the barrier effect during bird migration consisting in the exclusion of the north-western corner of the water region intended for the implementation of the BIII OWF from the development with wind turbines. This solution is consistent and constitutes a continuation for the undeveloped corridor implemented to the conditions of the decision on environmental conditions issued for the Baltica OWF – condition II.3.9 of the decision on environmental conditions, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37. When performing analyses for the purpose of this report, it was considered that, taking into account also the fact that the BIII OWF was one of the projects analyzed in the environmental impact report for the Baltica OWF project in terms of potential accumulation of impacts, as well as taking into account the information on the directions of bird migration from and to the Słupsk Bank area, confirmed by all the previously prepared environmental impact reports for the OWFs planned to be implemented on the north-eastern slope of the Słupsk Bank, the proposed actions were considered sufficient to ensure mitigation of the barrier effect for migratory birds, while ensuring that the impacts on the integrity, coherence and subject of protection of Natura 2000 sites through impacts on migratory birds on overwintering areas being the subject of protection of the Słupsk Bank area will not be significant. Re-analyzing this issue at the stage of the building permit will not provide any additional information and will not affect the change of the location of the corridor ensuring the passability of migration routes to and from the Słupsk Bank.

Additional actions mitigating the impacts relating to the barrier effect, consisting in the establishment of corridors undeveloped with wind turbines, are provided for in the Environmental Impact Assessment Report for the Baltic Power project and assume leaving an area undeveloped with wind turbines between the Baltic Power OWF and the Baltica 3 OWF, and supporting the 5 km corridor designed between the Baltica 2 and Baltica 3 areas and BIII OWF, and additionally assume leaving an undeveloped area with a width of 4 km east of the area planned for development as part of the Baltic Power project.

Both the analyses performed in this Report and the documentation submitted in the course of other procedures concerning the decision on environmental conditions for the OWF planned on the north-eastern slope of the Słupsk Bank confirm that the boundaries of the water region intended for the implementation of the BIII OWF do not contain migration corridors for bats. As a result of the performed analyses, it was concluded that further investigation of the impact of the planned BIII OWF on the migration of bats is pointless, it will not lead to the acquisition of new knowledge, nor will it contribute to the determination of other conditions for the implementation, operation and

decommissioning of the BIII OWF. In view of the above, it is not justified or even possible to determine the safety zones around the wind turbines and their significance for the migration of bats. In relation to bird migration, however, there are no examples of implementation of the OWF from other countries, and none of the environmental impact assessment reports prepared for the OWF in the Polish maritime areas confirmed the significance and possibility of determining zones around the individual wind turbines due to the perception of the entire farm as a barrier on the route. Such mitigated impacts are the above-described areas undeveloped with wind turbines.

For the purpose of this Report, taking into account the specific parameters of the Project, the modeling of the noise impact related to the foundation piling was repeated.

The conducted modeling, presented in detail in volume IV, section 6, was used to verify the effectiveness of the proposed solutions minimizing the noise impact. They fully confirm the effectiveness and sufficiency of the proposed methods. At the same time, it is proposed to differentiate the parameter determining the effectiveness of technical solutions to minimize the impact of underwater noise depending on the species requiring the implementation of the said solutions, i.e. to indicate separately the limit values necessary to be met at the boundary of the nearest Natura 2000 site protecting marine mammals for porpoises and separately for seals, using customized weighing functions.

With respect to recorders of bat activity in the farm area, the Environmental Decision in point II.2.a – bats determined that the number of bat recorders may not be lower than 6 pcs. Due to the fact that the monitoring surveys for the BIII OWF, but also for subsequent OWF projects planned to be implemented in the vicinity of the BIII OWF, do not indicate the existence of bat migration corridors in the area of the planned BIII OWF, and the acoustic observations of bats over the area planned for the implementation of the farm are incidental, it is proposed to locate at least 6 recorders in the first line of the wind turbine on the western and southern boundary of the BIII OWF development area. From the north and east, the BIII OWF borders with other OWFs, therefore, the location of recorders at the boundary of undeveloped areas with wind turbines is justified by monitoring the potential use of space by bats. Registration in the areas adjacent to other OWFs will be affected by the infrastructure of these farms.

Consequently, it should be found that the updated conditions of implementation and operation of the Project together with the environmental impact assessment for the proposed changes in the conditions of the Environmental Decision and the new knowledge on the environmental status in Polish maritime areas and on the impacts caused by the OWF, as well as the consequences of decisions made in other procedures on the decision on environmental conditions for the OWF projects, cause that the grounds for imposing the obligation to conduct an environmental impact re-assessment during the procedure on the building permit for the BIII OWF project disappeared. In such a situation, maintaining this condition in case of introducing the other changes described in this Report would make a repeated environmental impact assessment an unnecessary administrative obligation that adds no value in terms of the objective of ensuring a high level of environmental protection.

6. Impact of the current parameters of the Project and the results of the impact assessment on the necessity to carry out the environmental impact assessment of the

project in a cross-border context

In the course of the procedure on the decision on environmental conditions, which ended with the issuance of the Environmental Decision, no environmental impact assessment was carried out in a cross-border context. The assessment results presented in the Report 2015 indicated that the Project with the parameters approved in the Environmental Decision will not be a source of emissions or disturbances that could cause significant environmental impact outside the areas covered by the Polish jurisdiction. Such an assessment of the impacts caused by the planned BIII OWF was confirmed by the authority conducting the procedure ended with the Environmental Decision, stating that the planned Project would not cause cross-border environmental impacts (page 97 of the Environmental Decision).

The change of the Project does not result in an increase in the significance of any of the identified impacts relating to the implementation, operation or decommissioning of the BIII OWF; on the contrary, in the case of a significant part of the impacts, their significance is reduced and in part reduced significantly. Similar situations are presented for the assessment of cumulative impacts, as the update of the Project causes either no change in relation to the impacts identified for the Project with the parameters approved in the Environmental Decision or their reduction, thus the base for cumulation with other impacts is reduced or remains unchanged. As a consequence, also the impact in the form of cumulative impacts of the Project, in the proposed modified parameters, is reduced. There are also no new circumstances, changes in the factual situation, that would result in the occurrence of new impact receptors or scientific knowledge that would indicate a greater sensitivity of the identified receptors to impacts, the source of which may be the implementation, operation or decommissioning of the BIII OWF. Thus, it should be found that the update of the Project does not result in the obligation to conduct the environmental impact assessment of the proposed change in the conditions of the Environmental Decision in a cross-border context.

7. Impact of the current parameters of the Project and the results of the impact assessment on the necessity to establish a limited use area

As indicated in the Environmental Decision, wind turbines, similarly to substations, are not listed in the catalog of projects for which it is possible to establish a limited use area. The proposed changes in the conditions of the Environmental Decision are not associated with the introduction of any new elements of the Project to the scope covered by the Environmental Decision, and thus, as a result of the procedure for the change of the decision on environmental conditions, the material scope of the case does not change from the point of view of the possibility of establishing a limited use area.

8. Impact of the current parameters of the Project and the results of the impact assessment on the necessity to present the post-execution analysis

Point V of the Environmental Decision imposes an obligation to prepare and submit a post-execution analysis. As part of the procedure for the change of the Environmental Decision within which this Report was prepared, it is not requested to change the condition in question.

9. Impact of the current parameters of the Project and the results of the impact assessment on the requirements for counteracting the effects of industrial accidents

As indicated in the Report 2015, in accordance with Article 2 section 4 of the Environmental Protection Law, the principles of sea protection against pollution by vessels and administration authorities competent for such protection are determined in separate regulations. However, in relation to the offshore wind farm itself, the quantities of hazardous substances present in its area, do not qualify the farm to any of the categories of plants posing a risk of a serious industrial accident pursuant to the provisions of the Environmental Protection Law and the Regulation of the Minister of Development of January 29, 2016 *on types and volumes of hazardous substances present in the plant, which decide on classification of a plant as a plant of increased or high risk of major industrial accident* (Journal of Laws, item 138). The proposed changes in the conditions of the Environmental Decision are not associated with the introduction to the scope covered by the Environmental Decision of any new elements of the Project or increase in the quantity of hazardous substances present in the BIII OWF area, and thus, as a result of the procedure for the change of the decision on environmental conditions, the material scope of the case does not change from the point of view of the requirements for counteracting the effects of industrial accidents.

10. Compliance with local development plans

Spatial development plan for the Polish maritime areas, internal sea waters, the territorial sea and the exclusive economic zone at a scale of 1:200,000 was adopted on April 14, 2021.[1]
The Plan was prepared jointly by the Directors of Maritime Offices in Szczecin, Słupsk and Gdynia in order to ensure the consistency of spatial development of the entire area covered by the plan. The Plan covers all internal waters, the territorial sea and the exclusive economic zone under the jurisdiction of the Polish maritime administration, excluding port waters and three lagoons for which, due to the scale of conflicts and intensity of impacts between the land and the sea, plans will be prepared on a larger scale, to include detailed issues.[2] In the Plan, the POM.45.E area is intended for renewable energy generation, while internal and external technical infrastructure is considered as integral elements of projects of this type. Therefore, the Plan includes the implementation of the BIII OWF in the area in question. The Plan indicates limitations related to the use of area, including in the scope of technical infrastructure:

- it is limited to the infrastructure necessary to perform the energy generation function;
- it is limited to the methods that do not threaten the ecological function of spawning grounds and the survivability of fish (hard roe and larvae) of commercial species at early stages of development;
- it is required to install linear elements of technical infrastructure in such a manner as to ensure economical use of space under the seabed surface, and if it is impossible due to environmental or process reasons, other permanent protections shall be used to enable the safe use of set anchored gillnets.

[1] Regulation of the Council of Ministers of April 14, 2021 on the adoption of the spatial development plan for internal sea waters, territorial sea and exclusive economic zone at a scale of 1:200,000 (Journal of Laws of 2021, item 935)
[2] https://legislacja.rcl.gov.pl/projekt/12345201/katalog/12776609#12776609, access date: May 2022

The Plan in the part specifying the conditions of using the water region in the scope of renewable energy generation indicates that:

- this area is intended for generation of energy from wind by means of wind turbines, considering internal and external technical infrastructure as an element of projects aimed at this purpose;

- at the moment of commencement of the project consisting in the erection of artificial islands and structures, it is required to, by way of decision of the locally competent director of the maritime office, prohibit fishing and navigation in the water region intended as the construction site, together with a 500-meter safety zone around the water region, for the duration of construction activities;
- during the operation of the offshore wind turbines, it is required to, by way of a decision of the locally competent director of the maritime office, limit fishing and navigation in the safety zones established for each structure and in places that threaten the safety of the internal technical infrastructure.

The plan includes the permit for erection and use of artificial islands, structures and devices in the Polish maritime areas issued to the Investor for the water region in question, ref. No. GI7/62/1170069/decyzja/2012 by the Minister of Transport, Construction and Maritime Economy on March 30, 2012.

11. Comparison of the proposed technology with the technology referred to in Article 143 of the Environmental Protection Law

The Report 2015 contains a comparison of the proposed technology with the technology referred to in Article 143 of the Environmental Protection Law. The proposed changes in the conditions of the Environmental Decision do not result in significant changes in the technology used during the implementation and operation of the planned Project. However, it should be emphasized that the proposed changes are in line with the requirements relating to scientific and technical progress, as they directly reflect an increase in the knowledge about the environmental status in the Polish maritime areas and the impacts caused during the implementation and operation of offshore wind farms, and the emergence of technologies relating to the implementation and operation of the OWF, which were not available at the time of preparation of the Report 2015. Consequently, it should be stated that the proposed changes in the conditions of the Environmental Decision allow for updating the planned Project and, at the same time, confirm that the technologies proposed for the implementation and operation of the Project meet the requirements specified in Article 143 of the Environmental Protection Law.

12. References and other sources

1. Regulation of the Minister of Development of January 29, 2016 on types and volumes of hazardous substances present in the plant, which decide on classification of a plant as a plant of increased or high risk of major industrial accident (Journal of Laws, item 138).
2. Environment Protection Law of April 21, 2001 (consolidated text, Journal of Laws of 2021, item 1973, as amended).
3. Regulation of the Council of Ministers of April 14, 2021 on the adoption of the spatial development plan for internal sea waters, territorial sea and exclusive economic zone at a scale of 1:200,000 (Journal of Laws, item 935).

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

for the change of the decision on environmental conditions

BAŁTYK ŚRODKOWY III OFFSHORE WIND FARM

VOLUME VI

Non-technical summary

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Abbreviations and definitions

AIS	Automatic Identification System
Barotrauma	Rupture of the alveoli of bats flying up to a wind turbine blade due to a pressure change
Bathometer	An instrument for taking water samples for analysis
Benthos	Plant and animal organisms associated with the seabed
C-POD	A recorder of signals (so called "clicks") sent by porpoises
Environmental Decision	Decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm"
DEC	Decision on environmental conditions
Echolocation	Sending of very high frequency sounds (ultrasounds) by some animals (marine mammals, bats), which then return to them after being reflected by obstacles; based on the direction, time of return, and intensity of the returning sound, the animal can determine the direction, distance, and size of the obstacle;
EEZ	Exclusive Economic Zone
WT	Wind turbine
Phytobenthos	Plant communities at least a few millimeters in size, rooted in the seabed or attached to a hard surface (e.g. stones).
GDOŚ	General Director for Environmental Protection
GW	Gigawatt – a unit of power of energy generating equipment
GWh	Gigawatt hour – a unit of electrical energy produced
Hydrophone	Underwater microphone for underwater noise background recording
Ichthyoplankton	Spawn and fish in early life stages
Investor	Polenergia Bałtyk III Sp. z o.o.
HVDC cable	High voltage DC cable
kV	Kilovolt – a unit of voltage, e.g. of marine cables
Macrozoobenthos	Animal organisms larger than 1 mm, mainly larger invertebrates, inhabiting the surface or the interior of the bottom sediment
Heavy metals	A group of metals characterized by high density and often toxicity
OWF	Offshore Wind Farm
Baltica 2 OWF	Baltica 2 Offshore Wind Farm
Baltica 3 OWF	Baltica 3 Offshore Wind Farm
BII OWF	Bałtyk II Offshore Wind Farm
BIII OWF / Project	Bałtyk Środkowy III Offshore Wind Farm
Bird migration	is the movement of birds between two areas – the breeding and the overwintering area. Bird migration is caused by changes in weather conditions, and the associated unavailability of food. Bird migrations may also be local, such as in search of greater food abundance.
OTI	Offshore Transmission Infrastructure – offshore power grid

OS	Offshore substation – an element of offshore power infrastructure
MW	Megawatt – a unit of power of electricity generating equipment
WCS 2015	The worst case scenario from the Report 2015, which is a set of project parameters causing the worst case impacts, and which was the basis for conducting the environmental impact assessment during the procedure concluded with the issuance of the Environmental Decision.
EHV	Extra High Voltage – in relation to the rated voltage of the power infrastructure
NTU	Nephelometric Turbidity Unit
EIA	Environmental Impact Assessment
POM	Polish maritime areas
PSZW	Permit for erection and use of artificial islands, structures and devices in the Polish maritime areas – an equivalent of a location decision in the Polish maritime areas
Seabirds	Waterbird species which spend the non-breeding season predominantly in marine waters more than 1 km from the shore
Report 2015	The Environmental Impact Assessment Report for the purposes of the procedure finalized by the decision of the Regional Directorate for Environmental Protection dated July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22
Report/EIA Report	Environmental Impact Assessment Report for the amendment to the decision on environmental conditions issued for the Bałtyk Środkowy III OWF
RDEP	Regional Director for Environmental Protection
ROV	Remotely Operated Vehicle
Demersal fish	Fish living at the seabed (mainly cod and flatfish)
Pelagic fish	Fish whose life is not linked to a fixed substrate (e.g. herring, sprat)
SCADA	Supervisory Control and Data Acquisition – an IT system supervising the technological process
Siemens	Unit of conductance
MV	Medium voltage – in relation to the transmission capacity of the power infrastructure
Marine mammals	Mammals that spend most of their lives in sea or ocean waters
Cross-border environmental impact	Cross-border impact on the environment
EIA Act	Act of October 3, 2008 on access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessments (consolidated text, Journal of Laws of 2022, item 1029)
V	Volt – unit of voltage
Alternative option	Reasonable alternative option for the project
Zero option	Option of not implementing the project
HV	High voltage – in relation to the rated voltage of the power infrastructure

1. Introduction

1.1. Purpose and scope of the non-technical summary

This document is a non-technical summary of the Environmental Impact Assessment Report (the "EIA Report", "Report", "EIAR") prepared for the procedure on the amendment to the decision on environmental conditions for the Bałtyk Środkowy III OWF construction project ("BIII OWF", the "Project") related to the amendment to and update of some of the conditions of the previously obtained decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No.: RDOŚ-Gd-WOO.4211.12.2015.KP.22. (the "Environmental Decision").

The report contains a description of the surveys and analyses carried out for the Project and used to prepare the report which was the basis for issuing the decision to be amended – the Environmental Decision ("Report 2015") and the analyses that were carried out after obtaining the Environmental Decision, as well as an assessment of the impact of the updated parameters for Project implementation and operation on its environmental impact. The executive summary presents the key findings of the Report.

The purpose of the executive summary is to explain to non-specialists, especially participants in public consultation:

- what the Project under assessment is and what the purpose of its implementation is and what the updating of the Project parameters is;
- what environmental impacts it may cause and how these impacts will be affected by change of the Project implementation and operation parameters;
- what solutions will be used so that the potential impacts are not harmful for the environment or human and animal health.

The summary refers to each element of the EIA Report, in accordance with the requirement set forth in Article 66 section 1 item 18 of the Act of October 3, 2008 on providing access to information on the environment and its protection, public participation in environmental protection and on environmental impact assessment ("EIA Act").

The summary has, as much as possible, been written using non-technical language. However, sometimes it was necessary to use a specialist term. If this is the case, its explanation can be found in the text or in the glossary ("Abbreviations and definitions") above.

1.2. Benefits of the Project

BIII OWF will generate electricity from a renewable source – wind, at the estimated level of up to approximately 4,600 GWh of carbon-free electricity per year (with the installed capacity of 1,200 MW). The offshore wind farm generating between 3,168 and 5,160 GWh of carbon-free electricity could meet the electricity demand of between 1.2 and 2 million households.

In addition, it should be noted that the Polish energy sector, which is almost 90% reliant on burning coal, emits on average over 900-960 t of CO_2 per 1 MWh, which is the highest rate in the EU. In the context of the provisions of the energy and climate package, construction of zero-emission wind farms will be of great significance for the contribution of the Polish economy to the climate policy. Assuming that the CO_2 emission factor for Poland will remain at the level of at least 800 t/MWh for the next 20 years, the planned OWF project will

ultimately allow to avoid about 2 to 4 million tons of CO_2 per year.

BIII OWF has a chance, together with the other OWF projects being prepared in the Polish maritime areas, to become an important element in the construction of an international offshore grid in the Baltic Sea.
According to the Applicant's estimations, the purchase orders related to the construction of foundations and towers for BIII OWF may amount to around PLN 2.5 billion and their execution is planned to be entrusted to companies operating in Poland.
The sectors that will benefit most from the project and other similar projects are:

- ports (handling equipment transport, construction, service),
- warehouses (logistics of equipment deliveries – foundations, tower elements, turbines, blades),
- shipyards (the biggest deficit on the market are vessels for the construction (HLJV) and service of OWFs),
- engineering, design, logistics, maintenance, consulting services,
- cables (even several hundred kilometres of cables are needed for the construction of one OWF),
- science (environmental pre-development analyses and post-development monitoring, power, construction and engineering technologies),
- education (training programs for employees of construction, service and maintenance companies),
- tourism (existing wind farms are a tourist attraction with a great services potential).

2. General information (Summary of Volume I)

2.1. Information on the EIA report

Those who are interested in more information than that presented in the non-technical summary can read the full EIA Report. It consists of six volumes containing the following:

1) Volume I – Introduction,
2) Volume II – Project Description,
3) Volume III – Results of environmental surveys,
4) Volume IV – Environmental Impact Assessment,
5) Volume V – Summary,
6) Volume VI – Non-technical Summary.

According to Polish law (Article 8 of the EIA Act) administration authorities are obliged to make information on the environment and its protection which is in their possession, or which is intended for them, available to everyone. Therefore, this EIA Report may be made available to all interested entities by the authority conducting the procedure, i.e. the Regional Director for Environmental Protection ("RDOŚ") in Gdańsk. It is made available, as a rule, upon written request to be made in the way specified in the provisions of Articles 8–20 of the EIA Act.

2.2. Information about the Investor

The Investor for Bałtyk Środkowy III OWF is MFW Bałtyk III spółka z o.o.
The investor currently holds a permit for erection and use of artificial islands, structures and

devices in Polish maritime areas ("PSZW") for the BIII OWF project with a capacity of 1200 MW, which determines the project location, and concluded an agreement for the connection of the BIII OWF to the transmission grid, which determines the grid connection point and the amount of energy which can be supplied to the national power system. The Investor also holds a decision on environmental conditions issued by the Regional Director for Environmental Protection in Gdańsk on July 7, 2016, ref. No. RDOŚ-Gd-WOO.4211.12.2015.KP.22, for the project named "Construction of the Bałtyk Środkowy III Offshore Wind Farm". Due to the development of the project, changes in available OWF implementation technologies related to technological progress, changes in the knowledge about the Polish maritime areas and the impacts caused by offshore wind farms, as well as changes in the regulatory environment of the BIII OWF project, the Investor decided that it is necessary to update Project parameters and, as a result, amend the Environmental Decision.

2.3. Government's offshore wind energy policy

Offshore wind energy is playing an increasingly important role in Europe and worldwide. Although onshore wind farms are still predominant, the role of offshore wind farms will gradually increase. Despite significantly higher investment costs than onshore, OWFs are becoming increasingly competitive due to the following factors:

- wind speeds in offshore areas are higher and these winds are not so variable, thus increasing the generation potential of wind farms and the stability of the power system;
- larger wind turbines with significantly higher capacity can be installed in offshore areas as there are no constraint in terms of space and components can be transported from the production site to the installation site by sea;
- if they do not interfere with marine activities and do not have a negative impact on the marine environment, offshore wind farms do not arouse such strong emotions in the society and do not cause social conflicts. Wind energy development is also part of Poland's international and EU commitments to use renewable energy sources and reduce carbon dioxide emissions.

2.4. EIA procedure

Offshore wind farms ("OWF") are among those projects for which it is mandatory to prepare the EIA Report. The EIA Report is the basic document prepared in the procedure for the issuance of the DEC for the project. The DEC is a necessary attachment to the building permit application. The amendment to the decision on environmental conditions is governed by the provisions of Article 155 of the Code of Administrative Procedure ("CAP") and the provision of Article 87 of the EIA Act. Accordingly, the provisions on obtaining decisions on environmental conditions shall apply as appropriate to the amendment to the decision on environmental conditions. Consequently, an amendment to the decision on environmental conditions for a project for which an environmental impact assessment is required requires an environmental impact assessment to assess the impact of the updated conditions of project implementation and operation on the previously assessed environmental impacts.

2.5. Project consultations and participation of third parties in the procedure

Under Polish law, formal public consultations of the project (the so-called public participation procedure) are an obligatory element of the DEC issuance procedure if an environmental impact assessment is carried out during the procedure, and they are governed by the provisions of Article 29–38 of the EIA Act. After the submission of the EIA Report by the Investor, RDOŚ announces (by notices) the required information about the project to the public and, at the same time, sets a 30–day deadline for submission of comments and requests. They can be submitted by anyone.
Environmental organizations which, with reference to their statutory objectives, declare their willingness to participate in the DEC issuance procedure, participate in the procedure as a party. The participation of these entities in the procedure is governed by the provisions of Articles 44–45 of the EIA Act.

2.6. Report prepared by:

The team of authors of the Report:
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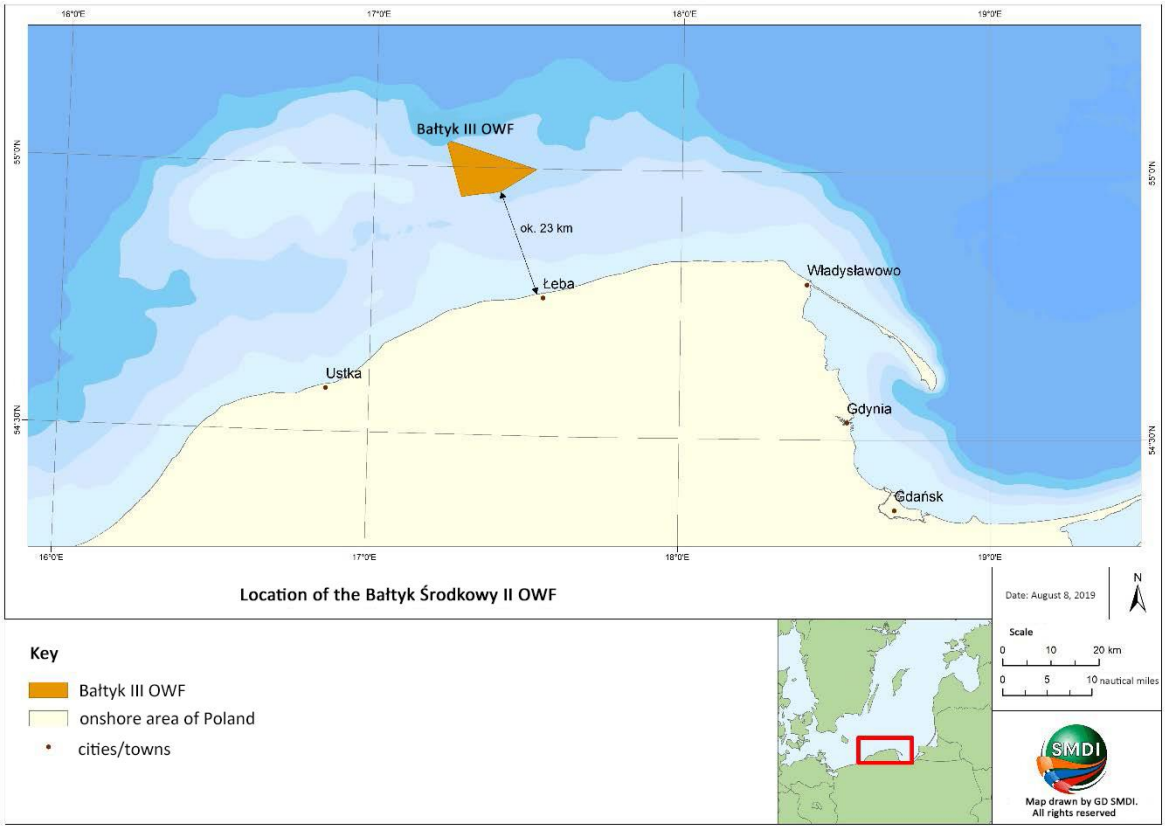
Environmental surveys and analyses carried out for the Report 2015 as well as additional analyses by ENINA and Equinor, were used for the purposes of preparing the Report.

3. Project description (summary of Volume II)

3.1. Location of the farm

The designed BIII OWF will be located in the southern part of the Baltic Sea, in the Polish Exclusive Economic Zone, in the location specified in the Environmental Decision, approximately 23 km north of the coastline, at the level of Łeba Municipality (Pomeranian Voivodship).
The location of the project is shown in the figure below.

Figure 1 Location of the BIII OWF



Source: Bałtyk Środkowy II Offshore Wind Farm. Environmental Impact Assessment Report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

3.2. Area of the occupied water region

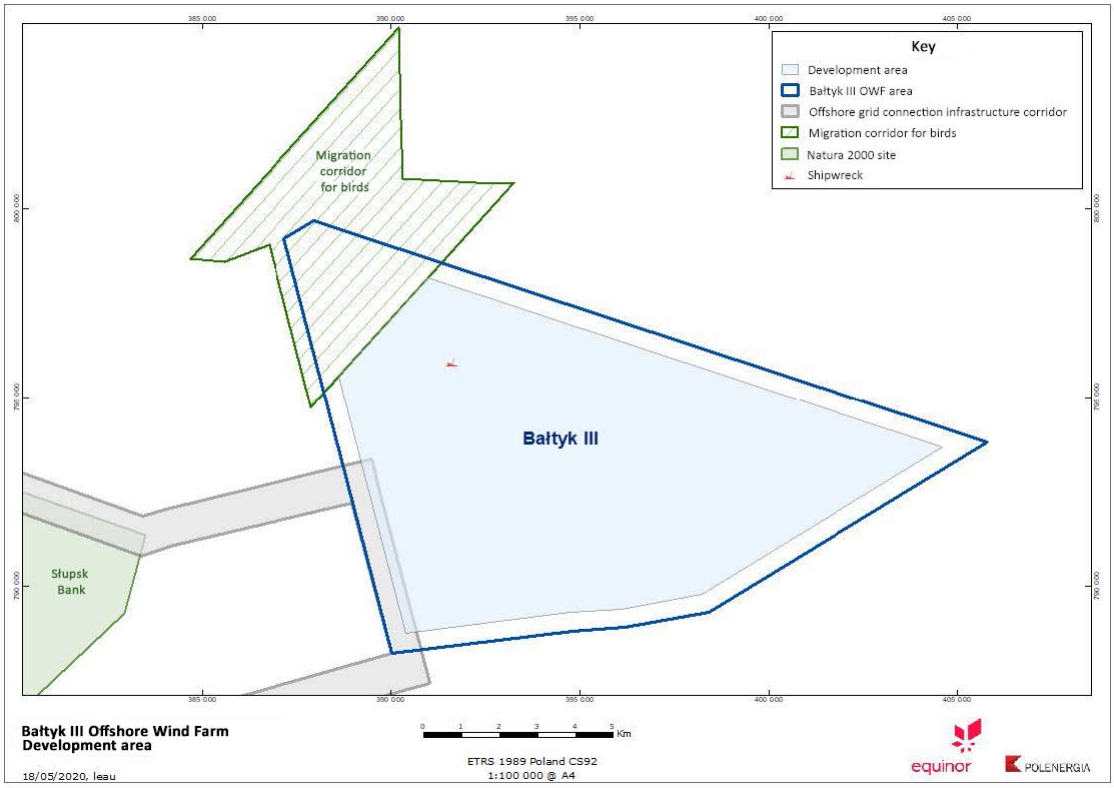
According to the arrangements made in the Environmental Decision, the surface area of the area intended for the construction of the BIII OWF is approx. 117 km^2. In accordance with the conditions specified in the permit for erection and use of artificial islands, structures and devices in the Polish maritime areas issued for the Project, the OWF components cannot be located in the 500 m buffer zone from the internal boundaries of the area intended for the construction of the farm. All structural components of the farm have to be located within the boundaries of the specified area, so it determines the maximum external range of the rotor, which additionally limits the area where foundations can be laid. The size of this limitation depends on the rotor radius.

At the stage of works on the EIA Report, the surface area of the BIII OWF development area was adjusted according to the permit for erection and use of artificial islands, structures and devices, which results only from the change of the method of calculating this surface area in order to make it consistent with the principles of determining the development area in accordance with the Construction Law. Moreover, as a result of the analysis of potential impacts of the Project on the environment, the Investor introduced, at the stage of works on the EIA Report, additional restrictions on the use of the development area according to the permit for erection and use of artificial islands, structures and devices to implement additional measures to mitigate cumulative impacts on birds: The north-western corner of the area intended for its construction was excluded from the development with the above-water elements of the BIII OWF in such a way as to create a 5 km wide corridor passable along its entire length and undeveloped with wind turbines, crossing the areas of the Bałtyk Środkowy III OWF farms, Baltica 2 OWF and Baltica 3 OWF in the SW-NE direction. The location of the proposed undeveloped corridor is shown in Figure 2.

Taking the above into account, it is assumed in the Report that the surface area of the water region intended for the project is approx. 117 km^2, whereas:

- the surface area for development with the BIII OWF, in accordance with the conditions specified in the permit for erection and use of artificial islands, structures and devices in the Polish maritime areas issued for the Project, is approx. 94 km^2;
- the surface area to be developed with above-water elements (wind turbines), taking into account the exclusion of a part of the BIII OWF area, for the purpose of creating a passable migration corridor for birds between groups of wind turbines, belonging to the projects located on the northern and north-eastern slope of the Słupsk Bank, is approx. 88 km^2.

Figure 2 Boundaries of the BIII OWF development area.



source: provided by the Employer

3.3. Description of the Project

The capacity of all wind turbines as part of the Project will range from 720 MW to 1200 MW. The BIII OWF will consist of:

- 60 wind turbines ("WT"), the basic components of which are: foundation, tower, nacelle with a power generator, and rotor,
- 1 internal offshore substation ("OS") located in the central part of the farm;
- a maximum of 200 km of submarine power and telecommunication cables, connecting the WT with each other and groups of wind turbines with the internal offshore substation.

The BIII OWF does not include the infrastructure for transmitting electricity generated by the farm to the land. A separate project, the Offshore Transmission Infrastructure ("OTI"), will serve this purpose. The Regional Director for Environmental Protection in Gdańsk issued for the project a decision, dated March 12, 2019, ref. No.: RDOŚ-Gd-WOO.4211.12.2016.KSZ/AJ.29 on the environmental conditions of the implementation of the project consisting in the construction of offshore transmission infrastructure.

As assumed in the report on the impact of the Project prepared for the procedure, which resulted in obtaining the Environmental Decision, the implementation of the Project may be carried out in stages, of which the first stage will cover the capacity up to 720 MW. The first stage is planned for implementation in the years 2024–2027. Implementation of subsequent stages will depend on the investment decisions made based on the current market conditions. The total construction time for the first stage will be up to 3.5 years. The time of construction of subsequent stages will depend on the decision regarding their size (number of wind turbines) and available technologies and equipment for the construction of offshore

wind farms.
The WT parameters will depend on the selected capacity (the higher the power output, the higher the tower and the longer the turbine blade span is required). The basic parameters affecting the environmental impact of the wind turbines planned for installation on the BIII OWF are presented in the table below.

Table 1 Basic parameters of the BIII OWF – option selected for implementation

Parameter	Option selected for implementation
Maximum total height of the wind turbine a.s.l. [m]	310
Minimum clearance between the lower wing position and the sea surface [m]	20
Maximum rotor diameter [m]	250
Number of wind turbines [pcs.]	60[1]
Maximum zone for a single rotor [m^2]	49 088

source: Investor's data

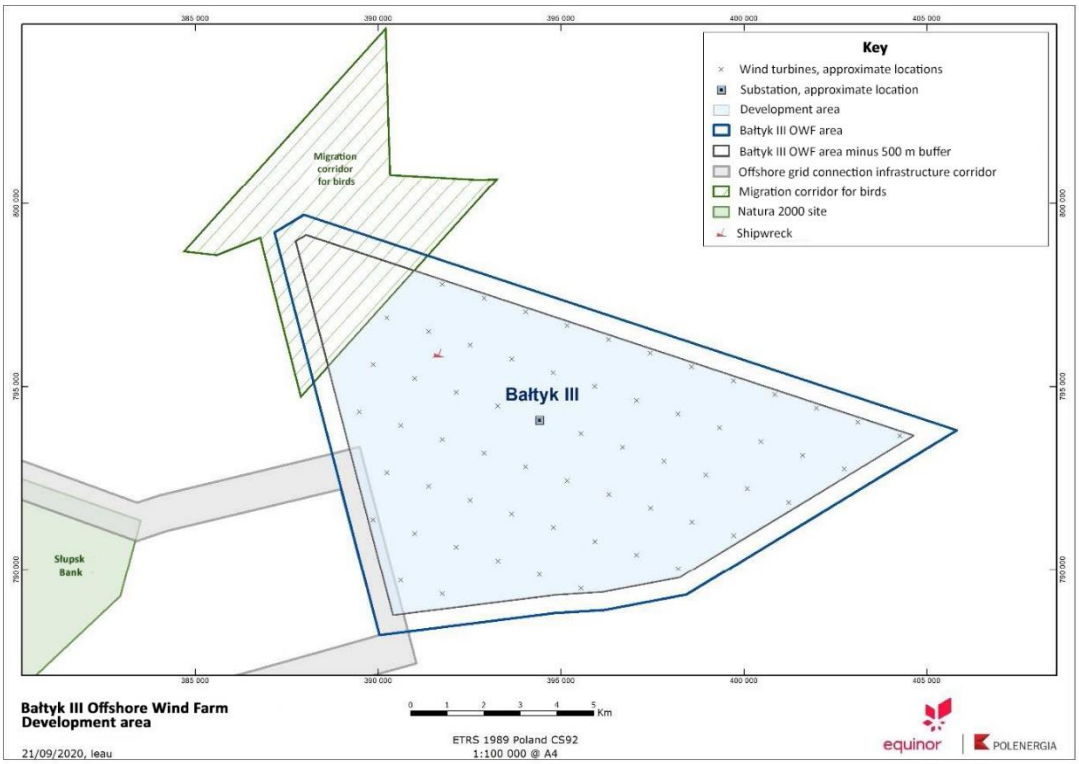
When updating the parameters of the Project, a preliminary development plan of the water region intended for the implementation of the BIII OWF was prepared, taking into account the results of wind measurements, preliminary geological and technical survey, and the results of the environmental impact assessments for the BIII OWF and the adjacent projects. The presented development plan was prepared assuming the installation of the maximum requested number of wind turbines, i.e. 60 pieces.
The key assumptions of the development plan are:

- minimum distances between wind turbines – 800 m;
- distribution of wind turbines in a manner ensuring the creation of corridors for the safe movement of vessels, service and rescue vessels through the farm;
- location of internal offshore substation in the central part of the farm;
- laying of inner array connection cables along corridors radiating from the OS to individual wind turbines, whereas these cables will connect from 5 to 6 wind turbines within one corridor;
- leaving the north-western corner of the area allocated for the Project undeveloped with above-water elements, widening of the undeveloped water region located between the planned farm and the Baltica 3 Offshore Wind Farm and Baltica 2 Offshore Wind Farm.

The development plan for the Bałtyk Środkowy III OWF may be subject to amendment (if a decision is made to build less than 60 wind turbines) or addition of further details and modifications, due to the specific requirements of adjusting the project to the selected generators, to the geotechnical conditions of the foundations in the locations of the planned farm elements as set forth in the complete geological survey, to the arrangements on the building permit design with competent authorities and institutions, including technical expert opinions in terms of maritime safety. However, the key assumptions for the arrangement of farm components, as set out above, will be maintained.
The currently planned spacing of the WTs in the area of the BIII OWF is shown in the figure below, and the final, detailed locations of wind turbines will be determined at the stage of the building permit design.

[1] The number of wind turbines may be reduced if turbines with higher unit capacity are used, while maintaining the minimum capacity of the farm.

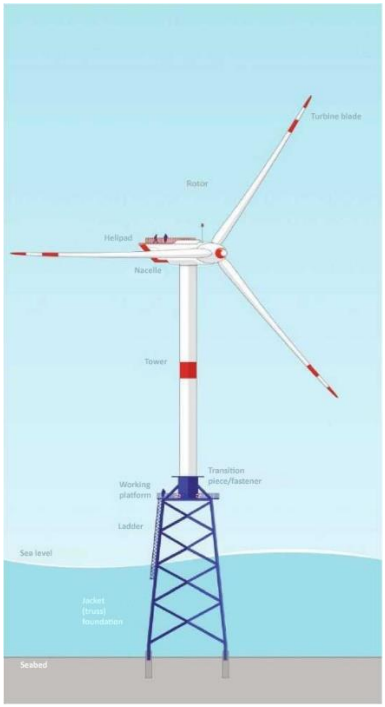
Figure 3 The planned spacing of the BIII OWF components in the option selected for implementation, assuming the construction of the maximum requested number of wind turbines (development plan)



source: provided by the Employer

A schematic of a typical offshore WT structure is shown in the figure below.

Figure 4 Schematic of an offshore wind turbine



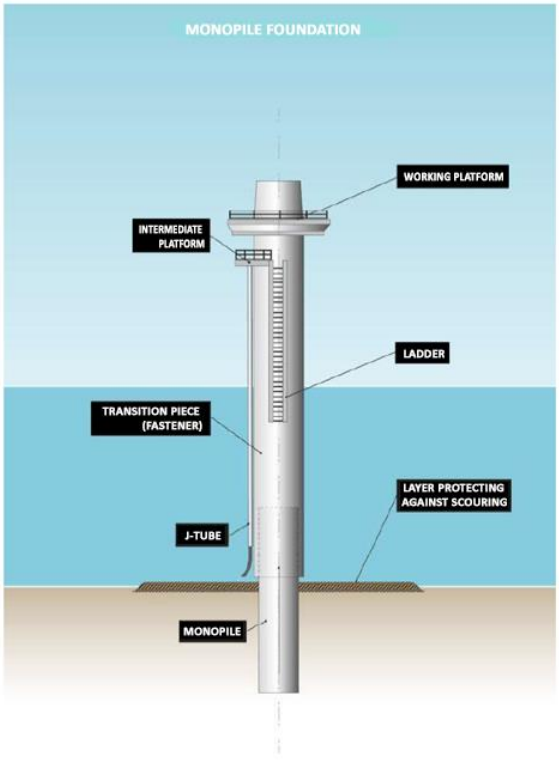
source: provided by the Employer

Photograph 1 Offshore wind turbine

source: provided by the Employer

A wind turbine is mounted on a tower, consisting of steel pipes with an average diameter of approx. 10 m (depending on the model). The basic structural materials of turbine blades include epoxy and polyester resins, carbon fiber, glass fiber and laminates. The wind turbine towers will be mounted on foundations which, in turn, will be placed on the seabed.
Currently, 4 types of foundations for the elements of the farm can be used, whereas in the case of a wind turbine, only monopile or jacket (truss) foundations can be used, whereas in the case of a substation, apart from the two mentioned types, it is also possible to use tripod foundations and gravity-base foundations (gravity based structures – GBS)).
The monopiles are made of steel cylinders with a diameter of 5–10 m that will be driven into the seabed. They are up to 120 m long. They are currently the most popular type of foundations used in the OWF. In the case of the BIII OWF, the maximum diameter of a pile in case of placing the wind turbine on monopile foundations will be 10 m.

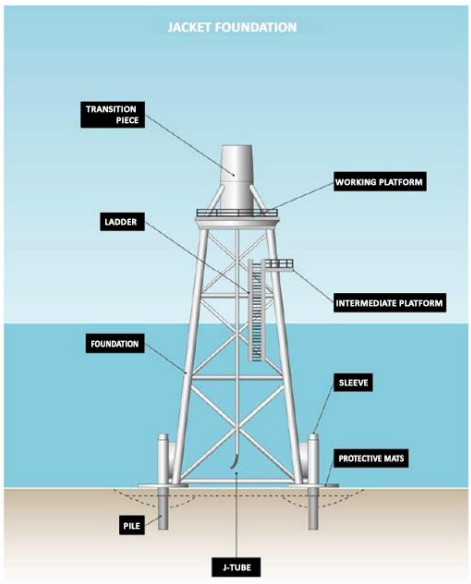
Figure 5 Monopile foundation



Source: provided by the Employer

A jacket foundation is made of four steel legs connected and reinforced with brackets made of cross-mounted pipes. That is why it is also called a truss foundation. These foundations are fixed to the seabed using 4 piles with a diameter of 1.8–3 m and a length of up to 70 m.

Figure 6 Jacket foundation

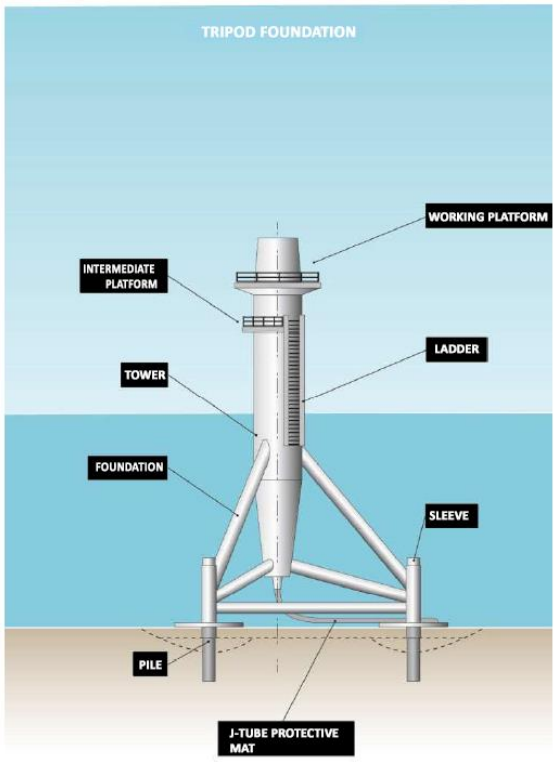


Source: provided by the Employer

The tripod structure consists of one main section (1st stage), which is the base for the fastener and the tower, and three 2nd stage sections, which are the foundation legs. The

tripod legs are equipped with sleeves for pile fixing. These foundations are usually fixed to the seabed using 3 piles with a diameter of up to 2.5 m and a length of up to 60 m.

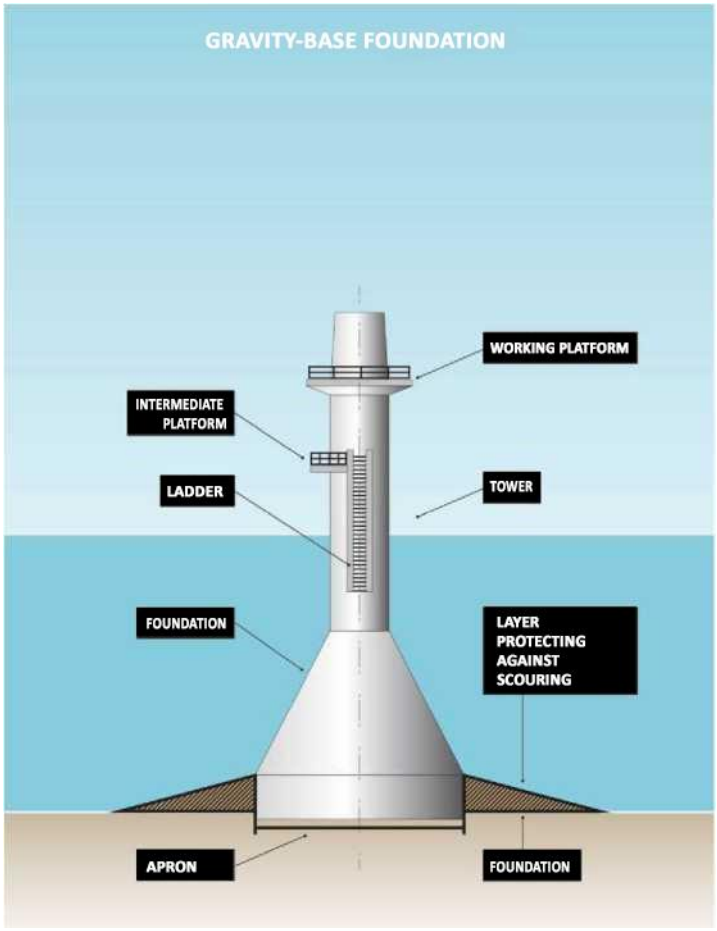
Figure 7 Tripod foundation



Source: provided by the Employer

Gravity-base foundation is a structure made of reinforced concrete. Its concept is based on the use of large mass to support the structure of an offshore substation. Gravity-base foundation consists of a main body and a base. The base can be conical or flat (in the shape of an octagon, hexagon, circle, etc.) and have a diameter of up to 50 m. The gravity-base foundation is filled with ballast.

Figure 8 Gravity-base foundation



Source: provided by the Employer

Wind turbines will be connected by means of a grid of 33 kV or 66 kV power cables to the substation. It is planned to lay up to 200 km of cables inside the farm. Cables will be buried in the seabed down to 3 m. If the technical conditions do not allow for them to be buried, they will be covered with a layer of stones or other specially adapted loads.

The substation will consist of a foundation (as for wind turbines), on which a working platform will be mounted, and transformers and other equipment will be mounted on a working platform. The substation may also contain staff welfare and residential rooms for farm maintenance personnel.

Photograph 2 Offshore substation

Source: provided by the Employer

3.4. Course of construction, operation and decommissioning

3.4.1. Construction

The implementation of the Project may be carried out in stages, of which the first stage will cover the capacity up to 720 MW. The first stage is planned for implementation in the years 2024–2027. Implementation of subsequent stages will depend on the investment decisions made based on the current market conditions. The total construction time for the first stage will be up to 3.5 years. The time of construction of subsequent stages will depend on the decision regarding their size (number of wind turbines) and available technologies and equipment for the construction of offshore wind farms.
Prior to commencement of the construction works, the Investor will select the construction and installation port. It will be used to unload the farm components from the delivery vessels, to store the components to ensure continuity of deliveries to the installation site during favorable weather conditions, to assemble nacelles, rotors and towers, to load the individual components or partially assembled components onto construction and installation vessels of the jack-up type or other installation vessels.
The ports of Gdańsk, Gdynia and Świnoujście are currently being considered.
Different vessels (ships and barges) will be used for construction of the farm, such as: cargo ships, large-size cargo ships, auxiliary vessels, hotel vessels, tugboats, jack-up vessels, cable laying vessels and others. At this stage, it is not possible to precisely determine their number, types or operating hours.
The most important stages of the construction process are installation of the foundations, installation of wind turbines and substation as well as inner array cable laying.

3.4.2. Operation

The currently expected time of the farm service life is 25–30 years.
Wind turbines owned by the BIII OWF will convert the kinetic energy of wind into electricity as a result of the generation process. The operation of a wind turbine unit is based on a process in which the air stream generates a buoyant force (the aerodynamic lift) acting on

aerodynamically shaped rotor blades and sets the rotor in a rotary motion. The rotating rotor drives a generator that converts mechanical energy of the rotor into low voltage electricity. The wind turbine generator generates electricity with a voltage of approx. 400–710 V, which is increased to medium voltage ("MV") by the wind turbine transformer. The generated electricity is transmitted via MV submarine cable lines to an internal offshore substation. In the substation the transmitted energy is transformed into high voltage ("HV"") or extra high voltage ("EHV") for transmission to the National Power System.
Before commencement of operation, the Investor will select the operating port where the farm operation and maintenance center will be located. It is also possible to locate the operation and maintenance center offshore. The operating port should be adapted to short-term maintenance works and quick response.
The ports of Gdańsk, Gdynia, Kołobrzeg, Władysławowo, Ustka, Łeba and Darłowo are currently being considered. To support the tasks within the stage of the farm operation, vessels (ships and barges), such as support vessels and small survey vessels, will be used. Other types of vessels may be used depending on the needs. At this stage, it is not possible to precisely determine their number, types or operating hours.
The BIII OWF will be controlled using an IT system supervising the process (SCADA – Supervisory Control and Data Acquisition). The SCADA system collects current data (measurements), prepares them for visualization, controls the generation process, handles reporting tasks, generates alarms (e.g. may report a necessity of scheduled or unscheduled maintenance of the equipment or its inspection, and may even trip a faulty wind turbine) and stores data. A weather monitoring will be also performed to provide data on the sea state and wind conditions so as to facilitate the farm equipment maintenance planning as well as wind turbine performance verification and generation forecasts. SCADA may be also used to transmit bird monitoring data if such monitoring is performed by the equipment installed on the farm structures (e.g. radar equipment or cameras). The control systems located on the individual farm structures will be connected using fiber optic cables (forming a part of the submarine cables) and, additionally, using radio communication from the monitoring and control center to be located most probably on one of the internal substations. The substation, in turn, will be connected with the onshore part through cables forming a part of the Offshore Transmission Infrastructure (OTI) representing a separate project.
During operation of the farm, there will be regular periodic inspections performed on the individual elements of the farm (of the above-water and underwater parts of the wind turbines, substation, cables, etc.) in line with the Maintenance Plan specified in the contract with the turbine manufacturer. There will scheduled (preventive) and unscheduled (corrective) maintenance performed. Additionally, an environmental monitoring program will be implemented.

3.4.3. Decommissioning

Decommissioning of the BIII OWF (or its individual elements, e.g. single turbines) may take place due to the following reasons:

- scheduled decommissioning due to the end of life of the equipment and closure of the farm,
- decommissioning due to technical reasons, e.g. errors made during the

construction process, due to which the competent authority orders removal of the farm equipment,

- decommissioning for formal and legal reasons (e.g. due to the expiry of the location decision).

Currently, the estimated life cycle of a wind farm comes to minimum 20 years. However, the technological progress in the offshore wind energy sector is rapid and it is highly probable that this period will be extended to 25–30 years in the case of the BIII OWF.
Before commencement of the decommissioning process, the Investor will select the port from which the works will be performed. Most probably this will be one of the ports used during the farm construction phase.
The individual elements of the wind farm will be probably decommissioned as follows:

- wind turbines – to be removed completely,
- foundations – to be removed down to 3 m below the seabed level or completely, or will be kept in place,
- inner array cables – to be removed or kept in place in the seabed, covered by sediments,
- scour protection – to be kept in place,
- substation – to be removed or kept in place for reuse in the future. The vessels used at the decommissioning stage will be similar to those used during the construction process.

3.5. Project options

It is requested in the Report to amend the Environmental Decision in the scope of the option selected for implementation, by introducing amendments and updates to the Project which lead to modification of conditions for implementation and operation of the Project specified in the Environmental Decision. All updates of the BIII OWF parameters lead either to the limitation of the maximum total ranges of conditions specified in the Environmental Decision or to the limitation of the scope of methods of implementation of the Project or technical solutions. In the case of parameters concerning the maximum height of turbines and the maximum rotor diameter, it is assumed to increase the parameters, which, however, from the point of view of generated impacts, are repeatedly compensated by reducing the number of wind turbines, resulting in a decrease in the maximum total area of the rotor zone by approx. 22% in relation to the parameters approved by the Environmental Decision. A similar situation applies to the area intended for the construction of foundations for the accompanying infrastructure – a small increase in the unit value is compensated many times by reducing the number of foundations for the accompanying infrastructure from 6 to 1.
While this Report is prepared for the purposes of the procedure on the amendment to the decision on environmental conditions, the environmental impact assessment conducted in the Report 2015, on which the Environmental Decision was based, was conducted based on the concept of envelope, i.e. determining the parameters of the Project generating the worst case impacts, the so-called worst case scenario, and subjecting such theoretical form of the Project to impact assessment. Therefore, in conducting the impact assessment in this Report, reference was made both to the conditions of implementation and operation of the Project approved by the Environmental Decision as a reference for proposed modifications to the contents of the Environmental Decision; reference was also made to the set of Project

parameters representing the worst case scenario in the Report 2015 – WCS 2015, for reference to the environmental impact assessment underlying the issue of Environmental Decision.
The option selected for implementation by the Investor is the one based on the turbines with the highest capacity, which are planned to be introduced to the market in 2024–2027, when the BIII OWF is planned to be constructed. These will be 12+ MW class turbines. The option selected for implementation is also the best one for the environment, and leaving the parameters of the BIII OWF in the form indicated in the Environmental Decision (approved option) is a rational alternative allowed by the Environmental Decision.

Table 2 Parameters of the option selected for the BIII OWF implementation, compared to the parameters of the option approved in the DEC

Parameter	Option selected for implementation	Option approved in the DEC
Maximum number of wind turbines [pcs]	60	120
Maximum total height of the wind turbine a.s.l. [m]	310	275
Minimum clearance between the lower wing position and the sea surface [m]	20	20
Maximum rotor diameter [m]	250	200
Maximum zone for a single rotor [m^2]	49 088	31 400
Maximum total zone for the rotors [m^2]	2 945 244	3 768 000
Maximum number of accompanying infrastructure foundations [pcs]	1	6
Types of wind turbine foundations considered	Foundations: monopile and jacket (truss) foundations	Foundations: monopile, tripod, jacket (truss) foundations and gravity-base foundations
Maximum seabed area occupied by 1 foundation of a wind turbine [m^2]	79	1 257
Types of accompanying infrastructure foundations considered	Foundations: monopile, tripod, jacket (truss) foundations and gravity-base foundations	Foundations: monopile, tripod, jacket (truss) foundations and gravity-base foundations
Maximum seabed area occupied by 1 foundation of accompanying infrastructure [m^2]	1 964	1 257
Maximum seabed area occupied by all foundations [m^2]	6 676	158 382
Highest density of wind turbines [pcs/km^2]	not applicable*	1,35
Minimum distance between wind turbines (counting from the axis of individual structures) [m]	800	parameter not specified in the decision
Maximum cable length of the farm internal connection infrastructure [km]	200	200

* the parameter was replaced with the minimum distance between wind turbines (counting from the axis of individual structures)

The option selected for implementation fulfills the investment assumptions of the Project. It enables a better economic result to be achieved by using fewer, more powerful wind turbines and thus optimizing the use of the energy potential of the area allocated for the construction of the farm and shortening the construction time. At the same time, thanks to the reduction in the number of wind turbines, the parameters of the project essential for the scale of environmental impacts, such as the total zone of rotors and occupation of the seabed, will be reduced.
A change deviating from the conditions specified in the environmental decision of 2016 is an increase in the maximum total height of the wind turbine from 275 meters to 310 meters and an increase in the maximum rotor diameter from 200 m to 250 m, which is related to the adoption of state-of-the-art technological solutions and implementation of 12 + class turbines. Regardless of the introduced change, the minimum clearance between the lower wing position and the sea surface will be maintained – 20 m, and the maximum total rotor zone will be changed, which will ensure that the impact of the option selected for implementation will be smaller than the option approved by the Environmental Decision (alternative option).

Key parameters of the Project that influence the scale and type of environmental impacts are presented in Table 2. In order to determine the boundary values for technical parameters of the wind turbines, technologies available on the market and technical conditions of their application were analyzed, including process relations between individual elements, such as: rotor – tower – foundation. The maximum capacity of the farm, which was limited in the PSZW to 1200 MW, was also taken into account.

The option selected for implementation is ultimately the same as the most environmentally friendly option, since it ensures achievement of the assumed business objectives with the lowest environmental impact at the same time. Possible modifications and further specification of certain technical parameters will take place during selection of individual technological solutions at the stage of designing and contracting of deliveries. However, these parameters will not exceed the boundary environmental conditions that have been identified for the most environmentally friendly option.
Changes in the description are related mainly to the specification of the option selected for implementation, resulting from the progress of design works, including the preparation of the preliminary farm development plan and selection of the foundation technology. It should be emphasized that most of the parameters of the BIII OWF is within the limits specified in the characteristics of the Project, which is an appendix to the Environmental Decision, except for the surface area actually available for development and the area on which the wind turbines can be founded, structure total height, maximum rotor diameter. It should be emphasized that the changes in the parameters determining the surface area to be developed result from the change in the understanding and application of the concept of a development area, so that it is consistent with the concepts used in the Construction Law and includes all elements of the wind farm, including those above the surface. An additional change is introduced as a result of the application of the mitigation measure consisting in leaving the north-western corner of the area intended for its implementation undeveloped with above-surface elements of the Project and widening the undeveloped water region located between the planned farm and the Baltica 3 Offshore Wind Farm and

the Baltica 2 Offshore Wind Farm.

In the current implementation option, the maximum total height of the wind turbine of 310 m was assumed, which is an increase in relation to the parameters from the currently held Environmental Decision by 12.72%. The Investor also adopted the maximum rotor diameter of 250 m, which is an increase in relation to the parameters from the currently held Environmental Decision by 25%. The Investor also assumed that the development of the wind turbine construction technology will allow it to reduce the number of wind turbines from 120 in the currently held Environmental Decision to 60. The increase of the WT parameters, assuming their execution by 50% less than the one adopted in the Environmental Decision, resulted in the decrease of the maximum total rotor zone from the area of 3,768,000 m^3 to 2,945,244 m^3, which means that it was reduced by 21.83% in relation to the data included in the current Environmental Decision.

3.6. Matrix of interconnections

The matrix of interconnections emission-impact-parameter for the Project, along with a summary of proposed modifications to the Project's implementation and operation conditions, is presented in the table below.

Table 3 Matrix of interconnections between potential emissions and disturbances caused by BIII OWF and their sources, direct and indirect environmental impacts and their determinants

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
Sediment structure disturbance (and any other physical disturbance of the seabed)	• Preparation of seabed for foundations • Geotechnical drilling • Installation of the foundations • Laying of a layer protecting against scouring	• Destruction and change of habitats • Reduction in population size • Reduction in feeding grounds • Possibility of damage to heritage features at the seabed • Possibility of scouring or exploitation of deposits when preparing the seabed for foundations • Possibility of backfilling mineral deposits with dredging spoil	• Sediments • Benthos • Fish	• Seabirds • Mammals • Cultural heritage	• Seabed type • Thickness of sediment layer	1. Number of foundations 2. Types of foundations 3. Foundation diameter 4. Width of a protective layer	Construction of 200 gravity-base foundations of the maximum considered diameter, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket foundations and implementation of one gravity-base foundation (with a maximum base diameter of 50 m) for the implementation of the OS.
Increased concentration of	• Preparation of seabed for	• Change in living conditions	• Benthos • Fish	• Seabirds • Mammals	• Type of sediments	1. Number of foundations	Construction of 200 gravity-base	Construction of 60 monopile

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
suspended matter in water	foundations • Installation of the foundations • Laying of cables	• Water turbidity	• Mammals • Seabirds • Hydrological conditions	• Tangible property	• Current directions • Current velocity • Sedimentation rate	2. Types of foundations 3. Foundation diameter 4. Cable length 5. Width of a protective layer	foundations of the maximum considered diameter, i.e. 40 m	foundations with a maximum diameter of 10 m or jacket foundations and implementation of one gravity-base foundation (with a maximum base diameter of 50 m) for the implementation of the OS.
Release of pollutants and biogenic substances from sediments into the water column	• Preparation of seabed for foundations • Installation of the foundations • Laying of cables • Heat emission from cables	• Increase in the amount of pollutants and biogenic substances in water • Change in living conditions • Decrease in population size • Increase in concentration of pollutants in fish of consumer species	• Benthos • Fish • Mammals • Hydro-chemical conditions	• Seabirds • Human health and life	• Type of sediments • Sediment contamination • Current velocity and direction	1. Number of foundations 2. Types of foundations 3. Foundation diameter 4. Cable length 5. Depth of cable burial	Construction of 200 gravity-base foundations of the maximum considered diameter, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket foundations and implementation of one gravity-base foundation (with a maximum base diameter of 50 m) for the implementation of the OS.
Sedimentation of disturbed sediment	• Preparation of seabed for	• Change in living conditions	• Benthos • Fish	• Seabirds • Mammals	• Type of sediments • Current directions	1. Number of foundations	Construction of 200 gravity-base	Construction of 60 monopile

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
	foundations • Installation of the foundations • Laying of cables	• Possibility of additional backfilling of mineral deposits		• Cultural heritage • Tangible property	• Current velocity • Sedimentation rate	2. Types of foundations 3. Foundation diameter 4. Cable length	foundations of the maximum considered diameter, i.e. 40 m	foundations with a maximum diameter of 10 m or jacket foundations and implementation of one gravity-base foundation (with a maximum base diameter of 50 m) for the implementation of the OS.
"Artificial reef" effect	• Foundations installed	• Creation of new habitats • Change in species composition • Increase in food base • Change in living conditions • Increase in the quantity and quality of professional and tourist fishing • Increase in income from	• Benthos • Fish	• Seabirds • Fish • Mammals • Tourism and recreation • Fishing • Tangible property	• Physical and chemical parameters of water	1. Number of foundations 2. Types of foundations 3. Foundation diameter	Construction of 200 gravity-base foundations of the maximum considered diameter, i.e. 40 m	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket foundations and implementation of one gravity-base foundation (with a maximum base diameter of 50 m) for the implementation of the OS.

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
		fishing and tourism industry						
Increase in underwater noise and vibration	• Installation of foundations • Laying of cables • Vessel traffic • Operation of wind turbines • Decommissioning of farm facilities	• Displacement from habitats • Change in living conditions • Bodily injury • Mortality • Reduction in catches	• Fish • Mammals • Seabirds	• Seabirds • Mammals • Fishing	• Background noise level • Depth • Seabed topography • Deep geological structure of seabed • Wind speed	1. Types of foundations 2. Number of foundations 3. Foundation diameter 4. Installation time for 1 foundation 5. Effective driving time 6. Number of hits when driving in the foundation 7. Hydraulic hammer power 8. Depth and method of cable laying 9. Number of construction vessels	Construction of 200 monopile foundations of the maximum considered diameter, i.e. 10 m (alternative option 2015) or removal of gravity-base foundations (200 pieces, alternative option 2015)	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket foundations and implementation of one gravity-base foundation (with a maximum base diameter of 50 m) for the implementation of the OS. or removal of monopile or jacket foundations (60 pieces) and gravity-base foundation
Heat emission from cables	• Cables	• Increase in water and sediment temperature	• Water • Sediments	• Abiotic environment • Archeology and	• Type of sediments • Thermal conditions at the	1. Cable length 2. Cable type 3. Burial depth	Construction of 200 wind turbines with cable infrastructure in	Construction of 60 wind turbines with cable infrastructure (it is assumed that a

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
		• Appearance of alien species		cultural heritage • Benthos • Fish	seabed		the alternative option 2015 (with the proviso that the option selected for implementation, i.e. 120 wind turbines, will likely require cables of similar length to be laid, due to the greater distances between wind turbines)	similar number of cables may be laid as in the WCS 2015 due to the distances between WTs)
Emergence of new structures under the sea surface	• Foundations • Cables	• Barrier effect • Change in living conditions • Changes in the regime of sea currents and waving • Obstructions to shipping and navigation • Orders for maritime industry	• Fish • Mammals • Hydrological conditions • Shipping and navigation • Maritime industry • Tangible property		• Water transparency • Wind speed	1. Number of wind turbines 2. Foundation type 3. Density WT/km^2 4. Foundations diameter 5. Constant noise and vibration 6. Cable length	Construction of 206 gravity-base foundations of the maximum considered diameter, i.e. 40 m (alternative option 2015)	Construction of 60 monopile foundations with a maximum diameter of 10 m or jacket foundations and implementation of one gravity-base foundation (with a maximum base diameter of 50 m) for the implementation of the OS.

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
Emission of electromagnetic field and radiation	• Cables	• Disturbed orientation • Changes in the use of space • Interference with radar systems • Disturbance to shipping and navigation	• Fish • Mammals • Radar systems • Shipping and navigation			1. Cable type 2. Cable length 3. Burial depth 4. Number of OSs 5. OS foundation height	Construction of 200 wind turbines with cable infrastructure in the alternative option 2015 (with the proviso that the option selected for implementation, i.e. 120 wind turbines, will likely require cables of similar length to be laid, due to the greater distances between wind turbines)	Construction of 60 wind turbines with cable infrastructure (it is assumed that a similar number of cables may be laid as in the WCS 2015 due to the distances between WTs)
Emergence of new structures above sea level	• Rotor • Tower • Substations	• Barrier effect • Displacement from habitats • Mortality due to collisions • Landscape	• Seabirds • Migratory birds • Landscape • Bats • Shipping and navigation			1. WT height 2. Rotor diameter 3. Number of structures 4. WT density	Construction of 200 wind turbines with a minimum clearance of 20 m, maximum rotor diameter of 200	Construction of 60 wind turbines with a minimum clearance of 20 m, maximum rotor diameter of 250 m and

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
		changes • Obstructions to shipping and navigation • Orders for maritime industry • Increase in innovation in industry • Increase in employment / wages	• Maritime industry • Tangible property				m and a maximum height of the entire structure of 275 m and 6 substations (alternative option 2015)	maximum height of the entire structure of 300 m and (the parameters of the diameter and the total height do not change in relation to the condition specified in the Environmental Decision) and 1 OS
Increased traffic of vessels and helicopters	• Vessels (ships, barges) • Helicopters	• Barrier effect • Scaring • Collisions with animals	• Seabirds • Migratory birds • Bats • Marine mammals • Fish • Benthos • Water • Sediments			1. Number of vessels 2. Type of vessels	Construction, operation and decommissioning of 200 facilities	Construction, operation and decommissioning of 60 farm facilities and 1 OS (alternative option 2015)
Emission of surface noise	• Rotor • Vessel traffic	• Scaring • Displacement from habitats • Deterioration of living conditions for people in the area of the farm	• Seabirds • Marine mammals • Fish • Tourism • Human health and life		• Wind speed • Wind directions • Wave height	1. Sound power of the turbine 2. Tower height 3. Number of WTs 4. Number and type of vessels	Construction / decommissioning of 200 wind turbines with infrastructure in the alternative option 2015 (causing the longest noise	Construction / decommissioning of 60 wind turbines and 1 substation with infrastructure in AO (causing the longest noise emissions due to the

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
		(e.g. on vessels)					emissions due to the long duration of construction or decommissioning; noise levels will be the same, regardless of the number of wind turbines built) Operation of 200 wind turbines in the alternative option (resulting in noise emissions of the highest level and propagation)	long duration of construction or decommissioning; noise levels will be the same, regardless of the number of wind turbines built, but duration of emissions depends on the number of wind turbines) Operation of 60 wind turbines (resulting in noise emissions of the highest level and propagation)
Emission of air pollutants	• Vessels • Helicopters	• Deterioration of living conditions for animals • Deterioration of living conditions for people in the area of the farm (e.g. on vessels)	• Air quality • Human health and life	• Birds • Mammals	• Wind speed • Wind directions	1. Number of vessels 2. Engine power 3. Fuel consumption 4. Number of working days	Construction / operation / decommissioning of 200 wind turbines with infrastructure in the alternative option 2015 (causing the highest air emissions from vessels and	Construction / operation / decommissioning of 60 wind turbines and 1 substation with infrastructure (causing the highest air emissions from vessels and helicopters, depending on the number of wind

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
							helicopters)	turbines)
Emission of water pollutants	• Vessels • Corrosion protection • Pointing • Agents to prevent fouling of offshore structures	• Deterioration of living conditions	• Hydro-chemical conditions • Benthos • Fish • Marine mammals • Seabirds		• Physical and chemical properties of water	1. Number of vessels 4. Number of foundations 5. Foundation type 6. Types of binders	Construction / operation / decommissioning of 200 wind turbines with infrastructure in the alternative option 2015 (causing the highest air emissions from vessels and helicopters)	Construction / operation / decommissioning of 60 wind turbines and 1 substation with infrastructure (causing the highest air emissions from vessels and helicopters, depending on the number of wind turbines)
Waste generation	• Construction process • Construction and service vessels • Construction and service support					1. Number of WTs 2. Number of foundations 3. Number of vessels 4. Duration of construction process 5. Service frequency	Construction / operation / decommissioning of 200 wind turbines with infrastructure in the alternative option 2015 (generating the largest amount of waste)	Construction / operation / decommissioning of 60 wind turbines with infrastructure (generating the largest amount of waste, depending on the number of wind turbines)
Light phenomena	• Operating wind turbines	• Stroboscopic effect • Shadow flicker	• Marine mammals • Seabirds		• Height of the wind turbine • Current position of the sun	1. Number of wind turbines 2. Height of the	Operation of 200 wind turbines (alternative option 2015)	Operation of 60 wind turbines and 1 substation

Type of emission or disturbance	Emission source	Type of impacts	Elements of ecosystem which are directly affected	Interconnections (indirect impacts)	Environmental factors influencing the scale of impact	Project parameters influencing the scale of impact	Worst case scenario (WCS 2015)	Project – option selected for implementation (Project after update)
					relative to the position of the wind turbine	wind turbine 3. Rotor diameter 4. Number of sunny days		

Key: Alternative option 2015 – alternative option of the Project from the Report 2015 assuming the construction of 200 wind turbines; OSI – option selected for implementation of the Project from the Report 2015 assuming the construction of 120 wind turbines, for which the Environmental Decision was issued.

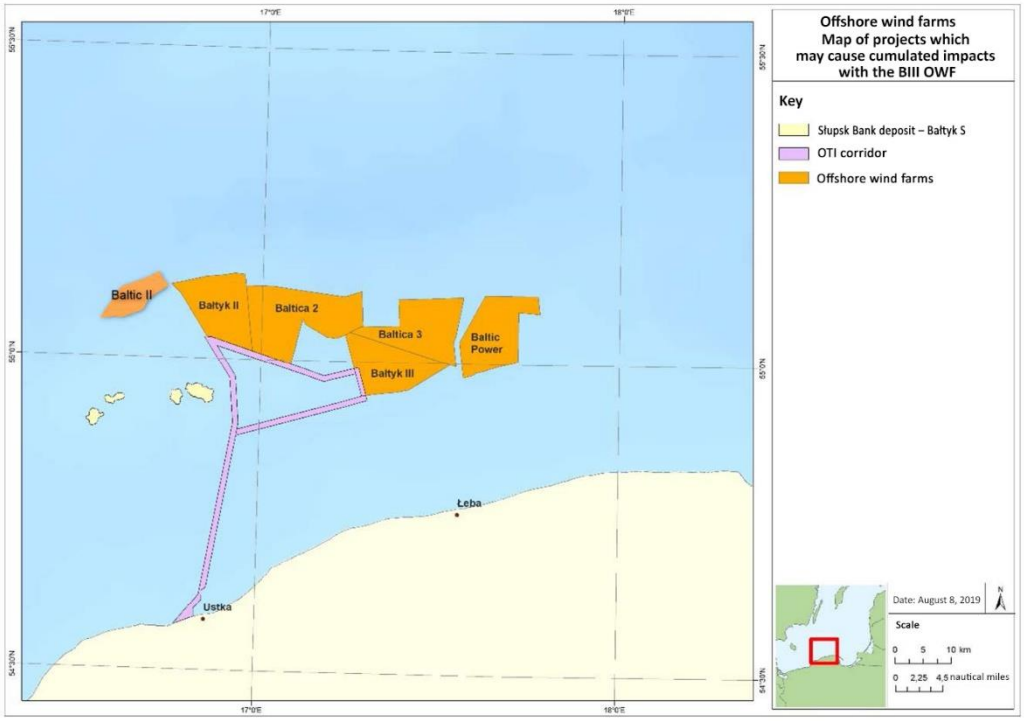
3.7. Accumulation of impacts

Taking into account location of the Project and anticipated range of its impacts, the Polish OWF projects, which are likely to be implemented in the foreseeable future, i.e. by ca. 2029, were taken into account in the first place in the analyses of potential cumulative impacts. These are Bałtyk II OWF, Baltica (Baltica 3 and Baltica 2) OWF, FEW Baltic II, Baltic Power, C-Wind OWF.

The provisions of the EIA Act require taking into account in the cumulative impact assessment only such impacts, which result from the projects for which the decision on environmental conditions was issued; therefore, when conducting the environmental impact assessment in the course of amending the decision on environmental conditions (assuming that the amendment itself does not increase the parameters of the project), one should limit oneself to examining the cumulative impact of only those projects, which had the decision on environmental conditions during the original environmental impact assessment. Otherwise, a situation would occur, in which the cumulative impact of projects, which obtained the decision on environmental conditions after issuing the decision on environmental conditions for the project covered by the amendment, would affect the conditions of implementation and operation of the project, which was approved before obtaining the decision on environmental conditions by those projects. Such a situation would mean, firstly, that erroneous environmental decisions were issued for subsequent projects, because the cumulative impact with the amended project should already be reflected in the assessment carried out for those projects, and secondly, it would lead to a secondary verification of the right acquired by the addressee of the decision on environmental conditions as a result of issuing subsequent decisions addressed to a different entity, and thus a violation of acquired rights.

Irrespective of the above reservations, the Report analyses the cumulative impacts also for the projects which were granted the decision on environmental conditions after obtaining the Environmental Decision, as well as those which are in the course of obtaining the decision on environmental conditions.

Figure 9 Projects whose impacts may potentially accumulate with the impacts of the BIII OWF



Source: own materials

4. Description of the environment (summary of Volume III)

Volume III of the Report includes a description of the environment within the range of potential impacts of the BIII OWF and serves as a basis for the assessment of environmental sensitivity to the impacts of the Project, which was conducted in Volume IV of the Report.

The individual chapters were prepared using the results of a comprehensive environmental conditions survey and analysis campaign carried out in 2012–2014 in the area and the available results of surveys conducted in 2016–2018 for the projects adjacent to BIII OWF – Baltica OWF and in the years 2018–2020 – Baltic Power OWF.

The description of some elements of the environment also used the results of the State Environmental Monitoring conducted in the Polish maritime areas in the area of the planned project.

Key information on each environmental element is provided below. The chapter also includes the reports on fishing and vessel traffic monitoring in the area of the planned farm, and up-to-date data on fishing in the water region intended for the construction of the BIII OWF were obtained, which are necessary for the socio-economic assessment.

4.1. Hydrology and hydrochemistry

4.1.1. Water quality

The physical and chemical parameters of water in the area of the BIII OWF do not differ from the typical contents of waters of the southern Baltic Sea. These waters are characterized by alkaline reaction and a relatively good oxygenation, with seasonal variations characteristic of southern Baltic waters.

Based on the content of biogenic substances (total nitrogen, mineral nitrogen (nitrates, nitrites and ammonia), phosphates and total phosphorus), marine waters of the area under

analysis were classified as waters below a good status (subGES) – according to the classification compliant with the MSFD.
Concentrations of polycyclic aromatic hydrocarbons (PAHs) slightly higher than the literature ones were observed in the BIII OWF area.
Comparing the results of water surveys with the limits specified in the Regulation of the Minister of Environment of November 09, 2011 on classification method of the condition of surface water bodies and environmental qualitative standards for priority substances (Journal of Laws of 2011 No. 257, item 1545)[2], the surveyed BIII OWF area can be classified as class I water quality (very good condition) because of the content of dissolved oxygen at the seabed, BOD5, inorganic nitrogen compounds (in winter), total phosphorus and TOC (in summer), free and bound cyanides, mineral oil index, phenols and metals (As, Cr (VI), Cu). Also, according to the currently binding Regulation of the Minister of Infrastructure of June 25, 2021 on the classification of ecological condition, ecological potential and chemical condition and the classification method of the condition of homogeneous surface water bodies and environmental qualitative standards for priority substances (Journal of Laws of 2021, item 1475), the quality of the waters in that water region is within the values defined for good water condition.
The waters of the area surveyed did not exceed the limit values of water quality indicators for PAHs as well as for cadmium, lead, mercury and nickel.
Due to a slight increase in the average annual reaction of the analyzed waters, the concentration of total nitrogen in summer months and the concentration of phosphates in winter, the waters from the BIII OWF area were described as class II water quality, i.e. waters of a good condition (based on the results of physical and chemical surveys).
The surveys carried out for the BIII OWF area show sea water quality values similar to the results obtained for the Baltica OWF area (Consortium of IMG and MEWO et al., 2017) and Baltic Power OWF (Consortium of IMG and MEWO et al., 2020), which are adjacent to the Project.
The waters of the area surveyed did not exceed the limit values of water quality indicators for PAHs as well as for cadmium, lead, mercury and nickel.
Due to a slight increase of the average annual reaction of the waters that are examined and the concentration of phosphates in winter, the waters from the BIII OWF area were described as Class II of water quality, i.e. waters of a good condition (based on the results of physical and chemical tests).
The tests conducted for the BIII OWF area show sea water quality levels similar to the results obtained for the Baltica OWF area (Consortium of IMG and MEWO et al., 2017), which is adjacent to the Project and do not deviate significantly from the values and water condition assessment defined for sea waters.

4.1.2. Water temperature

The temperature values do not deviate from the standard values for the entire measurement period. There were no extreme events deviating from standard values for the South Baltic area (The Climate of Baltic Sea Basin, 1998). Average temperatures ranged

[2] Despite the repeal of that regulation, it was considered appropriate to refer to the limits laid down therein, given that the surveys in question were carried out during its period of validity. During the surveys there was no secondary legislation referring to sea waters, therefore the results were referred to limit values for coastal waters.

between 2.1 and 2.8°C in winter and 19°C in summer. An increase in the average temperature of the Baltic Sea was observed (from 6.3°C to 7.8°C).

4.1.3. Sea currents and wave motion

Based on the studies which were conducted, seasonal variations in current velocity values are observed – the highest variability was recorded in the layer at the depth of 0–4 m b.s.l. (during a severe storm).
The most intensive wave motion was in the autumn and winter period, while it was calmest in spring and summer. The highest wave height recorded was 6.14 m and the highest significant wave was 3.89 m. The average wave height (calculated as the average of all recorded mean waves) was 0.57 m for point 001 and 0.54 m for point 002. The wave motion was mainly from the west (W) and north-east (NE).

4.1.4. Meteorological conditions

The wind speeds range from 0 to 5 on the Beaufort scale. The period when the stronger winds blow is the autumn-winter period, which coincides with the period of storms at sea, where the wind speed exceeds 20–23 m/s. The prevailing winds in the area of the farm are from the western and south-western sector.
The annual course of the measured air temperature was consistent with the average course of temperature in the Baltic Sea area (Climate of Baltic Sea Basin, 1998). The minimum value did not exceed -10°C. The maximum temperature did not exceed 25°C.
For more information see Section 2 Volume III of the Report.

4.2. Seabed

The seabed surface area of the area intended for the BIII OWF is diversified. The depth of the surveyed area is from approx. 23.5 m in the south-western part to approx. 43 m in the north-western part. The seabed slope is relatively mild. In the north-western part, the seabed topography is diversified – there are forms of ridges and depressions formed on the surface of loams. The height differences within these forms reach approx. 3 m.
As a result of the conducted analyses, five main types of sediments were distinguished in the deep structure of the BIII OWF area: outcrops of boulder clays, boulder clays with a thin sand cover, marine sands, mixed-grained sediments, clays and silts.
On the seabed surface, there are mainly fine and medium-grained modern marine sands, which constitute the so-called dynamic layer, which is displaced under the impact of wave motion. The thickness of this layer varies and falls on average between approx. 0.2 to approx. 1.7 m.
For more information see Section 3 Volume III of the Report.

4.3. Mineral resources

Four small fields (three over 0.25 km^2) of potential clastic raw materials deposits (gravel sands) were found in the area of the planned BIII OWF. These are accumulations lying underneath the overburden of fine and very fine sand with a thickness of 2 or more meters.

At present, the management of these potential accumulations seems to be unprofitable from the equipment and economic point of view.
No amber or heavy minerals were found there.
The BIII OWF area partially coincides with the areas of occurrence of hydrocarbon deposits. In the area of the planned BIII OWF and in its vicinity, there are no valid licenses for prospecting, exploration and extraction of hydrocarbons from deposits issued on the basis of the provisions of the PGG (status as of March 2022), therefore, no conflict of coexistence of the OWF and potential operation is expected.
For more information see Section 4 Volume III of the Report.

4.4. Bottom sediments

The analyzed surface bottom sediments from the BIII OWF area belong to inorganic sediments with organic matter content below 10%.
Concentrations of total phosphorus and total nitrogen did not exceed the values typical for biogenic substances in sediments of the southern Baltic Sea.
The sediments examined were characterized by low contents of heavy metals.
All samples were characterized by low concentrations of the PAH analytes that were examined, which did not exceed values typical for the southern Baltic Sea sediments.
The results of the concentrations of the sum of seven PCB compounds do not differ from the literature data on PCB contents in the surface bottom sediments of the southern Baltic Sea; these are now in their lower range, which shows that the concentration of these compounds have dropped recently.
The concentration of mineral oil was low in the area under examination. Oil concentration results for most samples are below the lower limit of the method determination.
The sediments that were examined were also characterized by low radioactive concentrations of 137Cs typical for sandy sediments of the southern Baltic Sea.
TBT concentrations in the examined area were also at a low level characteristic of sandy sediments in the southern Baltic Sea area.
The tests have shown that the bottom sediments collected from the BIII OWF area are not hazardous in terms of the substances that were examined and, in accordance with the Waste Act of December 14, 2012, i.a. 2, point 7 (Journal of Laws of 2022, item 699), may be moved within the waters.
For more information see Section 5 Volume III of the Report.

4.5. Benthos and benthic habitats

Phytobenthos are plant communities, at least a few millimeters in size, rooted in the bottom or attached to a hard surface (i.a. stones). The Baltic phytobenthos inhabits the seabed of the zone illuminated in the daylight, to a maximum depth of 22 m.
Due to the water depths in the area of the planned BIII OWF and in its vicinity, precluding the presence of rooted plants (found to the depth of 10 m in the Baltic Sea), the phytobenthos survey was conducted only in terms of occurrence of macroalgae on the rocky seabed.
Four species of algae from brown and red algae division were recorded (Furcellaria, pipefish, Pylaiella, Ectocarpus siliculosus) attached to stones or mussel beds moving on the sandy seabed in the south-western part of the buffer zone. One of the species – Furcellaria

lumbricalis – is under strict protection.

Phytobenthos grew very scarcely on stones and mussels – seabed cover up to 1%, which is typical for regions with depths exceeding 20 m. The surveyed area is characterized by low natural values of phytobenthos. Single copies of the protected algae do not affect this assessment.

In 2016, phytobenthos surveys were also conducted in the water region located in the vicinity of the BIII OWF area, intended for the Baltica OWF. The surveys showed a trace presence of phytobenthos only in the south-western part of the Baltica OWF area, i.e. at a significant distance from the area of the planned BIII OWF, outside the zone of its potential impact. Individual macroalgae specimens were represented by 6 taxons recorded so far in the Southern Baltic Sea: brown algae Sphacelaria sp. and Pylaiella littoralis and red algae Rhodomela confervoides, Coccotylus truncatus, Aglaothamnion tenuissimum and Furcellaria lumbricalis (Consortium of IMG and MEWO et al., 2017).

Surveys carried out in 2018–2020 in the neighboring area intended for the construction of the Baltic Power OWF did not show the presence of phytobenthos.

There is a macrophytobenthos monitoring station of the State Environmental Monitoring located in the area of the planned BIII OWF, in the northern part of the Słupsk Bank. During the surveys conducted at that station in 2020, as in previous years, representatives of red and brown algae were the most numerous.

Macrozoobenthos is a fraction of animal organisms larger than 1 mm, mainly larger invertebrates, inhabiting the surface or the interior of the bottom sediments.

27 species or divisions were found in the water region which covers the area of the planned BIII OWF and its vicinity, with two communities inhabiting different seabed types. Both communities are largely composed of the same species, but differ in the dominant species.

The community I inhabited mainly the north-western, deepest part of the surveyed area, where clams Mytilus *trassulus*, the main nutrient of benthic birds, dominated in terms of population size. Community II occurred in the shallower part of the area on sandy fragments of the seabed. In terms of population size, the dominant species in this community was the sand-inhabiting polychaete Pygospio elegans living in tubes made of clumped sand grains.

The species composition, population size and biomass of the macrozoobenthos in both communities were typical of the shallow and medium deep seabed of the open area of the southern Baltic Sea. Rare and protected species were not found.

During the surveys conducted in 2016, 33 zoobenthos taxa were found in the water region intended for the Baltica OWF, adjacent to the BIII OWF. The dominant taxa were typical of shallow to intermediate depth seabeds (down to 50 m b.s.l.) of open waters of the Southern Baltic.

On the other hand, in 2019, surveys were carried out in the Baltic Power OWF area adjacent to the east. 25 taxa were found in this area on the soft seabed, and 16 taxa were found on the hard seabed.

The shallow-water location of the bottom macrofauna monitoring as part of the State Environmental Monitoring closest to the BIII OWF area is located in the area of the Słupsk Bank (P14B station), whereas the closest deep-water location is located in the area of the Słupsk Furrow (P3 station). During the surveys carried out in 2020, a good condition of macroozoobenthos was found at the site in the Słupsk Bank area. However, in the case of the site located in the Słupsk Furrow area, 2020 was another year during which the B index value decreased, therefore the condition decreased from good to moderate, below the limit of good condition within the meaning of the MSFD.

For more information see Section 6 Volume III of the Report.

4.6. Fish

19 fish species (adults, larvae and roe in total) were recorded in the surveyed area: garfish, three-spined stickleback, saithe, common seasnail, great sand eel, cod, plaice, shorthorn sculpin, mackerel, fourbeard rockling, rock gunnel, turbot, European flounder, sprat, herring, lumpfish, lesser sand eel, vivaparous eelpout, sandeel fish, gobies (due to difficulties in identifying larvae by species, sandeel fish and gobies were identified by family). A total of 1,627 fish larvae belonging to 10 species or families were caught, the vast majority being sprat (1,396 pieces) and 1,762 spawn grains mainly belonging to sprat. No adult protected or endangered fish species were found.
From the point of view of natural values of the BIII OWF area, an important result of the ichthyoplankton surveys was the detection of the larvae of two partially protected fish species: common seasnail and larvae of gobies (most probably of the sand goby), found in number of 25 individuals and 9 individuals, respectively.
During the surveys conducted in 2016-2017 in the water region intended for the Baltica OWF, adjacent to the BIII OWF, 19 taxa of fish were caught, of which cod, flatfish, herring, sprat and sparse shorthorn sculpins, lumpfish, great sand eel and vivaparous eelpout were included in the permanent fish groups of the area surveyed. 12 taxa were identified in the ichthyoplankton samples.
During the surveys, 27 gobies larvae, most probably of the small goby, and 16 common seasnail larvae were recorded.
On the other hand, 22 taxa of fish were caught in the surveys carried out in the Baltic Power OWF area. The predominant species were European flounder and cod, the remaining species were small by-catches (great sand eel, plaice, shorthorn sculpin, hooknose, fourbeard rockling, turbot, herring, lumpfish, viviparous eelpout, whiting, and common dab).
For more information see Section 7 Volume III of the Report.

4.7. Seabirds

Seabirds are waterbird species which spend the non-breeding season predominantly in sea waters more than 1 km from the shore.

4.7.1. Seabirds in the area of the BIII OWF (excluding the Słupsk Bank)

During the 13-month research campaign carried out on the water region covering the area of the planned BIII OWF and the zone of its potential impacts, a total of 34 species of waterbirds were found, including 15 species of seabirds and 23 species related to the terrestrial environment. The share of seabirds among all observed birds was 72%, for other species of waterbirds it was 23%, while for birds associated with habitats it was 5%.
The following seabird species were recorded: long-tailed duck, European herring gull, common scoter, razorbill, velvet scoter, Eurasian wigeon, common guillemot, lesser black-backed gull, common gull, little gull, great cormorant, great black-backed gull, black-throated diver, northern pintail, black guillemot, black-headed gull, northern shoveler,

mallard, mute swan, black tern, red-breasted merganser, whooper swan, black-legged kittiwake, red-throated diver, tufted duck, common eider, parasitic skua, greater scaup, common tern, common merganser, sandwich stern (in decreasing order of population size). The total population size of all birds observed was 9,746 individuals. The most numerous recorded species are: long-tailed duck – 3,163 individuals, European herring gull – 2,294 individuals, common scoter – 524 individuals, razorbill – 422 individuals and velvet scoter – 284 individuals.

Seabirds in the survey area were at low densities. The average densities of waterbirds in the buffer zone and in the planned project area were similar. They did not exceed the values of 15 individuals/km^2 in any of the four phenological periods, and in the individual phenological periods they amounted to, respectively for the farm area and the buffer zone: 0.7 and 0.9 individuals/km^2 in summer, 3.2 and 3.4 individuals/km^2 in autumn, 13.1 and 10.6 individuals/km^2 in winter and 8.5 and 9.2 individuals/km^2 in spring.
The distribution of birds in the surveyed area in subsequent phenological periods was very variable, and it is difficult to identify one part of the surveyed area that was clearly preferred by seabirds. In summer and autumn, when the avifauna population size was low, in the OWF area there were mainly densities below 5 specimens/km^2, with slightly more birds staying north of the planned project area in the buffer zone and beyond. In winter, when the seabird population size was the highest, the area of the highest density ranging from 50 to 87 individuals/km^2 covered only a narrow strip in the western part of the buffer zone and overlapped with the planned project area to a small extent. The distribution of avifauna during this period was very diverse with neighboring areas with different densities. In spring, after a decrease in the population size of birds, their preference for the eastern part of the water region could be observed. However, the average density at the sites with the highest concentrations of avifauna reached only 35 individuals/km^2 in spring.
The reason for the lack of preferences for a single part of the surveyed water region is most probably a poor food base with low biomass of zoobenthos.
In 2016–2017, adequate monitoring was conducted in the water region intended for the Baltica OWF, adjacent to the BIII OWF area from the north (Baltica 3 Area) and north-west (Baltica 2 Area), and in its buffer zone. A total of 14 species of birds were found on water during the surveys, including 12 species associated with the marine environment (in order from highest to lowest abundance: long-tailed duck, razorbill, common guillemot, European herring gull, artic loon, lesser black-backed gull, velvet scoter, little gull, black guillemot, great black-backed gull, common scoter and red-throated diver) and two species of waterbirds rarely found at sea far from the coast: black-headed gull and common gull. The total number of all observed birds staying along transects in the Baltica OWF area amounted to 5129 individuals. The most numerous were long-tailed duck and razorbil, which accounted for 69% and 12% of the total avifauna grouping.
Taking into account partial coverage of the areas of performed surveys in the BIII OWF area in 2012–2013 and surveys in the Baltica OWF area in 2016–2017, a general comparison of the size and distribution of bird densities in individual periods in the common part of the area was made. The analysis did not show any significant differences in the use of the water region in question by seabirds.
In 2018–2019, further surveys of avifauna were carried out in the area adjacent to the BIII OWF from the east, intended for the construction of the Baltic Power OWF. As part of the surveys, a total of 19 species of birds staying on water were recorded, including 13 species

related to the marine environment and 6 species of aquatic birds rarely encountered at sea away from the coast. Species associated with the marine environment include: long-tailed duck, European herring gull, common guillemot, razorbill, velvet scoter, great black-throated gull, black-throated diver, lesser black-throated gull, red-throated diver, black guillemot, eider. On the other hand, the species observed rarely found at sea far from the coast are: common gull, black-headed gull, great cormorant, Eurasian coot, Arctic tern, greater white-fronted goose
For more information see Section 8 Volume III of the Report.

4.7.2. Seabirds in the Natura 2000 PLC990001 Słupsk Bank site

A total of 31 species of waterbirds were found during all the survey cruises carried out in the area of the site, including 15 species of seabirds and 12 species associated with the terrestrial environment. The total number of all birds observed was 102,134 (the average number per survey cruise was 5,674), including 72,225 birds during seven cruises carried out in winter months (the average number of seabirds per cruise was 10,313.6). Among all the birds observed, the proportion of seabirds was as high as 99.5%, which is due to the great abundance of long-tailed duck in the water region surveyed. In total, long-tailed duck accounted for more than 94% of all the birds observed, and 95.9% during the wintering period.
Seabirds periodically stayed in the Słupsk Bank site at high and very high densities. The average density of the whole group of seabirds in particular phenological periods was: 1.1 individual/km^2 in summer, 164.2 individuals/km^2 in autumn, 251.5 individuals/km^2 in winter and 67.9 individuals/km^2 in spring.
In 2016-2017, in parallel to the surveys in the Baltica OWF area, seabird surveys were conducted on the Słupsk Bank for the purpose of the environmental impact assessment of the farm.
During all the survey cruises, 18 bird species were recorded, including 12 species associated with the marine environment (in order from the highest to the lowest abundance: long-tailed duck, velvet scoter, European herring gull, black guillemot, razorbill, common scoter, common guillemot, artic loon, little gull, lesser black-backed gull, great black-backed gull and red-throated loon) and 6 species of water birds rarely seen at sea away from the coast (common gull, mute swan, great cormorant, greater white-fronted goose, graylag and Eurasian wigeon) with a total number of 58011 birds. The long-tailed duck which accounted for as much as 93% of all identified birds was definitely in majority. In summer, bird numbers in the area were very low with prevailing densities of 0.1 to 1 individual/km^2. In winter, on the other hand, concentrations of more than 10 individuals/km^2 dominated, whereas in approx. 1/5 of it they exceeded 100 individuals/km^2, locally reaching over 500 individuals/km^2.
A seabird survey at the Słupsk Bank was also carried out in 2017-2018 for the purposes of the environmental impact assessment of FEW Baltic II. 14 seabird species were found there during the survey (in the order from the highest to the lowest abundance: : long-tailed duck, velvet scoter, European herring gull, razorbill, common scoter, common guillemot, artic loon, lesser black-backed gull, black guillemot, little gull, red-throated loon, great black-backed gull, common eider, ember goose), 24 water bird species rarely seen at sea away from the coast (common gull, bean goose, mallard, Eurasian wigeon, mute swan, great cormorant, barnacle goose, lapwing, black-headed gull, graylag, goosander, Canada goose,

red-breasted merganser, common tern, northern pintail, gray heron, black tern, white heron, dunlin, whooper swan, European gold plover, great crested grebe, common sandpiper) and 15 species of terrestrial birds (skylark, white wagtail, common starling, siskin, swift, barn swallow, robin, common wood pigeon, great tit, chaffinch, yellow wagtail, goldcrest, Eurasian reed warbler, spotted flycatcher, sand martin).
The total abundance of stationary birds observed at the Słupsk Bank during the survey was 8,555 (the average of 71.4 individuals/h).Here, the dominant species among all the birds was also the long-tailed duck (Baltic Trade and Invest Sp. z o.o., 2019).
Results of surveys carried out as part of the Monitoring of Wintering Seabirds by the State Environmental Monitoring in 2020 indicated that the long-tailed duck and velvet scoter were by far the most abundant species recorded, accounting for approximately 81% and 15% of all individuals observed, respectively. The remaining species were much less abundant and the proportion of none of them exceeded 2.5 %. During the entire cruise, only 5 individuals of black guillemot were observed (one of three protected species in the area, including long-tailed duck and velvet scoter).
For more information see Section 8 Volume III of the Report.

4.8. Birds flying over the area during migratory periods

Migration is the movement of birds between two areas – the breeding and the overwintering area. Bird migration is caused by changes in weather conditions, and the associated unavailability of food.
Bird migrations may also be local, among others, in search of greater food abundance. In case of the BIII OWF area, such type of migration may relate to those seabirds which stay in its area.
As a result of the surveys of birds flying over the BIII OWF area, a high diversity in bird species was recorded. 97 species (32 waterbird and 65 terrestrial bird species) determined during spring and 56 species (25 waterbird and 31 terrestrial bird species) were identified during autumn migration. The species composition included almost all seabird species found in the Baltic Sea region and all major terrestrial bird taxonomic groups. High level of diversity of species recorded is not surprising, as of the 300 species inhabiting the region, the majority are migratory bird species.
In terms of frequency of observation and estimated population size of daily migrating birds, sea ducks were most numerous in the BIII OWF area, in particular long-tailed duck, common scoter and velvet scoter.
The most numerous migratory species recorded in autumn were geese; the total estimated number of individuals flying over the BIII OWF area is 100,000. This value represents 4% of the population of goose species counted together.
Other species of ducks, dabbling ducks and diving ducks were not numerous, only occasionally small flocks were recorded over the BIII OWF area during spring and autumn migration.
During the surveys, the presence of two species of divers (black-throated diver and red-throated diver) was recorded, but in relatively small numbers. It is estimated that about several hundred birds of these species fly over the BIII OWF area during the migration season.
All 3 species of razorbills inhabiting the Baltic Sea region were recorded: razorbill, common guillemot, black guillemot. The razorbill was the most numerous species out of them. It is

estimated that more than 6,000 individuals may fly over the BIII OWF area.
Gulls did not occur in large numbers during migration periods in the BIII OWF area, whereas the little gull (a species listed in Annex I to the EU Birds Directive) was systematically observed both during spring and autumn migrations. It is estimated that about 1,500 birds of this species (2% of the biogeographical population) may fly over the BIII OWF area during the migration period.
In the BIII OWF area, great cormorants were regularly observed during the surveys, but not in large numbers. The calculations indicate that about 1000 individuals of this species may fly over the BIII OWF area during the migration period.

During the surveys, quite numerous flights of common cranes over the area of the planned farm were found during autumn migration – in total, 1,483 individuals of this species were recorded during visual observations in this period.
For Charadriiformes, the largest percentage of the biogeographical population was recorded for the European golden plover (3.7%).
During the surveys over the area of the planned farm, only a few Falconiformes individuals were recorded: 8 birds of various species in spring and 1 unmarked falcon in autumn.
Despite the fact that many of the passerine birds migrating during the day avoid flying over the open sea, during the survey over the area of the planned farm, some species belonging to this row were found in large numbers, although they are a small part of their very numerous populations. The most frequently observed species include: chaffinch, starling, skylark, white wagtail and great tit.

Flight altitude

Most of the waterbirds recorded during the survey were flying during the day low above the BIII OWF area, below the potential height of a wind turbine rotor (< 20 m). A relatively large proportion of the recorded individuals (approx. 30%) flew at altitudes above 20 m above sea level only among divers and great cormorants. A large part of birds related to the terrestrial environment migrating over the BIII OWF area during the day flew at low heights, whereas a large part of migrating geese, common cranes and Charadriiformes flew at heights of a wind turbine rotor above 200 m.
In the case of night migrants, the vast majority of birds flew over the BIII OWF area at heights above 200 m above sea level.

Flight directions

Based on the results of the conducted surveys, it was found that the area of the planned location of the BIII OWF is not located on the main migration route through which birds fly in large clusters during seasonal migrations.
During the surveys conducted in 2016–2017, 145 species were found in the water region intended for the Baltica OWF, adjacent to the BIII OWF.
The general flight directions of all birds identified during the surveys carried out in the spring and autumn migration periods in 2013 in the BIII OWF area, in the water region designated for the Baltica OWF, adjacent to the area of the planned farm in 2016, were consistent with each other.
Subsequent surveys of flying birds were carried out in 2018–2019 in the area intended for the construction of the Baltic Power OWF. At that time, 95 bird species were observed. The most numerous were common scoter and long-tailed duck, similarly as in the areas of the

BIII OWF and Baltica OWF.
For more information see Section 9 Volume III of the Report.

4.9. Marine mammals

Marine mammals are mammals that spend most of their lives in sea or ocean waters.

The monitoring for marine mammals in the area of the planned BIII OWF and the adjacent waters revealed the presence of 3 species of marine mammals in the area of the planned wind farm and the adjacent waters. These are the porpoise (Phocoena phocoena), the gray seal (Halichoerus grypus) and the harbor seal (Phoca vitulina). The activity of all the above animal species was very low.
A total of 9 individuals of marine mammals were observed during aerial visual monitoring. These included 5 porpoises and 4 seals. One of the seals was a gray seal, two were harbor seals and for one individual its species could not be identified. All the animals were adults, no young were observed.
Surveys conducted in 2016-2017 in the water region adjacent to BIII OWF, which was intended for OWF Baltica, recorded 13 days of positive detection of porpoise. No porpoises were observed during aerial observations, despite good conditions for observations. However, it was possible to observe seals, which were not identified more closely, during these flights: in May 2016 (1 individual), in June 2016 (2 individuals) and in April 2017 (1 individual). The results which were gathered show that the surveyed area is an area with a low concentration of marine mammals (Consortium of IMG and MEWO et al., 2017).
According to the available data of the Inspectorate of Environmental Protection obtained within the framework of the State Environmental Monitoring, there were between 3 and 5 days of positive detections of porpoise at each of the five CPOD stations located on the Stilo Bank (CPOD06-CPOD10) during the whole period of the aforementioned monitoring, i.e. from March 2016 to August 2017 (GIOŚ, 2019).
Data on the occurrence and distribution of porpoises and their numbers in the Baltic Sea are also derived from the comprehensive acoustic monitoring of this species carried out in 2011–2013 within the SAMBAH project, according to which the area of BIII OWF is an area with low predicted densities of porpoises, but these densities are slightly higher in the period from November to April.
For more information see Chapter 10 Volume III of the Report.

4.10. Bats

During monitoring cruises carried out in the water region covering the area of the planned BIII OWF and its vicinity, a total of 13 noises of bats were recorded during spring migration. The presence of bats was recorded only in the northern part of the area, and the recorded sounds were emitted by the common noctule.
Bat activity surveys conducted in 2016-2017 in the Baltica OWF area, adjacent to the BIII OWF area, recorded a total of 79 records during the autumn and spring migrations. The records were attributed to the following species: Te Noctule Bat, Nathusius' Pipistrelle, Soprano Pipistrelle, Leisler's bat and daubenton’s bat. From among the listening points designated for the purposes of bat activity surveys in the Baltica OWF Area, the closest to the area of the planned BIII OWF were two points, located north-west and north. During the

surveys carried out in the period of spring and autumn migration, no activity or low/moderate activity was recorded in both points.
On the other hand, in 2019, surveys were carried out in the Baltic Power OWF area adjacent to the BIII OWF from the eastern side. Surveys during spring migration were carried out in April and May, while during autumn migration – from August to October. A total of 83 records were recorded (11 in spring, 72 in autumn), indicating bat activity.

Previous surveys on the occurrence and duration of bat activity in the Baltic Sea and south-eastern North Sea coasts and islands, carried out at 19 sites between 2007 and 2009, indicate that, in most cases, migratory bats in the Baltic Sea area move in dispersion. It cannot be excluded, therefore, that some of these bat species may migrate over the BIII OWF area or in its vicinity at different times.
For more information see Section 11 Volume III of the Report.

4.11. Archeology and national heritage

The analysis showed that the archives of the National Maritime Museum[3] and the Hydrographic Office of the Polish Navy (BHMW) do not contain any information on the cultural heritage in the area under survey.
As a result of the activities that were carried out a shipwreck was found which was entered into the Register of Underwater Archaeological Sites (Ewidencja Podwodnych Stanowisk Archeologicznych, EPSA) under the symbol B96.1. The wreck dates back to the beginning of the 20th century. This is evidenced by both the steam drive and the mixed steel-wood sheathing. The wreck is not of high historic value and can be used for tourist diving. According to the information received from the Hydrographic Office of the Polish Navy, no archaeological relics were found in shallow cores during the analysis of the material from geological surveys.
No relics of areas that could potentially be located in the settlement impact zone were observed during the survey. No valuable archaeological items were found at the seabed of the BIII OWF area.
No military objects, in particular torpedoes and minefield weapons, were found in the course of measurements within the planned project area. This does not mean that there are no residues of these weapons, unexploded ordnance or chemical weapons in the area.
Chemical tests on the sediments and water did not show any elevated indicators that could be a sign of the presence of chemical weapon residues in sediments. It should be kept in mind, however, that the survey was conducted at points and its scope is local, giving a general picture of the chemical properties of sediments and water in the BIII OWF area.
The BIII OWF area is not valuable from the archaeological point of view. For more information see Section 12 Volume III of the Report.

4.12. Commercial fishing

The total volume of fish catch in the area of the analyzed M7, M8, N7, N8 squares in which the BIII OWF is located fluctuated in 2015–2020 in the range of approx. 185 to 477 tons and accounted for less than 1% of the Polish total Baltic fish catch.
The main fish species caught in the analyzed fishing squares comprised cod, European

[3] Formerly: Central Maritime Museum.

flounder, herring and sprat. In commercial fishing, the average share of cod, which was the most important species caught, in the catch volume in 2015–2020 was 42% (total weight of fish caught), European flounder – 23%, sprat – 16% and herring – 14%.

There has been a clearly noticeable decrease in the volume of catches for cod. The information provided by scientists confirms that the eastern stock cod is in critical condition. In the years 2015–2020, in the area of the M7, M8, N7 and N8 fishing squares, between 37 (2020) and 66 (2015) fishing vessels out of 803 (2020) and 816 (2015) of the total Baltic Sea vessels entered in the Polish register were engaged in fishing. In the analyzed period, a steady decrease in the number of vessels engaged could be observed.
For more information see Section 13 Volume III of the Report.

4.13. Vessel traffic

As a result of the vessel traffic monitoring carried out in 2013–2014 in the BIII OWF area, information was collected on the basis of AIS data on the position, movement and stay of 2,653 vessels of various types and destinations, temporarily staying in the area limited by the radius of 15 km from the central point of the farm.
Due to the location of the planned project outside the area of intensive shipping traffic, no threat was found from commercial ship traffic of all sizes, tankers and passenger ships.
The project will generate some difficulties for fishing vessels heading from the ports of Łeba and Ustka to fisheries located to the north of the BIII OWF. Recently, the number of fishing vessels has decreased significantly due to the maritime policy pursued by the European Union and the reduction in the fishing fleet. The number of fishing vessels currently passing through the project area is estimated at 123 per year. The yacht and non-commercial vessel traffic will also not hinder or affect the project's safety, as these vessels will naturally divert to the recommended navigation routes after the project is completed and the area is closed for navigation.
With reference to the valid Spatial Development Plan for the Polish maritime areas, safety of navigation will be ensured by maintaining an appropriate distance between areas having the primary function E (renewable energy) and areas with the primary function T (transport). The BIII OWF area is located within the boundaries of the POM.45E water region. The Special Development Plan for the Polish maritime areas assumes 9 functions allowed for the POM.45E water region, including, i.a., transport and fishing.
The area of the planned project should, already during the construction of the wind farm and at the request of the investor, be declared by the Maritime Office in Słupsk as an area temporarily closed, or an area of restricted navigation due to ongoing construction works. After the completion of these works, this area may, as an artificial island, be declared an area closed for navigation and fishing and accessible only to vessels and helicopters serving the project and services such as the Maritime Search and Rescue. At the Investor's request, this decision is made by the competent Maritime Office for the area – in this case this is, under the applicable regulations, the Maritime Office in Słupsk.
For more information see Section 14 Volume III of the Report.

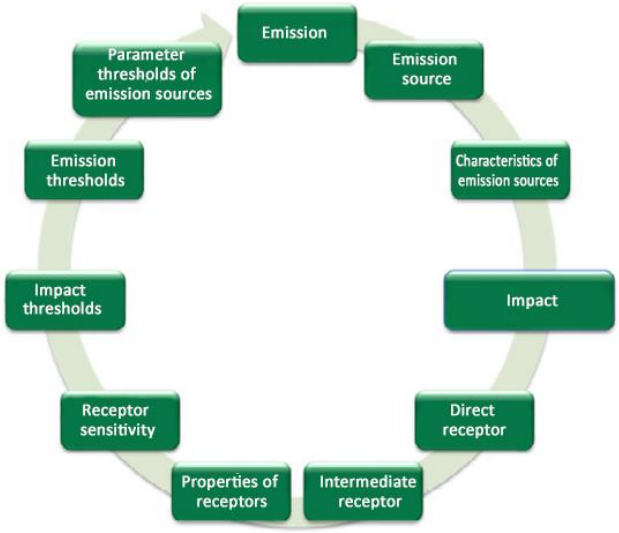
5. Impact Assessment Results (Summary of Volume IV)

The main assumption of the applied concept of the environmental impact assessment was

to determine how the change of parameters for the implementation and operation of the Project affects the impacts of the BIII OWF identified in the course of the environmental impact assessment, on the basis of which the Environmental Decision was issued, i.e. whether the update of parameters affects the changes in the nature of impacts and in what way it affects the identified significance of impacts.
Therefore the parameters of the offshore wind farm, which were identified as significant for the scale of its environmental impacts, were adopted from the Report 2015 prepared for the purpose of obtaining the Environmental Decision. The assessment looked at whether updating the Project's implementation and operating conditions might affect the assumptions about environmental conditions underlying the assessment in the Report 2015 and how the Environmental Decision formulated the environmental conditions for the execution of the design of the Project.

The analytical cycle conducted to achieve this assumption is based on that used in the Report 2015 prepared for the Environmental Decision, but it has been modified and adapted to the needs of the Environmental Decision amendment procedure. A diagram showing the relationship between emissions/disturbances and their sources, environmental impacts and Project parameters is presented in Figure 11 below.

Figure 10 Diagram of the relationship between emissions/disturbances and their sources, environmental impacts and Project **parameters**



Source: Bałtyk Środkowy III Offshore Wind Farm. Environmental Impact Assessment Report, SMDI Doradztwo Inwestycyjne Sp. z o.o. 2015

A number of operations and analyses were carried out during this cycle, the results and conclusions of which are presented in the following Sections of Volume IV of the EIA Report.

5.1. Abiotic environment

Table 4 Assessment of the impact on the abiotic environment

Assessment of the impact on the abiotic environment	
Assessment of the impact of the Project after	The impact assessment for the Project parameter update refers to the Project worst case scenario assessed in the Report 2015 (WCS 2015), i.e. the one with the highest potential impact on the abiotic environment (i.e. seabed and its surface sediments,

Assessment of the impact on the abiotic environment	
updating its parameters	marine waters and mineral deposits). The WCS 2015 assumed the construction of 200 wind turbines on gravity-base foundations and 8 foundations for accompanying infrastructure. The requested option assumes the construction of approx. 70% less of wind turbines in relation to the WCS 2015 and 50% less in relation to the parameters approved by the Environmental Decision, as well as one foundation for the accompanying infrastructure instead of eight, while excluding the possibility of using gravity-base and tripod foundations for the foundation of the wind turbine. The works during the construction stage, in particular the installation of foundations, the laying of power cables and the associated need for frequent anchoring of vessels, will disturb the structure of bottom sediments. This will cause a large amount of suspended matter to rise and float in the water. Various substances, including pollutants and biogenic substances, will be released into the water from this suspended matter. However, their quantities will be relatively small. In addition, if there are layers of stones and boulders placed around the foundations to prevent scouring, the composition of the sediments will change. Construction of the BIII OWF will also involve occupation of the seabed area within the farm boundaries, which will also make it more difficult or impossible to access mineral deposits. During construction works, bottom sediments will be disturbed and the structure of the seabed will be disturbed, which may result in their washing out or additional covering. Sand from the uncovered deposits may also be used as ballast for gravity-base foundations or for their production. During the operation of the farm, disturbances in the structure of bottom sediments in the immediate vicinity of the foundations and associated leaching of harmful substances from them to the water will occur at a much lower level than during the construction, especially if protective layers against scouring are applied. In addition, zinc or aluminum used to protect the foundations against corrosion will penetrate into the water. It is also possible that the temperature of water and sediments in the immediate vicinity of cables will increase slightly as a result of their heating. During operation of the farm, access to mineral deposits on its surface will be much more difficult or impossible, and the processes related to scouring of the bottom sediments in the immediate vicinity of the foundations may affect the sand deposits (regardless of a minimum extent of this impact). Impacts occurring during the decommissioning stage of the Project will be similar to impacts occurring during the construction stage, but will be less intense. The extent of seabed interference works will not be as large as for driving foundation piles. Some structural components may be left on the seabed, e.g. foundations. The piles will most probably be cut 3 m below the seabed. Transmission cables may be partially removed. The decommissioning works may affect mineral resources as the latter may be covered with an additional layer of lifted bottom sediments. After removing the farm elements, the whole farm area will be available for survey and exploitation of mineral deposits, if any. The results of the environmental impact assessment for the worst case scenario, the WCS 2015, indicated that no significant impacts would occur. The significance of overwhelming majority of impacts in the WCS 2015 has been assessed as low or negligible, moderate impact could be observed only in a few cases. **The impacts of the requested option will in most cases be proportionally smaller (due to the smaller number of wind turbines and the exclusion of the possibility of setting them on gravity-base foundations, which cause the greatest interference with the seabed). The update of the Project parameters will have a positive impact on limiting the impacts associated with the construction and operation of the BIII OWF.** During the construction, operation and decommissioning of the farm, unplanned events may also occur, e.g. a spill of oil derivative substances, which may contaminate the water column and bottom sediments. However, potential contaminants will largely diffuse in

Assessment of the impact on the abiotic environment	
	water, whereas the amount of substances likely to be released and the probability of an emergency is low. The significance of impacts arising from unplanned events was assessed to be negligible, low and moderate. **Also in this case, updating the Project will help reduce potential impacts.**
Mitigation measures	Due to the negligible or low significance of the majority of the BIII OWF's impacts on the abiotic environment, the mitigation measures are not required. Only measures are foreseen to mitigate the potential unplanned impacts, including: supplying vessels with means to deal with spills of oil derivative substances, supplying transformers with oil pits, using vessels whose hulls have not been coated with anti-fouling paint containing TBT, developing actions and procedures in case of a pollution hazard arising from construction, operation and decommissioning. **Updating the Project does not necessitate changes to the mitigation measures.**
Cumulative impacts	Simultaneous construction or decommissioning of the BIII OWF and other wind farms designed in the vicinity could cause cumulative impacts on the abiotic environment due to occupation of the seabed, suspension spreading caused by the disturbance of the structure of the bottom sediments and the release of a certain pool of pollutants and nutrients from the sediments to the water column, water turbidity and the possibility to cover the deposits of raw materials with an additional layer of sediments. However, it was concluded that the level of this accumulation would be small or minimal. **Updating the Project's parameters, due to the reduction of generated impacts, is beneficial from the point of view of the possibility to reduce cumulative impacts.**
Impact on Natura 2000 sites	BIII OWF, individually or in combination with other Projects, will not have a significant negative impact, direct or indirect, on the integrity, coherence and subject of protection of Natura 2000 sites**. Updating of the Project parameters will not affect the significance of the impacts caused by the construction and operation of the BIII OWF on Natura 2000 sites**.
Cross-border impacts	The Project is located in the Exclusive Economic Zone of Poland. The impact on the abiotic environment is local. It is not expected that BIII OWF will cause cross-border impacts, i.e. in the sea areas of the neighboring countries. **Updating the Project parameters does not affect the potential of transboundary impacts.**
Monitoring program	**The proposed modifications of the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.** The conditions and principles of monitoring abiotic elements of the environment are specified in the Environmental Decision in point II.2.
Report section	Volume IV Section 2

Source: own materials

5.2. Benthos

Table 5 Assessment of the impact on benthos

Assessment of the impact on benthos	
Assessment of the impact of the Project after updating its parameters	The impact assessment of the Project parameter updates addressed the Project worst case scenario assessed in the Report 2015 (WCS 2015), i.e. the one with the greatest potential environmental impact. The worst case scenario of the Project assessed in the Report 2015 (WCS 2015), i.e. the one with the greatest potential impact on benthos, is the construction of the wind farm using 208 gravity-base foundations with a diameter of 40 m, as this scenario will have the greatest impact on the seabed. The option approved with the Environmental Decision assumes the use of approx. 40% less foundations. However, they may have a larger maximum diameter (up to 40 m). The requested option assumes the construction of approx. 70% less of wind turbines in relation to the WCS 2015 and 50% less in relation to the parameters approved by the Environmental Decision, as well as one foundation for the accompanying infrastructure instead of six, while excluding the possibility of using gravity-base and tripod foundations for the foundation of the wind turbine. At the stage of construction of the BIII OWF, the most significant negative impacts on macrozoobenthos will occur, mainly its physical destruction in the area of up to approx. 1% of the farm area (depending on the project option). Permanent degradation of macrozoobenthos associations will occur in the area of foundations and along the route of submarine cable laying. The most important impacts on macrozoobenthos at the stage of operation will be associated with the loss of habitat (bottom surface) and the creation of "artificial reef" (positive impact). The surface of the hard substrate of underwater wind turbine structures (in the WCS) will be almost the same as the surface degraded as a result of the construction works. It will be colonized by plant organisms within a short period of time, in the daylight illuminated zone also by phytobenthos species. The taxonomic composition and quantitative structure of the benthos will be similar to that found in the mussel *Mytilus trossulus* (cf. environmental survey results – benthos). Negative impact of the decommissioning stage on benthos will mainly consist in permanent destruction of epiphytic communities on the underwater structures of the wind turbines and partial destruction of communities of benthic organisms around foundations. It can take up to 5 years to fully regenerate the habitat at the site of removed foundations. The results of assessment of the BIII OWF impact on the benthos indicate that no significant impact will occur. The significance of a vast majority of WCS impacts was defined as negligible or low. OSI impacts will usually be proportionally smaller (due to the smaller number of foundations). Unplanned events may also occur during construction, operation and decommissioning of the farm. Of these, only the larger spill of oil derivative substances is likely to have a low impact on macrozoobenthos. Impacts associated with other unplanned events will be negligible. The impacts of the Project within the changed parameters assessed in this Report will most likely be proportionally less due to the significantly lower number of foundations – by 70% compared to the WCS 2015 and 50% compared to the parameters of the Project approved by the Environmental Decision and the abandonment of the use of gravity-base foundations and tripods for the foundation of the wind turbine. **Consequently, the Project in updated parameters will cause significantly smaller impacts, and the modified parameters of the Project will have a positive impact on the reduction of impacts associated with the construction and operation of the BIII OWF.** Unplanned events may also occur during construction, operation and decommissioning of the farm. Of these, only the larger spill of oil derivative substances is likely to have a low impact on macrozoobenthos. Impacts associated with other unplanned events will be low or negligible. **Also in this case, updating the Project will help reduce potential impacts.**

Assessment of the impact on benthos	
Mitigation measures	Due to the negligible or low significance of the majority of the BIII OWF's impacts on benthos, no mitigation measures are required. **Updating the Project does not necessitate changes to the mitigation measures.**
Cumulative impacts	Cumulative impact on benthos may occur only in the case of simultaneous construction of two (or more) farms and their export cables and will be associated with suspended matter spreading due to the agitation of the bottom sediment layer and its subsequent re-deposition on the seabed. According to the modeling carried out for the Report 2015, suspended matter will settle to the seabed within a radius of up to 20 km from the farm, but within this distance the "extra" layer of sediment will be no more than 0.2–0.4 mm. Even in cumulation, the impact would not be significant. At the stage of operation, one may speak about a positive cumulative impact of an "artificial reef" at several neighboring farms. It should be added, however, that this will create a greater possibility of establishment of alien or invasive species in this part of the Baltic Sea than in the case of a single offshore wind farm, which is a negative impact for the preservation of naturalness of the local micro-ecosystem. Cumulative impacts in the case of simultaneous decommissioning of several neighboring OWFs would be similar to those at the construction stage, although less intense. **Updating the Project's parameters, due to the reduction of generated impacts, is beneficial from the point of view of the possibility to reduce cumulative impacts.**
Impact on Natura 2000 sites	The Natura 2000 sites in the area of impact of the project, where benthos habitats are protected, include the Słupsk Bank (5.5 km away) and Coastal Waters of the Baltic Sea (8.2 km away). The only significant planned impact of the BIII OWF reaching only the northern boundaries of the Natura 2000 sites, will be the re-deposition of suspended matter raised due to the works on the seabed. However, at this distance the "extra" layer of sediment will be no more than 0.2--0.4 mm, which should be considered a negligible impact. Therefore, no significant negative impacts of the BIII OWF (individually and cumulatively) on the benthic habitats and species protected within the Natura 2000 network, as well as on its integrity and coherence are anticipated. **Updating the parameters of the Project means excluding gravity-base foundations and tripods for the foundation of the wind turbine, which will significantly reduce the agitation of the bottom sediments and the concentration of suspended matter in the water and its subsequent deposition.**
Cross-border impacts	Due to the small range of the impact and a significant distance of the BIII OWF to the borders of Exclusive Economic Zones of other countries (at least about 50 km to the zones belonging to Sweden and Denmark), it was assumed that the planned project will not cause cross-border impacts on benthos. **Updating the Project parameters does not affect the potential of transboundary impacts.**
Monitoring program	The conditions and rules of benthos monitoring were specified in the Environmental Decision in point 2.2.a at the stage of construction of the BIII OWF, and 2.2.c at the stage of operation of the BIII OWF, and 2.2.b at the stage of decommissioning of the BIII OWF. **The proposed modifications of the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.**
Report section	Volume IV Section 3

Source: own materials

5.3. Fish

Table 6 Assessment of the impact on fish

Assessment of the impact on fish	
Assessment of the impact of the Project after updating its parameters	The Environmental Decision allowed for the implementation of the Project in the option including the construction of up to 120 foundations for wind turbines and up to 6 for the accompanying infrastructure. This Report aims to assess and analyze the environmental impact of the Project in the form included in the application for an amendment to the Environmental Decision, i.e. covering the construction of foundations for 60 wind turbines and one for the accompanying infrastructure. For the purposes of this assessment, reference was also made to the worst case investment scenario that was analyzed in the Report 2015 (WCS 2015), i.e. the one that could potentially have the greatest impact on fish, at that stage this was the construction of the wind farm using 208 gravity-base or monopile foundations, as this option will generate underwater noise for the longest period of time. The option selected for implementation on the basis of the Environmental Decision assumes the use of approx. 40% fewer foundations (which will reduce the installation time but not the noise level). The option covered by the application for the amendment to the Environmental Decision assumes even more far-reaching reduction in the number of turbines, and thus also the number of foundations. Relative to the WCS 2015, there will be 70% less of them and relative to the Environmental Decision, 50% less. It should be noted that in the option to be implemented on the basis of the updated parameters of the Project the time of piling works will be reduced but the noise level that will be emitted will remain at the same level. These impacts will not be of a significant negative nature when implemented in accordance with the mitigation measures provided for in the Environmental Decision. However, it should be noted that for impacts related to the disturbance of bottom sediments, the worst case scenario that was analyzed in the Report 2015 was the use of gravity-base foundations. At the present stage, it is known that such foundations will not be used for wind turbines, and the smallest impacts in this respect will be caused by monopile foundations (cf.: assessment of the impact on benthos). During the environmental surveys, 18 species of fish or fish families were found in the BIII OWF area and in the buffer zone, out of which 8 were taken into account in the detailed assessment. Assessment These include: sprat, herring, cod, European flounder, plaice, turbot, gobies and common seasnail. At the stage of the BIII OWF construction the most significant negative impacts on fish is mainly the emission of noise and vibration, associated with driving of foundation piles (with the highest intensity during the driving of monopiles) and the increase of suspended matter concentration in water (having impact primarily on juvenile forms, with the highest intensity when gravity-base foundations are used). The most important impacts on fish at the stage of operation will be connected with the creation of the “artificial reef” (positive impact), where fish can find shelter and favorable conditions for reproduction, especially if a ban or restrictions on commercial fishing was introduced in the area of the farm (such a decision can be taken by the maritime administration at the stage of project implementation). Negative impacts of the decommissioning stage on fish will mainly consist in permanent destruction of epiphytic communities of the artificial reef and negative impacts of increased quantity of suspension in water. The results of assessment of the BIII OWF impacts on fish indicate that no significant impact will occur. Already at the stage of the Report 2015 for the WCS 2015, it was determined that the vast majority of impacts that it could cause were determined to be negligible or low (low mainly for codfish, which is an important commercial species), provided that measures were taken to mitigate the impacts from piling noise. **Impacts of the option to be implemented under the amended Environmental Decision will usually be proportionally smaller (due to**

Assessment of the impact on fish	
	the smaller number of foundations they will last shorter, but the noise level will be comparable). The update of the Project parameters will have a positive impact on limiting the impacts associated with the construction and operation of the BIII OWF. During the construction, operation and decommissioning of the farm, contingencies may also occur, e.g. a spill of oil-derivative substances. The impacts associated with them are assessed to be negligible or low (for codfish). **Also in this case, updating the Project will help reduce potential impacts.**
Mitigation measures	Mitigation measures are required to reduce noise levels from piling as recorded in the Environmental Decision.
Cumulative impacts	The most significant cumulative impacts on fish may occur in the case of a simultaneous emission of noise from piling during the construction of two or more wind farms (or work of two "piling" units at BIII OWF at the same time). At the stage of operation, one may speak about a positive cumulative impact of an "artificial reef" at several neighboring farms. Cumulative impacts in the case of simultaneous decommissioning of several neighboring OWFs would be similar to those at the construction stage, although less intense. The cumulative impact at all stages is assessed (in the worst case scenario) to be low. **Updating the Project's parameters, due to shortening the duration of generated impacts, is beneficial from the point of view of reducing the possibility of cumulative impacts.**
Impact on Natura 2000 sites	The Natura 2000 sites within the range of impact of the Project, where fish and lampreys are protected, are Łupawa Valley, Słupia Valley and Słowińska Refuge, Słupsk Bank and Sarbsko Spit. From among the above-mentioned, only the Łupawa Valley, Słupia Valley and Słowińska Refuge are important sites for the occurrence of fish and lamprey species listed in Annex II to Council Directive 92/43/EEC, which are also subject to conservation in those areas. The impacts of the farm in terms of noise, water pollution and bottom sediments raised during construction could potentially affect the brook lamprey, European river lamprey, amur bitterling, spined loach and European bullhead which are the subjects of protection in these areas, however during the preliminary Natura 2000 impact assessment (screening) the impact of the farm on these species was considered unlikely and insignificant. **Updating of the Project parameters will not affect the significance of the impacts caused by the construction and operation of the BIII OWF on Natura 2000 sites.** Therefore, no significant negative impacts of the BIII OWF (individually and cumulatively) on the habitats and species of fish and lampreys protected within the Natura 2000 network, as well as on the integrity and coherence of these areas are anticipated.
Cross-border impacts	Due to the small range of the impact and a significant distance of the BIII OWF to the borders of Exclusive Economic Zones of other countries (more than 50 km to the zones of Sweden and Denmark), it was assumed that the planned Project will not cause cross-border impacts on fish, provided that mitigation measures for the noise from piling will be applied. **Updating the Project parameters does not affect the potential of cross-border impacts.**
Monitoring program	The Environmental Decision specified in point II.2.2.a) (fish) monitoring requirements that also apply to ichthyofauna. **The proposed modifications of the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.**
Report section	Volume IV Section 4

Source: own materials

5.4. Seabirds

Table 7 Assessment of the impact on seabirds

Assessment of the impact on seabirds	
Assessment of the impact of the Project after updating its parameters	The Environmental Decision allowed for the implementation of the Project in the option including the construction of up to 120 foundations for wind wind turbines and up to 6 for the accompanying infrastructure. This Report aims to assess and analyze the environmental impact of the Project in the form included in the application for an amendment to the Environmental Decision, i.e. for the construction of foundations for 60 wind turbines and one for the accompanying infrastructure. The changed project parameters assume that the maximum total height of the wind turbine will be increased to 310 m a.s.l. and the maximum rotor diameter will be increased to 255 m, at the same time, they assume that the total rotor zone will be reduced by approx. 22% in the case of the change of the Project parameters in relation to the project parameters approved by the Environmental Decision. During the environmental surveys, 28 species of seabirds were found in the BIII OWF area and in the buffer zone, out of which 9 were taken into account in the detailed assessment. These are long-tailed duck, European herring gull, common scoter, velvet scoter, razorbill, common guillemot, black-throated diver, red-throated diver and little gull. At the stage of construction of the BIII OWF, the most significant negative impacts on seabirds will occur, resulting from the emission of noise, light and increased vessel traffic, which will cause their deterring from the area of the project and their migration to places with more favorable living conditions. The potential impact of the wind farms in operation on seabirds will mainly relate to increased mortality due to collisions with turbines and changes in the distribution and behavior of birds (avoidance of the water region occupied by the project). It should be noted that these changes in bird behavior shall significantly reduce the risk of collision. Negative impacts of the decommissioning stage on seabirds (deterring) shall mainly be caused by the emission of noise and light during the decommissioning works or by increased vessel traffic. The results of the assessment of the BIII OWF impact on seabirds suggest that no major impact will occur**.** The significance of a vast majority of impacts of the WCS was defined as negligible or low. The exception is the impact of the construction stage on birds of high importance (Gaviiformes, long-tailed duck, velvet scoter), causing their displacement from the existing habitats in the BIII OWF area, which was determined as moderate. Of these species, only the long-tailed duck is on average living in the project area, but the deterring of birds from the BIII OWF area will not be important for the population of this species due to the presence of rich feeding grounds, e.g. in shallower waters in the area of the Słupsk Bank. The impacts of the Project option after the proposed changes will usually be proportionally smaller (due to a smaller number of wind turbines) than the option in the parameters approved by the Environmental Decision. In the case of impacts such as scaring away the water region occupied by the farm, the water region will most probably be the same, and only the density of the wind turbines will decrease, however, taking into account the mitigation measure in the form of creating a 5 km undeveloped area between the BIII OWF and the Baltica 3 OWF and the Baltica 2 OWF, the impacts will also be smaller in this respect than in the case of the project in the parameters approved by the Environmental Decision. During the construction, operation and decommissioning of the farm, unplanned events may also occur, e.g. spill of oil-derivative substances. However, impacts on seabirds associated with these events will only be assessed at the time of the event. Nevertheless, on Słupsk Bank in close vicinity of the farm, wintering of large numbers of seabirds takes place, so it is necessary to undertake all actions aiming at avoiding such event, and if it occurred – mitigating its consequences. Also in this case, updating the Project will help reduce potential impacts.
Mitigation	It is considered justified to maintain all measures mitigating the impact of the BIII OWF on

Assessment of the impact on seabirds	
measures	birds.
Cumulative impacts	The most significant cumulative impacts on seabirds are associated with the possible simultaneous construction of more than one OWF in the project area. This would primarily made birds to be deterred from a potentially larger area, and would potentially increase mortality due to collisions. In the case of realization of the (extremely unlikely) scenario of construction of a total of 6 wind farms on the north-eastern slope of the Słupsk Bank, the cumulative impacts could even reach the significant level. **Updating of Project parameters, due to reduction of the generated impacts as well as additional mitigation measures consisting in creating 5 km undeveloped area between the BIII OWF and Baltica 3 OWF and Baltica 2 OWF is beneficial from the point of view of possibility to reduce the cumulative impacts.** The cumulative impact at the stage of decommissioning are similar to that at the construction stage.
Impact on Natura 2000 sites	The Natura 2000 sites in the area of impact of the project, where seabirds are protected, include the Słupsk Bank (5.5 km away), Coastal Waters of the Baltic Sea (8.3 km away), and Słowińskie Seashore (22.3 km away). The most important impact of the construction stage is the deterring of birds which may partially migrate to the three above-mentioned Natura 2000 sites, thus increasing competition for habitat resources. At the stage of operation there will be a permanent deterring of birds from the farm area. There will also be a barrier effect for locally migrating birds (e.g. in search of food), some of which use Natura 2000 sites at least temporarily, with increased energy inputs and collisions with wind turbines. Birds inhabiting the nearby Natura 2000 sites are also unlikely to benefit from the abundance of food that will, in time, appear on the "artificial reef" created on the underwater elements of the farm. Taking into account the types of impacts of offshore wind farms on seabirds, as well as uncertainty about the scale and effects of these impacts in terms of the quality and population size protected within Natura 2000 sites, it cannot be clearly excluded in the preliminary assessment that the BIII OWF will not significantly affect the integrity and the species protected within the areas of the Słupsk Bank and the Coastal Waters of the Baltic Sea as areas that protect overwintering populations of seabirds, through the impact in the form of a barrier that hinders access to these overwintering areas. Significant impacts on the coherence of the Natura 2000 network cannot be excluded either, in terms of impacts on certain species from Annex 1 to the Birds Directive, which migrate to overwintering areas in large numbers within the analyzed area (razorbill, common scoter, long-tailed duck, velvet scoter). Accordingly, a proper assessment was made. After the analysis of possible impacts that the assessed project may cause, individually and in combination with other projects, it should be stated that: • The BIII OWF alone will not significantly affect the integrity, coherence or subject of protection of Natura 2000 sites in any of the considered options through the impacts it will cause on seabirds; • The BIII OWF in combination with other offshore wind farms that may be constructed in its immediate vicinity on the north-eastern slope of the Słupsk Bank, will not have a significant impact on the integrity, coherence or subject of protection of the Natura 2000 sites by influencing birds migrating to overwintering areas protected within the Słupsk Bank area in the case of application of the mitigation measure in the form of the proposed leaving of a 5 km migration corridor in the north-western corner undeveloped with wind turbines, between groups of wind turbines belonging to the OWF projects located on the north-eastern slope of the Słupsk Bank (between the BIII OWF and Baltica 3 OWF and Baltica 2 OWF) to allow for migration of long-tailed duck to the area of the Słupsk Bank during the autumn migration, and from this area during the spring migration.

Assessment of the impact on seabirds	
	The creation of such a corridor may mean the need to reduce the development of wind turbines in the north-western corner of the BIII OWF, but the final decision on this issue should be made at the stage of the repeated impact assessment during the approval of the building permit design. This solution is consistent and constitutes a continuation for the undeveloped corridor implemented to the conditions of the decision on environmental conditions issued for the Baltica OWF – condition II.3.9 of the decision on environmental conditions, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 **Updating of the Project parameters, due to reduction of the generated impacts as well as additional mitigation measures, will be favorable to limit the potential impacts on the Słupsk Bank Natura 2000 site.**
Cross-border impacts	Within the Baltic Sea there are seabirds from local breeding grounds located on the coasts of this sea (European herring gull, razorbill, common guillemot, black guillemot, and partially Melanitta) and birds from populations inhabiting northern Europe and Siberia (Gaviiformes, long-tailed duck, common scoter, velvet scoter) that appear here outside their breeding season. Significant cross-border impacts may therefore concern the impact of an offshore wind farm as a barrier on their migration route. Avoiding a wide obstacle results in a longer flight route. However, in the case of a single offshore wind farm, the increase in energy expenditure is small and does not affect the survival of the population (Pettersson 2005). The strong deterrent effect will also ensure that seabirds will not appear in the area occupied by wind turbines and thus the water region will be excluded from their feeding grounds. The area designated for construction of the BIII OWF is not a site of significant concentration of any of the species found during the monitoring. The expected impact of the wind turbine on bird species considered in the assessment is moderate at the most and limited in extent. According to the adopted methodological definition, this means changes relevant only locally and not nationally or internationally, and irrelevant to the maintenance of the favorable conservation status. Therefore, no cross-border impacts are expected from the project as a result of the construction of a single OWF. **Updating the Project parameters does not affect the potential of transboundary impacts.**
Monitoring program	The conditions and rules of bird monitoring were specified in the Environmental Decision in point II.2.a at the stage of operation of the BIII OWF. **As a rule, the proposed modifications to the conditions of implementation and operation of the Project do not affect the monitoring conditions specified in the Environmental Decision, however, for the sake of clarity and precision of the Environmental Decision, it is proposed to remove from point II.2.a concerning the monitoring of seabirds and birds flying over the farm area (including migratory birds) at the operation stage the part of the condition concerning the shutdown of turbines located on the route of registered bird flocks during migration periods. The provision requested to be repealed does not refer to the scope and conditions of monitoring, i.e. the subject of point II.2.a of the Environmental Decision, and is inconsistent with the condition specified in point I.2.31 and I.3.12 of the Environmental Decision concerning the shutdown of turbines, which raises interpretation doubts. At the same time, this amendment does not affect the contents of points I.2.31 and I.3.12 of the Environmental Decision.**
Report section	Volume IV Section 5.1

Source: own materials

5.5. Migratory birds

Table 8 Assessment of the impact on migratory birds

Assessment of the impact on migratory birds	
Assessment of the impact of	The Environmental Decision allows for the implementation of the Project in an option involving the construction of 120 wind turbines, with a minimum clearance of 20 m, a rotor

Assessment of the impact on migratory birds	
the Project after updating its parameters	diameter of 200 m and a maximum total height of 275 m. The total maximum rotor zone in this option is 3,768,000 m^2 for 120 turbines, and for the Project planned to be implemented after amending the Environmental Decision it is 2,945,280 m^2 for 60 turbines, with an increased maximum total height of up to 310 m and a maximum rotor diameter of 250 m. For the WCS 2015, the area was 5,820,800 m^2, which resulted from the number of wind turbines that was being analyzed at the time as the worst case scenario, i.e. 200 wind turbines. The highest potential mortality due to collisions with turbines was assumed for that option. The option currently envisaged for the implementation after amending the Environmental Decision assumes the construction of approx. 70% less wind turbines than it was in the WCS 2015 and 50% less than in the Environmental Decision, whereas the minimum clearance used in it is also 20 m, and the rotor diameter is maximum 250 m. The total maximum rotor zone, as indicated above, is 2,945,280 m^2, so it is smaller than the maximum rotor zone in the option approved by the Environmental Decision by approx. 22%. This Report uses the collision rate analyses prepared for the Report 2015 by DHI and ENINA, under the direction of Prof. Dr. hab. Piotr Tryjanowski. Both teams obtained similar results, which confirms the correctness of the analysis performed. In addition, for the purposes of this report, ENINA has performed in 2022 a collision rate analysis for the option to be implemented based on the amended Environmental Decision. Of the bird species recorded during bird species monitoring, 13 species or species groups were included in the detailed assessment. They include red-throated loon and black-throated loon, great cormorant, swans (whooper swan, mute swan and Bewick's swan), geese (greater white-fronted goose, bean goose, greylag goose, Brent, bernacle goose), wigeon, long-tailed duck, common scoter, common scoter, velvet scoter, common crane, little gull, black-headed gull, razorbill and common guillemot. At the stages of construction and decommissioning of the BIII OWF, there will be impacts on migratory birds in the form of the barrier effect and collisions with vessels. The barrier effect will be negligible as the changed route associated with the avoidance of the construction site will only represent a small part of the overall migration route, so the additional energy costs are going to be be very low. Bird to vessel collisions have been assessed as negligible to small as vessel traffic shall be limited to a relatively small area. The BIII OWF may affect migratory birds by creating a barrier and the risk of collision during the entire operation stage. The barrier effect is a low-intensity impact for all bird species, as bypassing or passing over the farm area (or construction vessels) involves a low additional energy outlay. Therefore, this impact is assessed as small or negligible for all species. Some species may hit wind turbines, but this impact will be negligible or low for all the species being analyzed. The results of the assessment of the BIII OWF impact on migratory birds suggest that no major impact will occur. **Updating of the Project parameters, including a significantly lower number of wind turbines in relation to the Project parameters approved by the Environmental Decision (by 50%) and the introduction of additional solutions minimizing the impact, consisting in the creation of a 5 km undeveloped area between the BIII OWF and the Baltica 3 OWF and the Baltica 2 OWF, contribute to a further reduction of the impact of the BII OWF on migratory bird species.**
Mitigation measures	It is considered justified to maintain all measures mitigating the impact of the BIII OWF on birds. Additionally, it is proposed to exclude the north-western corner of the BIII OWF area from the development (according to Figure 2 in chapter 3.2. of this summary). The exclusion from development of the north-eastern corner of the BIII OWF project, which is located in the vicinity of the Baltica OWF, which will allow to create between these OWF projects a corridor free from development with farm infrastructure with a minimum width of 5 km. This solution is consistent and constitutes a continuation for the undeveloped corridor implemented to the conditions of the decision on environmental conditions issued for the

Assessment of the impact on migratory birds	
	Baltica OWF – condition II.3.9 of the decision on environmental conditions, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 The reduction of the number of wind turbines to be implemented in the option planned for implementation on the basis of the changed Environmental Decision should also be considered as mitigation measures. Therefore, II.1B sub-point 1) and provision I.3 sub-point 1) of the Environmental Decision require an appropriate amendment in this respect which should reflect the current assumptions of parameters while maintaining the parameters under which the farm will be implemented.
Cumulative impacts	The impact significance of construction works carried out simultaneously at several farms on migratory birds will be negligible to low. Most migratory birds will avoid the construction area with minimally increased energy cost. It is also to be expected that collisions with vessels used for construction purposes will not be numerous. Current calculations were made for the planned project of potential mortality in a situation when apart from the BIII OWF in the option planned for implementation after amending the Environmental Decision there will be another 5 farms operating nearby. As shown by the calculations and analyses, there will be no significant collision rate (negligible to low significance), and the barrier effect with minimizing measures taken will not significantly affect migration over the area. **Updating of Project parameters, due to reduction of the generated impacts as well as additional mitigation measures consisting in creating of approx. 5 km undeveloped area between the BIII OWF and Baltica 3 OWF and Baltica 2 OWF is beneficial from the point of view of possibility to reduce the cumulative impacts.**
Impact on Natura 2000 sites	When assessing the impacts of wind farms on migratory birds, it is extremely difficult, and often impossible, to indicate the extent of potential impacts. That is because a wind farm located along a migration route may, due to the barrier effect or major mortality resulting from bird collisions with rotors, affect the condition of migratory populations, and thus affect ecosystems in places to which the populations migrate. Therefore, the focus was on assessing the impact on the Natura 2000 network coherence by way of assessing the impact of the BIII OWF on the migratory birds stream in its area, especially by assessing the scale of impacts on the size and quality of the Eurasian population of migratory birds subject to protection as part of the Natura 2000 network, as a result of the barrier effect and potential depletion of their numbers as a result of collisions with wind turbines. Having analyzed possible impacts that the assessed project may cause, individually and in combination with other projects, it has been found that: 1) BIII OWF alone will not significantly affect the integrity, coherence or subject of protection of Natura 2000 sites in any of the options being considered through the impacts it will have on migratory birds. 2) The BIII OWF in combination with other offshore wind farms that may be constructed in its immediate vicinity on the north-eastern slope of the Słupsk Bank, will not have a significant impact on the integrity, coherence or subject of protection of the Natura 2000 sites by influencing birds migrating to overwintering areas protected within the Słupsk Bank area in the case of application of the mitigation measure in the form of the proposed leaving of a 5 km migration corridor in the north-western corner undeveloped with wind turbines, between groups of wind turbines belonging to the OWF projects located on the north-eastern slope of the Słupsk Bank (between the BIII OWF and Baltica 3 OWF and Baltica 2 OWF) to allow for migration of long-tailed duck to the area of the Słupsk Bank during the autumn migration, and from this area during the spring migration.
	The creation of such a corridor may mean the need to reduce the development of wind turbines in the north-western corner of the BIII OWF, but the final decision on this issue should be made at the stage of the repeated impact assessment during the approval of the building permit design. This solution is consistent and

Assessment of the impact on migratory birds	
	constitutes a continuation for the undeveloped corridor implemented to the conditions of the decision on environmental conditions issued for the Baltica OWF – condition II.3.9 of the decision on environmental conditions, ref. No. RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37 **Updating of Project parameters, due to reduction of the generated impacts as well as additional mitigation measures consisting in creating of approx. 5 km undeveloped area between the BIII OWF and Baltica 3 OWF and Baltica 2 OWF is beneficial in terms of reducing the potential impacts on Natura 2000 sites, including the Słupsk Bank Natura 2000 site.**
Cross-border impacts	A cross-border impact of the BIII OWF on migratory birds is not expected. Significant cross-border impacts might apply to the impact of the farm as a barrier on their migration route. Avoiding a wide obstacle results in a longer flight route. However, both in the case of a single OWF and their accumulation, the increase in energy expenditure is small and does not affect the survival rate of the population. Similarly, the mortality as a result of collisions with wind turbines will not significantly affect the size of the population of birds inhabiting other countries and migrating through the BIII OWF water region (and possible neighboring farms). **Updating the Project parameters does not affect the potential of transboundary impacts.**
Monitoring program	The conditions and rules of bird monitoring were specified in the Environmental Decision in point II.2.a (indent 6 in the part Monitoring at the operation stage) at the operation stage of the BIII OWF. **The proposed modifications of the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.**
Report section	Volume IV Section 5.2

Source: own materials

5.6. Marine mammals

Table 9 Assessment of the impact on marine mammals

Assessment of the impact on marine mammals	
Impact Assessment of the Project after updating its parameters	The Environmental Decision allowed for the implementation of the Project in the option including the construction of up to 120 foundations for wind turbines and up to 6 for the accompanying infrastructure. This Report aims to assess and analyze the environmental impact of the Project in the form included in the application for an amendment to the Environmental Decision, i.e. for the construction of foundations for 60 wind turbines and one for the accompanying infrastructure. In the Report 2015, the option associated with the use of 10 m diameter monopile foundations was adopted as the set of parameters representing the worst case scenario because that scenario will result in the highest level of underwater noise. In terms of impact duration, the Report 2015 alternative option resulted in further-reaching impacts due to the number of foundations, i.e. 208 versus 126 for the alternative option approved by the Environmental Decision. The most significant negative impacts on marine mammals will occur at the stage of construction of the BIII OWF, mainly the emission of noise and vibration, associated with driving of foundation piles (with the highest intensity during the driving of monopoles) and the increase of suspended matter concentration in water (with the highest intensity when gravity-base foundations are used). The most important impacts on marine mammals during the operation stage will be related to the creation of an “artificial reef’ (positive impact) where mammals can find potentially rich fish stocks constituting their basic food. The negative impacts of the decommissioning stage on mammals will mainly consist in noise emission during decommissioning works, destruction of the artificial reef (reduction of food base) and negative impacts of increased suspended matter in water.

Assessment of the impact on marine mammals	
	The results of the assessment of the BIII OWF impact on marine mammals suggest that no major impact will occur. The significance of a vast majority of impacts of the WCS 2015 was defined as negligible or low. An exception is noise from piling (without minimizing measures) which may result in impacts on mammals of moderate significance. Following the application of minimizing measures, such as e.g. a bubble curtain, the assessment of the significance of the impact on mammals is also reduced to negligible or low. **The updated Project parameters assume a 70% reduction in the number of wind turbines compared to the Project parameters analyzed as the alternative option in the Report 2015 and a 50% reduction compared to the Project parameters approved by the Environmental Decision, as well as a reduction in the number of foundations from six to one for offshore substations. For such specified parameters of the Project the noise propagation was modeled again (assuming additionally higher power of hammers used for piling, i.e. 4,500 kJ), which confirmed low or negligible magnitude of impacts when applying minimizing measures such as e.g. a bubble curtain.** During the construction, operation and decommissioning of the farm, contingencies may also occur, e.g. a spill of oil-derivative substances. The impacts associated with them are assessed to be negligible (for seals) or low (for porpoise). **Also in this case, updating the Project will help reduce potential impacts.**
Mitigation measures	**The condition specified in point II.1.A 1) of the Environmental Decision – design and application of a technical solution in the form of an air curtain or any other technology minimizing the impact of underwater noise on fish and marine mammals, which ensures the reduction in its level so that at the border of the nearest Natura 2000 site protecting marine mammals, i.e. Słowińska Refuge PLH220023 it does not exceed 171 dB re 1 µPa2s (SEL, in water). However, due to a change in the threshold values used as guideline for the determination of impacts on marine mammals, it is proposed to change this condition of the Environmental Decision to take into account the different sensitivity characteristics for the porpoise and seals. Consequently, it is proposed to set the limits necessary to be complied with at the boundary of the nearest marine mammal Natura 2000 site, i.e. Słowińska Refuge PLH220023, were set at 140 dB re 1 µPa2s SELcum and weighted for cetaceans with high sensitivity to very high frequencies (VHF) for porpoise and 170 dB re 1 µPa2s SELcum and weighted for seal (PCW) for seals. The content of the other conditions concerning minimizing measures should remain as in the Environmental Decision.**
Cumulative impacts	The most significant cumulative impacts on marine mammals may occur only in the case of a simultaneous emission of noise from piling during the construction of two or more wind farms (or work of two "piling" units at the BIII OWF at the same time). The modeling results suggest that simultaneous piling in two different locations may significantly increase the cumulative noise level, and thus lead to an increase in the extent of noise impacts on marine mammals. At the stage of operation, one may speak about a positive cumulative impact of an "artificial reef" at several neighboring farms. **Updating the Project parameters, due to the shortening of the duration of generated impacts is beneficial from the point of view of the possibility to reduce the cumulation of impacts.** Cumulative impacts in the case of simultaneous decommissioning of several neighboring OWFs would be similar to those at the construction stage, although less intense (no piling noise).
Impact on Natura 2000 sites	The Natura 2000 sites in the area of the impact of the project, where marine mammals are protected, include Słowińska Refuge (19 km away), Puck Bay and Hel Peninsula (53 km away), Kaszubskie Cliffs (55 km away). At the screening stage it was not possible to rule out a significant impact of the BIII OWF on marine mammals being the subject of protection of the Słowińska Refuge PLH220023 site during the construction process (piling noise) and a significant impact on the integrity of that

Assessment of the impact on marine mammals	
	site. At the same time, already at that stage it was assessed that the impact significance of the BIII OWF on marine mammals protected on the PLH220032 site – Puck Bay and Hel Peninsula, will be negligible. During the appropriate evaluation, the possibility of using effective measures minimizing impacts was identified, in the form of a reduction of noise propagation and the use of interruptions in the piling process to allow marine mammals to move between the areas. When applying those measures, no significant negative impacts of the BIII OWF were found (individual or cumulated) on the integrity and coherence of the Słowińska Refuge area or on porpoises and gray seals being the subject of its protection. **Updating the Project parameters, due to the shortening of the duration of generated impacts, will favor limiting potential impacts on the Słupsk Bank Natura 2000 site.**
Cross-border impacts	Due to the significant distance between the BIII OWF and the boundaries of the exclusive economic zones of other countries (at least approx. 50 km), it was found that the planned project will not cause cross-border impacts on marine mammals provided that measures to mitigate piling noise propagation are taken. **Updating the Project parameters does not affect the potential of cross-border impacts.**
Monitoring program	The conditions and rules of mammal monitoring were specified in the Environmental Decision in point II.2.a (indent 3) at the stage of construction of the BIII OWF, and II.2.a (Monitoring at the operation stage, indent 5) at the stage of operation of the BIII OWF. **The proposed amendments to the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.**
Report section	Volume IV Section 6

Source: own materials

5.7. Bats

Table 10 Assessment of the impact on bats

Assessment of the impact on bats	
Impact Assessment of the Project after updating its parameters	The Project worst case scenario WCS 2015, i.e. one that may potentially have the greatest impact on bats, and being the basis for the impact assessment performed in the Report 2015, is the construction of a wind farm with the use of 200 wind turbines with a minimum clearance of 20 m, rotor diameter 200 m and maximum total height 275 m (i.e. the reasonable alternative project option of that time). This scenario will possibly cause the highest mortality of bats. The option currently envisaged for implementation following the amendment to the Environmental Decision assumes the construction of approximately 70% fewer wind turbines compared to the WCS 2015, and 50% fewer than in the option approved by the Environmental Decision. As for the option approved by the Environmental Decision, it uses a minimum clearance of 20 m and a maximum rotor diameter being 250 m. The total maximum rotor zone is 2,945,244 m^2, which is less than the maximum rotor zone of the option approved by the Environmental Decision being 3,768,000 m^2 For the WCS 2015, the area was 5,820,800 m^2, which resulted from the number of wind turbines that was being analyzed at the time as the worst case scenario, i.e. 200 wind turbines. During the environmental surveys, there were single observations of one species of bat – common noctule – in the area of the BIII OWF and in the buffer zone. Further farm facilities created during the construction process may be used as new hiding places and stops on the migration route. In addition, increased vessel traffic and structures above the water surface are associated with increased insect concentration. Bats, attracted to the construction area in this way, will be exposed to collisions with vessels and wind turbines under construction. A potential major cause of bat mortality during the operation stage will be collisions with

Assessment of the impact on bats	
	wind turbine structures and barotrauma (death as a result of alveolar rupture). The farm facilities themselves and the lights they are equipped with, can attract insects. They can also be attracted by the temperature raise caused by the operation of the blades. Thus, feeding grounds for bats may potentially be created. Impacts occurring during the project decommissioning stage will be similar to impacts occurring during the construction stage, however, they will be less intense. Increased traffic in the project area will attract insects, followed by bats that may crash into the remaining wind turbine structures and vessels. Unplanned impacts will primarily be associated with vessel failures and spills of pollutants from them. Insects, given the right weather conditions (no rain, calm sea), can collect near the surface of water in the failure location, thereby luring bats into the area of potential spills. As a result, hunting individuals may be at risk of being poisoned by toxic substances entering their bodies, or drowning due to the limited possibility to swim. The results of assessment of the aforementioned environmental impact indicate that no significant impact will occur. The significance of the vast majority of potential impacts on the common noctule was determined to be low. **Change of the Project parameters, including the one related tp a significantly smaller number of wind turbines in relation to the parameters of the Project approved by the Environmental Decision (by 50%), contribute to a further reduction of the impact of the BIII OWF on bats**.
Mitigation measures	None. Due to the low significance of the majority of the BIII OWF's impacts on bats, no mitigation measures are required. **Updating the Project does not necessitate changes to the mitigation measures.**
Cumulative impacts	Simultaneous construction or decommissioning of the BIII OWF and other wind farms being designed in the vicinity might have cumulative impacts. However, those impacts will not be significant as no bat migration routes have been identified in the project area.
Impact on Natura 2000 sites	No direct, indirect, secondary or cumulative impacts of the project on bat species protected within the Natura 2000 network or on the integrity and cohesion of that network are envisaged. The area designed for the project development lies outside its boundaries. The nearest area, i.e. Słupsk Bank, is situated about 5.5 km away, however, bats are not a subject of its protection. They are also not protected in Polish nature areas within a radius of 50 km. The closest Polish Natura 2000 site, where the common noctule is present but not protected, is the Lower Oder, located approx. 300 km south-west of the farm, and the foreign one is Norna Fyledalen (Sweden), approx. 216 km to the north-west. **Updating of the Project parameters will not affect the significance of the impacts caused by the construction and operation of the BIII OWF on Natura 2000 sites.**
Cross-border impacts	The common noctule is a species that migrates long distances, up to 1,600 km between summer (north-eastern Europe) and winter location (south-western Europe). However, the number of contacts recorded during monitoring surveys does not indicate that a bat migration corridor exists in the farm area. Therefore, the project implementation will not cause cross-border impacts on the population of common noctule in Sweden or in other countries. **Updating the Project parameters does not affect the potential of cross-border impacts.**
Monitoring program	It is proposed to change the conditions of bat monitoring at the operation stage specified in the Environmental Decision by indicating that the bat activity recorders will be located at least 6 in the first line of the wind turbine on the western and southern boundary of the BIII OWF area, which is justified by the characteristics of the bat observations so far in the area of the planned farm and the infrastructure of offshore wind farms planned by other investors – point II.2.a of the Environmental Decision. It is also proposed to waive a part of the condition concerning the bat mortality survey as part of post-development monitoring during the Project operation. Monitoring must be carried out using verified survey methods. It should be noted that in the case of the bat mortality survey, there are no methods giving

Assessment of the impact on bats	
	reliable results in the scope of conducting such surveys in maritime areas. The nature of the environment, including wave motion, sea currents, activity of animals taking dead specimens, makes it impossible to reliably design the monitoring of bat mortality within the OWF area
Report section	Volume IV Section 7

Source: own materials

5.8. Landscape

Table 11 Assessment of the impact on the landscape

Assessment of the impact on the landscape	
Impact Assessment of the Project after updating its parameters	On the basis of available literature data, parameters of the project and analyses carried out, it was estimated that the potential impact range of the BIII OWF may reach up to 50 km. The greater range of visibility than that found in the existing projects results from significantly higher maximum size parameters of the BIII OWF (maximum total height of the structure, maximum range of the rotor zone). The following towns and villages are within this range: Ustka (urban municipality of Ustka), Rowy (rural municipality of Ustka) and Łeba (municipality of Łeba). Based on the available literature data, the significance of landscape (as a resource on which the BIII OWF may have an effect) was classified as medium. Two main social groups were found to be exposed to visual impacts from the location of the BIII OWF in the maritime area: residents of coastal towns located in the impact zone and tourists visiting the Polish coast in the impact zone. Locations with special exposure to the sea include: sea ports in Ustka and Łeba, hotels with sea views (e.g. the Neptun hotel located by the beach near Łeba), lighthouses near Ustka, Łeba, Stilo, the seaside promenade in Ustka. The places with special exposure to the sea include, for example: sea ports in Ustka and Łeba, with exposure to the sea, hotels (e.g. Neptun hotel located on the beach near Łeba), lighthouses near Ustka, Łeba, Stilo, the seaside promenade in Ustka. For the purpose of the assessment, observation points have been selected which, due to their exposure and their significance to the public perception of potential impacts, have been identified as potentially sensitive to impacts from the BIII OWF. The following lookout points in the surroundings of the project, with a view of the sea, have been selected: • beach in Ustka; • beach in the vicinity of Rowy; • dunes within the borders of the Słowiński National Park; • beach within the borders of the Słowiński National Park; • beach in the vicinity of Łeba; • lighthouse in Stilo; • beach in the vicinity of Białogóra; • beach in the vicinity of Lubiatowo; • beach in the vicinity of Dębki; • beach in the vicinity of Karwia. These points were assigned an appropriate category of importance, photographic documentation and visualizations were prepared for them and the impact on the landscape was subsequently assessed. The assessment took into account the meteorological conditions, which directly contribute to the increase or decrease in visibility. The meteorological parameters of particular significance in the context of visual impact of the planned BIII OWF include sunshine duration and the number of sunny days (without cloud

Assessment of the impact on the landscape	
	cover and precipitation) per year, which will increase the visibility of the project, as well as precipitation, haze, fog and cloud coverage, which will lead to reduction of the OWF visibility from the land. The climate on the coast is classified as coastal strip climate with the lowest amplitudes of air temperatures, high humidity, mild winters, cooler summers and strong winds. The prevailing wind here is from the west and southwest. The obtained data on visibility for 2013 show that very good visibility (from 20 km) dominated for the most part of the year, especially in the summer months (June, July, August). WindPRO software was used to prepare the visualization. For visualization and analytical purposes, it was assumed that wind farms were painted with paints in colors commonly used by wind turbine manufacturers for offshore wind farms. During the construction phase there will be impacts on the landscape related to specific works such as: construction and transport of componentss, assembly/installation of turbines at sea and construction of internal and external infrastructure and cable for the transmission of energy to land. The magnitude of the impact of vessel traffic during the construction stage of the BIII OWF, both for the Project parameters approved by the Environmental Decision and for the updated Project parameters, has been classified as insignificant, mainly due to the significant distances between transport routes, construction ports and the construction site. Because the landscape significance has been classified as medium, the impact significance has been assessed as negligible. The analysis carried out for each of the selected observation points showed that regardless of the considered option, the visual impact of the project on the landscape during the operation phase will be similar. The visibility of the BIII OWF decreases with increasing distance of the observer from the project and is reduced to zero within a radius of about 45-50 km. The project may theoretically cause the greatest visual impact on observers located near dunes and beach within the borders of the Słowiński National Park, due to the shortest distance of this point from the farm area. But the impact magnitude for this point has been assessed as low. In the case of the beach in Łeba, Rowy, Silo, the impact magnitude was assessed as low, but this classification was determined by the very high importance of the resource. Wind turbines shall be very poorly visible from these points or shall be visible only incidentally. Due to the significant distance, the wind turbines being a part of the BIII OWF should be theoretically invisible from the localities of Lubiatowo, Białogóra, Dębki, Karwia and Ustka – the impact magnitude for this lookout point was determined as unchanged. The conducted environmental impact assessment shows that there are no significant impacts on the landscape either for the Project in the parameters approved by the Environmental Decision or in the updated parameters of the Project implementation and operation. A visualization of the project from the dunes and Słowiński National Park is shown in the photograph below. At the stage of project decommissioning, the aesthetic values of the landscape will be temporarily reduced as a result of decommissioning works in progress. These impacts will consist in the increased movement of vessels taking part in the decommissioning of the farm. The significance of the impact on the marine landscape for this stage was assessed as negligible for both considered options. **Updating the Project parameters will not have an impact on changing the character or significance of the impacts associated with the execution and operation of the BIII OWF.**
Mitigating actions	No need was found to apply measures mitigating the impact of the BIII OWF on the marine landscape. The main factor influencing the minimalization of visual impact on the marine landscape is the significant distance (over 23 km) of the project from the coast.

Assessment of the impact on the landscape	
Cumulative impacts	The significance of the cumulative impact at the construction stage for the implementation option currently applied for and the option approved by the Environmental Decision was assessed as negligible. In the event of the implementation and operation of the BIII OWF, Bałtyk II OWF, Baltica 2 OWF and Baltica 3 OWF, Baltic Power OWF, their visual impact will be cumulative. The degree of accumulation will depend on the observation point. The scale of accumulation will be small and will not significantly affect the change of visual perception of these projects from the indicated observation points. Large or very large cumulative impacts were not indicated for any observation point. During the decommissioning phase, regardless of the considered option, there will be no or negligible accumulation of impacts with other projects in this respect. The potential scale of accumulation will be small and will not have a significant influence on changing the visual perception of the projects which may cumulate. **Updating the Project parameters will not affect the significance of the cumulative impacts associated with the execution and operation of the BIII OWF.**
Impact on forms of landscape protection areas	In the vicinity of the planned project (approx. 19–35 km), in an onshore area, there are forms of landscape protection areas such as: • national parks (Słowiński National Park), • landscape parks (Nadmorski (Coastal) Landscape Park), • protected landscape areas (Coastal Protected Landscape Area, Seashore Protected Landscape Area to the east of Ustka, Seashore Protected Landscape Area to the west of Ustka). The construction, operation and decommissioning of the BIII OWF, regardless of the considered option, independently and in combination with other projects, will not have any impact on the aforesaid forms of nature protection areas.
Impact on Natura 2000 sites	Not applicable
Cross-border impacts	Due to the distance of the BIII OWF from the borders of other countries it was found that there will be no transboundary impact of the project on the landscape. **Updating the Project parameters does not affect the potential of cross-border impacts.**
Monitoring program	Due to the lack of significant impacts of the BIII OWF on the marine landscape, no monitoring was found necessary. **The proposed amendments to the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.**
Report section	Volume IV Section 9

Source: own materials

Photograph 3 Visualization made from the dunes of the Słowiński National Park for the BIII OWF,

Baltica 3 OWF, Bałtyk II OWF and Baltica 2 OWF – turbines facing the observer

Source: own materials

5.9. Cultural heritage

Table 12 Assessment of the impact on cultural heritage

Assessment of the impact on cultural heritage	
Assessment of the impact of the Project after updating its parameters	The Environmental Decision allows for the implementation of the Project in the option covering the construction of up to 120 foundations for wind turbines and up to 6 for the accompanying infrastructure, allowing for monopile, jacket, tripod and gravity-base foundations. This Report aims at assessing and analyzing the environmental impact of the Project in the form included in the application for the amendment of the Environmental Decision, i.e. construction of foundations for 60 wind turbines and one for the accompanying infrastructure. For the purposes of this assessment, reference was also made to the worst case scenario for the project, which was analyzed in the Report 2015 (WCS 2015), i.e. the one that could potentially have the greatest impact on cultural heritage. The WCS 2015 is the construction of a wind farm using 206 foundations. The option selected for implementation as a result of the Project parameters update assumes the construction of approximately 70% less of wind turbines in relation to the WCS 2015 and 50% less in relation to the parameters approved by the Environmental Decision, as well as one foundation for the accompanying infrastructure instead of six ones, and the exclusion of the use of gravity-base foundations and tripod for the wind turbine foundation. The assessment is related to the impact of the BIII OWF on the objects of great importance for the protection of cultural heritage. “Underwater cultural heritage" means all traces of human existence of a cultural, historic or archaeological nature which have been, or are, totally or partially submerged under water, temporarily or permanently for at least 100 years, including sites, structures, objects, artifacts and human remains, together with their archaeological and natural context, vessels, aircraft and other vehicles or parts thereof, cargo or other content, including their archaeological and natural context, as well as objects of prehistoric nature. Cables and pipelines and systems currently in use are excluded from the definition. The following potential impacts on the underwater cultural heritage have been identified

Assessment of the impact on cultural heritage	
	during the implementation of the BIII OWF project: damage or complete destruction by anchors of vessels, damage during the installation of pile foundations, subsidence of soil, exposure of archaeological objects and settlement of disturbed sediments. In addition, unplanned emissions may occur at each stage of the project, such as pollution of the water column and seabed sediments by oil derivative substances, pollution of the water column by accidentally released chemicals, which may indirectly affect the sites that are important from the perspective of cultural heritage protection. During construction works, military objects, including unexploded ordnance, may also be encountered. In such cases appropriate procedures should be followed. In the course of archaeological research a shipwreck has been found. The identified object is of minor historical value and its importance as a resource in the context of cultural heritage protection has been determined as medium. During the geotechnical surveys and construction works new, unidentified archaeological objects may be discovered which, due to a lack of knowledge about their existence at this stage, have not been included in the impact assessment presented in the report. For the purpose of the impact assessment it has been assumed that in order to ensure the safety of the teams working in the farm area at all stages, i.e. construction, operation and decommissioning, a protective zone will be established around the identified wreck within which it will be forbidden to anchor vessels or lay farm components, including the laying of cables. Initially, the 50-meter protection zone was established, but its size should be verified after detailed magnetometer survey carried out at a later stage of the project. All potential impacts of the BIII OWF on the discovered wreck have been assessed to be of negligible significance except for impacts associated with the installation of pile foundations and the spill of oil derivative substances during an emergency, which have been assessed to be of minor significance. The results of the assessment showed that the project consisting in the construction of the BIII OWF will not have a significant negative impact on objects of great importance for the protection of cultural heritage in any of the considered options of the project, at any of the stages, i.e. construction, operation and decommissioning. **Updating the Project parameters due to the reduction of the impacts related to the sediment excitation and suspension falling down may have a positive impact on the reduction of potential impacts associated with the execution of the BIII OWF.**
Mitigation measures	**The Project update does not require any changes in terms of mitigation measures** (designation of protection zones around found shipwreck).
Cumulative impacts	Due to the local character of the potential impacts of the OWF and the location of the found shipwreck, it was stated that the accumulation of impacts of the BIII OWF and of other projects is unlikely. **Updating the Project's parameters, due to the reduction of generated impacts, is beneficial from the point of view of the possibility to reduce cumulative impacts.**
Impact on Natura 2000 sites	Not applicable
Cross-border impacts	The wreck of the steamer found in the area of the planned BIII OWF does not constitute an object of high historical value. According to the provisions of the UNESCO Convention on the Protection of the Underwater Cultural Heritage of 2001 and the United Nations Convention on the Law of the Sea of 1982, there is an obligation to protect the shipwreck from damage. Attention should be paid to the intercultural character of monuments located in maritime areas. In most cases, shipwrecks located off the coast of a given country come from a completely different area. Destruction of the steamer shipwreck would reduce the resources of the international cultural heritage of offshore areas. Due to their local character, impacts of the BIII OWF will not have a cross-border effect on other archaeological objects located within the boundaries of the exclusive economic zones of other countries. **Updating the Project parameters does not affect the potential of cross-**

Assessment of the impact on cultural heritage	
	border impacts.
Monitoring program	In the area of the planned BIII OWF no risk of impact on the objects of great importance for the protection of cultural heritage was found, therefore there is no justification for indicating monitoring activities in this respect. If there is a significant movement of sediments identified during the post-investment monitoring stage, the areas where the sediment layer has been washed out should be reassessed for possible revision of the areas excluded from anchoring and other operations **The proposed amendments to the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.**
Report section	Volume IV Section 8

Source: own materials

5.10. Fishing

Table 13 Assessment of the impact on fishing

Assessment of the impact on fishing	
Assessment of the impact of the Project after updating its parameters	In the Report 2015, while performing the environmental impact assessment, as the worst case scenario (WCS 2015), it was assumed that the area occupied by the farm will be completely excluded from the possibility of fishing from the moment of commencement of construction works. The impact of the farm on fishing will be similar, regardless of the analyzed option, i.e. after updating the Project parameters and in the parameters approved by the Environmental Decision. In order to determine, with the greatest possible accuracy, the impact of the project on fishing (determination of potential losses to fishing) in the area occupied by the BIII OWF (in the case of complete exclusion of the farm area from performing fishing activities), the relative share of the area to be occupied by the farm in the total area of fishing squares was taken into account. The surface area of the BIII OWF area is approx. 117 km^2, whereas the surface area of the M7, M8, N7, N8 fishing squares – in part of which the farm will be located – is 1.58 thousand km^2. Thus, the BIII OWF occupies approx. 7% of the total surface area of the four squares. In relation to the average size of the Polish Baltic Sea fishing, calculated in terms of area (fishing productivity), made in the squares lying (partially or fully) in the Polish economic zone, the fishing productivity observed in the analyzed square can be assessed as low. In 2015–2020, it ranged from approx. 3.1% to approx. 7.9% (from approx. 116 kg/km^2 in 2020 to approx. 302 kg/km^2 in 2016) of the productivity observed in the Polish maritime areas. Average fishing productivity in the M7, M8, N7, N8 fishing squares for 2015–2020 accounted for approx. 215 kg/km^2 (which was approx. 5.4% of the productivity of the Polish maritime areas). The main fish species caught in the analyzed areas of the M7, M8, N7, N8 fishing squares comprised cod, herring, sprat and European flounder. The volume of catches of Baltic cod of the Polish fishing fleet in 2015–2020 ranged from 0.47 to 13.6 thousand tons, herring from 37.4 to 50.9 thousand tons, Baltic sprat from 60.1 to 74.5 thousand tons and European flounder from 9.4 to 16.7 thousand tons. In 2020, the Polish Baltic Sea fishing fleet consisted of 823 vessels with a capacity of 32385 thousand GT and engine power of 80.37 thousand kW[4]. These values have changed slightly compared to 2019. Catches of the Baltic fleet in 2020 amounted to 130 thousand tons in the Baltic Sea area and 61.5 thousand tons from the Atlantic Ocean and Pacific Ocean[5]. For 2019, this represents a reduction of catches in total (in the Baltic Sea area and other areas) by 40.6

[4] Data of the Statistics Poland for 2020 https://stat.gov.pl/obszary-tematyczne/transport-i-lacznosc/transport/gospodarka-morska-w-polsce- w-2020-roku,7,18.html
[5] Data of the Statistics Poland for 2020 https://stat.gov.pl/obszary-tematyczne/transport-i-lacznosc/transport/gospodarka-morska-w-polsce- w-2020-roku,7,18.html

Assessment of the impact on fishing	
	thousand tons. In terms of share in the value of catches, herring representing 35.6% of the total value of Baltic catches (65.7 tons) remained the most important fish species in the Baltic Sea fishing in 2020 in the M7, M8, N7 and N8 fishing squares. Catch results in sprat fishing are usually very similar to those of vessels fishing for herring. In 2020, 34.8 tons of sprat were caught, which constitutes 18.8% and 45.7 tons of the storm, which constitutes 24.7% and 5.8 tons of cod, which constitutes 3.1%, and other species – 32.8 tons, which constitutes 17.7. All potential impacts of the BIII OWF on fishing will be of minor or negligible significance or will cause no change ("no change"). The conducted analysis of fishing activities shows that in the area of the M7, M8, N7, N8 fishing squares, part (7%) of which will be occupied by the wind farm, fishing boats operate (<12 m) that use fixed gear and vessels over 12 m that use set gillnets or trawls (bottom or pelagic trawls). The results of the assessment demonstrated that the project consisting in the construction of the BIII OWF will not have a significant negative impact on fishing activity at any stage of the project, i.e. construction, operation and decommissioning. **Updating the Project parameters does not affect the impacts assessed at the stage of issuing the Environmental Decision.**
Mitigation measures	Not recommended. However, the Investor plans consultations with fishing communities at the stage of obtaining a building permit in order to determine the rules of using the farm area by fishermen and the possible system of compensation for confirmed losses due to possible restrictions imposed by the competent maritime administration authorities.
Cumulative impacts	When assessing the cumulative impacts the electricity transmission infrastructure of the OWF, the neighboring offshore wind farms and maritime navigation routes were taken into account. It was concluded that in most cases there would be no or negligible accumulation of impacts. The exception is the possibility of accumulation of impacts of the BIII OWF with impacts of other offshore wind farms in the worst case scenario, i.e. the construction of the BIII OWF, Bałtyk II OWF, Baltica OWF 2 and Baltica 3 OWF and Baltic Power and the exclusion of their areas from the fishing activity. The cumulative effect of the impact of the five adjacent wind farms was assessed as moderate. The fisheries taken by these projects are of minor importance for fishing and the vessels fishing there will be able to move easily to other fishing areas. **Updating the Project parameters due to widening of the undeveloped corridor between the BIII OWF and the Baltica 3 OWF and Baltica 2 OWF will have a positive impact on limiting the impacts associated with the possibility of limiting the cumulative impacts.**
Impact on Natura 2000 sites	Not applicable
Cross-border impacts	No cross-boundary impacts of the BIII OWF on the fishing industry of other countries were identified. **Updating the Project parameters does not affect the potential of cross-border impacts.**
Monitoring program	The fishing activities of the fleet are monitored by the fishing administration on an ongoing basis. There is no need to collect additional information. **The proposed amendments to the Project's implementation and operation conditions do not affect the monitoring conditions specified in the Environmental Decision.**
Report section	Volume IV Section 10

Source: own materials

5.11. Other users

Table 14 Assessment of the impact on other users of offshore areas

Assessment of the impact on other users of offshore areas	
Background	"Other users of offshore areas" is a concept that, for the purposes of EIAR, includes:

Assessment of the impact on other users of offshore areas	
	• coastal tourism, • recreational fishing, • water sports, • military operations, • radiolocation and communication systems, • civil and military aviation, • maritime shipping, • survey, exploration and exploitation of mineral resources of the seabed and the Earth's interior underneath, • maritime industry, • human health and life. An element of the assessment of the impact on other users is also the assessment of the possibility of social conflicts. A summary of the assessment for each of these categories is presented separately below.
Coastal tourism	Coastal tourism is an important branch of the tourism industry in Poland. Due to the proximity of the sea coast, coastal municipalities are considered as areas of high natural value, which are an attraction for both domestic and foreign tourists. It was concluded that the OWF could potentially cause the following types of impacts on coastal tourism: 1) at the construction stage: impact on the landscape due to increased vessel traffic involved in the construction of the farm and the appearance of individual farm facilities in the progressing construction process of the project, emission of surface noise in connection with construction activities; 2) at the operation stage: impact of wind turbines and other farm components (e.g. transformer stations, measurement and research stations) on the landscape, surface noise emission by wind turbines and vessels servicing the farm, light phenomena (shadow flickering, light marking); 3) at the decommissioning stage: impact on the landscape due to an increased traffic of vessels involved in disassembly of the farm elements, emission of surface noise due to the disassembly works, disappearance of a tourist attraction in the form of an OWF. The impact assessment in the Report 2015 was based on the worst case scenario of the project, which will potentially have the greatest impact on coastal tourism – WCS 2015. The WCS 2015 assumed the construction of 200 wind turbines on gravity-base foundations and 8 foundations for accompanying infrastructure. The requested option assumes the construction of approx. 70% less of wind turbines in relation to the WCS 2015 and 50% less in relation to the parameters approved by the Environmental Decision, as well as one foundation for the accompanying infrastructure instead of six. It was determined that the impact of the BIII OWF on coastal tourism will be mostly related to the impact of this project on the landscape. The BIII OWF has the potential to visually impact the coastal section from Ustka on the west side to Karwia on the east side. Coastal tourism was, therefore, determined as the receptor of the impact of the BIII OWF in this entire section. The importance of coastal tourism (as a recipient of the BIII OWF impact) has been categorized as medium. It was determined that the potential impact of the BIII OWF on coastal tourism related to the visual impact of the project on the landscape at all stages will be negligible. The results of the assessment showed that the project consisting in the construction of the BIII OWF will not have a significant negative impact on coastal tourism in any of the considered options of the project, at any of the stages, i.e. construction, operation and decommissioning, or cumulatively with other projects.

Assessment of the impact on other users of offshore areas	
	Additionally, it should be emphasized that visual issues are very subjective – what by some will be perceived as a disruption of the landscape leading to a decrease in the tourist attractiveness of the region may be perceived even as an attraction in itself by others. Therefore, the impact of the BIII OWF may also be positive – the farm may become an additional tourist attraction for the region. **Updating the Project parameters does not affect the impacts assessed at the stage of issuing the Environmental Decision.**
Recreational fishing	Based on the results of vessel traffic monitoring (see Section 14 Volume III of the EIAR) it cannot be ruled out that the area of the BIII OWF is an area of recreational fishing. There is no data available, however, that would make it possible to determine the exact intensity of such activities. The analysis of the impact on commercial fishing (see Section 10 Volume IV of the EIAR) did not show the existence of any particularly valuable fisheries within the boundaries of the BIII OWF. On this basis, it was considered that this is also not a particularly attractive fishery for recreational fishing. It was found that the OWF may at all stages, i.e. construction, operation and decommissioning, potentially cause the following types of impact on recreational fishing: 1) necessity to change the existing sailing routes, 2) necessity to move to other fisheries, 3) emission of surface noise. At the stage of operation, attractive fishing areas may be created at the perimeters of the farm due to the so-called "artificial reef" effect – this is a positive impact. The impact assessment in the Report 2015 was based on the worst case scenario of the project, which will potentially have the greatest impact on coastal tourism – WCS 2015. Complete exclusion of the farm area from the possibility of vessel traffic, including vessels offering sea angling services, was considered to be such a scenario. It was found that all of the above mentioned impacts could potentially occur in the BIII OWF project, provided that the impact consisting in the emission of surface noise only applies to the construction stage and the potential decommissioning of the farm. The importance of recreational fisheries (as an impact receptor) for the assessment of the significance of impacts of the BIII OWF has been classified as low. It was concluded that the demonstrated potential impacts of the BIII OWF on recreational fishing at all stages would be negligible. The results of the assessment showed that the project consisting in the construction of the BIII OWF will not have a significant negative impact on recreational fishing, in any of the considered options of the project, at any of the stages, i.e. construction, operation and decommissioning, or cumulatively with other projects. It should be stressed that in connection with the implementation of the BIII OWF positive impacts may occur - the so-called "artificial reef" effect may lead to an increase in stocks of fish species being the subject of recreational fishing, and the farm as a tourist attraction may cause increased interest in angling voyages, if offers of such voyages also include the opportunity to see the OWF up close. **Updating the Project parameters does not affect the impacts assessed at the stage of issuing the Environmental Decision.**
Water sports	Windsurfing and kitesurfing are sports that are practiced in the coastal zone, usually at a distance of up to 1 nautical mile from the shore. It was found that the BIII OWF would not be a source of impacts on windsurfing and kitesurfing (also in accumulation with other projects) in any of the considered options. No separate assessment of the impact of the BIII OWF on marine sailing was made – it was found that the impacts of the BIII OWF on marine sailing were similar to those of other types of vessels of similar sizes and having similar navigation equipment. It was not found that the BIII OWF could be the source of potential impacts on shipwreck diving (also in accumulation with other projects) in any of the considered options. Updating the Project parameters does not affect the impacts assessed at the stage of

Assessment of the impact on other users of offshore areas	
	issuing the Environmental Decision.
Military operations	The BIII OWF does not occupy water regions where naval maneuvers are carried out. Therefore, no impact assessment was carried out in this respect.
Radiolocation and communication systems	In order to meet the formal requirements resulting from the PZEW provisions for the purposes of the project an expert opinion was prepared on the impact of the BIII OWF on the communication systems and radar systems of the Border Guard, Polish Navy, Maritime Search and Rescue Service, Global Maritime Distress System and Safety System and the National Maritime Safety System. This is a document independent of the EIA Report. The EIA report only presents conclusions resulting from the expert opinion. It was found that offshore wind farms might potentially cause the following types of impacts on communication and radiolocation systems: 1) no signal of coastal and vessel communication systems and radar systems – turbines are a physical obstacle to waves, thus blocking the signal of transmitter/receiver stations, 2) impediments to the correct location of vessels by shore-based radar stations due to radar echoes, 3) impediments to the proper functioning of shipborne radar systems, 4) communication difficulties caused by interference in communication systems – interference caused by radio waves reflected by wind turbines. Where, based on simulations performed for the worst case scenario assuming the maximum number of turbines being 200 pieces, it was found that negative impacts reached beyond a 2-kilometer zone from the turbine boundary, corrective actions were proposed being the installation of additional transmitting devices on chosen turbines. Those devices would compensate for e.g. lack of signal or interference caused by the OWF presence. The zone width of 2 km was adopted on the basis of a risk analysis, review of publications and simulation results contained in the expert opinion. Possible keeping of the distance of 2 km from the wind farm by vessels will eliminate all hazards with a risk level defined as high and very high. It should be emphasized that the expert opinion will be updated at a later stage of the project, once the final number and parameters of wind turbines are known together with their layout. Then, on the basis of the results of the updated expert opinion, possible mitigation measures will be consulted with competent administrative authorities, if necessary. **Updating the Project parameters does not affect the impacts assessed at the stage of issuing the Environmental Decision.**
Civil and military aviation	It was found that offshore wind farms could potentially affect civil and military aviation primarily at the operation stage, resulting in the following impacts: 1) wind turbines (under construction or constructed) may, due to their height, be a physical obstacle for aviation (including for helicopters operating drilling rigs or participating in rescue actions), 2) components of the offshore wind farm (in particular turbines) may cause disturbances in the operation of radar systems used in aviation. Based on the approval of the planned project location by the President of the Civil Aviation Authority and positive opinion by the Military Air Traffic Service Office of the Polish Armed Forces, it was stated that the BIII OWF will not affect the civil and military aviation in any of the options of the project considered in the report., covering the maximum height of wind turbines towers up to 300 m, in the case of higher height, it will be required to obtain re-approval of the competent authorities. In accordance with the content of the permit for erection and use of artificial islands obtained, the Investor was obliged to supplement the design documentation within the scope of projects concerning the elimination of safety risk in aviation tasks by the Polish Air Force. Accumulation of impacts of the BIII OWF and other OWFs is potentially likely to occur, primarily at the stage of operation of those projects. **Updating the Project parameters does not affect the impacts assessed at the stage of**

Assessment of the impact on other users of offshore areas	
	issuing the Environmental Decision.
Maritime shipping	Based on the results of vessel traffic monitoring in the area of the BIII OWF, which were presented and discussed in detail in Section 14 Volume III of the EIAR, it was found that the planned project lies outside the area of intensive shipping traffic. Many vessels passed through the BIII OWF area in all directions, although the distribution was clearly getting denser in the area south of the planned project, which is related to the Traffic Separation Scheme established in this area – Słupsk Bank, and east and north of the OWF where the usual navigation route for tankers and large bulk cargo vessels (planned as the future deep-water route D, set for the largest merchant ships and for tankers) passes. It was found that due to the increase in vessel traffic in the area of the project at all stages (i.e. construction, operation and decommissioning), compared to the original situation – i.e. the pre-investment stage, offshore wind farms might potentially have a negative impact on maritime shipping, causing: • disturbance of the existing order and restriction or hindrance to shipping, which necessitate changes to the existing vessel routes (if they passed through the farm area). An increase in vessel traffic volume is particularly evident at the construction stage (or the potential decommissioning of the farm). At the operation stage the situation stabilizes, the traffic volume of vessels involved in the farm operation decreases, and the traffic is characterized by certain regularity and predictability resulting from the schedule of maintenance works; • electric shock hazard in case of emergency anchor dropping by the vessel and cable damage. However, that risk is minimized because substations are equipped with protection automation which switches off the cable in case of damage; • interference with radar and communication systems (as discussed in detail in Section 11 of this document). OWFs may also be a source of positive impacts: • generating additional revenues in ports handling ships involved • in the construction/operation or possible decommissioning of the farm; • OWF components may be a place of refuge for castaways; • assisting navigation and allowing for better spatial orientation (thanks to marked farm components). It was found that due to the increase in vessel traffic volume, the BIII OWF might be a source of impacts on maritime shipping as described above, including on existing and planned shipping routes, but those impacts would not be significant. In case of restriction of the right of passage through the farm area, it will be necessary to change customary routes of some vessels and direct them to the north or south of the BIII OWF area, depending on planned destination. Based on results of a complex navigation expert opinion to be developed at a later stage of the project, the investor will implement, in consultation with the maritime administration and in compliance with the applicable legal regulations, appropriate actions aimed at minimizing the navigational risk (e.g. marking farm components, marking the farm on maps, messages). Therefore, it is assumed that possible collisions between vessels or between vessels and farm components will be unplanned events, caused mainly by human error, mechanical failure (resulting, e.g. in the loss of vessel steerability) or difficult weather conditions. Simultaneous construction of two OWFs or construction of an OWF near another OWF being operated or decommissioned may necessitate bigger changes to shipping routes. **Updating the Project parameters does not affect the impacts assessed at the stage of issuing the Environmental Decision.**
Exploration, prospection and exploitation of	In order to meet the formal requirements resulting from the PSZW provisions, an expert opinion has been prepared at the request of the investor on the impact of the BIII OWF on the safety of exploration, prospection and exploitation of mineral resources of the

Assessment of the impact on other users of offshore areas	
mineral resources of the seabed and the Earth's interior underneath	seabed and the Earth's interior underneath. This is a document independent of the EIA Report. The report discusses the conclusions of that expert opinion. It was stated that offshore wind farms might limit the possibilities of exploration, prospection and exploitation of mineral resources of the seabed and the Earth's interior underneath it in case when in the area of the OWF the process of installation of particular components of the farm has started or the farm has been already constructed. Then, traditional methods of prospection are not used, and the possibility of setting up a drilling rig (in order to identify a deposit) or a production rig is limited, due to the need to maintain certain safety zones. Currently, in the area intended for the implementation of the OWF BIII, there are no licenses for the exploration and exploitation of mineral resources of the seabed and the Earth's interior. Therefore, there is no possibility that the OWF BIII will affect this type of activity.
Maritime industry	An important factor in the development of service and logistics facilities for the BIII OWF will be the close distance between potential centers which might perform such functions and the area of the planned project. Both the cost of maritime transport and downtimes related to the need to take into account weather conditions are of great importance. An important factor ensuring construction capacity of the offshore wind energy market is the availability of specialized vessels for transport and construction of offshore wind turbines. There are currently more than 35 such vessels on the European market, and the demand is still growing. If the extension and modernization of Polish ports are carried out properly, it is estimated that they may play the role of both production ports and construction ports. At the farm operation stage, smaller ports and back-up facilities located on the central coast (Ustka, Darłowo) will gain importance. On the Polish market there are currently several manufacturers of OWF components for export. Those are mainly steel structures with low process requirements, such as foundations and wind towers. Due to the demand for qualified personnel, the offshore wind energy sector may have a significant impact on the directions of education and the labor market in Poland, especially in the shipbuilding, electrical machinery and maritime construction sectors, and lead to the creation of a number of new jobs. **Updating the Project parameters does not affect the impacts assessed at the stage of issuing the Environmental Decision.**
Human health and life	None of the impacts of the BIII OWF were identified as likely to have a significant adverse impact on human health and life on the basis of the studies carried out. A hazard to human health and life may occur mainly in the event of a collision of vessels or vessels with OWF components, but such situations are classified as so-called unplanned events, which are very unlikely to occur. **Updating the Project parameters does not affect the impacts assessed at the stage of issuing the Environmental Decision.**
Unplanned impacts	At each stage of the project there is a potential, unplanned risk associated with the possibility of collision of ships and helicopters and release of hazardous substances (especially oil derivatives) into the environment. It was found that unplanned events and failures in the area of the BIII OWF did not pose a direct hazard to coastal tourism (an oil spill, considering its most probable range, will not reach the coastline). Potential oil spills will be a direct constraint on recreational fishing and water sports, and they will prevent such activities within the range of the spill. However, the likelihood of such unplanned events and failures is very low, from 1 in every 100 years (50% chance of an occurrence within 50 years) up to 1 in every 10,000 years (1/200 chance of an occurrence within 50 years). Due to the reduced number of wind turbines, the number of vessel operations associated with the construction, operation and decommissioning of the wind turbines

Assessment of the impact on other users of offshore areas	
	will decrease, thus updating the Project parameters will have a beneficial effect on reducing the risk of impacts associated with any unplanned events.
Cross-border impacts	It was found that the BIII OWF would not be a source of cross-border impacts on other users of maritime areas. Updating the Project parameters does not affect the potential of transboundary impacts.
Analysis of potential social conflicts	The process of analyzing and assessing the risk of social conflicts included three stages, described below. The first stage consisted in examining the possibility of occurrence of significant negative spatial, environmental and economic conflicts and took place at the stage of selecting the location for the BIII OWF. The second stage consisted in identification of all social and professional groups as well as areas of activity using the sea resources, which are exposed to potential impacts of the BIII OWF, and carrying out the assessment of the impact of the project on the existing forms of using the marine space. At the third stage of the analysis, the sensitivity of local communities to potential factors triggering conflicts related to the feeling of threat to changes in the quality and comfort of life, as well as the susceptibility of local communities to protests related to investment activity in their neighborhood were analyzed. The analysis covered the following municipalities: urban and rural municipalities of Darłowo, Postomino, urban and rural municipalities of Ustka, Smołdzino, Słupsk, Łeba, Wicko, Choczewo, Krokowa. Within the framework of the performed analysis, the following conflict-triggering factors were analyzed: 1) visibility of the BIII OWF from permanent residence places (exposure to the sea from places of residence, rest or work) 2) the impact (noise, EMF) of the transmission infrastructure, 3) restricted access to fishing areas, 4) restricted access to tourist shipping areas, 5) restricted access to the use of beaches by tourists, 6) impact on tourism revenue – impact significance 7) impact on fisheries revenue – impact significance, 8) impact on coastal and marine protected areas (national parks, Natura 2000 sites), 9) impact on landscape protection areas (landscape parks and protected landscape areas). It was stated that the risk of potential social conflicts caused by the preparation and execution of the BIII OWF will vary from one municipality to another. The risk seems to be greater in municipalities where there have already been social protests or special interest groups. Such municipalities include the municipalities of Łeba, Ustka (urban municipality) and Choczewo. The lower risk of social conflicts concerns municipalities which derive income from existing onshore wind farms or other power sector projects and/or whose inhabitants are highly aware of such projects. This group includes the municipalities of Postomino, Smołdzino, Wicko, Krokowa. **In assessing the impact of the proposed modification to the Project implementation and operation conditions as determined by the Environmental Decision, no users were identified for which the proposed modification to the Project implementation and operation conditions would affect the result of the assessment for the Project in the parameters for which the environmental assessment was conducted in the Report 2015 and the Environmental Decision was issued.**
Report section	Volume IV Section 11

Source: own materials

5.12. Biodiversity

Table 15. Assessment of the impact on biodiversity

Assessment of the impact on biodiversity	
Biodiversity in the area of the BIII OWF	In the area of the BIII OWF and in the surrounding buffer zone, during the research conducted in 2012–2013, the occurrence of the following species was found: • 4 species of algae (phytobenthos), including one species covered by the national protection system and included in the so-called Polish Red List of Plants and Fungi; • 27 macrozoobenthos species or divisions, no rare or protected species were found; • 15 fish species (adults, larvae and roe in total), no adult protected or endangered fish species were found, while a small number of larvae of species under partial protection were found; • 15 species of seabirds, all under species protection in Poland – one under partial protection, other under strict protection, three species are listed in Annex I to the EU Birds Directive (which means that they are covered by special protection measures, also including their habitats), while two are classified as per IUCN as endangered species (vulnerable category); • 3 species of marine mammals, including porpoise, were found only as adults, no juveniles were observed. • 97 species of migratory birds in the spring and 56 in the fall season.
	• It was found that the area of the planned BIII OWF is not a valuable area for bats (during the survey, sounds emitted by the common noctule were recorded only once).
Assessment of the impact of the Project after updating its parameters	In the assessment of the impact of the BIII OWF on biodiversity the impact of the planned farm was analyzed in terms of: • the possibility of degradation of ecosystem functions, conditioning the sustainable existence of populations of species, benthic habitats and protected natural habitats; • loss, fragmentation and isolation of species habitats, including benthic habitats and protected natural habitats; • loss of species diversity; • loss of intra-species genetic diversity. The execution of the BIII OWF, although it will be the source of certain disturbances during all stages, will not cause any changes in environmental conditions in its vicinity, which could result in the disturbance of the marine ecosystem functions, within which it will be located. The results of the impact assessment for the BIII OWF on particular environmental receptors indicate that it will not significantly affect the basic ecosystem functions in the water region, i.e. the function of providing habitats and the production function of providing food resources for living organisms in this part of the Baltic Sea. The BIII OWF will not cause the degradation of the marine ecosystem functions, within which it will be located, which determine the sustainability of species populations and habitats in its area. The execution of the planned farm will also not cause fragmentation or isolation of species habitats, including benthic habitats. It is not expected that the execution of the planned farm could cause a decrease in the species diversity of the organisms in its area. The execution of the BIII OWF will not cause isolation of local populations of marine organisms by creating an impassable barrier for them or a permanent depletion of their numbers. Therefore, it will not reduce genetic variability within species populations (i.e. intra-species genetic diversity) within the marine ecosystem within which it will be implemented.

	Updating the Project parameters does not affect the impacts that would occur if the Project was implemented in the parameters approved by the Environmental Decision.
Report section	Section 12 Volume IV of the Report

Source: own materials

5.13. Climate

Table 16. Assessment of the impact on climate and of climate changes on the Project

Assessment of the impact on climate and of climate changes on the Project	
Climate	The climate characteristics in the area of the planned Bałtyk Środkowy III OWF are presented in Section 13 Volume II of this Report. The section also provides information on greenhouse gas emissions and discusses the expected climate change scenarios.
Assessment of the impact of the Project after updating its parameters on climate and of climate changes on the Project	The following theoretical impacts of climate change effects on the BIII OWF were found within the conducted analyses: • increase in the number of windy days and constant wind speed in the South Baltic area – which will contribute to the increase of the OWF productivity and thus its positive impact on the climate by increasing the avoided CO_2 emission; it will also improve the economic effect of the Project; • increase in the number and scale of extreme weather phenomena, including hurricane winds, storms, precipitation – which may contribute to the temporary suspension of the wind turbine operation, with wind speeds exceeding the design safety thresholds; in extreme cases, it may lead to the wind turbine damage; • decrease in the number of frosty and very frosty days and thus decrease in the number of days with icing - which will influence the reduction of loads on supporting structures (foundations) and wings, increasing the Project's lifespan; • increased wave and current velocities - which may contribute to slightly increased impacts in the form of scouring of seabed sediments around the foundations; • rise in mean sea level – with the predicted values of this rise, it will not be significant for the individual components of the wind turbine and their operation; • increase in shore erosion – which may cause an increase in cumulative impacts with possible erosion caused at the export cable landfall location. The potential impacts of the BIII OWF on the climate should be considered in two aspects – as negative and positive impacts. Negative impacts of the OWF BIII on the climate will be mainly related to the emission of air pollutants, especially at the construction stage, when particularly intensive vessel traffic is expected. The positive impact on the climate will be the generation of electricity by the BIII OWF from a non-emitting and renewable source, which will replace the currently operating coal-fired sources in the power system. This will result in a process of avoiding emissions associated with burning coal in power plants and combined heat and power plants. **Updating the Project parameters does not affect the impacts that would occur if the Project was implemented in the parameters approved by the Environmental Decision.**
Report section	Section 13 Volume IV of the Report

Source: own materials

5.14. Protected areas and facilities and ecological corridors

Table 17. Assessment of the impact on protected areas and facilities and ecological corridors

Assessment of the impact on protected areas and facilities and ecological corridors	
Protected areas and facilities and ecological corridors in the impact area of the BIII OWF	Protected areas and facilities other than Natura 2000 sites The only one among the areas and facilities protected under the environmental protection act, apart from the Natura 2000 sites, potentially within the range of the BIII OWF impact (underwater noise impact) is the Słowiński National Park (further referred to as: the SPN), located approximately 19 km from the boundaries of the Project. The offshore part of the SPN covers a fragment of the Baltic Sea between Łeba and Rowy, 2 sea miles wide and with maximum depth of 20 meters. The most common sea fish species are cod, European flounder, plaice, shorthorn sculpin, sprat, herring (spawning here from February to May), lesser sand eel, great sand eel, turbot, lumpfish and vivaparous eelpout. Migratory fish are represented here by salmon, eel, sea trout and smelt. There is also recorded presence of marine fish under partial protection in Poland: sand goby, common goby, common seasnail and twait shad. The coastal zone of the SPN is also visited by the marine mammals under strict protection in Poland: grey seal, ringed seal, harbor seal and porpoise. Ecological corridors The map of ecological corridors in Poland does not specify their course in Polish maritime areas (further referred to as: the POM), within which the planned BIII OWF is located. Nevertheless, as Poland, including POM, is located within two large migration corridors: East Atlantic and Mediterranean-Black Sea, the impact of the BIII OWF on their continuity was assessed in Section 5 Volume IV of the Report with reference to seabirds (part 1) and migratory birds (part 2), especially in the context of the coherence of the Natura 2000 areas.
Assessment of the impact of the Project after updating its parameters	In the area of national parks the whole nature and landscape values are protected. Due to the distance between the BIII OWF area and the SPN, the planned farm will not cause any physical transformations of the area within the park borders and will not deteriorate its landscape values. The only impacts of the BIII OWF that may potentially occur in the SPN area are the impacts of underwater noise generated during the erection of foundations with respect to marine mammals and fish. It is not expected that the noise emission during the construction of the BIII OWF in the option with the use of monopile foundations will cause any significant disturbances in the functioning of animals in the SPN area. However, the occurrence of a behavioral response to noise generated by foundation piling (avoidance reaction) in marine mammals and fish in its north-eastern area cannot be completely excluded. Because the occurrence of the said disturbance will be limited to a relatively small part of the SPN area, it can be assumed that the significance of potential impacts of the BIII OWF on marine mammals and fish populations within the Park boundaries will be negligible, especially if mitigation measures are applied. The execution of the BIII OWF in the applied option will not have a significantly negative impact on the protected areas and facilities, other than Natura 2000 sites. **Updating the Project parameters does not affect the impacts that would occur if the Project was implemented in the parameters approved by the Environmental Decision**.
Report section	Section 14 Volume IV of the Report

Source: own materials

6. Assessment Summary and Conclusions (Summary of Volume V)

6.1. Conclusions

The conducted environmental impact assessment shows that it is justified to execute Bałtyk Środkowy III OWF in the currently requested option selected for implementation, i.e. the

option consisting in the change and update of the parameters of the Project in relation to the parameters approved in the Environmental Decision. Change of the Project parameters shall have a beneficial effect on reducing the impacts associated with the construction and operation of the Project.
For the impact of the Project on Natura 2000 sites, the assessment in the Report 2015 concluded a lack of significant negative impacts on the items subject to conservation under Natura 2000 sites, while the update of parameters of the BIII OWF shall contribute to further reduction of its impacts related to the execution, operation and decommissioning of the farm. Thus, the proposed modifications to the conditions of the Environmental Decision will not result in the possibility of significant adverse impacts on Natura 2000 sites.
Due to the nature of the Project's parameters update, in particular as a result of significant reduction in the number of wind turbines, i.e. up to 60 compared to 120 for the option approved by the Environmental Decision, as well as due to the limitation of acceptable types of foundations for the wind turbines, the cumulative impact with other projects, especially offshore wind farms will be reduced in relation to the Project in the option approved by the Environmental Decision. An additional element that further affects the mitigation of cumulative impacts is the introduction of solutions (in consultation with the investor of Baltica 2 and Baltica 3 OWF) to ensure a minimum 5 km wide corridor free from any development with wind farm elements between the BIII OWF and Baltica 3 OWF and Baltica 2 OWF infrastructure. Consequently, the updated parameters of the Project should be considered as contributing to the mitigation of the cumulative impacts of the execution, operation and decommissioning of the BIII OWF.
The modifications to the conditions of implementation and operation of the Project do not result in the obligation to conduct the environmental impact assessment of the proposed change in the conditions of the Environmental Decision in the cross-border context. They also do not affect the changes in the creation of the obligation to establish a limited impact area and the requirements for counteracting the effects of industrial accidents.
No change to the post-execution analysis obligations set out in the Environmental Decision is sought in these procedures.
Updated conditions for the implementation and operation of the Project together with the environmental impact assessment for the proposed changes to the conditions of the Environmental Decision, fulfillment of the recommendations of the Authority specified in point IV of the Environmental Decision and the new knowledge on the condition of the environment in Polish maritime areas and on the impacts caused by the OWF, as well as the consequences of decisions made in other procedures on the decision on environmental conditions for the OWF projects, cause that there are no grounds for imposing the obligation to conduct a new environmental impact assessment during the procedures on the building permit for the BIII OWF project. In such a situation, maintaining this condition in case of introducing the other changes proposed in this Report would make a repeated environmental impact assessment an unnecessary administrative obligation that adds no value in terms of the objective of ensuring a high level of environmental protection. Therefore, it is reasonable to waive the obligation to conduct the repeated environmental impact assessment as part of the building permit procedure

6.2. Impact of current parameters of the Project and results of the impact assessment on the conditions of Project's execution, operation and decommissioning specified in the Environmental Decision

As the updated parameters of the Project influence the conditions of implementation and operation of the Project, on the basis of conducted impact assessment a proposal of changes of particular provisions of the Environmental Decision was formulated. Proposed amendments to the individual provisions of the Environmental Decision are presented below in a layout consistent with that used in the Environmental Decision.

1. In point I.1 of the Environmental Decision it is proposed to change the parameters of the BIII OWF by indicating that it shall consist of a maximum 60 wind turbines ("WT") and maximum 1 internal offshore substation ("OS"). The proposed change also includes the change of the maximum total height of the wind turbine above sea level to 310 m and the maximum rotor diameter to 250 m, while reducing the maximum total rotor zone to 2,945,244 m^2 and determining the maximum zone for a single rotor to 49,088 m^2.

   In this point, it is also proposed to separately indicate the maximum seabed area occupied by 1 foundation of the wind turbine, specifying it at 79 m^2, and separately the maximum seabed area occupied by 1 foundation of the accompanying infrastructure, specifying it at 1,964 m^2, and at the same time determining the total seabed area occupied by all foundations at 6,676 m^2. At the same time, it is also proposed to indicate in this point that monopile or jacket type foundations may be used for the foundation of the wind turbine.

   It is also requested to determine the surface area of the farm area intended for development without taking into account in its size the buffer area determined by the rotor radius, i.e. 100 m. The conclusion of the Environmental Decision does not specify the buffer itself, but the specified value of the development area (89 km^2) clearly indicates that the 100 m buffer was used when determining it. In accordance with the contents of the Environmental Decision, the area intended for development has a surface area of 117 km^2 – in accordance with the permit for erection and use of artificial islands, structures and devices, the area of the farm up to approx. 119.52 km^2, however, the Environmental Decision refers to the area verified during the measurements carried out in the course of preparation of the environmental impact assessment report – reduced by the 500 m buffer with the surface area of approx. 23 km^2. This means that the area where it is possible to locate the farm elements is an area of approx. 94 km^2. Due to the fact that, in accordance with the interpretation of the provisions of the Construction Law, the development area must include all elements of the designed civil structures, including above-surface elements, i.e. in this case the rotor blades, the farm development area, in relation to the conditions specified in the permit for erection and use of artificial islands, structures and devices (500 m from the boundary of the farm area), should not be additionally reduced by the buffer surface area with a width determined by the maximum rotor diameter, and in order to make the contents of point I.1 of the Environmental Decision consistent with point I.3.8, I request for indication that the surface area possible for development is approx. 94 km^2.

   It is also proposed in part of point I.1. of the Environmental Decision regarding the spacing of the wind turbines to indicate that the wind turbines shall be spaced to

allow maintaining the minimum distances between individual wind turbines of 800 m from the axis of individual structures, while the substation shall be placed in the central part of the farm area.

It is also proposed to delete the parameters describing the capacity, dimensions and weight of AC transformer stations and AC/DC converter stations. Since the planned maximum number of offshore substations has been reduced from 6 to 1, the final substation parameters may differ from the parameters indicated in the Environmental Decision, whereas these parameters do not affect the level and impact of the planned Project on the environment. These parameters may be determined only at the stage of the building permit design.

In addition, it is proposed to change the provision on cable protection to a formula consistent with the draft spatial development plan for internal sea waters, the territorial sea and the exclusive economic zone, indicating that if technical conditions do not allow for burial of cables, then they shall be secured by means of permanent protection.

2. Appropriate changes in accordance with those indicated for change in point I.1 are proposed in point I.3.1. of the Environmental Decision, i.e. it is proposed to replace the number of 120 wind turbines with 60, whereas the maximum rotor diameter of 200 m should be replaced with the maximum rotor diameter of 250 m and the total height of the structure not higher than 275 m above sea level should be replaced with the total height of the structure not higher than 310 m above sea level.
3. In point I.3.2. of the Environmental Decision the number of 6 substations is proposed to be changed to 1.
4. In point I.3.3. of the Environmental Decision, it is proposed that instead of the density parameter of 1.35 pcs/km^2 the minimum distances to be kept between individual wind turbines of 800 m from the axis of individual structures should be indicated.
5. In point I.3.4. of the Environmental Decision, it is proposed to assume a maximum zone for a single rotor of no more than 49,088 m^{2}and a total maximum zone for all rotors of no more than 2,945,244 m^2.
6. In point I.3.5. of the Environmental Decision it is proposed to indicate that for 60 foundations for wind turbines it is possible to apply two types of foundations: monopile or jacket type, while for a foundation for a substation it is possible to apply one of four types of foundations: monopile, gravity-base foundation, jacket type or tripod type.
7. In point I.3.6. of the Environmental Decision it is proposed to indicate that the maximum seabed area occupied by one foundation (without a possible scour protection layer) for a wind turbine may not exceed 79 m^2 and for an offshore substation not more than 1,964 m^2, and the total maximum seabed area occupied by all foundations – not more than 6,676 m^2.
8. In point II.1.A.1 of the Environmental Decision, it is proposed to introduce a differentiation of the parameter determining the effectiveness of technical solutions to minimize the impact of underwater noise depending on the species/group of species requiring the introduction of the solutions in question. This means that the limits necessary to be complied with at the boundary of the nearest marine mammal Natura 2000 site, i.e. Słowińska Refuge PLH220023, were set at 140 dB re 1 µPa2s SELcum and weighted for cetaceans with high sensitivity to very high frequencies (VHF) for porpoise and 170 dB re 1 µPa2s SELcum and weighted for seal (PCW) for seals. A detailed rationale is provided in Volume IV, Section 6, Chapter 9.1.1.4 of the Report.

9. In point II.1.B1. of the Environmental Decision, the number of 120 wind turbines is proposed to be changed to 60.
   a)
   b) it is proposed to change the rotor diameter not larger than 200 m to the rotor diameter not larger than 250 m.
   c) it is proposed to change the height of the total structure not exceeding 275 m above sea level to the height of the total structure not exceeding 310 m above sea level.
10. In point II.1.B, it is proposed to add another letter and in this newly added point to indicate the obligation to leave the possibility of locating the farm above-water elements at the north-western end of the water region intended for the BIII OWF implementation, thus indicating the area allowed for development with above-water elements in accordance with the coordinates presented in the table below.

Table 18. Geographic coordinates of the boundaries of the BIII OWF development area with above-water elements

Point	ETRS89_Poland_CS92	
	Longitude	Latitude
1	17° 21' 21,473" E	54° 57' 21,518" N
2	17° 17' 17,639" E	54° 57' 0,529" N
3	17° 15' 28,399" E	55° 0' 39,156" N
4	17° 17' 36,907" E	55° 2' 5,406" N
5	17° 30' 31,280" E	54° 59' 50,060" N
6	17° 24' 36,771" E	54° 57' 39,861" N
7	17° 22' 38,491" E	54° 57' 25,473" N
8	17° 21' 23,133" E	54° 57' 21,632" N
9	17° 21' 22,998" E	54° 57' 21,625" N
10	17° 21' 22,510" E	54° 57' 21,596" N
11	17° 21' 22,023" E	54° 57' 21,562" N
12	17° 21' 21,537" E	54° 57' 21,524" N

11. An additional letter is proposed to be added to point II.1.E to include an obligation to carry out visual observation for the presence of marine mammals during the preparation and execution of seabed clearance (detonation) operations. Observations should be made from suitable observation platforms on vessels and allow a wide field of observation in the direction ahead of the vessel, and should be made during periods of good visibility. If marine mammals are recorded within the zone of potential impact, the operation should be ceased until the individuals concerned are not present within the zone.
12. In point II.1.E, it is proposed to add an additional letter and include an obligation for the deployment of marine mammal scaring devices prior to the start of seabed clearing operations by controlled explosive ordnance disposal by the relevant services. The range and effectiveness of the device should be adapted to the range of potential impacts related to the explosive detonation, detonation place and season, and allow for effective scaring away of marine mammals from the area where they could be exposed to a permanent threshold shift – PTS.

13. In point II.2.a, concerning the monitoring of seabirds and birds flying over the farm area (including migratory birds) at the operation stage, it is proposed to delete the part of the condition concerning the shutdown of turbines located on the route of registered bird flocks during migration periods. The provision requested to be repealed does not refer to the scope and conditions of monitoring, i.e. the subject of point II.2.a of the Environmental Decision, and is inconsistent with the condition specified in point I.2.31 and I.3.12 of the Environmental Decision concerning the shutdown of turbines, which raises interpretation doubts, at the same time this change does not affect the contents of points I.2.31 and I.3.12 of the Environmental Decision.
14. In point II.2.a, concerning the monitoring of bats at the operation stage, it is proposed to make the condition more precise by indicating that at least 6 recorders of bat activity will be located in the first line of the wind turbine on the western and southern boundary of the BIII OWF area, which is justified by the characteristics of the bat observations so far in the area of the planned farm and the infrastructure of offshore wind farms planned by other investors. It is also proposed to waive a part of the condition concerning the bat mortality survey as part of post-development monitoring during the Project operation. Monitoring must be carried out using verified survey methods. It should be noted that in the case of the bat mortality survey, there are no methods giving reliable results in the scope of conducting such surveys in maritime areas. The nature of the environment, including wave motion, sea currents, activity of animals taking dead specimens, makes it impossible to reliably design the monitoring of bat mortality within the BIII OWF area. This change is also consistent with the grounds for the Environmental Decision, which indicate that bat monitoring should be based only on the bat activity survey and should be carried out on the same principles as monitoring prior to the implementation of the Project. It should also be emphasized that the conditions concerning the monitoring of bat mortality have not been specified in other decisions on environmental conditions for the OWF.
15. It is proposed to repeal the provision of point IV of the Environmental Decision and state that it is not necessary to carry out the environmental impact re-assessment as part of the procedure for issuing the building permit decision. Regarding:
    a) determination, at the current stage of the project development, of further details concerning the development of the farm area and significant narrowing down of the foundation technologies planned to be used,
    b) proposed modifications of the conditions of implementation and operation of the Project and changes in the state of facts covering new knowledge about the marine environment and the regulatory environment of the BIII OWF,
    c) fulfillment of the recommendations of the Authority specified in point IV of the Environmental Decision and presentation of relevant results and conclusions in the attached project environmental impact assessment report, in particular the analysis of solutions related to the mitigation of cumulative impacts provided for in the decisions on environmental conditions issued for other offshore wind farm projects planned to be implemented on the north-eastern slope of the Słupsk Bank, there are no conditions requiring the environmental impact re-assessment as part of the procedure for issuing the building permit decision for the Bałtyk Środkowy III OWF project.

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