The Environmental Impact Assessment Report on the Baltica Offshore Wind Farm

Non-specialist abstract

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PRINCIPAL:

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(*Elektrownia Wiatrowa Baltica-2 Sp. z o.o.*)
Baltica-3 Wind Farm Limited Liability Company with the registered office in Warsaw
(*Elektrownia Wiatrowa Baltica-3 Sp. z o.o.*)

Gdańsk, November 2017

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	MEWO S.A.	
Subcontractors	**National Marine Fisheries Research Institute**	
	DHI Polska LLC	
	EKO-KONSULT LLC	
	ENVIA LLC	

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Contents

Abbreviations and definitions

Applicant	Baltica-2 Wind Farm LLC and Baltica-3 Wind Farm LLC
Baltica 2 Area	Area covered by the decision of 16 April 2012 No. MFW/4/12 issued for Baltica 2 Offshore Wind Farm LCC with the registered office in Warsaw
Baltica 3 Area	Area covered by the decision of 16 April 2012 No. MFW/5/12 issued for Baltica 3 Offshore Wind Farm LCC with the registered office in Warsaw
BŚII, BŚIII	Offshore wind farm "Polenergia Bałtyk II", previously "Bałtyk Środkowy II", Offshore wind farm "Polenergia Bałtyk III", previously "Bałtyk Środkowy III"
C-POD	Continuous porpoise detector
EGIA	Electricity grid installation area – the area on which electricity grid and teletechnical networks are allowed to be laid
EGMMIA	Electricity grid and measurement masts installation area – the area on which electricity grid and teletechnical networks as well as measurement masts are allowed to be installed
EIA	Environmental impact assessment
EIA Report	The environmental impact assessment report in accordance with the Act of the 3 October 2008 on sharing information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessment (Journal of Laws of 2008, No. 199, item 1227 as amended)
EMF	Electromagnetic field
EU	European Union
GBS	Gravity-based structure
MW	Megawatt
NM	Nautical mile
NMFRI (Polish: *MIR-PIB*)	National Marine Fisheries Research Institute (Polish: *Morski Instytut Rybacki – Państwowy Instytut Badawczy*)
NPS (Polish: *KSE*)	National Power System (Polish: *Krajowy System Elektroenergetyczny*)
OSPAR	The OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic or Oslo and Paris Commission
OWF	Offshore wind farm

OWF Area	Baltica OWF Area
OWF Area (1 NM)	Baltica Offshore Wind Farm Area together with the surrounding zone of width of at least 1 nautical mile
OWF Area (2 NM)	Baltica Offshore Wind Farm Area together with the surrounding zone of width of at least 1 nautical mile
OWF's built-up area	The built-up area of the Offshore Wind Farm – an area where the construction of offshore wind power stations, power substations, residential and service platforms, measurement and research platforms (including measurement masts) as well as the installation of electricity grid and teletechnical networks is planned
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PEG (Polish: *PGE*)	Polish Energy Group
Phytobenthos	Communities of aquatic plants, including vascular plants and macroalgae
PMA (Polish: *POM*)	Polish Marine Areas (Polish: *Polskie Obszary Morskie*)
Project	An investment involving construction of an offshore wind farm, in accordance with the permits for the construction and use of artificial islands, structures and devices issued by decisions No. MFW/4/12 and MFW/5/12 of the 16 April 2012
PSE	Polish Electricity Grid Joint Stock Company
PSZW	The permit for the construction and use of artificial islands, installations and devices in the Polish marine areas under the Act of the 21 March 1991 on the Polish sea areas and the Maritime Administration (Journal of Laws of 1991, No. 32, item. 131, as amended) (Polish: *Pozwolenie na wznoszenie sztucznych wysp*)
Zoobenthos	Invertebrates that live both on the surface and inside seabed sediments

1 Introduction

The Environmental Impact Assessment Report (EIA) has been compiled for the purposes of the environmental impact assessment of the undertaking operating under the name of Baltica Offshore Wind Farm (hereinafter referred to as: Baltica OWF), which consists in the construction of an offshore wind farm in the Polish marine areas (PMA). It is planned that the Baltica OWF will have the maximum electric power capacity of 2550 MW installed in the offshore wind power stations. Additionally, various elements of an internal wind farm infrastructure will be installed in the Baltica OWF Area – stations, electricity grid and teletechnical networks as well as service, residential, research and measurement platforms.

The EIA Report is an appendix to the application for issuing the decision on environmental conditions of the planned project. The analysis of the environmental impact of the planned Baltica OWF is the subject matter of this paper. It applies in particular to the comparison of analysed variants of the planned project in terms of its environmental impact and the indication which of the variants is the most favourable for the environment. Additionally in the EIA Report mitigating measures have been defined and a scope of monitoring of the environment has been proposed. The EIA Report applies to the phases of: construction, exploitation, overlapping construction and exploitation phase, and the phase of decommissioning of the investment.

The following companies are the Applicants planning the implementation of Baltica OWF: Baltica-2 Offshore Wind Farm LLC and Baltica-3 Offshore Wind Farm LLC – special purpose vehicles of the PEG Renewable Energy Joint Stock Company (Polish: PGE *Energia Odnawialna S.A.*), which is a company from the PEG Joint Stock Company Capital Group (Polish: *Grupa Kapitałowa PGE S.A.*).

The EIA Report for the Baltica OWF has been compiled by the consortium of the Marine Institute in Gdańsk and MEWO Joint Stock Company, in cooperation with the following subcontractors: NMFRI, ENVIA LLC, DHI Polska and EKO-KONSULT LLC.

1.1 Classification of the undertaking

Under the Regulation of the Council of Ministers of the 9 November 2010 on types of projects likely to have significant impact on the environment (consolidated text: Journal of Laws of 2016, item 71), the planned project has been classified as:

- the one that may always affect significantly the environment, under the paragraph 2, section 1, points:

  5) *installations using wind energy for electricity generation with a total nominal power station capacity not smaller than 100 MW and located in the maritime areas of the Republic of Poland,*

  6) *power substations or overhead power lines with voltage rating not less than 220 kV, and length not shorter than 15 km;*

- the one that potentially may significantly affect the environment, under the paragraph 3, section 1, points:

  7) *power substations or overhead power lines with voltage rating not less than 110 kV, other than those mentioned in paragraph 2, section 1, point 6,*

59) *airports other than those mentioned in paragraph 2, section 1, point 30 or landing pads, with the exclusion of landing pads of trauma centres, referred to in the Act of the 8 September 2006 on State Emergency Medical Services (Journal of Laws of 2013, item 757, as amended), intended only for rescue helicopters.*

Having been classified as a project that may always significantly affect the environment means the obligation to obtain a decision on environmental conditions following completion of proceedings regarding the assessment of the project's environmental impact.

1.2 Rationale for the implementation of the project

The planned project, the Baltica OWF, is an investment of the following companies: Baltica-2 Offshore Wind Farm LLC and Baltica-3 Offshore Wind Farm LLC – special purpose vehicles of the PEG Renewable Energy Joint Stock Company (Polish: *PGE Energia Odnawialna S.A.*), which is a company from the PEG Joint Stock Company Capital Group (Polish: *Grupa Kapitałowa PGE S.A.*) and after 2020 constitutes one of the strategic options of the development of the PEG Joint Stock Company Capital Group (Polish: *Grupa Kapitałowa PGE S.A.*).

In the first stage of the investment the implementation of an OWF with capacity of 1045.5 MW is planned in accordance with the contract regarding connection to the National Power System (NPS, Polish: *Krajowy System Elektroenergetyczny – KSE*), signed with the Polish Electricity Grid Joins Stock Company (PEGJS, Polish: *Polskie Sieci Elektroenergetyczne S.A. – PSE*) in 2014. The next stage of the project, including approximately 1500 MW, will depend on the possibility of connecting generation capacities to the NPS (Polish: *KSE*).

The operating of the Baltica OWF during 25-year-long exploitation will allow avoiding emissions of over 80 m tonnes of CO_2, over 1 m tonnes of SO_2, around 150 thousands of tonnes of nitrogen oxides, and over 2 m tonnes of dust in lignite-fired power stations. If the Baltica OFW with the maximum capacity applied for (2550 MW) is constructed, during 25-year-long exploitation, generation of over 200 TWh (200 000 000 000 kWh) of electricity might be expected.

The electricity generation and reduced emissions can be elements of Poland’s compliance with international regulations at the global and regional level. This applies particularly to the regulations regarding electricity generation from the renewable energy sources, emission reduction and climate change prevention.

1.3 EIA Report’s aim and scope

The EIA Report has been compiled for the purposes of the environmental impact assessment of the enterprise operating under the name of Baltica OWF.

The purpose of the EIA Report is to specify:

- the nature and scale of the project;
- possible variants of the project, including indication of the variant most favourable for the environment;
- environmental conditions, resources and values of abiotic, natural, cultural and landscape environments;
- the existing and planned use and development of marine areas;
- other conditions resulting, among other things, from specific provisions, e.g. concerning the prevention of construction failures or disasters;

- the nature, extent and significance of the expected environmental, spatial and social impacts related to the construction and exploitation of the Baltica OWF;
- the possibility of avoiding, preventing, limiting and possibly compensating for identified adverse project's impacts or risks, including potential emergency situations;
- the need to delineate potential recommendations to be used during all phases of the project;
- monitoring suggestions.

1.4 The basis for the EIA Report

The EIA Report has been based on:

- the documentation of the Applicant, which consisted of:
    - the permit for the construction and use of artificial islands, structures and devices in Polish marine areas (PMA) within the project entitled "The Complex of Offshore Wind Farms with the maximum total capacity of 1500 MW together with technical, measurement and research, and service infrastructure associated with the pre-investment, implementation and exploitation stages", of the 16 April 2012, Ref. No. MFW/4/12 (Wind Power Station Baltica-2 Joint Stock Company), and within the project entitled "The Complex of Offshore Wind Farms with the maximum capacity of 1050 MW together with technical, measurement and research, and service infrastructure associated with the pre-investment, implementation and exploitation stages", of the 16 April 2012, Ref. No. MFW/5/12 (Wind Power Station Baltica-2 Joint Stock Company),
    - the contract No. DS/MFW/2012/Baltica-3 for connection to the transmission network of the Baltica Offshore Wind Farm of the 24.10.2014 together with Annex 1, concluded on the 3 November 2015,
    - the expert report – The Action Plan on Counteracting Threats and Contamination from Oil Spills, Maritime Institute in Gdańsk, MEWO S.A., Gdańsk 2017,
    - the expert navigational report, Maritime Institute in Gdańsk, MEWO S.A., Gdańsk 2017,
    - the expert report on the impact on safety of the research into prospecting and extraction of seabed mineral resources, Maritime Institute in Gdańsk, MEWO S.A., Gdańsk 2017,
    - documentation containing the results of environmental surveys and environmental inventories carried out during the period from March 2016 to April 2017 for the purposes of this environmental impact Report;
- strategic documents, programming and planning documents at the international, national, regional and local level;
- binding international, European Union's and national legal regulations, including:
    - the Act of the 3 October 2008 on sharing information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessment (henceforth referred to as: the EIA Act),
    - Directive 20011/92/EU of the European Parliament and Council of the 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (as amended by the Directive of the 16 April 2014).

Moreover, while compiling the EIA Report, sources of information detailed in the EIA Report's chapter "Sources of information and used materials (literature and source materials)" were used, in particular environmental impact reports or other documents regarding projects completed, being

implemented or planned, located in the vicinity of the planned project, i.e. the Offshore Wind Farm Bałtyk Środkowy III (currently Polenergia Baltic III, henceforth BŚIII) and the Offshore Wind Farm Bałtyk Środkowy II (currently Polenergia Baltic II, henceforth BŚII).

1.5 The findings of the strategic and planning documents

The EIA Report contains the analysis of the strategic and planning documents of various levels – from the regional level (for example **the Spatial Management Plan for the Pomeranian Voivodeship 2030**), through the national level (for example **the Maritime policy of the Republic of Poland up to 2010**), up to a global level (for example **the Framework Convention of the United Nations regarding the Climate Change**).

The planned project is in line with the expectations of many policies and strategies, in particular regarding environmental protection (reduction of pollution emissions), balanced development (the use of renewable energy sources), and energy security (independence from external energy sources).

In no case does the planned investment contradicts the environmental objectives of the analysed strategic and planning documents.

1.6 Information on the links between the project and other undertakings

In the immediate vicinity of the investment, there are other offshore wind farms planned to be launched. Currently, three decisions on the construction and use of artificial islands, structures and equipment in the PMA, remain in force – they have been issued for the following projects adjoining the Baltica OWF: BŚII (from the West), BŚIII (from the South) and Baltic Power (from the East). Two of these projects (BŚII and BŚIII) received decisions regarding the projects' environmental conditions Locations of the other planned OWFs near Baltica OWF are shown on the diagram below (Figure 1).

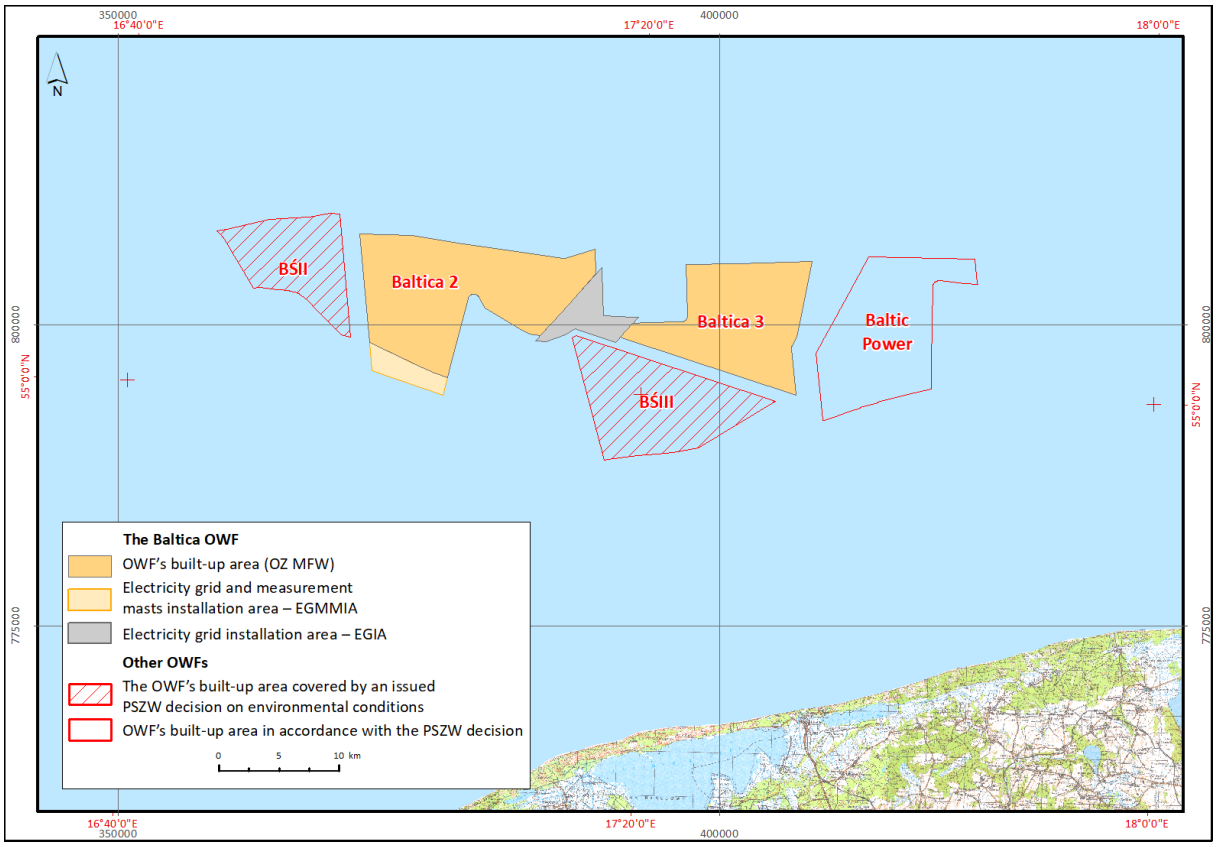

Figure 1. The project location in relation to neighbouring offshore wind farms with respect to the issued PSZW decisions

Source: internal data

The construction of the offshore connection infrastructure is planned in the immediate vicinity of the investment site, thanks to which it will be possible to transfer electricity generated by offshore wind farms to the NPS (mainly through power cables but also telecommunication and teletechnical cables). For the purposes of the Baltica OWF, the construction of off- and onshore infrastructure required for connection to the Żarnowiec substation is planned south from the farm area. In 2014, PSE Joint Stock Company concluded an agreement with the Baltica-3 Wind Farm LLC for connection to the transmission network. Still in force also remain the permits for laying and maintaining subsea cables and pipelines for:

- the external connection infrastructure of the OWF, BŚII and BŚIII (decisions: MFWK/1/13– 19.07.2013 – Ministry of Transport, Construction and Maritime Economy; No. 4/14– DUM Słupsk);
- the external connection infrastructure of the FEW Baltic II (decision: MFWK/1/15 – Ministry of Transport, Construction and Maritime Economy; No. 1/15 – DUM Słupsk);
- the offshore electricity transmission infrastructure – eastern part – (MIP-E) (DUM 4/14).

1.7 Methodology for the planned project's impact assessment

Based on the available data and environmental surveys and inventories carried out for the purposes of this EIA Report, environmental, spatial and social conditions have been determined. On this basis, the potential impacts and risks related to the planned project have been identified. The scope and

range of the anticipated environmental impact have also been determined. Comparisons have been made with similar cases, in terms of environmental conditions and the size and nature of impacts.

The approach used to assess the scale and significance of impacts has arisen from the authors' experience gained during the environmental impact assessments of projects planned for implementation in marine areas, including offshore wind farms.

The adopted approach makes it possible to indicate comprehensive actions aimed at avoiding, preventing, limiting or compensating the negative impacts associated with the planned undertaking. A diagram describing the methodology for the environmental impact assessment of the project has been presented in a diagram (Figure 2).

The actions resulting from the implementation of the planned project in its individual phases, i.e. construction, exploitation and decommissioning, including the overlapping construction and exploitation phase, have been defined in the first stage of the assessment. Based on the environmental and inventory surveys, carried out for the purposes of the EIA Report, the environmental elements on which these activities may have impact have also been specified. In the second stage of the assessment, based on the literature and experts' experience, the links between the sources of potential interactions and individual elements of the elements (receptors) have been identified.

The specified impacts have been assigned features in four categories:

- nature of impact (positive or negative);
- type of impact (direct, indirect, secondary/primary, cumulative, reversible, permanent);
- range of impact (local, regional) and denotation whether the impact is transboundary;
- time range of impact (short-term, medium-term, long-term, permanent, temporary).

At the same time, the receptors' resistance to the specific impacts in the cases of possible interaction between the action and the receptor has been established. Considering the assigned characteristics of impacts and the established resistance of receptors, the scale (magnitude) of impact specific for individual links between the impact and the receptor has been determined. The impacts have been described in a four-level scale (impact scale):

- negligible impact;
- low impact;
- medium impact;
- high impact.

Taking into consideration the prevalence or rarity of a specific receptor, its importance and role in the environment, and most of all its conservation status, the individual receptors, considered an environmental resource, have been assigned a value (significance), specified in a three-point scale: low, medium or high.

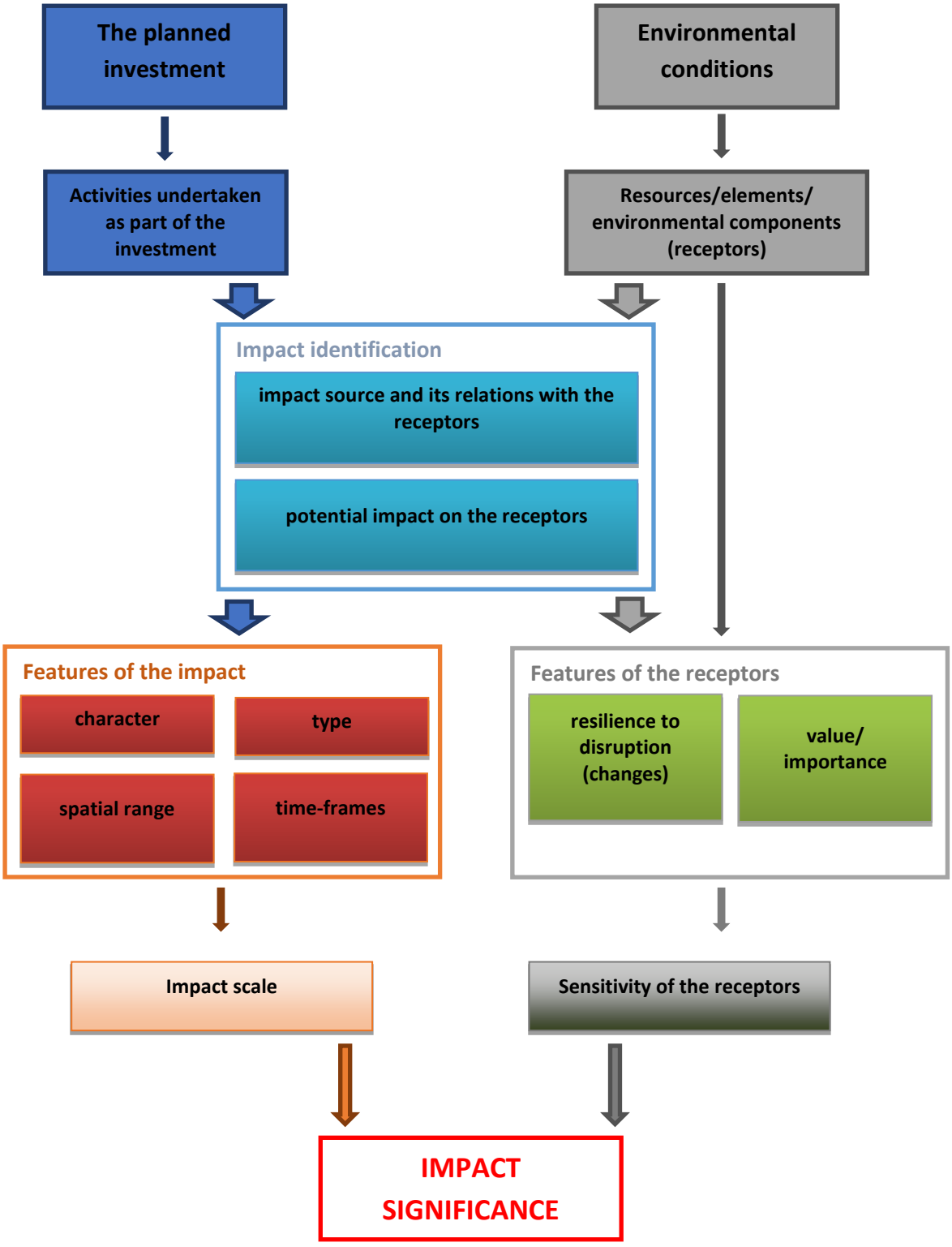

Figure 2. The diagram of the environmental impacts' identification and their assessment along with the description of their significance

Source: own materials based on ESPOO REPORT, Nord Steam (2). English Version. W-PE-EIA-POF-REP-805-040100EN. Ramboll, Nord Stream 2, April 2017

In the next stage of the assessment, the significance of the impact has been determined also on the four-point scale and while taking into account the assigned impact's scale and the value (significance) of a receptor (Table 1):

- irrelevant impact;
- insignificant impact;
- moderate impact;
- significant impact.

Table 1. The matrix defining the impact's significance in relation to the impact's scale and the value of the resource

The significance of impact		**Resource value/Receptor's significance**		
		Low	**Medium**	**High**
The scale of the impact	**Negligible**	Irrelevant	Irrelevant	Insignificant
	Low	Irrelevant	Insignificant	Moderate
	Medium	Insignificant	Moderate	Significant
	High	Moderate	Significant	Significant

Source: internal data

2 Description of the planned undertaking

2.1 General characteristics of the planned undertaking

2.1.1 Subject and scope of the undertaking

The planned undertaking is the Baltica Offshore Wind Farm with a maximum installed capacity of 2550 MW, located in the marine areas of the Republic of Poland, in the area of 268.2 km^2, in the distance of about 26 km of the sea shore, near Łeba. The planned undertaking includes phases of construction, overlapping construction and exploitation, exploitation, and decommissioning.

The Baltica OWF will consist of the following elements:

- offshore wind power stations consisting of nacelles with rotors and towers anchored or set on foundations on the seabed or embedded in the seabed;
- cable installations of internal electricity grid and teletechnical networks;
- power substations;
- research and measurement platforms as well as residential and service platforms.

The project's parameters for the Applicant's variant have been presented in a table (Table 2). The description of the variants considered in this document can be found in the chapter 2.4.

Table 2. List of the most important parameters in the Applicant's variant of the project

Parameter	**Variant proposed by the Applicant**
Maximum installed capacity [MW]	2550
Maximum number of wind power stations [items]	209
Maximum diameter of the rotor [m]	220
Minimum clearance between the working area of the rotor and the water surface [m]	20
Maximum height [m]	250

Parameter	Variant proposed by the Applicant
Maximum number of additional constructions [items]	25
Maximum diameter of the gravity based structure [m]	40
Maximum area of the seabed occupied by the gravity based structure [m^2]	1257
Maximum area of the seabed occupied by the foundations [m^2]	262 713
Maximum length of cable installation routes within the OWF [km]	418

Source: internal data

2.1.2 The location of the project and the occupied sea area

The Baltica-2 Offshore Wind Farm LLC and Baltica-3 Offshore Wind Farm LLC have been issued with the permit of the Minister of Maritime Economy and Inland Navigations (PSZW) for offshore wind farms with the maximum total capacity of 2550 MW including technical and research and measurement infrastructure. PSZW is a permit that grants the Applicant the right to use the Polish maritime area for the purposes specified in the permit, but it is not a permit for the implementation of the investment. The Applicant will be required to obtain the necessary permits before the beginning of the implementation of the planned investment. The area covered by the PSZW has been shown in a diagram (Figure 3). The figure also presents the area of the planned Baltica OWF investment consisting of:

1) the OWF's built-up area, where the construction of offshore wind power stations together with the infrastructure is planned – a total area of 237.63 km^2;
2) the electricity grid installation and the measurement masts area – EGMMIA – 11.55 km^2;
3) the electricity grid installation area – EGIA – 19.02 km^2.

In the electricity grid installation area – EGIA – it is planned to lay the electricity grid to connect the Baltica 2 and the Baltica 3 Areas. After having established the detailed location of this connection, the Applicant will apply to the appropriate maritime administration institutions for a permit for cable-laying in the Polish Exclusive Economic Zone. Construction of the offshore wind power stations is planned only in the OWF's built-up areas. This is due to the need to move the boundary of the Baltica OWF's wind power stations construction area away from the boundary of the Natura 2000 Słupsk Bank site (PLC990001) by about 2 km and the need to leave a space free from offshore wind power stations between the Baltica 2 Area and the Baltica 3 Area. Both above restrictions are associated with the need to protect birds in the area of the Natura 2000 Słupsk Bank site (PLC990001), most of all – the most common sea bird in this area during the winter – the long-tailed duck (*Clangula hyemalis*). Reduction of the built-up areas of the offshore wind power stations will allow to limit the environmental impact of the Baltica OWF. As demonstrated in the Report, the investment in this form has a moderate impact on the environment at the most, including no significant negative impact on the Natura 2000 Słupsk Bank site (PLC990001), neither separately nor in conjunction with other projects.

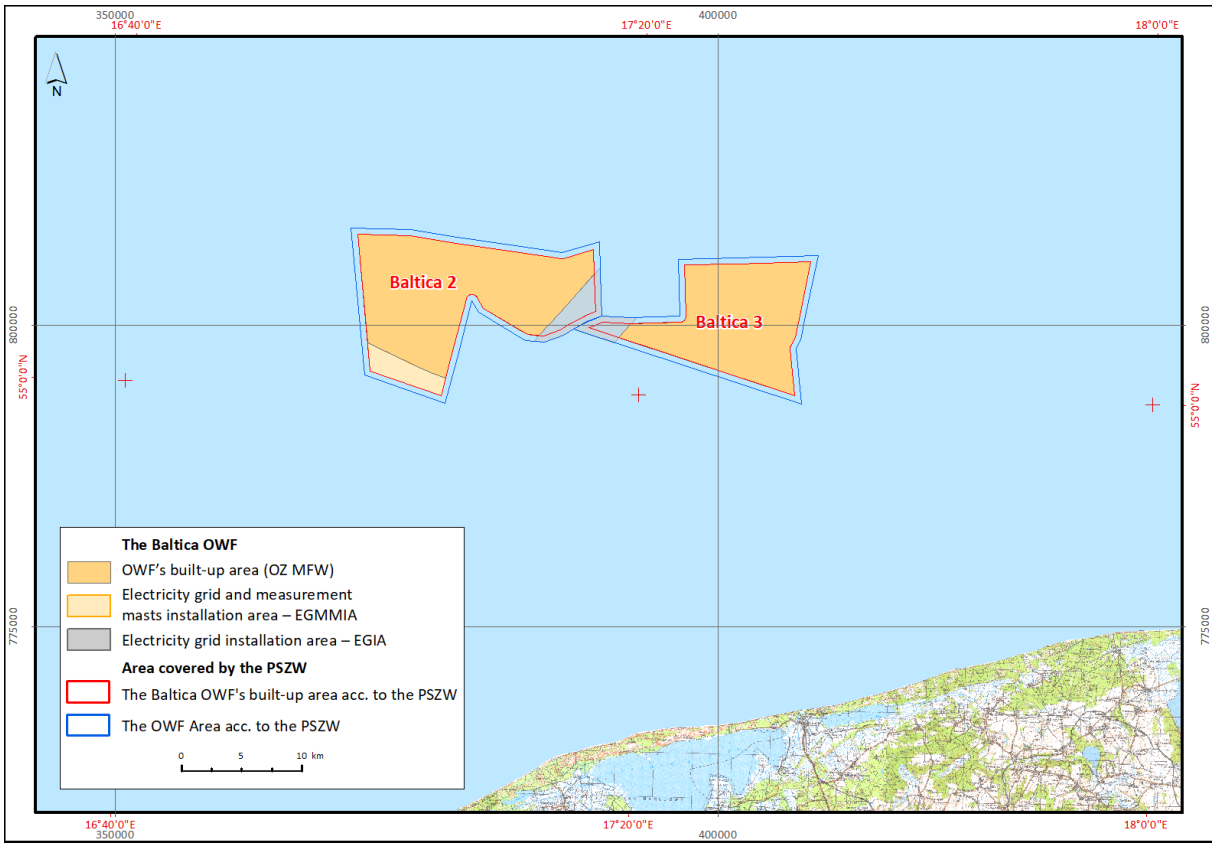

Figure 3. The project's location

Source: internal data

2.1.3 Staging of the project's implementation

On the 24 October 2014, the PSE entered into an agreement with the Baltica-3 Wind Farm LLC regarding connecting the Baltica OWF to the transmission system.

The Baltica OWF will be connected to a 400-kV distributor in an existing power substation 400/110 kV Żarnowiec in the Pomeranian Voivodeship.

The power committed for distribution in the agreement on the Baltica OWF connection will constitute the first stage of the construction of the Baltica OWF.

The residue power (i.e. 1504.5 MW) will be distributed in the subsequent stages based on terms of connection, which will be obtained by the Applicant in the future.

2.2 Technology description

2.2.1 Description of the production process

Offshore wind power stations, just like their onshore counterparts, are devices for converting kinetic energy of wind into electricity by propelling the electricity generator with a rotor driven by wind. Mechanical energy of the rotating rotor is transformed into alternating low voltage current in the generator. The voltage is usually transformed into medium voltage to enable further transmission to the collection stations. The transmission of electricity to power substations, collection and/or

conversion stations, depending on a technical solution, i.e. the level and type of the voltage transmitted ashore, takes place with the use of power lines.

Wind power stations do not need to use fuels and other raw materials to generate electricity. Properly exploited, they do not cause environmental pollution. A demand for electricity in small amounts is made only in the case of windless weather. The limited demand for raw materials is related to the construction (materials used to produce as well as fuels and other materials necessary during the construction process), operation of service units (fuels and materials) and decommissioning (fuels and materials).

2.2.2 Description of the technology of individual elements of the project

Offshore wind farms consist of offshore wind power stations, electricity grids connecting the elements of offshore wind farms and offshore power substations, where the parameters of the current generated in the offshore wind power stations are adapted for transmission within an offshore wind farm and outside to the NPS.

Offshore wind power stations consist of several main elements (Figure 4):

- the nacelle with electric generator and rotor, usually consisting of three blades;
- the tower on which the nacelle is mounted;
- the support structures;
- the foundation (or anchoring system).

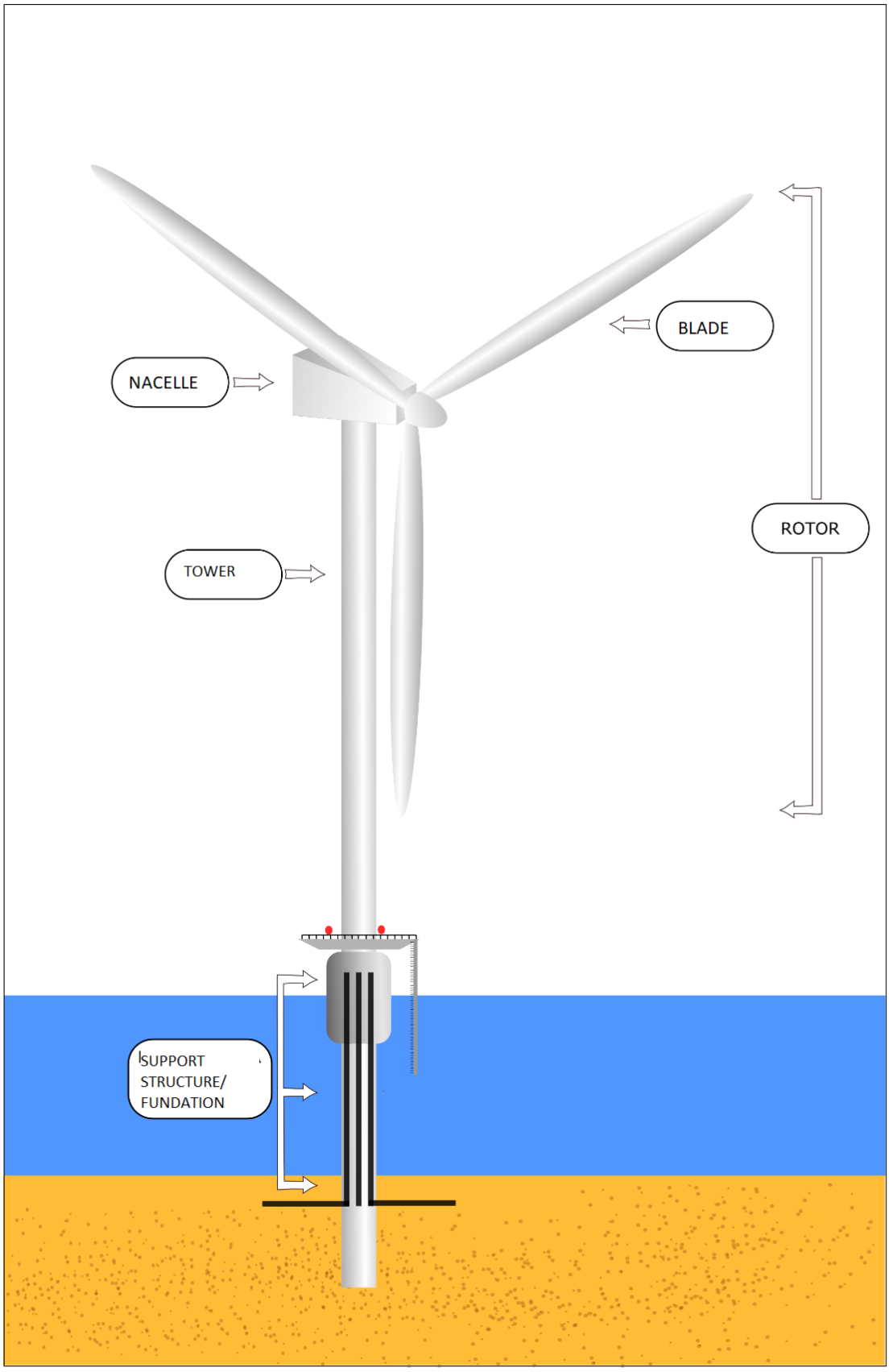

Figure 4. Main elements of an offshore wind power stations

Source: internal data

The basic elements of offshore wind power stations and offshore wind farms have been described below.

Nacelles with rotors

Nacelles with rotors are the basic element of the offshore wind power station responsible for the fundamental technological process – the conversion of kinetic energy of wind into electricity by forcing a wind power station's rotor to move and transferring the drive to an electric generator.

Electricity generation systems used in offshore wind power stations in most cases consist of rotors with three blades that rotate on a hub connected to an electric generator either directly to the shaft or indirectly by means of a gearbox that adjusts the rotor's speed to the speed required for the stable operation of a generator. After transforming kinetic energy into electric energy, the voltage is adjusted to the voltage in the internal electricity grid of the collection station at the OWF with the use of a transformer. The whole equipment of the electricity generation system outside the rotor is placed in the nacelle mounted on the tower. There is a possibility of placing a helicopter landing pad on a nacelle.

At the time of submission of the application, there are offshore wind power stations of up to 9.5 MW in operation. Due to the rapid growth of the offshore wind energy technology, using wind power stations with higher capacity is expected in the future. An example of technological progress in the field of generating electricity from wind is wind power station V164 produced by MHI-Vestas. Such wind power station was first launched in 2014. A power station with a rotor diameter of 164 m and capacity of 7.0 MW was used. After constantly improving various elements of the wind power station from the motion control software and the rake angle of the blades, through improving the efficiency of the gearbox, to optimising the generator's cooling system, in June 2017 the first wind turbine V164 with a capacity of 9.5 MW and the same rotor was installed. It should be expected that at the time of the Baltica OWF's implementation, wind power stations of greater capacity will be available. In 2017, there have been prototypes of 10 MW wind power stations using generators based on superconducting technologies (e.g. 10 MW Sea Titan), which are characterised by even a twofold reduction in the weight of the nacelle with the rotor, compared to the classic generation. This may allow, in the near future, for the construction of wind power stations with potentially twice as large capacity on the same foundations and towers, with only slightly larger rotors.

Towers

Nacelles with rotors are mounted on towers with various types of construction. The most common are steel and reinforced concrete constructions, prefabricated and connected on land or directly at sea.

Support structures

Five different wind turbine support structures and other permanent structures can be used for the analysed offshore wind farm, including all optional structures:

a) gravity based structure;
b) jacket structure;
c) monopile;

d) tripod;
e) floating structure.

The above constructional solutions have been presented schematically in diagrams below (Figure 5)

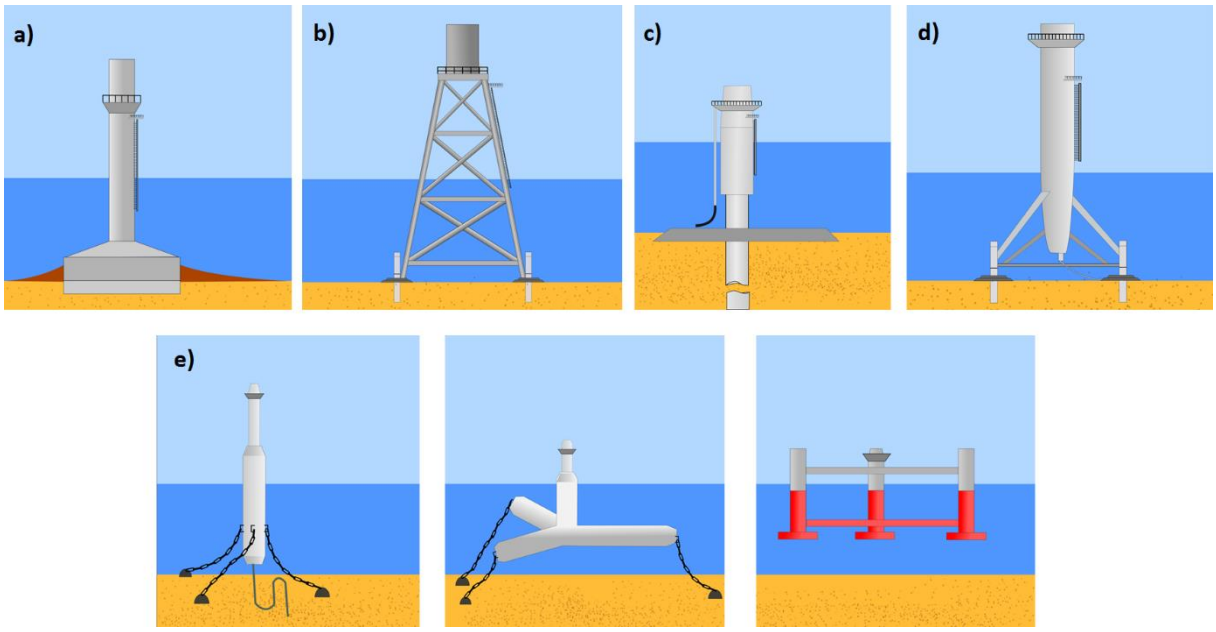

Figure 5. The draft of supporting structures: a) gravity based, b) jacket, c) monopile, d) tripod, e) floating (various types)

Source: internal data

The stability of the gravity based structure (GBS) is ensured by the low placed gravity centre and the weight of the structure itself. This type of construction is placed directly on the seabed. For this construction, an initial preparation of the seabed consisting in levelling it and possibly replacing the ground is often required. This entails dredging works, which cause disturbance to the seabed sediments' structure along with the short-term suspension of the finest fractions in the water. Moreover, in the immediate vicinity of the GBS foundation, sea currents are subject to modification – the effects of potential sediment leaching are eliminated by the shape of the foundation footing and, if needed, scour protection.

The jacket structure consists of a series of tubular elements connected to each other. The truss is settled on the bottom of the sea area in an indirect way. The clamps located at the bottom of the main girders are connected in a rigid way to the embedded in the ground piles. The survey of the environmental impact of this type of construction first of all requires an assessment of the noise level during its installation.

A monopile, in the most simple way, can be defined as a large-scale, prefabricated steel pipe with a mass of up to 1000 tonnes, driven to a maximum of half of its length into the seabed. The interior of the structure remains empty until it's erected and its bottom and head remain open. The total length of the piles in currently implemented constructions might be even 80 m. Piles which are 6 m in diameter and have wall thickness – in some segments – of over 100 mm are used. Driving this type of a pile into the ground generates sound and its propagation in water.

The way of transferring loads to the substrate via the tripod construction is completely different than in the case of large diameter piles. By dividing the force within the structure into 3 independent pillar supports, a better working characteristic is obtained. In situations where the ground conditions do not allow the large-diameter pile to be embedded (too much resistance to piling in or vibrating), a replacement solution may be the support structure with a tripod geometry. As in the case of a jacket structure, the noise is primarily assessed during foundation installation.

The analyses of the impact on the marine environment caused by suspended matter resulting from anthropogenic factors demonstrate that among the types of support structures presented above, the greatest disturbance will be caused by the installation of a gravity based structure. The monopile construction on the other hand is characterised by the highest noise level during installation.

Industrial surveys on floating wind power stations date back to the mid-1990s of the twentieth century. Although they are advanced, up to date only the prototype or pilot solutions have been tested under real world conditions. The floating structures are intended for deeper sea and ocean areas, and the current economic estimates make it possible to conclude that such solutions in offshore wind energy industry are competitive in comparison to the supporting structures embedded in the seabed for depths exceeding 50 m.

Currently, the use of the following three types of deep sea foundations in the offshore wind energy industry, adapted from the crude oil and gas extraction industry, is considered:

- spar buoys – constructed as large-sized, cylindrical buoys with considerable stability provided by a low placed gravity centre (ballast placed in the lower part of the buoy) in relation to the buoyancy centre;
- tension leg platforms – they consist of a floating hull anchored by ties (each “leg” consists of a set of tendons), cables or pipes with a vertical or almost vertical course. They are applicable at depths exceeding 50 m;
- semi-submersible structures – they owe their buoyancy, and above all their stability, to the lower, submerged hull which is connected with the actual deck (frame) by columns. Generally, such constructions are applicable at depths over 70–80 m.

Noise reduction system

The placing of the above described elements of the project in or on the seabed is often accompanied by the generation of significant underwater noise. Experience of other offshore wind farms shows that piling without the use of noise reduction measures usually means significant negative impact on marine mammals and fish. Therefore, the Applicant decided to use the noise reduction system, due to underwater noise and in order to avoid significant negative impact of vibrations and noise on underwater biota. This system will be characterized by efficiency which on boundaries of selected protection areas will enable reaching underwater noise levels that will not be causing any significant negative impact.

The boundary of the Natura 2000 Ostoja Słowińska site (PLH220023) is an area for which the necessity to keep the appropriate underwater noise level has been established, due to fish and marine mammals being objects of protection in this area. During the foundation work, underwater noise on the boundary of this area will be monitored at all times.

The value of underwater noise on the boundary of the Słupsk Bank site (PLC990001) must be reduced and monitored (from beginning of November until the end of April) due to necessity to prevent disturbance to wintering there long-necked duck, the object of protection in this area.

Currently there are not many methods of underwater noise reduction, mainly because of the far-reaching and effective sound propagation in water. At the time of the application, the commonly used methods are bubble curtains, which are created by pumping air through the diffusers installed on the seabed (Figure 6). The air bubble "walls" created in this way, thanks to the change of acoustic parameters between the mediums (water–air), remain the most effective means of noise reduction.

Another method of reducing underwater noise nuisance for marine biota might be using the "soft start" procedure – successive increase of the energy used by the hammer hitting the pile. This enables mobile marine biota to leave the area of direct underwater noise impact. Additionally, before commencement of the foundation laying processes, devices for deterring marine biota might be used. The "soft start" procedure and deterrence do not lower the noise level but enable to reduce effectively the number of marine organisms exposed to the impact of the underwater noise.

It should be expected that before the commencement of the Baltica OWF construction other effective noise reduction measures may appear, thus, the Applicant assumes the use of a noise reduction system, without prejudging the way it is implemented, to be able to use the most appropriate underwater noise reduction methods at the time of construction, enabling adherence to the noise levels in the areas specified above.

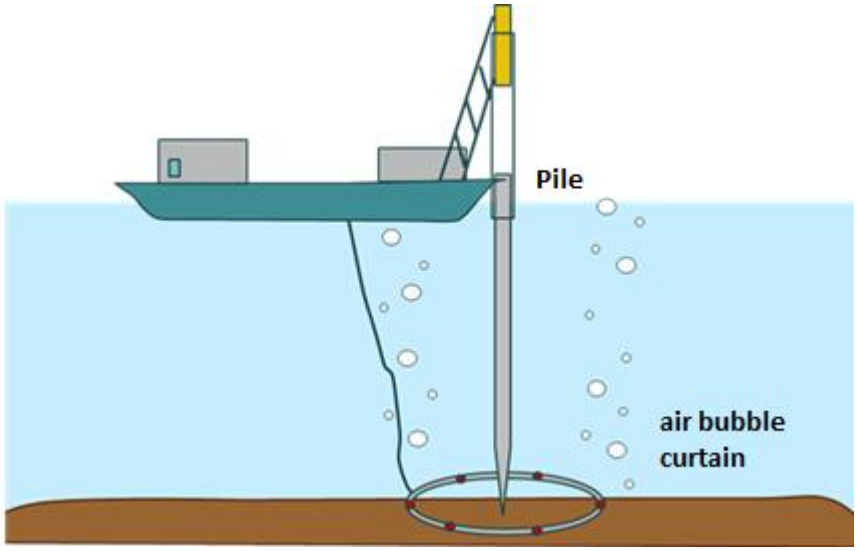

Figure 6. An outline of the big bubble curtain application

Source: DHI materials

Internal power and telecommunications lines

The internal wind farms' connection system includes offshore electricity grid joining individual offshore wind power stations into groups connected to offshore power substations as well as the necessary teletechnical and telecommunication lines in the form of fiber-optic lines integrated in multi-core power cables or in separate cables laid together with the power cables. The internal electricity grid in the Baltica OWF does not have yet agreed parameters (type and level of voltage), as

these parameters will depend on the farm's electric concept, the distribution of offshore wind power stations and the number of power substations.

Cable networks (electricity and teletechnical) included in the internal wind power stations and power substations connection system will be laid embedded in the seabed to a depth of about 2 m or on the seabed in the case of unfavourable for embedding in the seabed geological conditions.

Power substations

The OWF will have a group of power substations located in the OWF Area. In order to optimise the costs and rationalise the use of the area, the possibility of implementing multiple power substations placed on a common platform is not excluded. In addition to the standard equipment of power substations in devices and installations necessary for the transformation of voltage and for the service and supervision of the station (helicopter landing pad and crane as well as others, depending on the needs), in selected stations the option of creating rooms and installations allowing short or long-term stay of service teams is accepted.

The determination of the offshore power substations' location will be possible after specifying the location of the individual elements of the OWF.

Marine substations will be embedded on foundations chosen from types described for offshore wind power stations.

Research and measurement as well as residential and service platforms

In order to conduct measurements of meteorological parameters necessary to determine the working conditions of the designed offshore wind power stations, the construction of a maximum of two stationary offshore research and measurement stations located within the limits of the OWF's built-up area and/or the EGMMA has been assumed, while in the second above mentioned area the station may be implemented within the limited to the construction of a measurement mast scope due to the proximity of the Natura 2000 Słupsk Bank site (PLC990001).

The key element of the planned research and measurement stations will be a meteorological mast with the maximum height of up to 150 m, together with the necessary measuring equipment, able to record and transmit data.

The most advanced variant of the research and measurement platform assumes the construction of the station in the form of an extensive work platform, which will house both the mast with a height of up to 150 m, as well as the additional installations and equipment as well as rooms for conducting other scientific and research works, including temporary stay of survey teams.

The measurement station might be also constructed in a different form, e.g. as a temporary facility based on a support structure used after the completion of the measurements for the wind power station foundation or on a structure temporarily embedded on the seabed, or as a temporarily anchored structure.

In order to reduce the transport costs of specialist maintenance and repair teams, in the case where it is not possible to locate suitable facilities, e.g. on power substation platforms, the Applicant has considered locating a maximum of two residential and service stations within the OWF's built-up area, as an additional infrastructure of the planned project.

2.3 Enveloping concept of the EIA Report

The EIA Report is based on the concept of an envelope description of the project. The enveloping concept means that in the case of the evaluation of the chosen parameter and the possibility of applying different technical solutions, the environmental impact assessment has been carried out for the potentially most burdensome to the environment solution. It has been assumed that if the most burdensome solution would not have a significantly negative impact on the environment, the remaining, less burdensome solutions would also be acceptable. An example of the enveloping approach to the assessment can be the assessment of the foundation laying impact. The gravity based structure installation requires great effort related to the transferring of the sediment and it is the most burdensome solution in this respect. The piling of a monopile will generate the greatest noise. In the enveloping concept of the assessment, it has been assumed that the assessment will take into account the amount of sediment moved in the case of the use of a gravity based structure and the underwater noise generated in the case of piling a monopile. This means that the environmental impact assessment of the technology most burdensome for the given environmental element has been carried out. It is unlikely that such impacts will occur simultaneously – if a gravity based structure is selected, the underwater noise will be much smaller, and if a monopile is selected, the sediment will be practically unmoved. This means that each applied foundation selection will lead to smaller impacts than the ones assumed in the EIA Report.

Investment process, in the case of marine wind power industry, from the beginning of preparations to the completion often lasts for more than 10 years. On the other hand, the marine wind power industry uses increasingly modern technologies. Their aim is to reduce environmental impact through the increase of electricity generation from a single wind power station and the decrease of their total number necessary to obtain presumed farm capacity. Therefore, the investment parameters have been described in such a way which in the future will enable to use technological progress and to apply of better (that is with lesser environmental impact than in case of those currently used) solutions. The existing and currently used wind power stations (with capacity from 3.6 MW to 9.5 MW), with the prospect of the Baltica OWF's completion and the commencement of the first construction phase after 2021, are likely to be replaced by devices with lesser environmental impact.

2.4 The considered variants of the project

2.4.1 An approach to the designation of the project's variants

The project has been described in two variants: the one proposed by the Applicant – in simple terms – with larger offshore wind power stations (with greater technical parameters), and in a rational alternative variant – in simple terms – with smaller offshore wind power stations (with smaller technical parameters).

The project has been characterised by specifying the following parameters for each of the variants:

- **the maximum installed capacity of the OWF** – this parameter is determined by the decisions of the PSZW, depending on the Applicant preparing the investment process. Ultimately, the amount of the installed capacity will be the derivative of the possibility of connecting to the NPS and the result of optimisation of the planned farm from the point of view of environmental parameters. Under no circumstances will this value be exceeded;

- **the maximum number of wind turbines** – a parameter resulting from the maximum installed capacity of the OWF and the anticipated size of the wind turbines installed in the OWF. The use of wind turbines of various sizes is accepted, but no more than the maximum number declared;
- **the maximum rotor diameter** – a parameter defining the size of the rotor, affecting, among others, the scale of the impact on birds and bats in the OWF Area;
- **the minimal clearance between the working area of the rotor and the water surface** – a parameter affecting the scale of the impact on birds and bats in the OWF Area – the lower the rotor blades reach, the greater the effect is;
- **the maximum height of wind turbines** – the maximum height of wind power stations resulting from the height of the tower and radius of the rotor; a parameter affecting the scale of the impact on birds and bats in the OWF Area and the aerial use of the OWF Area;
- **the maximum diameter of the gravity based structure** – a parameter defining the diameter of the largest permissible foundation constituting the maximum coverage of the seabed;
- **the maximum seabed surface covered by the gravity based structure** – the maximum surface covered by a single gravity based structure without anti-erosion protection (e.g. rip-rap);
- **the maximum seabed area occupied by foundations** – the limit value of the total area occupied by the foundations (for the gravity based structures as covering the largest seabed surface); a parameter directly affecting benthic organisms through the interference in the seabed;
- **the maximum length of cable installation routes inside the OWF** – a parameter defining the length of cable connections inside OWF's built-up area, electricity grid area and electricity grid and measurement masts area, necessary to determine the scale of the suspended solids dispersion during the burial of cables.

2.4.2 The considered variants of the project along with the justification for their choice

In accordance with the requirements for the preparation of the project's environmental impact assessment report, the proposed variants are reasonable, i.e. possible to implement in the current legal status (including as part of the issued PSZW decisions) and with the current knowledge about the environment.

The variant proposed by the Applicant (the Applicant's variant) is an option which, to the greatest possible extent assumes the use of the latest technologies available at the time of the preparation of the construction project for the specific stages of the project, including, in particular the wind power stations larger than those available on the market at the time of applying for the decision on the project's environmental conditions. During the OWF implementation, the use of various types and capacities wind power stations is allowed. In the case of the implementation of the construction program of the OWF with a total capacity specified in the PSZW, i.e. 2550 MW, the employment of no more than 209 wind power stations on different types of foundations with a maximum diameter of 40 m has been assumed.

The rational alternative variant has been chosen as a variant based on the existing technologies, currently used and available on the market on an industrial scale. For this reason, it was accepted that the wind power stations' capacity will be 8 MW. For the total installed capacity of 2550 MW this translates into a maximum of 319 wind power stations embedded on various foundations, with the maximum foundation diameter of 35 m. The rational alternative variant applies to the same farm

built-up area, like in the case of the Applicant's variant, but with the higher number of planned wind power stations it will require a different layout in the area, including their higher density.

The most important parameters of the project for both variants analysed in the EIA Report, i.e. the variant proposed by the Applicant and the rational alternative have been presented in the table (Table 3). For some parameters, variants (e.g. minimum clearance) have not been differentiated, as their choice is related to the environmental parameters (flight altitude of birds) or to the legal context (maximum installed capacity deriving from the PSZW).

Table 3. List of the most important parameters of the project for the variant proposed by the Applicant and the rational alternative variant

Parameter	Variant proposed by the Applicant	Rational alternative variant
Maximum installed capacity [MW]	2550	2550
Maximum number of wind power stations [items]	209	319
The maximum diameter of the rotor [m]	220	180
Minimum clearance between the working area of the rotor and the water surface [m]	20	20
Maximum height [m]	250	230
Maximum number of additional constructions (power substations, research and measurements and/or residential and service platforms [units]	25	25
The maximum diameter of the gravity based structure [m]	40	35
Maximum area of the seabed occupied by the gravity based structure [m^2]	1257	962
Maximum area of the seabed occupied by the foundations [m^2]	262 713	306 913
Maximum length of cable installation routes within the OWF [km]	418	638

Source: internal data

The variant proposed by the Applicant will allow for the implementation of the investment of the same capacity, but with better, in comparison to the rational alternative variant, environmental parameters, in particular with:

- fewer wind power stations;
- smaller total rotor working area;
- smaller coverage of the seabed surface;
- shorter cable length;
- shorter construction time;
- smaller resources and fuel consumption;
- smaller waste generation.

The variant proposed by the Applicant will allow reducing the environmental impact of the investment and, according to analyses included in the EIA Report, it is the variant most favourable for the environment.

2.5 Description of particular phases of the project

The Baltica OWF will be implemented in four phases:

- construction phase;
- overlapping construction and exploitation phase;
- exploitation phase;
- decommissioning phase.

The main activities related to all phases of the offshore wind farm, i.e. the construction, overlapping construction and exploitation, exploitation and decommissioning phases, will be the following:

- the transport of construction elements, including large-scale ones, during the construction phase, occasionally during exploitation and again in the decommissioning phase of the undertaking;
- the transport of supplies and materials in all phases of the undertaking;
- carrying out construction works (e.g. construction of foundations) and installation works (e.g. laying cables);
- the transport of service teams and service works;
- carrying out dismantling works in the decommissioning phase.

The following vessels and aviation units will be used during the works:

- construction vessels, usually large, specialized vessels with a high level of security (e.g. equipped in dynamic positioning systems with multi-level security); often such units are supported on the lowered onto the seabed supports and stabilized under their own weight by elevating itself above the water surface;
- transportation vessels, universal or adapted to perform specific tasks, often equipped with dynamic positioning systems;
- tug supply vessels, usually small, fast watercraft for transporting service teams or supplies, adapted to be moored/docked to a wind power station and to transfer people and materials to offshore wind power stations;
- in some situations – helicopters for transporting service teams and supplies.

In the case of all activities within the OWF Area, there will be noise generated by ships during normal operation. Navigational and communication devices installed on ships and operated in accordance with the relevant regulations will create permissible electromagnetic field (EMF). Ship equipment is regularly checked for EMF emissions because of people working on the vessels.

Vessels employed currently, by burning fossil fuels, emit pollutants (gases and dust) into the atmosphere. In this case, it may be expected that this impact will be gradually reduced due to increasing the proportion of clean light fuels (for example compressed natural gas/liquefied natural gas) or introducing new standards for the quality of heavy fuels, especially these applying to the fuels' sulphur content.

The operations of construction and transportation vessels must be carried out from the ports with appropriate parameters (the size and draft of the approved vessels and increased quay capacity). The ports suitable for these vessels are, for example, Gdańsk, Gdynia, Szczecin and Świnoujście. Tug supply vessels can use ports of lower requirements. The ports closest to the planned investment which meet such requirements are the ports of Ustka and Łeba.

The number of sea operations related to the construction, exploitation and decommissioning phases of the Baltica OWF project is proportional to the number of facilities installed and constructed in the

OWF Area. Therefore, the number of operations and their effects (for example fuel consumption, emissions related to transport) for the Applicant's variant will be smaller than in the case of the rational alternative variant.

Solid waste and wastewater management during all phases of the OWF's life

The Applicant will require the contractors of all works related to the construction, exploitation and decommissioning of the Baltica OWF to apply legal requirements and good practices regarding waste and wastewater treatment, in particular to note the opportunities arising from sorting the solid waste and potential recycling a part of it.

Various hazardous materials will be used during different phases of the Baltica OWF's life, including lubricating, diesel and hydraulic oils. All units used for the construction, exploitation and decommissioning of the Baltica OWF and all the Baltica OWF's constructions will be equipped with appropriate protective measures to prevent the spillage of these substances (e.g. trays for any transformer oil spills) and measures to eliminate the effects of these substances' spills (e.g. sorbents). The oil-polluted water produced during the works (e.g. washing of equipment, decks) will be collected and separated to obtain concentrations permitted to be discharged into the sea and the oil obtained from the separation process will be stored and transferred in appropriate containers to specialized waste disposal companies.

The same will be done in the case of other waste, including other hazardous waste – they will be sorted, collected in specially marked and secured containers, transported ashore and transferred to specialized companies for utilisation.

Domestic sewage generated during the construction, exploitation and decommissioning of the Baltica OWF will be stored, pre-treated and discharged into the sea or transferred ashore in accordance with the appropriate regulations regarding limiting the discharge of pollutants by ships.

In the EIA Report the descriptions of individual OWF's life stages provide the estimated quantities of solid waste and wastewater generated in these phases.

It is assumed that sediment transferred during the underwater works will be managed within Baltica OWF. It will not be moved outside of the Baltica OWF Area, but only beyond the direct area of foundation settlement. This applies to the gravity based structure or other foundation types for which it might be necessary to prepare and/or change the substrate. No pollution has been found within the sediments in the OWF Area, therefore transferring them to an offshore dump site or landfills is not planned. The maximum amount of the transferred sediments can occur in the case of gravity based structures, but these sediments can be used to fill and weight the foundation structures or to shape the seabed around the foundation.

Noise emissions related to the underwater works

For the most of offshore wind farms, the construction site must be prepared with the use of the dredging process, which generates noise and suspended matter of sediments. The noise emitted by the dredgers comes from various sources, mainly from the ship's propulsion and the suction head of the dredger (Figure 7).

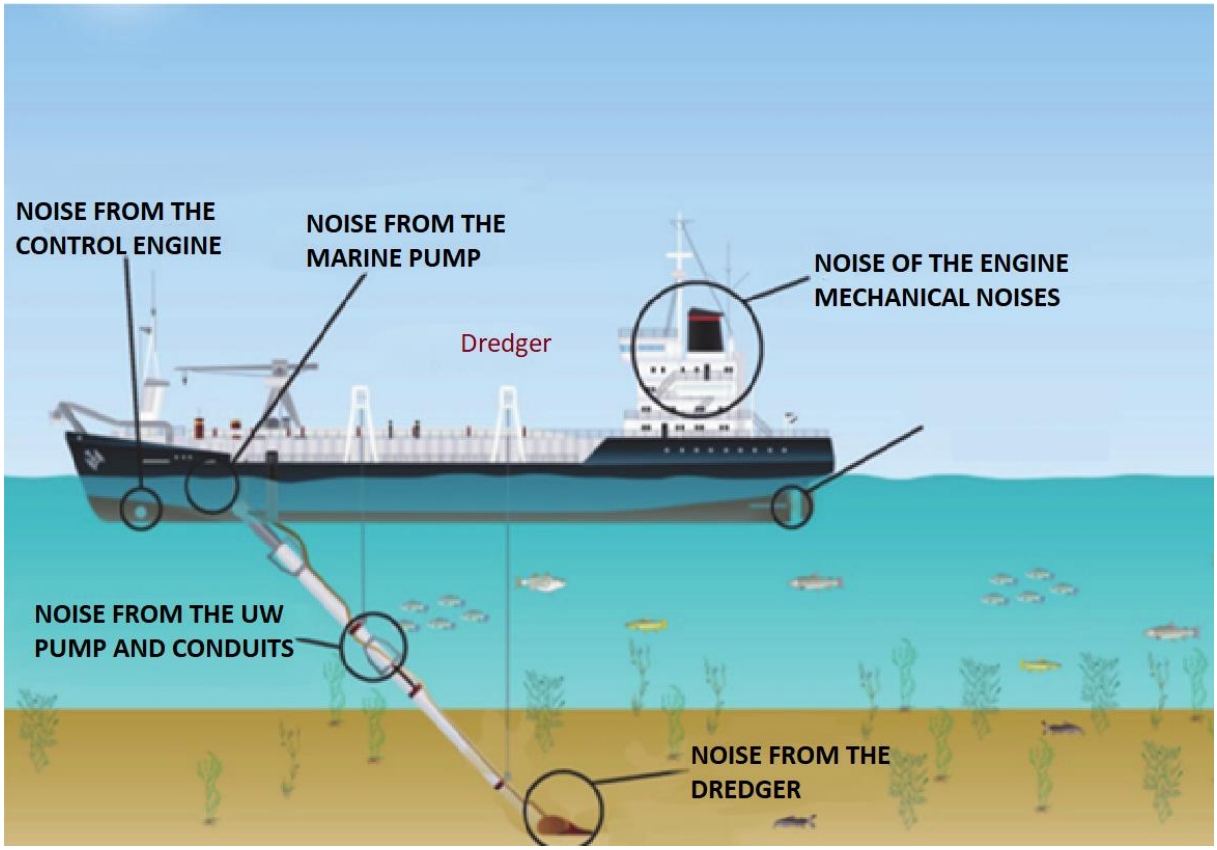

Figure 7. Schematic illustration of a dredger's operation

Source: after: CEDA, 2011

The noise levels in the case of the work of dredgers are lower than in the case of a pile driver.

The underwater works with the use of dredging systems can be the most intense during the phases of construction and decommissioning. Such works in the exploitation phase can only take place in the case of emergency service works (e.g. the repair of buried and broken cables).

2.5.1 Construction phase

Depending on the adopted variant, this stage will include the installation of a maximum of 209 (the Applicant's variant) or 319 (the rational alternative variant) wind turbines, internal wiring and the completion of up to 25 other types of structures or installations within the Baltica OWF Area. The construction phase will require a very large number of transport and reloading operations and linked to them slightly increased traffic of large vessels, as well as the presence of a large number of vessels in the OWF Area. The construction is accompanied by significantly increased traffic of smaller supply and service vessels. It should be remembered that the relatively large undertaking will be extended over time – the assumed construction cycle is 8 years. Since most structures are prefabricated on land, it should be emphasized that the inconvenience of building processes is in practice directly proportional to the number of construction elements. In relation to the above, higher number of the constructions in the alternative variant makes the rational alternative variant have greater impact on marine environment.

Prior to the OWF construction, it will be necessary to organize construction site facilities, assuming that each of the logistics solutions, including the following will be possible:

- direct transport from the producer to the OWF Area;
- indirect transport through the main supply ports – the nearest ports are in Gdańsk and Gdynia;
- indirect transport through temporary supply ports – the nearest port is in Ustka;
- transport from service ports – the nearest ports are located in Łeba and Ustka.

Transport from major supply ports will change the organization of these ports' operating to a small extent. The creation of a temporary supply port in Ustka and the location of service ports in Ustka and Łeba will be associated with changes in the organization of work of these ports, as they will require adaptation to greater ship traffic and its efficient service.

Maritime transportation during the phase of construction of the Baltica OWF will be crucial and the impact of land transportation should be minimal. Land transportation will take place within existing transportation solutions. It cannot be ruled out that the assembly or production of large-scale elements will take place in port or shipyard areas. Traffic in maritime transportation will take place in the direction of the sea area occupied by the Baltica OWF where up to date it has been small or insignificant.

The number of offshore operations related to the construction phase of the Baltica OWF is proportional to the number of facilities installed and constructed in the OWF Area as well as on the length of the installed electricity grid. Therefore, the number of operations and their effects (for example fuel consumption, emissions related to transport) for the Applicant's variant will be smaller than in the case of the rational alternative variant.

In the construction phase, the generation of waste due to the exploitation of ships carrying out the construction of the Baltica OWF and the generation of waste during filling the installations with cement or sediment, joining construction elements (e.g. welding), piling and driving piles (e.g. drill cuttings), assembly of anti-corrosion protection elements and possible abrasion of the protective coatings (e.g. during piling) is expected.

2.5.2 Construction and exploitation phase

The Baltica OWF construction concept assumes the possibility of simultaneous construction and exploitation of offshore wind power stations. In the impact assessment category, this phenomenon will be the sum of the simultaneous impact of the OWF construction in one place and its exploitation elsewhere. Due to separate locations and different technical requirements the occurrence of conflicts should not be expected.

2.5.3 Exploitation phase

In contrast to the construction phase, this stage will be characterised by the increased traffic of small and medium sized vessels related to the exploitation and service of the OWF. Three variants of exploitation are possible:

- the use of offshore residential and service stations – the movement of small vessels within the farm will take place between the station and individual wind power stations. To secure the functioning of the residential and service station, cyclical supply transport and periodic exchange of the station crew and service personnel will be necessary. The estimated number

of trips will minimally increase the intensity of navigation for the main navigation routes and will only slightly increase the intensity of navigation in the service port;

- the use of medium sized vessels – service bases that will perform periodic service duty in the OWF area and make cyclical trips to service ports to replenish the supplies and exchange service personnel or crew. Changes in the intensity of navigation will occur in the same way as in the case above;
- the use of small vessels travelling between the service port(s) and the OWF area in the daily work cycle. The estimated number of trips will significantly increase the intensity of navigation on navigation routes and in ports.

The number of offshore operations related to the exploitation phase of the Baltica OWF is proportional to the number of facilities installed and constructed in the OWF Area; it is also proportional to the length of the installed electricity grid. Therefore, the number of operations and their effects (for example fuel consumption, emissions related to transport) for the Applicant's variant will be smaller than in the case of the rational alternative variant.

The exploitation of the offshore wind farm will be a long-term project. The offshore wind power stations will be connected with power substations by electricity grid and teletechnical networks. The length of the cables laid inside the OWF will depend on the number of installed wind power stations (up to 209 power stations), offshore measurement and research stations, and offshore power substations. It is assumed that the length of the cable routes will not exceed 418 km. Cables buried in the seabed are optimized to generate vestigial electric field. Sediment, separating cables from water, makes the electromagnetic field effects decrease as the depth the cables are buried at increases.

The electric current flowing through the cable, makes it heat up. The temperature of the cable increasing above the ambient temperature triggers the transfer of heat from the cable to the surrounding environment. According to adopted in 2012 OSPAR's guide on the best environmental practices regarding the laying and the use of subsea cables, burying the cable at a depth of 1 m to 3 m under the seabed is sufficient to make, within 0.2 m below the seabed surface, the rise of the sediment temperature associated with the heat emission through the power cables under load no greater than the recommended 2°C. The minimum depth the cables are buried at will be determined depending of the type of sediments (their thermal conductivity) and the type of electricity grid (size and type of loads, thermal characteristics).

The main factors causing the generation of waste and wastewater at the Baltica OWF's exploitation stage is the employment of ships and conduction of repairs.

2.5.4 Decommissioning phase

In technical terms, the decommissioning phase is a reversal of the OWF construction phase. The individual components of offshore wind power stations will be removed and transported to utilization sites.

The number of offshore operations related to the decommissioning phase of the Baltica OWF is proportional to the number of facilities installed and constructed in the OWF Area, including the length of the installed electricity grid. The number of operations and their effects (for example fuel consumption, emissions related to transport) for the Applicant's variant will be smaller than in the case of the rational alternative variant.

Is it expected that the decommissioning of the construction in the Baltica OWF Area will be taking place to the level of the sea-bed. In the case of the decommissioning of the Baltica OWF, the generation of waste is mainly related to the physical removal of the worn out Baltica OWF's components and the exploitation of ships used during the decommissioning.

2.6 The risk of major accidents or natural and construction disasters

The main threats that may occur during the construction and decommissioning of offshore wind power stations are the spillages of oil derivative substances, mainly diesel, hydraulic, transformer and lubricating oils. The marine environment may be incidentally endangered with materials containing hazardous substances, if they were to be used. During the exploitation phase, the main cause of marine pollution can be oil spills. Both within the open sea waters (e.g. the OWF area) and near the coast, they can be a problem with long-lasting effects on fauna, flora, fishery and beaches affected by the contamination. However, the risk of a major failure resulting in the emission of hazardous substances is minimal. A probability of ships collision belongs to the category of very rare events (not more than once every 100 years), and ship's contact with the OWF construction to the category of very rare events (not more than once every 200 years). Taking into account the effects in the form of 200 m^3 of diesel oil emission, the risk level is within an acceptable range. Emission of 200 m^3 of diesel oil will cause insignificant damage to the natural environment because it will disperse within 12 hours.

3 Inventory survey and environmental conditions

In the EIA Report the environmental conditions in the Baltic OWF Area have been described based on the inventory surveys conducted in years 2016–2017 and based on available literature, including information from the EIA reports for other OWFs nearby (BŚII and BŚIII).

3.1 Inventory survey

As part of the inventory survey, surveys have been carried out; their summary is presented in the table (Table 4). The surveys have been carried out in the areas presented in the figure (Figure 8).

Table 4. Summary of marine environment elements/components surveying

Type of surveys	Time of field studies	Range	Methods
Geophysical	04.2016 – 05.2017	OWF Area (1 NM)	The measurements have been carried out along the same profiles, spaced every 90 m: • bathymetric; • sonar; • magnetometric (magnetic anomalies measurements); • seismoacoustic and seismic. The processing phase included the analysis of the material collected during magnetometric, bathymetric and sonar measurements as well as video inspections of selected objects (using a remotely operated underwater vehicle). Also, the core sample collection has been conducted in an evenly distributed measuring grid with an average density of 1 core sample per 3 km^2.

Type of surveys	Time of field studies	Range	Methods
Hydrometeorological (including sea currents)	03.2016 – 04.2017	OWF Area	The measurements have been carried out using two sets of measurement buoys for measuring meteorological conditions and four sets for bottom measurements of physical parameters (two directly under the buoys and two in places of the shallowest areas of the OWF). Measuring sets recorded the following elements: wind (velocities and directions), atmospheric pressure, temperature and humidity of air, wave motion (heights, periods and directions), sea levels and sea currents (velocities and directions, recorded in the following layers: surface, central and bottom). Measurements have been carried out at hourly intervals. Meteorological stations have been located about 4 m above the free surface of the sea.
Hydrological	04.2016 – 01.2017 water samples collection; 03.2016 – 04.2017 measurements using measuring sets	OWF Area (1 NM)	Samples of surface water, bottom water and vertical profile samples have been collected at 101 survey stations. The samples were then subjected to laboratory analyses. The turbidity, salinity and water temperature have been recorded with the use of the measuring sets. The measurements have been carried out for a year, at hourly intervals. The measuring sensors have been placed at the depths of: 1 m, 4 m, 8 m, 16 m and above the seabed. In addition, the measurements of turbidity, salinity and temperature have been carried out in an entire vertical profile during water and sediment sampling as well as during the measuring sets' maintenance work.
Geochemical	06–10.2016; 01–05. 2017	OWF Area (1 NM)	At 488 survey stations distributed in a uniform grid, samples of seabed sediments have been collected, which have been subjected to laboratory analyses, carried out on the basis of PN-EN-ISO standards or, in the absence thereof, in accordance with research procedures developed by the accredited laboratory of the Maritime Institute in Gdańsk Environmental Protection Department.
Biological (phytobenthos)	06–08.2016	OWF Area (1 NM)	The surveys have been carried out in a rocky bottom area. The surveys included underwater video inspection in 25 transects (medium length 111 m) and sampling with the use of a stone grab mounted on a remotely operated underwater vehicle. Film documentation analysis and laboratory analysis of samples have been carried out.
Biological (zoobenthos)	05-07.2016	OWF Area (1 NM)	The surveys included sampling at 501 stations, including 402 on the soft seabed and 99 on the hard seabed, with the help of specialist equipment suitable for both soft and hard seabed. Afterwards, laboratory analyses have been carried out.
Biological (ichthyofauna)	03.2016 – 01.2017	OWF Area (1 NM)	Acoustic survey – scientific echo sounder. Pelagic fish catch – pelagic trawl. Ichthyoplankton catch – Bongo net. Demersal fish catch – sets of survey nets.
Biological (marine mammals)	03.2016 – 04.2017	OWF Area (1 NM)	Passive acoustic monitoring of porpoises with the use of 10 C-POD devices spaced evenly within the OWF Area. Background noise measured using 2 (3) acoustic recorders. Aerial surveys have been carried out by qualified observers

Type of surveys	Time of field studies	Range	Methods
			along 10 transects (7 aerial surveys have been conducted in total).
Biological (migratory birds)	03–05.2016; 07–11.2016; 03.2017	OWF Area (2 NM)	Visual observations, acoustic recordings, vertical and horizontal radar measurements have been carried out. The tests have been performed at 3 stations simultaneously for over 40 days. The stations were ships which were always anchored at the same position, evenly distributed within the OWF Area. Acoustic recordings and radar measurements have been recorded in a continuous mode. Flight route tracking and visual observations have only been carried out during the day.
Biological (seabirds)	03.2016 – 03.2017	OWF Area (2 NM) and the Słupsk Bank site	Examinations along the delineated transects have been performed 23 times. They included counting all birds staying on water and birds sitting on water in a transect area (300 m off each of the ship's board) as well as counting birds in flight – all of them and in a particular moment along the transect with so-called "snap shot" technique.
Biological (bats)	05.2016 08–09.2016 04–05.2017	OWF Area (2 NM)	Bat's activity surveys have been carried out in the spring season and in the autumn migration season for over 50 nights. Bats' activity surveys have been carried out by a direct survey method recording acoustic signals during cruises with two ships along the delineated transect covering the entire OWF Area and at six monitoring points visited on rotation during the given migration season.

Source: internal data

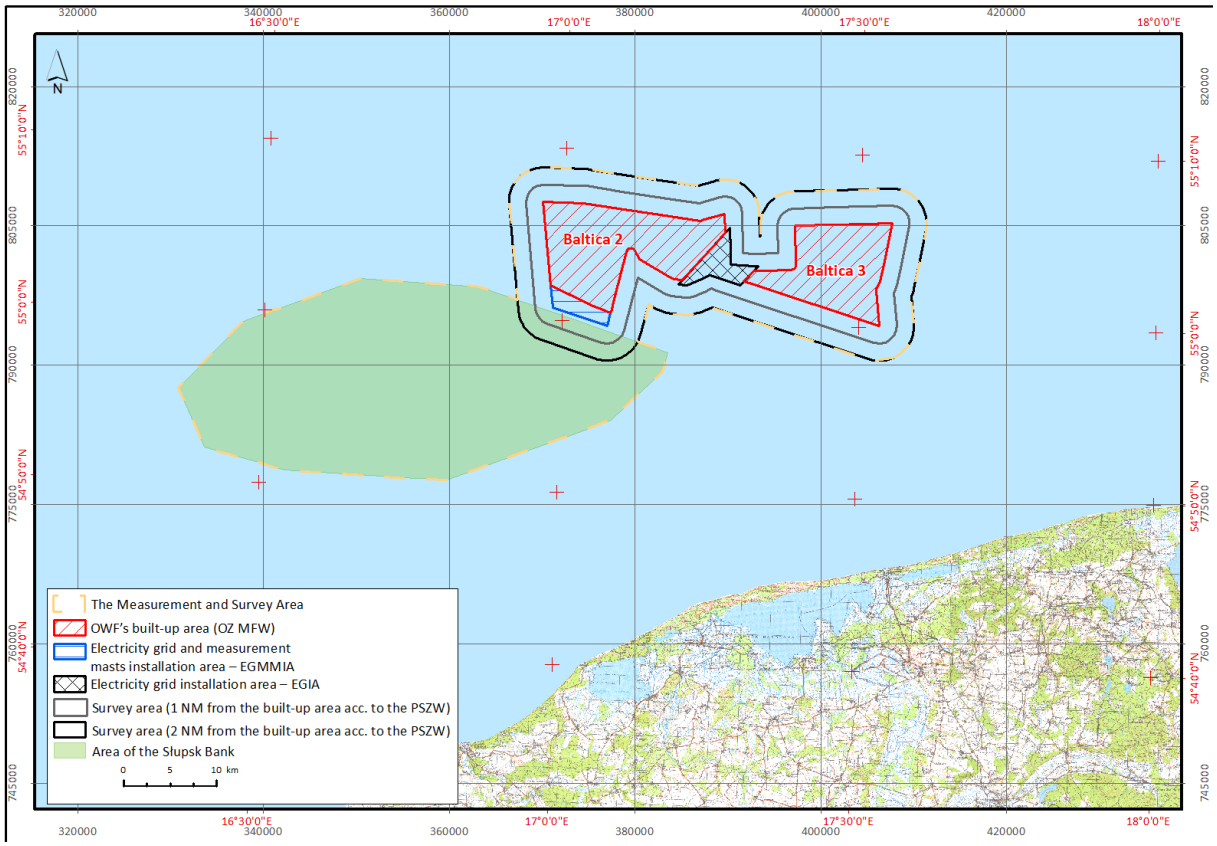

Figure 8. Location of the measurement and survey area

Source: internal data

In total 18 research vessels [examples are presented on pictures (Photo 1, Photo 2)] have carried out over 700 days of research cruises and among others:

1) 330 geophysical survey profiles and 124 deep seismic profiles have been completed to identify seabed shape and structure, in total over 7400 km of surveys;
2) sea birds' examinations have been carried out on 23 occasions in 11 transects with the total length of over 200 km, including 80 km of transects located in the Słupsk Bank site area;
3) over 1600 samples of water have been taken and 36 thousand analyses of them have been carried out;
4) almost a thousand samples of sediments were taken and 23 thousand analyses of them were carried out;
5) almost 200 lithic cores up to 6 m in length have been taken from the sea bed;
6) radar surveys have been simultaneously carried out in three locations to establish parameters of the flight of migratory birds;
7) for over a year records were kept on two measuring buoys (Photo 3), four current profilers/wave-meters, 10 continuous porpoise detectors and between 2 to 3 underwater noise recorders;
8) seven observation flights in order to survey marine mammals have been carried out;
9) four seasons of surveys of ichthyofauna have been carried out, with ichthyoplankton, pelagic and demersal fish examined;

10) through subsea video inspection (Photo 4), based on geophysical surveys – over 600 objects of anthropogenic origin, and on magnetometric surveys – over 400 magnetic anomalies have been localised.

Photo 1. R/V IMOR – the ship of the Marine Institute in Gdańsk

Source: collections of the Marine Institute in Gdańsk

Photo 2. R/V Baltica – the ship of the National Marine Fisheries Research Institute

Source: collections of the National Marine Fisheries Research Institute

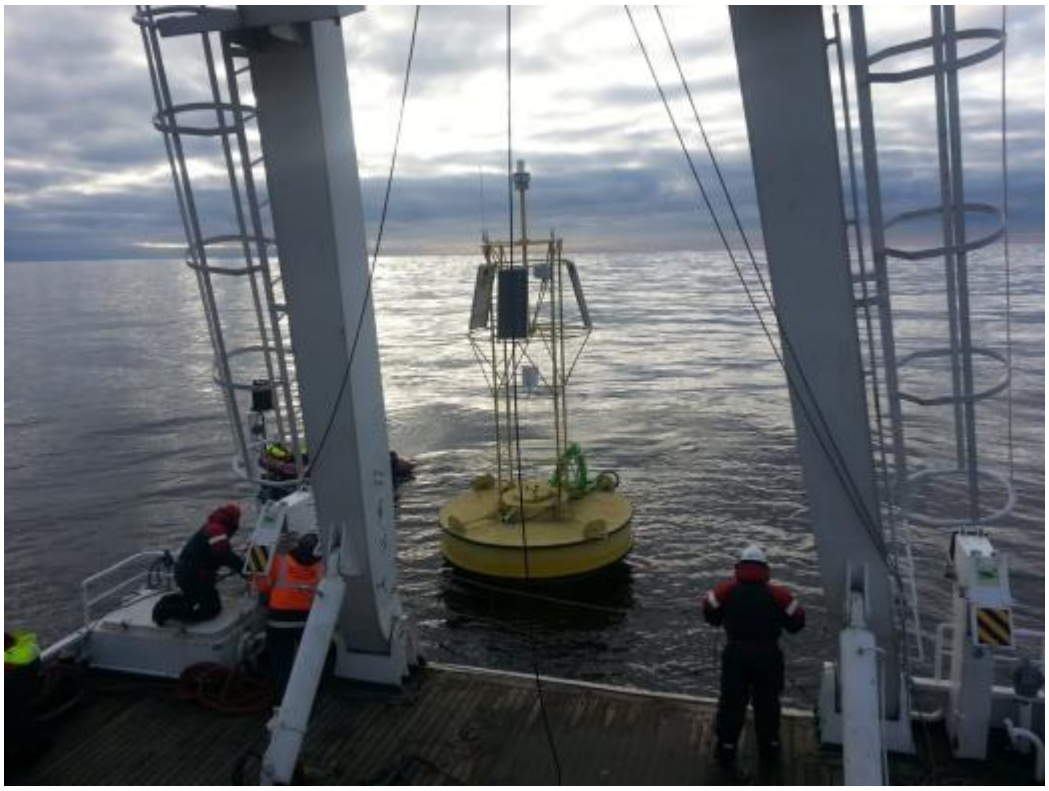

Photo 3. General view of the measurement buoy while placing it in a designated position on the sea

Source: collections of the Marine Institute in Gdańsk

Photo 4. Seaeye Falcon underwater vehicle

Source: technical documentation

Detailed results of all elements of the inventory survey are contained in the Report from the inventory of abiotic and biotic resources of the OWF Area, which constitutes the Appendix 1 of the EIA Report.

3.2 Environmental conditions

The planned Baltica OWF is **located** on the Southern Baltic, north-east of the Słupsk Bank, about 26 km north of the shoreline. The Baltica OWF Area includes a fragment of the north-east of the slope of the Słupsk Bank. The depth ranges from 21 to 53 m.

The eastern part of the Baltica OWF declines towards the north-east, with depth from about 21 m in the south to about 50 m in the north-east. The central part of the Baltica OWF includes an area with depth between about 30 and 53 m. It constitutes an evident drop located between the fragments of the western and the eastern parts. The eastern part of the Baltica OWF with depth from about 28 to about 50 m declines gently towards the north.

In this area 5 types of bottom surface have been identified: morainic plateau area, morainic plateau slope, plateau of kame terraces, plain abrasive-accumulative platform as well as relict hills of old clays, turned by the glacier in the past.

The seabed surface of almost entire Baltica OWF Area is covered with a nonadjacent and varied thin layer of fine- and medium-grained sands. In places, multi-grained sediments and clusters of boulders (so-called boulder areas) are accumulated on the seabed surface.

Superficial **sea-bed sediment**s from the Baltica OWF Area belong to non-organic sediments with the marginal content of biogenic substances. The content of metals and other organic contaminants and radionuclides is also similar to the literature data for seabed sediments of the Southern Baltic Sea. Mineral oils were the exception – their slightly increased values were recorded in two places located in the eastern part of the Baltica 2 Area. They were marginal and might be treated as incidental. Obtained results allow classifying the sea-bed sediments as clear, with the content of biogenic substances, organic pollutions and harmful substances not exceeding the values typical for sand sediments of the Southern Baltic Sea.

The surveys carried out indicated that the sediments in the Baltica OWF Area have generally been characterised by a small number of fine fractions and low concentrations of metals and persistent organic pollutants. The lack of accumulation of detrital resources is clearly demonstrated by the results of the conducted surveys.

The description of **hydrophysical** conditions in the Baltica OWF Area, i.e. salinity, temperature and turbidity of the seawater shows typical seasonal variability of these elements throughout the year.

Examined physicochemical parameters of water in the Baltica OWF Area basically did not differ from the typical content of waters of the Southern Baltic Sea. The suspended matter in the examined measurement periods was also at the level typical for the waters of the Southern Baltic Sea.

The content of nutrients (total nitrogen, mineral nitrogen, nitrates, nitrites and ammonia, phosphates and total phosphorus) in the tested waters in the Baltica OWF Area was characterised by the seasonal variability typical of the Southern Baltic Sea waters. The waters of the Baltica OWF Area were characterised by low levels of particularly harmful substances.

The average mineral oil concentration in the Baltica OWF Area was low and did not exceed environmental quality standards.

In comparison to the obtained water inspection results with the limit values specified in regulations, the Baltica OWF Area may be classified as first-class quality water (condition – very good), due to the content of dissolved oxygen, organic carbon and total phosphorus.

The other examined parameters, i.e. metals, phenols, cyanides and PCBs, did not exceed the limit values specified in the regulations. However, in the case of PAHs and mineral oil, isolated cases of exceeding the limit values have been found, but the average values of these parameters for the OWF Area have not exceeded the environmental quality standards.

The average wind velocity for the whole measurement period 2016/2017 in the Baltica OWF Area was around 7 $m \cdot s^{-1}$, and the maximum was almost 21 $m \cdot s^{-1}$. North-western winds were predominant. The air temperature ranged between about -6°C to about 23°C. Atmospheric pressure was between 979 hPa and 1043 hPa. Relative humidity was characterised by high variability, oscillating from 51% to 100%.

Due to the lack of detailed information on the current parameters of the cleanness of the air over the sea areas intended for the construction of the wind farms, the air quality assessment has been related to the information obtained as part of the measurements carried out by the Inspection of Environmental Protection within the framework of the National Environmental Monitoring for the nearest coastal research station (Łeba). The values recorded there fall within the A class air quality range.

In the sea areas, which cover the territory of the planned Baltica OWF, no measurements allowing for the assessment of the air quality in terms of their greenhouse gas content, concentrations of dust and other harmful volatile substances have been taken.

The **background noise** tests indicate that the ambient noise levels in the Baltica OWF Area are typical of the shallow waters of the Baltic Sea. Seasonal differences in noise levels at stations and between them have been found. Ship traffic is the most important source of anthropogenic noise at low frequencies.

There are no natural or artificial sources of **electromagnetic radiation** present in the area of the planned Baltica OWF project. The existing 450 kV transmission system Sweden-Poland is located several kilometres from the planned Baltica OWF location.

Trace amounts of **macroalgae** occur in the south-western part of the research area, outside of the area of the project. This is due to large depths and limited availability of the hard substrate, overgrown mainly with mussels. Such poor occurrence of the phytobenthos (sea bottom plants) is typical for the open water regions of the Baltic Sea at depths of around 20 m. Although in the research area (outside of the investment area) single specimens of rare in the PMA species *Furcellaria lumbricalis* (*F. Fastigiata)* have been found, the random nature of their occurrence and their poor quantitative structure (low percent of bottom coverage, vestigial or small size thallus) does not increase significantly natural values of the farm itself and its closest surrounding. The planned investment implementation will not make changes in the population of this species in the PMA.

For the purposes of the EIA Report preparation, surveys of **zoobenthos** (animals living on the bottom of the sea) were carried out in the Baltica OWF Area in 2016. As a result – the presence of 33 groups of zoobenthos has been determined. Zoobenthos did not stand out in terms of its content and diversity features in relation to the surveys carried out in other areas with similar environmental conditions.

As a result of surveys carried out in the region of the Baltica OWF Area it has been determined that the **ichthyoplankton** (spawn and fish on early stages of development) was moderately diversified (12 groups). The presence of the larvae of partially protected species of fish has been determined (common sea snail and gobies).

Carried out surveys indicate the occurrence of spawn of sprat, but it is not a significant spawning ground. The spawning of the sand lance, common seasnail, shorthorn sculpin and turbot cannot be excluded, but their reproduction in the waters of the nearby Słupsk Bank is more likely. The results obtained during the surveys do not indicate the presence of spawn of cod. The absence of herring in the spawning season, as well as sparse occurrence of its larvae allows determining that in the Baltica OWF Area there are no spawning grounds significant for this species. The OWF Area is a place of seasonal feeding migration of pelagic fish and cod as well as spawning flounders.

During the **ichthyofauna** (fish) surveys 19 species of fish have been caught it total with the use of all the fishing gear. Cod, flatfish, herring, sprat and sparsely occurring shorthorn sculpins, lumpfish, great sand eels and viviparous eelpout have been included to the permanent fish groups. Moreover, it has been determined that the bottom of the Baltica OWF Area may have significant feeding functions for many species harvested commercially, such as flatfish and cod.

The surveys have demonstrated the presence of **marine mammals** in the Baltica OWF Area and in the adjacent waters. The species recorded were the porpoise and the grey seal. Occasional detection of porpoise was recorded on the C-POD devices, but during visual observations they were not recorded at all. During visual observations two specimens of grey seal were recorded.

As a result of carried out surveys of **migratory birds**, in total 145 species with various occurrence rate have been observed and recorded in the Baltica OWF Area. The migratory birds' surveys were carried out for over 40 days from three vessels equipped with research radars. The surveys were carried out during the spring birds' migration season as well as in the autumn one. The most frequently recorded were: European herring gull and long-tailed duck. Most of the birds' flights took place at the altitude of 20 m above sea level. Prevailing directions of the migratory birds flying through the Baltica OWF Area in the spring season were directions from the north-east to the east, and in the autumn season – from the south-west to the west.

In the surveys of **sea birds** using the Baltica OWF Area as their overwintering and resting place during their migration, the occurrence of 14 species in total has been determined, including 12 species linked to the water environment and 2 species rarely recorded far from the coast. The surveys have been carried out in the Baltica OWF Area and in the Słupsk Bank area. The most frequently recorded were: long-tailed duck and razorbill. The most frequently recorded long-tailed duck – a bird wintering in the Słupsk Bank area – was observed during the winter season in moderate numbers – over 60 specimens on km^2 in the Słupsk Bank area and more than 5 specimens on km^2 in the Baltica OWF Area, which is the evidence of significantly smaller appeal of the Baltica OWF Area for wintering long-tailed ducks than that of the Słupsk Bank area.

The surveys of **bats**' activity in the Baltica OWF Area were carried out during the spring and the autumn migration season. In total 79 records indicating low activity of bats have been recorded. The records have been allocated to the following species: common noctule, Nathusius's' pipistrelle, soprano pipistrelle and lesser noctule as well as Daubenton's bat.

The Baltica OWF Area is located outside the boundaries of the **protected areas**, created in accordance with the Nature Conservation Act of 16 April 2004; it is also outside the European Ecological Network Natura 2000. The four conservation sites of the Natura 2000 located closest to the OWF Area are: the Słupsk Bank (PLC990001) – 2 km, *Przybrzeżne wody Bałtyku* (PLB990002) – 12 km, *Ostoja Słowińska* (PLH220023) – 23 km and *Pobrzeże Słowińskie* (PLB220003) – 26 km. In the *Ostoja Słowińska* area (PLH220023) the Słowiński National Park is located, including its marine part.

The results of the environmental surveys carried out for the purposes of the EIA Report indicate that the Baltica OWF Area in terms of biodiversity is in most cases homogeneous. It is impossible to indicate parts of areas with higher natural values than others. The results regarding sea birds and the long-neck duck distribution are the exception indicating that it prefers sea areas with the depth smaller than 30 m. In the remaining part of the Baltica OWF Area it occurs in definitely smaller numbers. However, the sea area with the depth smaller than 30 m constitutes only 6% of the Baltica OWF Area.

There are no elements of the underwater **cultural heritage** in the Baltica OWF Area. During the geophysical surveys conducted in 2016, 3 unknown wrecks were found in the Baltica OWF Area, two of which have been reported as potential elements of the underwater cultural heritage to the Provincial Monument Conservator in Gdańsk. The third case referred to a wreck, which did not meet the cultural heritage criteria.

The Baltica OWF Area is characterised by a small degree of exploitation through **human activity**.

As part of the works on the EIA Report surveys of fishing activity have been carried out, including the size and value of the catch as well as the amount of the fishing effort. The primary species of fish caught in the area of the five analysed fishing squares in the years 2012–2016 were cod and flounder.

In the neighbourhood of the Baltica OWF Area there is a training ground of the Navy which is not a restricted zone. The training ground is intended for submarine exercises.

In the Baltica OWF Area, people stay sporadically and briefly. Customary and planned shipping routes and other busy routes used by ships run through the Baltica OWF and in its region – in a distance of between several to several dozen kilometres. It is proposed to create a new North-Eastern shipping route corridor on the north side of the Baltica OWF Area. There are no permanent elements of development in the Baltica OWF Area and its vicinity.

The nearest forms of land development are the areas of concession for exploration and identification of crude oil and natural gas deposits, and the nearest extraction platform is located at a distance of over 55 km.

Within the area of the Baltica OWF's potential impact on landscape there is a land area on the stretch from Wicko in the west to Jastrzębia Góra in the east. Due to the coastal zone shape, in some weather conditions from beaches along this section the highest elements of the Baltica OWF's wind power stations located nearest the coast might be visible.

4 Modelling carried out for the purposes of the project's impact assessment

For the purposes of the EIA Report three models have been made; their purpose was to:

- obtain information regarding the scope and concentration of the suspended matter's dispersion as a result of the installation and construction works – detailed results are presented in the Appendix 3;
- obtain information regarding the scope and intensity of the noise generated during the installation and construction works – detailed results are presented in the Appendix 2;
- calculate the potential number of allisions of birds migrating through the Baltica OWF Area with wind power stations – detailed results are presented in the Appendix 4.

Modelling of the propagation of the suspended matter was carried out for various foundation sizes, depth and type of sediment. The results of the simulations carried out lead to the following conclusions:

- the greatest ranges of the suspended matter's impact occur at moderate winds with steady direction;
- higher concentrations of suspended matter (ranging from a dozen to several dozen $mg \cdot l^{-1}$) are limited to the local area of the dredging works;
- the greatest thickness of layers of newly created sediments, in cases of the least beneficial conditions within 100 m of the location of works carried out – they do not exceed the value of 18 mm after carrying out preparations for the foundation and 9 mm after laying power cables;
- thickness of newly created sediments within 1000 m from the location of works carried out do not exceed the value of 4 mm;
- the impact of suspended solids on the marine environment in the least favourable scenario does not exceed 42 hours from the beginning of work in the seabed on a single foundation (this condition is determined by the moment of reaching the negligible concentration, lower than 2 $mg \cdot l^{-1}$);
- dredging works carried out in two locations at the same time, in order to install supporting structures within 3 km from each other do not impact each other in terms of the interaction of their suspended matter, when work is carried out in non-cohesive soils (such as sand, rubble) and have little impact in the case of cohesive soils.

The results of the model tests of the suspended matter's dispersion were taken into account during the project's impact assessment, particularly on benthic organisms and fish.

For the model calculations of the underwater noise one scenario of piling was accepted in relation to the envelope nature of the EIA Report – until now never used before – foundation piling with pile diameter of 12.5 m, including the use of the underwater noise reduction system (e.g. bubble curtain or other equivalent noise reduction measures). Modelling carried out demonstrated that even with such a large pile diameter noise reducing measures allowing to reach such an underwater noise level which will not impact significantly marine biota can be used in the key areas (e.g. at the boundary of the protection place of the porpoise of the Ostoja Słowiańska). Analyses of noise propagation for frequencies which might be affecting porpoises, seals and fish have been carried out. These analyses

indicate that the lowest level of noise changing behaviour of animals on average from the piling location has a range 24 km, 4.1 km and 24.1 km for porpoises, seals and fish respectively. It cannot be ruled out that in regard to the Applicant's approach, which indicates that newest and innovative methods will be applied during the project's implementation, these values will be decreased significantly after selection of a specific model/specific models of wind power stations, and consequently – the sizes of piles.

The result of modelling of allisions of migratory birds indicate unambiguously that regardless of the species of birds flying through, after application of at least 20 m gap between the endings of operating blades and the surface of water, potential allisions will be isolated. The significance of the impact for particular species is assessed in the Appendix 4 and it was insignificant at the most.

5 The description of the envisaged environmental effects in the event of a failure to undertake the project, considering available environmental information and scientific knowledge

Failure to undertake the Baltica OWF may have negative impact on the environment. First of all, providing the same amount of energy from sources based on fossil fuels will result in emissions of greenhouse gases and pollutions to the atmosphere. In the case of the new sources – energy generation will also involve making spatial changes and creating new inland impact zones. All the above will involve difficult to assess, but surely negative impact on the environment. Is it not possible to indicate their results, as in the case of the new sources their locations are not known.

6 The Project's Environmental Impact Assessment

The impact of the Baltica OWF in all phases of the project and for specific components has been summarized in the next subsections. In the last subsection, the summary of the assessment of the impact of the Baltica OWF on the Natura 2000 area has been presented.

6.1 Seabed, including: geological structure, seabed sediments, access to resources and deposits

The impact of the Baltica OWF on the seabed in all phases of the project has been compiled together with its impact assessment in the table below (Table 5).

Table 5. The significance of the impact of the Baltica OWF on the seabed in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Disruption of the seabed structure	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Change of the seabed morphology	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Change of the composition of sediments	Irrelevant	None	Irrelevant	None
Ground subsidence	Irrelevant	Irrelevant	Irrelevant	Irrelevant

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Resuspension and sedimentation of suspended matter	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Sediment heating	None	Irrelevant	Irrelevant	None

Source: internal data

As indicated in the above table, the significance of the impact of the Baltic OWF on the seabed in all phases of the project is negligible. Heating the sediments by buried in the seabed cables – the impact present in the exploitation phase – is an example of the fact that not all impacts occur in all phases of the project.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by greater coverage of the seabed area (higher number of the foundations) and potentially larger amount of agitated sediment in the rational alternative variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on the seabed is more beneficial for the environment.

6.2 Marine waters and the quality of marine waters and seabed sediments

The impact of the Baltica OWF on marine waters and the quality of marine waters and seabed sediments in all phases of the project has been complied together with its impact assessment in the table below (Table 6).

Table 6. The significance of the impact of the Baltica OWF on marine waters and quality of marine waters and seabed sediments in all phases of the project

Impact	Phase of the project			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Resuspension and sedimentation of suspended solids	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Contamination with accidentally released wastewater	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Release of contaminants and nutrients from the sediment into the water deep related with resuspension (agitation) of seabed sediment	Irrelevant (for sediments) Insignificant (for water)	Irrelevant (for sediments) Insignificant (for water)	Irrelevant (for sediments) Insignificant (for water)	Irrelevant (for sediments) Insignificant (for water)
Contamination with compounds from anticorrosion protection agents	None	Insignificant	Insignificant	None
Impact on wave motion and ocean currents	None	Irrelevant	Irrelevant	None

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on marine waters and quality of marine waters and seabed sediments in all phases of the project is insignificant at the

most. Contamination with the compounds coming from corrosion protection measures – the impact present in the exploitation phase – is an example of the fact that not all impacts occur in all phases of the project. It must be added that the impact related to anti-corrosion protection may not occur at all, if electrolytic cathodic protection is used. However, the option to choose this technology will depend on the foundation type.

The significance of the impact for the Applicant' variant and the rational alternative variant are the same. The difference in the impact is caused by the higher number of power stations and consequently – greater needs in terms of anti-corrosion protection and potentially greater amount of resuspended sediment in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on marine water and the quality of marine water and seabed sediments is more beneficial for the environment.

6.3 Climate and atmospheric air

The impact of the Baltica OWF on the climate and atmospheric air in all phases of the project has been compiled together with its impact assessment in the table below (Table 7).

Table 7. The significance of the impact of the Baltica OWF on the climate and atmospheric air in all phases of the project

Impact	**Phase of the investment**			
	Construction	**Exploitation**	**Overlapping construction and exploitation**	**Decommissioning**
Greenhouse gases emission as a result of the fuel consumption on vessels	Insignificant	Irrelevant	Insignificant	Insignificant
Emissions reduction due to generating energy from zero-emission sources (**positive impact**)	None	Difficult to estimate	Difficult to estimate	None

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on the climate and atmospheric air in all phases of the project is insignificant at the most. Emissions reduction – the impact present in the exploitation phase – is an example of the fact that not all impacts occur in all phases of the project. It needs to be noted that the significance of the impact in a form of emissions reduction is difficult to assess – this arises from the fact that the emissions reductions effects may appear in any location, where energy is generated with the use of other sources of emissions (e.g. coal-fired power plant) and emissions reduction may have different significance of the impact in different locations. However, it is important that this impact is positive. Emissions reduction is more times greater (more than tenfold) than estimated emissions from the vessels used to work on the Baltica OWF.

The significance of the impact for the Applicant' variant and the rational alternative variant are the same. The difference in the impact is caused by the higher number of power stations and consequently – greater needs in terms of ship traffic and fuel consumption in the alternative rational variant in comparison to the Applicant's variant. Emissions reduction at the same installed capacity practically will be very similar and will depend solely on the efficiency of the wind power plant

complex. The Applicant's variant in terms of the impact on the climate and atmospheric air is more beneficial for the environment.

6.4 Phytobenthos

The impact of the Baltica OWF on phytobenthos (animals living near the sea bottom) in all phases of the project has been compiled together with its impact assessment in the table below (Table 8).

Table 8. The significance of the impact of the Baltica OWF on phytobenthos in all phases of the project

Impact	**Phase of the investment**			
	Construction	**Exploitation**	**Overlapping construction and exploitation**	**Decommissioning**
Disruption of the seabed structure	None	None	None	None
Increase of suspended matter concentration in the sea deep and suspended matter sedimentation	Irrelevant	None	Irrelevant	Irrelevant
Release of contaminants and nutrients from the sediment into the water deep related with resuspension (agitation) of seabed sediment	Irrelevant	None	Irrelevant	Irrelevant
Habitat loss	None	None	None	Irrelevant
Artificial reef effect – the presence of artificial hard substrate in the environment (negative and positive impact)	None	Irrelevant	Irrelevant	Irrelevant

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on phytobenthos in all phases of the project is at the most – irrelevant. The lack of or insignificance of the impact of the Baltica OWF Area on phytobenthos results from the fact that its trace amounts have been found in the research areas, outside of the Baltica OWF Area and they have been only in the south-western part of the research area. The artificial reefs effect may have positive impact – creation a new habitat for phytobenthos, and negative – it may lead to the settling of alien organisms.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – the greater sea bottom ground take, the larger construction surface that may be covered with vegetation, and potentially greater amount of resuspended sediment in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on phytobenthos is more beneficial for the environment.

6.5 Zoobenthos

The impact of the Baltica OWF on phytobenthos (animals living near the sea bottom) in all phases of the project has been compiled together with its impact assessment in the table below (Table 9).

Table 9. The significance of the impact of the Baltica OWF on zoobenthos in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Disruption of sediment structure	Irrelevant	None	Irrelevant	Irrelevant
Increase of suspended matter concentration in the sea deep and suspended matter sedimentation	Irrelevant	None	Irrelevant	Irrelevant
Release of contaminants and nutrients from the sediment into the water deep related with resuspension (agitation) of seabed sediment.	Irrelevant	None	Irrelevant	None
Coverage of the seabed	None	Irrelevant	Irrelevant	Irrelevant
The emergence of artificial hard substrate in the environment, i.e. supporting structure and scour protection layer (negative and positive impact)	None	Insignificant	Insignificant	None
The loss of artificial hard substrate in the environment, i.e. supporting structure and scour protection layer (negative and positive impact)	None	None	None	Insignificant

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on zoobenthos in all phases of the project is insignificant at the most. This results from the small value of the resource that is zoobenthos in the OWF Area, as well as small or negligible scale of the impact.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – the greater sea bottom ground coverage, greater foundation surface, and potentially greater amount of resuspended sediment in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on zoobenthos is more beneficial for the environment.

6.6 Fish

The impact of the Baltica OWF on fish in all phases of the project has been compiled together with its impact assessment in the table below (Table 10).

Table 10. The significance of the impact of the Baltica OWF on fish in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Noise emission and vibrations	Insignificant	Insignificant	Insignificant	Insignificant
Increase in suspended solids concentration	Moderate	None	Moderate	Moderate
Release of contaminants and nutrients from the sediment into	Insignificant	None	Insignificant	Insignificant

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
the water column				
Change of habitat	Insignificant (negative)	Moderate (positive)	Insignificant (negative) Moderate (positive)	Insignificant – negative
Creation of a mechanical barrier	Insignificant	Insignificant	Insignificant	None
Electromagnetic field emission	None	Insignificant	Insignificant	None

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on fish in all phases of the project is at the most – moderate. Most of the assessments of the significance of the impact of the Baltica OWF Area on fish shows increased significance due to recorded in the OWF Area occurrence of the protected fish species – common seasnail and gobies. However, most of negative effects is short term and will affect fish to a moderate degree at the most.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – it will be related to the heavier vessel traffic (noise and vibrations), the larger foundation surface, and potentially greater amount of resuspended sediment in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on fish is more beneficial for the environment.

6.7 Marine mammals

The impact of the Baltica OWF on marine mammals (seals and porpoises) in all phases of the project has been compiled together with its impact assessment in the table below (Table 11).

Table 11. The significance of the impact of the Baltica OWF on marine mammals in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Noise and vibrations emission from various sources	Moderate	Insignificant	Moderate	Insignificant
Resuspension of the sediments	Moderate	None	Moderate	None
Changes in the environment	Moderate	None	Moderate	None
Collisions of vessels	Moderate	Insignificant	Moderate	Insignificant
Emission of the electromagnetic field	Insignificant	Insignificant	Insignificant	None
Visual effects	None	Insignificant	Insignificant	None
Reef effect	None	Of little importance (positive)	Of little importance (positive)	None
Shelter effect	None	Of little importance (positive)	Of little importance (positive)	None
Drilling	None	None	None	Insignificant

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on marine mammals in all phases of the project is at the most – moderate. Most of the assessments of the significance of the impact of the Baltica OWF Area on marine mammals shows increased significance due to the importance of porpoise (high value of the resource) that was recorded, although rarely, in the Baltica OWF Area. The greatest expected impact is linked to the construction phase and the noise during foundation laying processes.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – it will be related to the heavier vessel traffic (noise and vibrations), the higher number of foundations (more piling), and potentially greater amount of resuspended sediment in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on marine mammals is more beneficial for the environment.

6.8 Seabirds

The impact of the Baltica OWF on marine mammals in all phases of the project has been compiled together with its impact assessment in the table below (Table 12).

Table 12. The significance of the impact of the Baltica OWF on seabirds in all phases of the project

Impact	**Phase of the investment**			
	Construction	**Exploitation**	**Overlapping construction and exploitation**	**Decommissioning**
Traffic of watercraft and helicopters	Moderate	Moderate	Moderate	Moderate
Noise and vibrations	Moderate	Moderate	Moderate	Moderate
Lighting of the investment site	Moderate	None	Moderate	Moderate
Creation of a mechanical barrier	Moderate	None	Moderate	None
Barrier caused by the presence of ships	Insignificant	None	Insignificant	Insignificant
Collisions with ships	Insignificant	None	Insignificant	Insignificant
Destruction of benthos habitats	Moderate	None	Moderate	None
Increase in concentration of suspended matter in water	Insignificant	None	Insignificant	Insignificant
Re-deposition of disrupted sediments	Insignificant	None	Insignificant	None
Disturbing and displacement from habitats	None	Moderate	Moderate	None
Collisions with power stations	None	Moderate	Moderate	None
The creation of artificial reef	None	Insignificant	Insignificant	None
The creation of a closed sea area	None	Insignificant	Insignificant	None
Decommissioning of farm buildings	None	None	None	Moderate

Source: internal data

As indicated in the above table, the significance of the impact of the Baltic OWF on seabirds in all phases of the project is at the most – moderate. Most of the assessments of the significance of the impact of the Baltica OWF Area on seabirds shows increased significance due to the significance of two species – black throated loon and red-throated loon which were recorded, although very rarely, in the Baltica OWF Area. The greatest expected impact is linked to the phases of construction and decommissioning (vessels traffic, noise, lightening and mechanical barrier) and with the exploitation phase (vessel traffic, noise, lightening and potential allisions with power stations).

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – it will be related to the heavier vessel traffic (noise and vibrations) and higher probability of collisions in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on marine mammals is more beneficial for the environment.

6.9 Migratory birds

The impact of the Baltica OWF on migratory birds in all phases of the project has been compiled together with its impact assessment in the table below (Table 13).

Table 13. The significance of the impact of the Baltica OWF on migratory birds in all phases of the project

Impact	**Phase of the investment**			
	Construction	**Exploitation**	**Overlapping construction and exploitation**	**Decommissioning**
Barrier effect – vessel traffic	Insignificant	None	Insignificant	Insignificant
Collisions with ships	Insignificant	None	Insignificant	Insignificant
Barrier effect – wind power stations	None	Insignificant	Insignificant	None
Collisions with power stations	None	Insignificant	Insignificant	None

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on migratory birds in all phases of the project is insignificant at the most. Most of the assessments of the significance of the impact of the Baltica OWF Area on migratory birds show increased significance due to occurrence of species of great importance.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – it will be related to the heavier vessel traffic and higher probability of collisions in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on migratory birds is more beneficial for the environment.

6.10 Bats

The impact of the Baltica OWF on bats in all phases of the project has been compiled together with its impact assessment in the table below (Table 14).

Table 14. The significance of the impact of the Baltica OWF on bats in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Vessel traffic	Insignificant	Insignificant	Insignificant	Insignificant
Installation of elements of the farm	Insignificant	None	Insignificant	None
Above-water noise	Insignificant	Insignificant	Insignificant	Insignificant
Allisions with elements of the power station	None	Insignificant	Insignificant	None
Barotrauma – a shock associated with the change of pressure in the vicinity of rotating blades in wind power stations	None	Insignificant	Insignificant	None

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on bats in all phases of the project is insignificant at the most. This is related to their very sparse occurrence in the OWF Area, in spite of the high value of the resource.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – heavier vessel traffic and higher probability of allisions in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on seabirds is more beneficial for the environment.

6.11 Protected areas (other than Natura 2000 sites)

As part of the analysis of the impact of the Baltica OWF on the protected areas other than Natura 2000 site, is has been established that the Słowiński National Park is located within the potential impact range, situated within 23 km from the Baltica OWF. In the Appendix to the ordinance of the Minister of Environment of 16 February 2017 on the Słowiński National Park safeguarding duties (Official Journal of the Ministry of Environment – Dz.Urz.MŚ.2017.10 as amended), the wind farms construction within the Park's zone was listed among potential external hazard. The Baltica OWF is located outside of the Park's zone, at a distance of over 20 km and as such, it does not constitute a risk to the Park. In relation to the above for both the Applicant's variant and the rational alternative variant there will be no impact on the protected areas other than on the areas of Natura 2000.

6.12 Wildlife corridors

The impact of the Baltica OWF on wildlife corridors in all phases of the project has been compiled together with its impact assessment in the table below (Table 15).

Table 15. The significance of the impact of the Baltica OWF on wildlife corridors in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Physical barrier effect	Irrelevant	Irrelevant	Irrelevant	Irrelevant

Source: internal data

As indicated in the above table, the significance of the impact of the Baltica OWF on wildlife corridors in all phases of the project is insubstantial.

The impact of the Baltica OWF on wildlife corridors is the same for the Applicant's variant and for the rational alternative variant.

6.13 Biodiversity

The impact of the Baltica OWF on biodiversity in all phases of the project has been compiled together with its impact assessment in the table below (Table 16).

Table 16. The significance of the impact of the Baltica OWF on biodiversity in all phases of the project

Impact	**Phase of the investment**			
	Construction	**Exploitation**	**Overlapping construction and exploitation**	**Decommissioning**
Emissions (noise, suspended matter, nutrients)	Insignificant	Insignificant	Insignificant	Insignificant
Physical barrier effect	Insignificant	Insignificant	Insignificant	Insignificant

Source: internal data

As indicated in the above table, the significance of the impact of the Baltic OWF on biodiversity in all phases of the project is insignificant.

The impact of the Baltica OWF on biodiversity is the same for the Applicant's variant and for the rational alternative variant.

6.14 Cultural amenities, monuments and archaeological sites

The impact of the Baltica OWF on cultural amenities, monuments and archaeological sites in all phases of the project has been compiled together with its impact assessment in the table below (Table 17).

Table 17. The significance of the impact of the Baltica OWF on cultural amenities, monuments and archaeological sites in all phases of the project

Impact	**Phase of the investment**			
	Construction	**Exploitation**	**Overlapping construction and exploitation**	**Decommissioning**
Damaging or complete destruction of archaeological relics by anchors	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Damage or complete destruction during settling gravity based foundations and cable laying	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Damage during installation of pile type foundations	Insignificant	Irrelevant	Irrelevant	Irrelevant
Ground subsidence	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Uncovering of archaeological sites and objects	Irrelevant	Irrelevant	Irrelevant	Irrelevant

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Re-deposition of re-suspended sediment	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Discovery of new archaeological sites and objects	Irrelevant	Irrelevant	Irrelevant	Irrelevant

Source: internal data

As indicated in the table above, the significance of the impact of the Baltica OWF on cultural amenities, monuments and archaeological sites and objects in all phases of the project is insignificant at the most. The greatest expected impact is linked to the construction phase and potential damages during foundation laying processes.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – it will be related to the higher number of the foundations and as a result – greater seabed area where potential damages of elements with cultural value or those being monuments can occur, in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on cultural amenities, monuments and archaeology is more beneficial for the environment.

6.15 The exploitation and development of the sea area and material goods

The impact of the Baltica OWF on the exploitation and development of the sea area and material goods in all phases of the project has been compiled together with its impact assessment in the table below (Table 18).

Table 18. The significance of the impact of the Baltica OWF on the exploitation and development of the sea area and material goods in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Fishing restrictions in the Baltica OWF Area	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Accumulation of fishing exclusion zones	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Extension of ship passage route to the fisheries located north of the Baltica OWF	Irrelevant	Irrelevant	Irrelevant	Irrelevant

Source: internal data

As indicated in the above table, the significance of the impact of the Baltica OWF on the exploitation and development of the sea area and material goods in all phases of the project is insignificant. Currently the only forms of the exploitation of the sea area are fishery and navigation. As the vessel traffic can bypass the Baltica OWF Area and the work on the spatial management plan of the PMA is in progress, it was concluded that there would be no significant impact on navigation – also due to small vessel traffic in the Baltica OWF Area.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – the higher density of their distribution in the Baltica OWF Area in the alternative rational variant in comparison to the Applicant's variant. Higher density of powers stations distribution will result in the higher impact on the vessel traffic in the Baltica OWF Area in the case of allowing the vessel traffic to pass through this area (the decision is within the remit of the maritime administration). The Applicant's variant in terms of the impact on the exploitation and development of the sea area and the material goods is more beneficial for the environment.

6.16 Landscape, including cultural landscape

The impact of the Baltica OWF on landscape, including cultural landscape in all phases of the project has been compiled together with its impact assessment in the table below (Table 19).

Table 19. The significance of the impact of the Baltica OWF on landscape, including cultural landscape in all phases of the project

Impact	**Phase of the investment**			
	Construction	**Exploitation**	**Overlapping construction and exploitation**	**Decommissioning**
Landscape disturbance arising from the vessel traffic	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Landscape disturbance arising from transportation of the structural components of the OWF	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Landscape disturbance arising from building the OWF structure	Irrelevant	Irrelevant	Irrelevant	Irrelevant

Source: internal data

As indicated in the above table, the significance of the impact of the Baltic OWF on landscape, including cultural landscape in all phases of the project is insignificant.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – it will be related to the higher density of the wind power stations distribution and heavier vessel traffic in the rational alternative variant, in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on landscape, including cultural landscape is more beneficial for the environment.

6.17 Population, health and living conditions of people

The impact of the Baltica OWF on population, health and living conditions of people in all phases of the project has been compiled together with its impact assessment in the table below (Table 20).

Table 20. The significance of the impact of the Baltica OWF on population, health and living conditions of people in all phases of the project

Impact	Phase of the investment			
	Construction	Exploitation	Overlapping construction and exploitation	Decommissioning
Noise emission	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Air pollutions	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Generation of wastewater and waste	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Shipping disruption	Irrelevant	Irrelevant	Irrelevant	Irrelevant
Exclusion of areas used in fishing industry	Irrelevant	Irrelevant	Irrelevant	Irrelevant

Source: internal data

As indicated in the above table, the significance of the impact of the Baltic OWF on population, health and living conditions of people in all phases of the project is insignificant.

The significance of the impact is the same for the Applicant's variant and for the rational alternative variant. The difference in the impact is caused by the higher number of power stations and consequently – it will be related to the heavier vessel traffic (noise, air pollution and shipping disruption) and greater quantities of generated wastewater and waste in the alternative rational variant in comparison to the Applicant's variant. The Applicant's variant in terms of the impact on population, health and living conditions of people is more beneficial for the environment.

6.18 The assessment of the impact on Natura 2000 sites

The assessment of the impact of the Baltica OWF Area on the Natura 2000 sites has been carried out in two stages, i.e. initial assessment and the main assessment.

6.18.1 Initial assessment

The key element of the initial impact assessment of the OWF on the areas of the Natura 2000 ecological network is to ascertain whether a Natura 2000 site is located within the range of the Baltica OWF's impact. The Baltica OWF Area is located outside the Natura 2000 sites. The location of the Baltica OWF Area in relation to the Natura 2000 sites is presented in the figure (Figure 9).

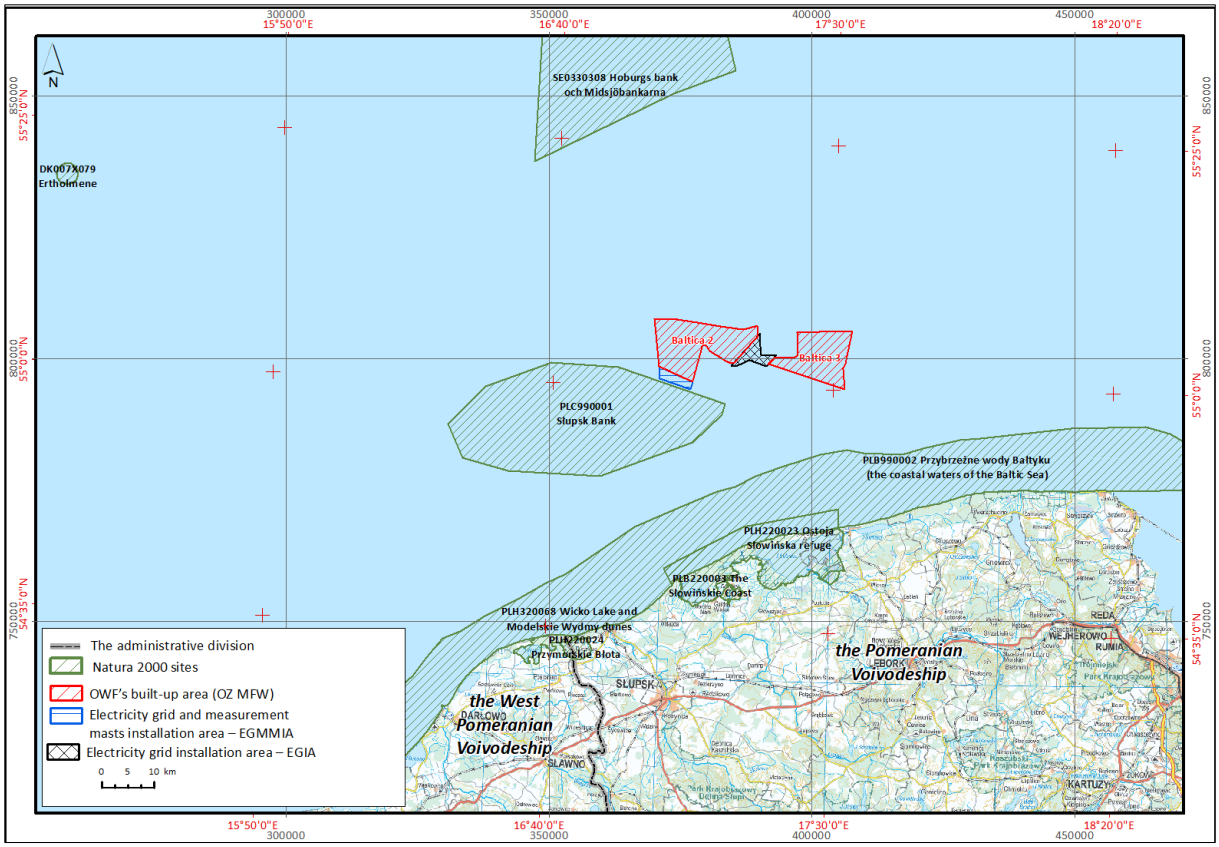

Figure 9. The areas of the Natura 2000 ecological network near the Baltica OWF area

Source: internal data

The impacts that may extend beyond the Baltica OWF Area in at least one of the three phases of the project include:

- increase of the suspended matter concentration in the water column and its sedimentation;
- underwater noise emission resulting from the specifics of carried out construction work;
- disturbance of space arising from the area being built-up with the wind power stations.

In addition to the Baltica OWF, other planned offshore wind farms, for which EIA reports have been prepared and/or environmental decisions have been issued, were also included in the analysis of cumulative impacts.

As a result of the initial assessment of the planned project's impact on the sites of the Natura 2000, considering the range and nature of its effects, both separately and with accumulation with other projects, it was indicated that two sites of the Natura 2000 are within the range of the potential impact, i.e.: the Słupsk Bank site (PLC990001) and the *Przybrzeżne wody Bałtyku* site (PLB990002).

The initial assessment has shown that there is no significant impact on the natural habitats which are the subjects of protection of the concerned the sites of the Natura 2000.

6.18.2 Main assessment

The main assessment of the project's impact on the sites of the sites of the Natura 2000 has included the aspect related to the potentially significant impact resulting from the disturbance of space in the context of: birds that are the subject of protection in the areas of the Słupsk Bank (PLC990001) and

the *Przybrzeżne wody Bałtyku* (PLB990002), the integrity of the Słupsk Bank site (PLC990001), and the coherence of the Natura 2000 network.

Subject of protection

Within the context of the protection of the seabirds' population within the Natura 2000 network, the significant features of the Słupsk Bank site (PLC990001) and *Przybrzeżne wody Bałtyku* site (PLB990002) will be:

- their location on the migration route of the Eurasian population of seabirds to the wintering grounds located in this area;
- the appropriate habitat conditions that make these areas attractive as wintering grounds or resting places during the seabirds' autumn and/or spring migration;
- the accessibility of these areas for the populations of wintering birds and birds resting during migration.

Following the assessment, carried out during the Baltica OWF's construction phase, it should be stated that no significant, negative impact in the form of displacement from their habitats bird species which are the subject of protection within the areas of the Słupsk Bank (PLC990001) and the *Przybrzeżne wody Bałtyku* (PLB990002) is expected.

In the exploitation phase, the impact on the subject of protection associated with the Słupsk Bank (PLC990001) will be moderate, and on the subject of protection associated with the *Przybrzeżne wody Bałtyku* (PLB990002) will be insignificant.

During the Baltica OWF's decommissioning phase no significant, negative impact mainly consisting in the disturbance to the birds' presence in the areas analysed and the decrease of the barrier effect for the bird species which are the subject of protection within the Słupsk Bank site (PLC990001) and the *Przybrzeżne wody Bałtyku* site (PLB990002) is expected.

Integrity

Due to the location of the Baltica OWF, the impact of the planned investment on the integrity of the Natura 2000 site can be seen in the context of the nearest to the network area, i.e. the Słupsk Bank site (PLC990001).

Within the Słupsk Bank site (PLC990001) there are two natural habitat sites for the protection of which this area has been delineated, i.e. Underwater sandy banks (Polish: *Piaszczyste ławice podwodne* – 1110) and Reefs (Polish: *Rafy* – 1170). At the same time, this area is a place of occurrence of birds, which are also the subject of its protection. Therefore, the preservation of the integrity of the Słupsk Bank site will depend on the lack of the significant impact on both the subject of protection (species and habitats) and other elements of the environment that may have an indirect impact on this site's functioning. The planned investment will not have a significant impact on them, in particular in terms of the underwater noise and the increase of the suspended matter concentration in the water column and its subsistence on the seabed.

Other important elements of the environment of the Słupsk Bank site (PLC990001) that have an influence on the preservation of this area in an undeteriorated state include: the quality of water and seabed sediments, the status of habitats for benthic and pelagic organisms, which represent the

diversity of this area and are primarily the food supply for birds. As indicated in the chapter on the impact on seabed sediments, the planned investment's impact on them will be irrelevant and occur only locally, i.e. outside the Natura 2000 site. Also, the impact on the pelagic habitat, both in terms of water dynamics and its physical and chemical parameters, has been determined as irrelevant. In view of the above, and considering the location of the planned Baltica OWF outside of the Słupsk Bank site (PLC990001), its construction will not fragment the site, nor will it lead to disturbances that could affect the size of the population, the density or the existing balance between the key organisms and the abiotic elements of this area.

Concluding, it can be stated that the significance of the Baltica OWF's impact on the integrity of the Słupsk Bank site (PLC990001) will be insignificant.

The coherence of the Natura 2000 network

Very poor knowledge of birds in the Polish Exclusive Economic Zone and the lack of data on the movements of birds and marine mammals within its area is a serious impediment in determining the possible disturbance of the coherence of the Natura 2000 network, understood as a set of environmental features and elements that provide connection between particular areas.

The Baltica OWF Area is located near the Słupsk Bank site (PLC990001), which is an important wintering ground for the long-tailed duck. An important aspect of the Natura 2000 network coherence is to ensure accessibility to this area.

As part of the planned project, a space free from wind farm installations near the south-western boundary of the Baltica 2 Area and the Słupsk Bank site (PLC990001) is designed, which will significantly reduce the impact of the offshore wind farm on the neighbouring Natura 2000 site. Also, the creation of a migration corridor between the areas of the Baltica 2 and the Baltica 3, free from wind power stations, will have a positive influence on the coherence of the Natura 2000 network by enabling the birds an unconstrained migration in the north-east to south-west direction, where most of the bird species assessed in terms of the OWF's influence on seabirds migrate.

There is no clear data on the occurrence and preferred routes of marine mammals' migrations. According to the biological descriptions of the porpoise, it feeds and lives mainly in coastal waters, and the determinant of its occurrence is the availability of food. Also, the grey seal is recorded primarily in the coastal zone, and its only permanent place of residence is found in the vicinity of the Przekop Wisły Vistula estuary. The construction of the Baltica OWF at a considerable distance from the areas where marine mammals are the subject to protection and the potential routes of their migration between these sites will not hamper their migration, and consequently on the coherence of the Natura 2000 network.

Bearing in mind the above, it can be assumed that the impact's significance of the investment in question on the Natura 2000 network's coherence will be of little importance.

As a result of the main assessment of the Baltica OWF's impact on bird species which are the subject of protection of the Słupsk Bank site (PLC990001) and the *Przybrzeżne wody Bałtyku* site (PLB990002), as well as the integrity of the Słupsk Bank site (PLC990001) and the coherence of the Natura 2000 network, it can be stated that the planned project, both in the form proposed by the

Applicant as well as a reasonable alternative will not cause significant impact on the analysed the sites of the Natura 2000.

7 Cumulative impact of the planned project

In the PMA three planned projects linked to the hydrocarbon and gas extraction are implemented and two projects linked to the construction of the OWF, adjacent to the Baltica OWF Area, which have been issued the decisions on environmental conditions (Figure 10). Each of these activities has its specific characteristics, including different environmental impacts, their type, scope, time scale and extent.

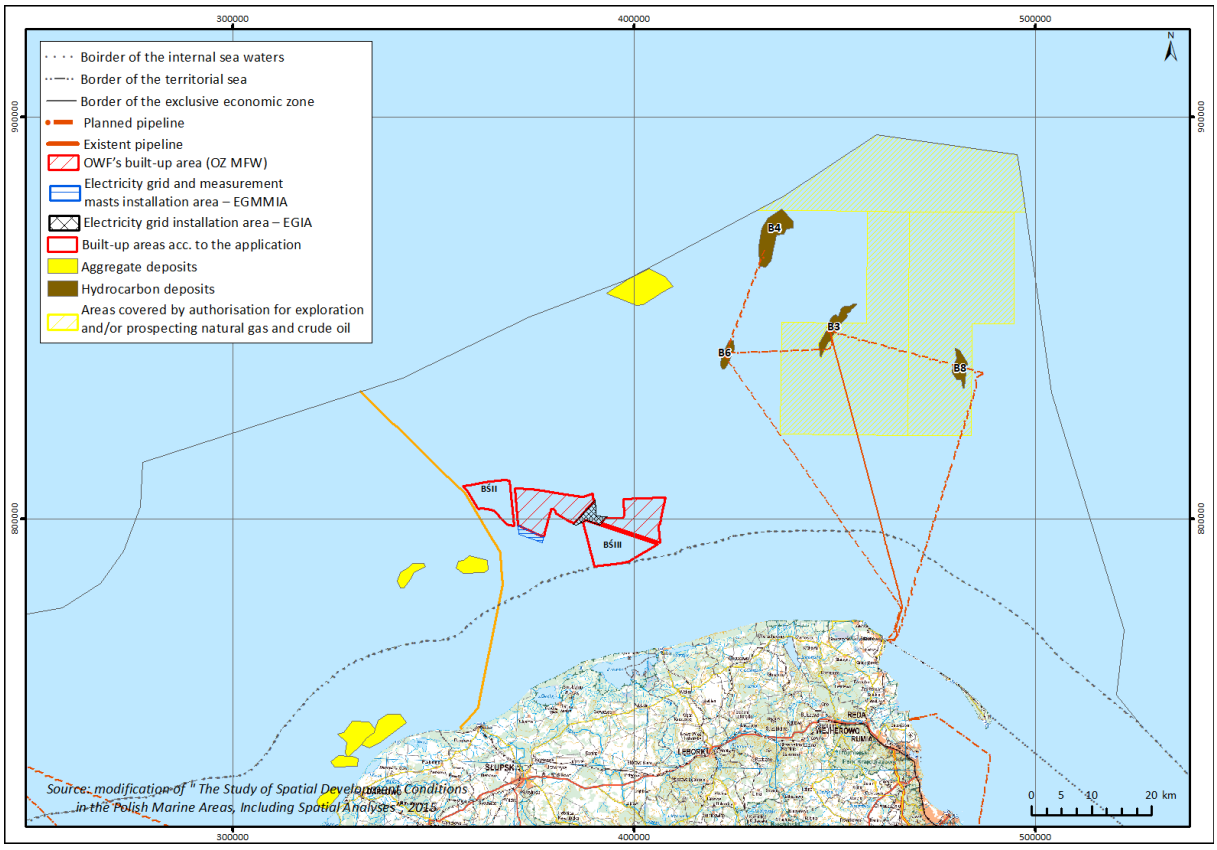

Figure 10. The location of the Baltica OWF Area and other projects within the Polish marine areas that have been issued with the decisions on environmental conditions

Source: internal data

Decisions on environmental conditions for the projects related to the extraction of hydrocarbon and gas indicate the impacts and their significance. In the context of the impact that characterizes the Baltica OWF, and which may generate a cumulative impact, the impacts of hydrocarbon and gas extraction are so irrelevant that they will not cause cumulative impact.

In case of the implementation of the two adjoining the Baltica OWF Area offshore wind farms, i.e. BŚIII and BŚII, due to the similar nature of the projects and the resulting similar impacts as well as their proximity, cumulative impacts may occur.

The cumulative impact of the Baltica OWF and other offshore wind farms may occur if actions generating similar impact are carried out simultaneously. In the case of impacts that are classified as

temporary, the cases of simultaneous execution of the same actions by different investors should be considered as rare. Also, the impacts that have been identified as local will not result in cumulative impact, as in most cases their range will be limited to the built-up area of the Baltica OWF.

Therefore, the Baltica OWF's impacts, which may generate a cumulative impact with other projects, include impacts that are at least medium-term and their range extends beyond the built-up area of the Baltica OWF, i.e.:

- disturbance of space, including the following aspects:
  - creation of a barrier hindering free movement of birds,
  - displacement of birds from their habitats,
  - landscape disturbances,
  - interference to radars operating,
  - fishing limits;
- underwater noise;
- the increase in suspended matter and their sedimentation.

In the assessment of the cumulative impact arising from **space disturbance**, the focus was primarily on impacts on birds, which significance was assessed as the highest, i.e. as moderate. Thus, the impact on the exclusion of seabirds from feeding grounds (scaring away and displacement from habitats) and the creation of a barrier for birds caused by the presence of wind turbines has been analysed.

Exclusion from the feeding grounds may be caused by the vessels and helicopters' traffic, emission of noise and vibration, illumination of the investment site and the destruction of benthos during various phases of the investment (the impact on the long-tailed duck, velvet scoter, black-throated loon and red-throated loon).

The area of the limited accessibility of feeding grounds for seabirds increases with the increasing area adjacent to the Baltica OWF occupied by other OWFs. The biggest number of long-tailed ducks will potentially be displaced from the BŚII area during the winter period. Thanks to restricting the development area of the Baltica OWF and moving the boundary of the area of wind turbines built-up away from the Natura 2000 Słupsk Bank site (PLC990001), the number of this species' specimens displaced from their habitats in winter will be four times lower than in the case of the BŚII. It will also be smaller than the number of long-tailed ducks displaced from the BŚIII area, although the area of the Baltica OWF is significantly larger than the area of the BŚIII.

The presence of the wind power stations, the emission of light and noise can be a source of disturbance for some sensitive bird species (long-tailed duck, velvet scoter and loons) and cause their complete or partial dislocation outside the Baltica OWF.

Appearing in the construction phase structures of subsequent wind power stations and power substations will gradually cover more and more of the farm area creating the **physical barrier** for birds. The barrier effect scale will depend on the number of offshore wind turbines erected, their density, size, the clearance between the surface of the sea and the lower position of the rotor blade, rotor's diameter and the emitted light and noise. However, the choice of the variant will not have a significant influence on the size and the significance of the impact of the investment on seabirds (the same development area). Therefore, in order to overcome the impact of the compact barrier

created by the wind turbines, the Applicant decided to create a space free from installations between the Baltica 2 Area and the Baltica 3 Area.

For the four (long-tailed duck, velvet scoter, black-throated loon and red-throated loon) out of ten seabirds' species the impact scale was assessed as moderate. The wind power stations built or exploited on a large area of neighbouring farms will cause the birds to escape from the vast area, limiting their access to the feeding grounds. The high timidity of these species, however, diminishes the risk of allisions with power stations.

In the context of the cumulative impact of the Baltica OWF and two other farms (BŚII and BŚIII), it can be stated that the Applicant's decision to reduce the development area of the Baltica OWF (the removal of the boundary of the development area away from the Natura 2000 site Słupsk Bank (PLC990001), as in the case of BŚII and leaving a free from installations space between the Baltica 2 Area and the Baltica 3 Area) will significantly reduce the cumulative impact of these three farms, including the exploitation phase, on marine birds.

None of the Baltic wind farms have entered the decommissioning phase yet and therefore it is difficult to predict how many groups of birds would appear in the zone after removal of the wind power stations. While assessing the extent of the cumulative impact during decommissioning of the Baltica OWF, it was assumed that at that time the BŚII and the BŚIII will be in the decommissioning phase or shortly after. It is anticipated that with the gradual dismantling of wind turbines, the negative impacts consisting of the deterrence of birds from the area occupied by them will be reduced. The area freed from the wind power stations will most likely become at least temporarily an attractive feeding ground for sea ducks (mainly long-tailed duck), because during the exploitation of wind farms, organisms' groups, which are these birds feed, would be formed on the seabed. However, due to the direction of migration of most birds, including seabirds, in the area of the investment, along the north-east to south-west line, the wind farms most likely still in operation at that time will have an impact on them. This could result in a move of the bird migration front, which would otherwise fly over the area occupied by these two farms, to the areas of the decommissioned Baltica OWF. Birds would be able to use the feeding base developed there during the exploitation of the Baltica OWF, but according to the carried-out surveys this might only apply to the sea areas with depths of 30 m where mainly birds feeding on benthos seek food. These areas – in the case of the Baltica OWF together with the BŚII and BŚIII – constitute around 18% of the built-up area of these farms.

The creation of a physical barrier may also affect birds migrating over the areas of the Baltica OWF, BŚII and BŚIII. In this case, we are looking at the effect of bypassing the barrier and the possibility of allisions with the offshore wind power stations. During the construction and exploitation phase, the bypassing may concern the power stations under construction (unfinished and unexploited) and vessels participating in the construction works. It was estimated at values from irrelevant to insignificant.

Landscape disturbance in the case of cumulative impacts related to the simultaneous exploitation of the Baltica OWF, BŚII and BŚIII, depend mostly on weather conditions – visibility and the curvature of the Earth.

In the case of Łeba, single windmills can be seen for more than 200 hours per year, but 50% of wind power stations installed in the above mentioned OWFs will never be visible. In the case of Lubiatowo, individual wind turbines can be seen for about 160 days a year, while no more than 25% of wind power stations installed in the above mentioned OWFs will ever be visible. The wind power stations will not be visible from Ustka and Dębki.

Additionally, the constraint associated with the visibility of wind turbines from land is the Earth's curvature and the associated height restriction of the objects that can be seen from a great distance. In a practical manner, this limitation manifests itself by the fact that the greater the distance between the observer and the offshore wind power stations, the smaller part of them can be seen. As in the case of non-cumulative effects, the impact was assessed as irrelevant, although it varies depending on the observer's distance from the OWF.

Disturbances in the operation of **systems using electromagnetic field**, such as navigation radars of water crafts, coastal surveillance systems, radio communication equipment and terrestrial radio and television broadcasting, will certainly take place, both in the case of the exclusive existence of the Baltica OWF and in the case of the coexistence of the Baltica, BŚII and BŚIII OWFs.

As in the case of the exclusive impact of the Baltica OWF, in accordance with the conditions included in the PSZW (also for the BŚII and the BŚIII) investors, during the construction design stage, are obliged to make arrangements with relevant users (the Border Guard, Ministry of National Defence and maritime administration), to implement solutions that will allow them to accept the Baltica, BŚII and BŚIII OWFs' impact on communication and radiolocation systems. Therefore, despite the importance of these systems for society and the state's interest, it should be assumed that the significance of the Baltica, BŚII and BŚIII OWFs' impact on these systems will be irrelevant.

In the case of the non-availability of the area free from installations between the planned farms, the route of **fishing vessels** stationed in Ustka, and especially in Łeba, will be extended. The use of an undeveloped area between Baltica 2 Area and Baltica 3 Area as a route leading to fisheries located north of the OWF could reduce this additional distance.

For vessels operating from the port of Łeba, the additional distance to pass (using the undeveloped area between the Baltica 2 Area and the Baltica 3 Area) will be 16 km. For vessels stationed in the port of Ustka, the route will be extended from 71 km to 85–86 km in the case of a route along the western boundary of the BŚII OWF or the use of the undeveloped area. The calculations of the cost's increase based on the methodology described in the chapter, indicate that the travel time of vessels stationed in Łeba due to the need to bypass the farms when travelling to and from the fisheries will increase by approximately 1.3 hours. This will increase the cost of crew's salaries by about 28.5 thousand PLN per year. Extending the route will also increase fuel costs by approximately 13.2 thousand PLN per annum.

If the fishing vessels passage across the farm area between the Baltica 2 Area and the BŚII OWF area turns out to be impossible, the route to and from the fishery for vessels stationed in Ustka will be extended by 28 km. As a result, the time of arrival and return from the fishery will be extended by 2.5 hours. The calculations demonstrate that the extension of the route will increase the cost of fishing by about 205 thousand PLN per year, including 60 thousand PLN due to additional fuel cost and 145 thousand PLN due to the labour cost increase. Similar costs will be related to the use of the

route running through the undeveloped area between the Baltica 2 Area and the Baltica 3 Area by fishing vessels from Ustka.

From the description of **the underwater noise** effect and their ranges presented in Appendix 2 it can be concluded that in no case will they be significant effects, provided that a maximum of 2 simultaneous piling in the Baltica, BŚII and BŚIII OWFs' areas will be carried out.

Seismic surveying with the use of high-energy sound sources (e.g. an *airgun*) may be an additional potential source of cumulative underwater noise. Therefore, in the case of simultaneous seismic surveys and foundations laying in the Baltica OWF Area, cumulative impact may be significant. Very few physical remedies are used during seismic surveys – the source of noise during the survey is mobile and therefore noise reduction systems are not applicable. It is possible to reduce the arduousness by the appropriate use of the work of marine mammal observers, in accordance with international recommendations.

The simplest way of avoiding the cumulative impact is in this case the appropriate organization of actions over time – avoiding simultaneous foundation laying and seismic surveys. The significance of the impact of such underwater noise accumulation seems irrelevant because the hydrocarbon exploration licenses issued are located at a considerable distance from the Baltica OWF.

The cumulative impact arising from the **increase of the suspended matter concentration and its subsidence** will occur when simultaneous activities related to foundation engineering of the wind power stations in the construction phase in various places within the OWF areas are carried out. This impact will be limited in time. As the modelling results demonstrate, the suspension of the suspended matter in a water column will not last for more than 42 hours and the effects will occur only when the distance between the foundation engineering sites is shorter than 10 km and when the works are carried out simultaneously.

8 Transboundary impact

As a result of the assessment of the Baltica OWF's environmental impact no significant impact has been determined, including the aspect of the cumulative impact. Thus, the implementation of the planned project will not cause transboundary environmental impact and there it is not necessary to implement the procedures regarding transboundary impact.

9 Analysis and comparison of the variants considered and the most favourable variant for the environment

The fundamental difference between the variant proposed by the Applicant and the rational alternative variant is based on technical solutions resulting from the intensive development of offshore wind energy technology. The maximum installed capacity specified in the PSZW decision is the upper limit that can be implemented in both analysed variants. This limit can be realized on the basis of currently available technologies or on the assumption of their continuous development. The main factor which differentiates the two variants is the possibility of producing more powerful turbines in the future.

In the rational alternative variant wind power stations with the highest currently commonly used capacity have been accepted for the analyses. With this assumption to obtain 2550 MW it would be necessary to build 319 wind power stations. In the variant proposed by the Applicant, it has been assumed that larger wind power stations will be used, which would enable to reach the OWF's maximum installed capacity with construction of 209 wind power stations.

The variant proposed by the Applicant will allow for the implementation of the project of the same capacity, with better, in comparison to the rational alternative variant, environmental parameters, in particular with:

- fewer wind power stations;
- smaller total rotor working area;
- smaller coverage of the seabed surface;
- shorter cable length;
- shorter construction time;
- smaller resources and fuel consumption;
- smaller quantity of generated waste.

The variant proposed by the Applicant will allow reducing the environmental impact of the investment and, according to analyses included in the report, it is the variant most favourable for the environment.

10 The comparison of proposed technology with technology meeting the requirements referred to in Art. 143 of the Environmental Protection Law

The Art. 143 of the Environmental Protection Law sets out technological requirements which should be met by a newly built construction in the context of protection of the environment. Due to the technological specification and long-term conditions of operation in the marine environment, offshore wind farms require these requirements to be verified at an early stage of investment planning.

Structural elements of the OWF are to be constructed of neutral materials in relation to seawater and substrate (seabed). The resistance to erosion, corrosion or chemical compounds activity that may occur in water is a basic condition for failure-free exploitation of the OWF.

The efficiency of energy production will be one of the basic criteria for the selection of offshore wind power stations and their distribution as well as the method of transfer of the generated energy from the OWF to the National Power System with a reduction in transmission losses. The overriding criterion of energy efficiency is its production, with obvious limitations related to the windiness of the area, without the consumption of energy resources – in a fully renewable manner. In the case of this type of renewable energy, the actual efficiency of energy use involves non-returnable energy consumption to produce the OWF components (wind power stations and other facilities) and to install them at sea.

The consumption of water, materials, resources and fuel will take place during the Baltica OWF's construction phase and in the phase of dismantling its elements after their consumption from a technological point of view. For 20–30 years of exploitation, wind power stations will require the use of consumable resources and fuels during servicing.

The emissions and their range will primarily concern the acoustic impact associated with the operation of wind turbines. They will not affect marine organisms significantly nor cause noticeable electromagnetic interactions.

Experiences related to the exploitation of wind turbines in the Baltic Sea allow the installation of the most efficient and proven solutions that meet the requirements of the most advanced technologies, resistant to the operating conditions of the marine environment at very variable winds.

11 Description of the prospective actions to avoid, prevent and reduce negative impacts on the environment

The Baltica OWF's in all its phases i.e. construction, exploitation and decommissioning, will result in impacts on environmental elements classified in most cases as irrelevant or at most – moderate, therefore the following **actions to avoid, prevent or limit these impacts** have been proposed:

- selection of solid construction towers and discontinuance of the use of the truss construction in the wind power stations;
- preparation of waste and wastewater management procedures for each phase of the project;
- incorporation in the executive plan and selection of building contractors having at their disposal ships which hulls have not been covered with anti-fouling paint containing tin compounds;
- limitation of the use of strong light;
- painting the tips of the rotor blades with bright colours;
- beginning of piling with increasing impact energy (so-called "soft-start" procedure);
- decommissioning of the construction without the use of methods using explosives.

Additionally, considering the location of the Baltica OWF, and in particular, its proximity to the Natura 2000 Słupsk Bank site (PLC990001):

- the minimum clearance between the working area of the rotor and the water surface should be ascertained as 20 m;
- the vessels taking part in the implementation of the investment should be banned from entering the Słupsk Bank (PLC990001) during the period from the beginning of November to the end of April;
- the laying of foundations in the Baltica OWF Area in the period from the beginning of November to the end of April should be allowed, provided that the underwater noise resulting from these works at the boundary of the Słupsk Bank site (PLC990001) is maintained at a level that would not disturb the birds which are the subject of protection in the area.

12 Proposal for monitoring the impact of the planned project and information on the available results of another monitoring, which may be important for establishing responsibilities in this area

In connection with the Baltica OWF implementation, a monitoring scheme of the project's environmental impact in the construction, exploitation and decommissioning phase including: underwater noise, migratory birds, wintering birds, marine mammals and benthos (organisms living in or on the seabed) was proposed in the EIA Report. Other monitoring schemes implemented within the framework of the State Environment Monitoring Program in the PMA results of which might be use for verification of the assumptions of the Baltica OWF's environmental impact assessment have been indicated.

13 Limited use area

It has been indicated in the EIA Report that there are no grounds for ascertaining the prospect of exceeding the environmental quality standards for air, noise, wastewater and PEM – the magnetic and electric fields magnitude will not exceed the maximum permissible values valid outside the area, to which the Applicant has a legal title. Therefore, designation of the restricted use area is not necessary.

14 Analysis of potential social conflicts related to the planned undertaking, including the analysis of impacts on the local community

In the context of potential social conflicts related to the project's implementation, some arising from the investment aspects which might impact their emergence have been identified. At the same time, the information meetings with representatives of interested social groups (local and fishing industry communities) have been held. The outcome of these meetings has been used in the preparation of the EIA Report. Meetings with fishermen and local communities indicated resistance of the fishing community against the construction of the OWF, linked to the potential fishing limitation in the Baltica OWF Area and the transit through this area. General concern was raised regarding the condition of the Baltic Sea environment in the context of declining catch quantities. In the context of local communities, a potential use of the port in Łeba as the port serving the Baltica OWF has been recognized. As a result of these meetings both parties have taken active steps during the preparation of the spatial management plan of the PMA. This activity is carried out by the maritime administration and is supposed, among other things, to serve to reduce social conflicts associated with the use of the sea areas.

15 Indication of difficulties resulting from technical shortcomings or gaps in contemporary knowledge encountered in the preparation of the EIA Report

The research of the PMA is varied. The abiotic environment is relatively well known. Therefore, there are no knowledge gaps in the field of seabed sediments expertise, hydrology, hydrometeorology and geology of the surface features. Basic deficiencies in knowledge refer to all biotic elements: phytobenthos, zoobenthos, ichthyofauna, marine mammals, seabirds, migratory birds, and bats. This applies not only to the aspects of knowledge regarding the occurrence of the individual biotic elements, but most of all to the knowledge of the way, in which these organisms will react to the construction of the Baltica OWF – this results from the fact that up to date no offshore wind farms have been constructed in the PMA. Conclusions regarding the environment impact of the Baltica OWF can be drawn exclusively based on the experience from other areas (offshore wind farms in the North Sea and in the western part of the Baltic Sea).

16 Summary of information on investment

The planned project consisting in the construction, exploitation and decommissioning of the Baltica Offshore Wind Farm has been located in the Polish Exclusive Economic Zone of the Baltic Sea, north and north-east of the Słupsk Bank, more than 26 km north from the shoreline.

A summary of the most important parameters of the Baltica OWF has been presented in the table (Table 21).

Table 21. The list of the most important parameters of the offshore wind farm for the variant proposed by the Applicant

Parameter	Variant proposed by the Applicant
Maximum installed capacity [MW]	2550
Maximum number of wind power stations [items]	209
The maximum diameter of the rotor [m]	220
Minimum clearance between the working area of the rotor and the water surface [m]	20
Maximum height [m]	250
Maximum number of additional constructions [items]	21
Maximum number of service and residential platforms [items]	2
Maximum number of research and measurement platforms	2
The maximum diameter of the gravity based structure [m]	40
Maximum area of the seabed occupied by the gravity based structure [m^2]	1257
Maximum area of the seabed occupied by the foundations [m^2]	262,713

Source: internal data

This EIA Report describes the impact of the investment on the environment in a complete and exhaustive manner, indicating that both separately and in conjunction with other projects for which decisions on environmental conditions have been issued, regardless of the technology used – e.g. the type of foundation, the size of wind turbines – in the scope outlined in the description of the

Applicant's variant and the rational alternative does not cause significant negative impact on the environment. This also applies to the impacts on the Natura 2000 Ecological Network.

The envelope nature of this Report cause that each of potential technologies of the implementation of the investment will have smaller impact on the environment than the one describer in the Report. An example might be the choice of foundations – in case of choosing the gravity based structure, the impacts associated with the suspended matter will be the largest, but those associated with the underwater noise – much smaller than in the case of the foundation requiring piling where the impacts associated with the suspended matter will be minimal, but those associated with the noise – the largest.

The environmental impact of the investment has been reduced by moving the localization of the wind power stations away from the Natura 2000 Słupsk Bank site (PLC9900001) and leaving the migration corridor between the areas of Baltica 3 and Baltica 3. The migration corridor between the Baltica 2 and Baltica 3 areas is also a response to, included in the decisions on environmental conditions of the BŚII and BŚIII OWFs, requests regarding the need to designate a corridor for birds flying through the offshore wind farm areas. The corridor between the Baltica 2 and Baltica 3 areas has been designated on the basis of the results of migratory birds' surveys for the purposes of the EIA Report and it also takes into consideration the results of such surveys for the BŚII and BŚII OWFs. The data from the Baltica OWF surveys confirm directions and routes of the flights obtained in the earlier surveys and constitute sufficient grounds for designation of the corridor.

In the EIA Report, it was demonstrated particularly clearly that there is no significant impact related to the exact location of the wind power stations within the OWF's built-up area in relation to environmental component in all phases of the project. Therefore, it can be acknowledged that there is no need to carry out a further environmental impact assessment as part of the procedure regarding the decision on issuing a construction permit.

Both the variant of the Applicant and the analysed rational alternative variant are characterized by effects with the significance from irrelevant to moderate in all phases of the project. The intensity of some effects of the rational alternative variant is greater than in the case of the Applicant's variant. These include, for example, greater vessel traffic, larger predicted quantity of generated waste, and the larger area of covered seabed. The relatively higher intensity of these impacts would be the result of a greater number of wind power stations to be constructed, and thus many impacts may last longer and be repeated more times during individual phases of the project. Therefore, it should be stated that the investment in the Applicant's variant is the most favourable option for the environment.

17 List of tables

18 List of photographs

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