

ENVIRONMENTAL IMPACT REPORT

SUPPLEMENT TO THE REPORT ON THE ENVIRONMENTAL IMPACT OF THE "CONSTRUCTION
OF THE KARCINO-SARBIA WIND FARM (17 WIND TURBINES)" OF 2003

Name of the undertaking: **KARCINO-SARBIA Wind Farm (under construction)**

Contractor: **AOS Agencja Ochrony Środowiska Sp. z o.o.
based in Koszalin**

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I. INTRODUCTION

This document is an environmental impact report prepared for a project which is currently in the implementation phase.

The project in question is the construction of a wind farm of a capacity of 51 MW by the Investor – the company WKN Polska Sp. z o.o. based in Koszalin. The wind farm is located in the Kołobrzeg municipality, in the villages of Karcino i Sarbia, and consists of 17 VESTAS V90/3.0MW wind turbines. The project is being implemented based on the building permit no. 74/2004, issued on 27 February 2004 by the District Authorities in Kołobrzeg, together with the construction log-book. In November 2003, a Team of Environmental Impact Experts from AOS Agencja Ochrony Środowiska Sp. z o.o. based in Koszalin, drew up an Environmental Impact Report for the project. The environmental impact assessment procedure was also carried out.

Based on the environmental impact assessment procedure, the Environmental Protection Department of the Kołobrzeg District Authorities issued a Decision (ref. no. OŚ.II.7633-9/2004) dated 23.02.2004 declaring the undertaking as not in violation of current environmental protection standards.

This study supplements the Report drawn up in November 2003, and was prepared within the scope consistent with the decision issued by the Head of the Kołobrzeg Municipality on the requirement to prepare the environmental impact report and its scope, and pursuant to the decision issued by the West Pomerania Provincial Office in Szczecin (ref. no. K-SR-Ś-7-6613/159/06) on 4 September 2006 on the scope of the environmental impact report, with a particular focus on the description of the Natura 2000 network of protected nature sites within and in the vicinity of the planned project, and a list of all bird species, natural habitats, plant and animal species requiring protection in the form of establishment of Natura 2000 sites.

The Report was prepared in connection with the Investor's application for a decision on environmental requirements conditioning the consent for the project implementation. The Report and impact analyses were prepared for the entire undertaking.

The study offers a detailed description of features of the natural and cultural environment typical of the area of the project and surrounding areas, as well as presenting an analysis of potential environmental impacts of the project, particularly with regard to Natura 2000 sites.

Furthermore, the study includes a programme describing actions that can be taken in order to reduce, monitor and compensate the negative impact of the undertaking in question on the surrounding environment.

References

The procedural law basis for this study consists of the legal acts and source materials listed below:

- 1) Act on Environmental Protection Law of 27 April 2001 (Journal of Laws 2001.62.627 of 20 June 2001)
- 2) Act on Nature Conservation of 16 April 2004 (Journal of Laws of 2004, no. 92, item 880)
- 3) Act on Waste Management of 27 April 2001 (Journal of Laws no. 62, item 628)
- 4) Ordinance of the Minister of Environment of 16 May 2005 on types of habitats and plant and animal species requiring protection in the form of establishing Natura 2000 protected sites (Journal of Laws no. 94, item 795)
- 5) Ordinance of the Minister of Environment of 21 July 2004 on Natura 2000 special bird protection areas (Journal of Laws no. 229, items 2312 and 2313).
- 6) Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (21 May 1992) – EU Habitats Directive
- 7) Council Directive 79/409/EEC on the conservation of wild birds (2 April 1979) – EU Birds Directive
- 8) "Proposal regarding proposed sites within the Natura 2000 network in Poland – "Shadow List", Warsaw 2004
- 9) Ordinances of the Minister of Transport and Construction Industry of 13 January 2006 amending ordinances regulating means of reporting and marking air navigation obstructions (Journal of Laws no. 9, item 53)
- 10) Ordinance of the Minister of Environment of 29 July 2004 on acceptable noise levels in the environment (Journal of Laws no. 178, item 1841)

- 11) Ordinance of the Council of Ministers of 10 May 2005, amending the ordinance on the specification of types of undertakings that can have a major environmental impact and detailed conditions qualifying undertakings for the requirement to prepare an environmental impact report (Journal of Laws no. 92, item 769)
- 12) Ordinance of the Minister of Environment of 30 October 2003 on admissible levels of electromagnetic fields and methods of checking compliance thereof (Journal of Laws no. 192 of 14.11.2003, item 1883)
- 13) Area development plan of the Kołobrzeg municipality, approved by the resolution of the Kołobrzeg Municipality Council no. XVI/84/91 of 30.12.1991, published in the Official Journal of the Koszalin Province no. 3 of 29.02.1992, amended by the resolution of the Kołobrzeg Municipality Council no. XXXIV/189/97 of 30.12.1997, published in the Official Journal of the Koszalin Province no. 4 of 25.02.1998
- 14) "Environmental review of the Kołobrzeg municipality, general statement of environmental protection requirements", Nature Conservation Office, Szczecin 2002
- 15) "Programme of Environmental Protection in the Kołobrzeg Rural Municipality until 2012", August 2004
- 16) Marek Ziółkowski, Bogusław Kotlarz "Evaluation of the impact of the Karcin-Sarbia wind farm, Kołobrzeg municipality, on the breeding site of the white-tailed eagle *Haliaeetus albicilla*", September 2005
- 17) Prof. Maciej Gromadzki "Opinion concerning migrations of wild birds from Western Siberia, the Ural the European central region of the Russian Federation over the territory of Poland", Institute for Ornithology of the Polish Academy of Sciences
- 18) "Birds and Wind Turbines"- Danish Wind Industry Association, 10 May 2003.
- 19) "Birds and Offshore Wind Turbines", National Environmental Research Institute, Denmark 1998
- 20) "Remote techniques for counting and estimating the number of bird-wind turbines collisions at sea" M. Desholm, A.D. Fox, J. Kahlert – Department of Wildlife Ecology and Biodiversity, National Environmental Research Institute, British Ornithologists Union, 2006
- 21) Environmental Impact Report "Construction of the Sarbia-Karcino Wind Farm (17 wind turbines)", Koszalin 2003
- 22) Environmental impact report concerning the planned set of wind turbines near Gniezdzewo (Puck municipality)" Proeko, Gdańsk 2004
- 23) Catastral maps issued by the District Centre of Survey Plans and Documentation in Kołobrzeg

- 24) Topographic maps issued by the Provincial Centre of Survey Plans and Documentation in Szczecin
- 25) Analysis of sound propagation performed by WindPRO 2, version 2.5.3.65
- 26) Documentation of land and water conditions in the project implementation area – Zakład Projektowo-Handlowy "GEOLOG", Bolesław Plichta, Jakub Kanarek, Koszalin, July 2002
- 27) Geology and engineering documentation for the project area – Pracownia Badań Geologicznych "GEOPROFIL", Jan Wiśniewski, Krzysztof Urban, Koszalin 2001

II. GENERAL INFORMATION ABOUT THE PROJECT

1. Location and adjacent facilities

The wind farm under construction is located south-west of Kołobrzeg, in the vicinity of the villages of Sarbia, Karcino, Drzonowo and Nowogardek.

Wind turbines and the required technical infrastructure will be located on the plots listed below:

a) Location of wind turbines

No. of wind turbines	Plot no.	Within the bounds of	<i>Wind turbine height [m above sea level]</i>
1	756	Karcino	<i>150</i>
2	453	Karcino	<i>150</i>
3	481	Karcino	<i>150</i>
4	507	Karcino	<i>150</i>
5	521/2	Karcino	<i>150</i>
6	705	Karcino	<i>150</i>
7	705	Karcino	<i>150</i>
8	705	Karcino	<i>150</i>
9	516/4	Sarbia	<i>150</i>
10	560/8	Sarbia	<i>150</i>
11	560/8	Sarbia	<i>150</i>
12	560/8	Sarbia	<i>150</i>
13	500/1	Sarbia	<i>150</i>
14	550/1	Sarbia	<i>150</i>
15	572/1	Sarbia	<i>150</i>
16	227/1	Sarbia	<i>150</i>
17	<i>20/1</i>	<i>Sarbia</i>	<i>150</i>

The plots listed above are also provided with technical infrastructure in the form of access roads, medium-voltage power network (15/30kV), control network, telecom + IT network and assembly sites.

b) access roads: 407; 17/4; 23/1; 400; 436/4; 425/1; 428/5; 516/5; 519/2; 429; 203/1; 226; 438/7; 309/3 – within Sarbia, 463; 614; 706; 703; 702; 710; 519; 512; 508; 503/2; 530; 483/4; 483/1; 482; 539; 610; 5; 661; 638 – within Karcino, 65/2; 308; 377; 444; 151/1; 150; 301/2; 317 – within Drzonowo.

c) routes of the medium-voltage cable network (15/30kV), control network, telecom + IT network: 407; 17/4; 23/1; 400; 19/1; 18/1; 446/1; 583/1; 581; 436/4; 425/1; 428/5; 516/5; 519/2; 429; 203/1 – within Sarbia, 463; 614; 706; 703; 702; 710; 519; 512; 508; 503/2; 530; 483/4; 483/1; 482; 539; 610 – within Karcino, 177/1; 185; 208/1; 207; 205/1 – within Nowogardek.

d) transformer/switching station: 207/1, within Nowogardek

The plots on which the wind turbines are located are currently used for farming purposes. Field works will be performed on the plots of land also after the wind turbines have been installed.

The closest buildings of the Sarbia village are located ca. 580 m south of the project site, while the closest existing buildings of the Karcino village are situated ca. 590 m north of the project site.

The wind farm that is currently under construction is located north and south of the Kołobrzeg-Trzebiatów railway line which is separated from the wind farm by a forest strip and cultivated fields.

Areas of the Nowogardek village stretch around 550 m north-east of the project area.

The location of wind turbines and necessary technical infrastructure are presented on maps included in the Appendices no. 1 and 2 which are an integral part of this study.

2. Modifications to the project

In the course of the project implementation, due to changes in land ownership and organisational changes, it became necessary to introduce a number of corrections into the technical solutions that were approved in the building permit no. 74/2004 of 27.02.2004 and the decision of the Environmental Protection Department of the Kołobrzeg District Authorities (ref. no. OŚ.II.7633-9/2004) dated 23.02.2004 declaring the undertaking as not in violation of current environmental protection standards.

The modifications are effectively minor adjustments. No changes in the number of wind turbines, their type or technical parameters are planned.

The location of some internal roads on privately-owned land in the villages of Sarbia i Karcino must be changed. Also, the curvature of some exit roads connecting the district road with local roads and the local road with internal roads will be modified. Furthermore, the planned route of underground power network cables on privately-owned land or in the technical strip of local roads will be modified. Also, the location of two wind turbines will be changed by ca. 20-50 m. Despite the shift, the turbines will remain within the same plots.

The project modifications will be implemented in the plots listed below:

- change of location of two wind turbines within previously allocated plots:
plot 560/8, within Sarbia and plot 756 (previously 615) within Karcino.
- changed route of access roads designed or redesigned within the following plots: 481, 482, 483/1; 483/4; 530; 503/2; 507; 521/2; 706; 705; 703; 702; 710 within Karcino and on plots no. 429; 203/1; 519/2 within Sarbia
- changed route of the medium-voltage cable network (15/30kV), control network, telecom + IT network designed or redesigned within the following plots: 481; 482; 483/1; 483/4; 530; 503/2; 705 within Karcino and plot 519/2; 516/4; 516/5; 428/5 within Sarbia.

The scope and nature of changes introduced in the stage of the project implementation is presented in the map included in an appendix to this report. The map shows the modifications of road alignment and power cable location and the site of wind turbines.

The above-mentioned road and power cable location changes will also be accompanied by modifications of the area of road infrastructure and the length of the underground power cable.

Modifications of areas and lengths are presented in the table below:

Element [m²], [m]	As of 2004	As of 2006
Access roads, assembly sites and exits from macadam roads [m ²]	66,607	75,534
Exit from the bitumen road [m ²]	157	360
Exits from pavement slabs [m ²]	405	1518
<i>Length of the power cable [m]</i>	<i>12,439.8</i>	<i>11,734.7</i>

The scheduled changes at the implementation stage of the project increase the total area occupied by road infrastructure and hard-surface sites by 1 ha. The length of the power cable will also be changed, with the pathway reduced by ca. 705 m.

Changes in road routes had to be implemented on account of the recommendations issued by the manufacturer of wind turbines with regard to the transport of oversize cargo (weight and size of wind turbine components).

The project modifications are presented on a map which is included in the Appendix no. 1 to this Report.

3. Technical description of the project

3.1 Intended use of the facility

The wind farm is going to generate electric power that will be sold to Polish power grids.

The operation of the wind farm will be based on the use of wind energy to rotate the turbines (propellers). The rotating turbines will generate electric current.

The Vestas V90/3.0MW turbine is a pitch-regulated turbine equipped with the Optispeed control system that allows turbine blades to rotate at varying speeds. The system makes it possible to optimise the process of electric power generation, particularly in the case of modest winds, adjusting the operation of the turbine to the local electricity grids. The turbine is also provided with a microprocessor-controlled rotor pitch regulation system ensuring continuous and optimal adjustment of blade angles to wind direction and strength.

3.2. Technical information, output

According to the Investor's assumptions, the wind farm is going to consist of 17 wind turbines by VESTAS Denmark, type V90, with a capacity of 3 MW each. The total output of the wind farm is going to be 51 MW.

The wind turbines are self-operating, with a function of automatic measurements of operation and control conditions. They will only need periodic inspections and maintenance.

The cut-in wind speed is 4 m/s, while the optimum wind speed to achieve the maximum turbine output is 17 m/s. In the case of winds over 25 m/s the rotor is locked for safety reasons.

Technical specification of VESTAS V90/3.0 MW wind turbines:

No.	Data type	VESTAS V90/3.0
ROTOR		
1	Rotor diameter	90 m
2	Area	6.362 m ²
3	Nominal number of revolutions	16.1 r.p.m
4	Scope of revolutions	9-19 r.p.m
5	Number of blades	3
6	Power regulation	OptiSpeed system and blade pitch regulation system
7	Air brake	Three separate hydraulic cylinders regulating rotor blade pitch
TOWER		
8	Hub height	105 m
OPERATING PARAMETERS		
9	Cut-in wind speed	4 m/s
10	Nominal wind speed	15 m/s
11	Stop wind speed	25 m/s
GENERATOR		
12	Nominal output	3000 kW
13	Type	Asynchronous with OptiSpeed
14	Technical data	50 Hz 1.000 V
GEARBOX		
15	Type	Planet/parallel axles
CONTROL		
16	Type	Output regulation and optimisation via OptiSpeed and pitch regulation via OptiTip
WEIGHT		
18	Rotor	38 t
19	Nacelle	66 t
20	Tower	275 t

Vestas V90-3.0 MW is a rotor pitch-regulated turbine with three blades and a 90-metre rotor diameter. Rotor flexibility makes it perfect for installation in areas with low winds. The V90/3.0 MW turbine is equipped with a special system (OptiSpeed) which allows turbine blades to rotate at varying speed and pitch. A V90 wind turbine provided with the OptiSpeed system makes it possible to adjust revolution speed by up to 60%.

The OptiSpeed system optimises power generation, particularly if winds are modest. The system adjusts the operation of the turbine to suit the parameters of power grids regardless of their requirements.

In the case of low winds, VESTAS V90/3.0 turbines are another important step towards the fulfilment of low sound level requirements. The turbine makes it possible to set the sound level before the installation. In this way, the operation of the turbine is precisely adjusted to the specific requirements of any given location.

Vestas V90/3.0 MW turbines are also equipped with a microprocessor-controlled system of pitch regulation which ensures continuous and optimal adjustment of blade angles to the prevailing winds. In Vestas V90/3.0 MW turbines, the pitch mechanism is fitted in the blade hub itself and contains a separate hydraulic pitch cylinder for each blade.

Modern V90 wind turbines are equipped with a lightning protection system, protecting the entire turbine from the tips of the blades to the base. The protection system has been duly tested and conforms to DEFU recommendations and applicable IEC standards.

3.3. Employment, land development

The planned wind farm is virtually self-operating and requires only occasional maintenance. The wind farm does not require water supply pipes or lateral sanitary sewer lines.

3.4. Infrastructure and communication connections

Access to the planned wind turbines is designed from the villages of Sarbia and Drzonowo.

III. INTENDED USE OF LAND AND LAND MANAGEMENT

A) Current area development form

Lands zoned for the construction of the wind farm are currently used for agricultural purposes and designated as arable land, meadows, pastures and field cultivation areas. The areas in question belong to private owners and to the Agricultural Property Agency.

B) Provisions of the local area development plan

According to the local area development plan of the Kołobrzeg municipality, approved by the resolution of the Kołobrzeg Municipality Council no. XVI/84/91 of 30.12.1991, published in the Official Journal of the Koszalin Province no. 3 of 29.02.1992, together with the amendment approved by the resolution of the Kołobrzeg Municipality Council no. XXXIV/189/97 of 30.12.1997, published in the Official Journal of the Koszalin Province no. 4 of 25.02.1998, the development plan – in its general implementation provisions – permits the location of wind turbines within the bounds of Karcino and Nowogardek villages, between the villages of Kędzielno and Stramnica, and along the edge of the upland stretching between Budzistowo and Obroty.

The project which is currently being implemented conforms to the provisions of the local area development plan.

Following a nature conservation officer's comparative analysis of results of the 2002 nature condition survey and the Master Plan for the Kołobrzeg municipality (drawn up in 2000), discrepancies were identified between the results of the above-mentioned nature condition survey and the approved directions of area development plans for the municipality (as laid down in the Master Plan). The discrepancy resulting from the analysis concerned the planned development of residential buildings, tourist buildings, housing developments and idle land development. ***However, no conflict was found in the nature conservation officer's analysis between the protection of the municipality's environmental assets and the development of wind power industry on lands allocated for that purpose.***

IV. ENVIRONMENTAL FACTORS AFFECTING THE AREA OF THE PROJECT AND ADJACENT AREAS

ENVIRONMENTAL DESCRIPTION

The majority of lands zoned for the project are used for agricultural purposes, mainly for crop growing and as wet mown meadows. Due to the intensification of agricultural activity within the site of the project, the local landscape lost some of the elements determining its ecological value.

Since the project that is currently in progress is located in the vicinity of the Natura 2000 network, i.e. the special protected area of natural habitats called the "Trzebiatów-Kołobrzeg Coastland" (PLH 320017) and within the "Trzebiatów Wildlife Refuge", a Special Bird Protection Area proposed by non-government organisations and listed in the so-called Shadow List, a relevant analysis of the main environmental factors involved in the construction of the wind farm and an analysis of potential environmental impacts that might result from the project implementation were performed.

The impact of the wind farm on all environmental aspects within the project's impact zone was analysed.

1. GEOLOGICAL CONDITIONS IN THE PROJECT AREA

1.1. Subsurface area

In the subsoil of the documented area, there are quaternary (Holocene and Pleistocene) deposits. In the course of the soil investigations it was found that areas allocated for the construction of the wind farm in question include the following geotechnical layers:

- wet clays with an addition of mica, layered with dust,
- wet dust and clay loam,
- wet loam, sandy loam layered with fine sand, sandy loam and compact loam with an addition of gravel grains, pebbles and small boulders,
- wet and hydrated dusty sand, fine-grained sand and coarse-grained sand,

- wet and hydrated sandy gravel, gravel and – in deeper layers – pebbles with an addition of loam and gravel grains,
- wet clays,
- wet silty loam and compact silty loam, as well as wet sandy dust,
- wet loam, sandy loam, loam layered with dust, compact loam with an addition of gravel grains, pebbles and small boulders,
- wet and hydrated dusty sand, fine-grained and medium-grained sand, often with the addition of gravel grains and pebbles,
- hydrated gravel in a thick state
- hydrated fine sand in a loose state
- hydrated dusty sand, fine sand, medium-grained sand in a medium thick state
- hydrated thick fine dust,
- hydrated trick gravel,
- loam, sandy dust in a plastic state,
- loam, compact loam, sandy loam, silty loam and sandy dust,
- loam, compact loam, sandy loam, silty loam and sandy dust,
- clay in a rigid flexible state.

It was concluded that the area surveyed is characterised by simple soil conditions that enable a spread foundation of the planned wind turbines.

1.2. Surface area

Around Sarbia and Karcino, there are soils with a high profile for cereal growing and pasturage. The land zoned for the project implementation is currently used for farming purposes and is classified as crop land representing the soil valuation class RIVa, RIVb, RIII and RV , i.e. poor soils.

1.3. Topographic conditions

Geomorphologically, the area on which the wind turbines are located is a section of the hilly moraine upland of the North Polish (Baltic) Glaciation, Pomeranian phase, main substage. In land depressions, there are local hollows. In the eastern and northern parts, the moraine upland is intersected by the valleys of the Dębosznica and Łużanka rivers. The Dębosznica river flows ca. 100 m from the closest planned wind turbine (no. 6) situated at the eastern fringe of the wind farm, while the Łużanka river flows ca. 200-300 m north of the wind turbine no. 4 and north-east of the wind turbine no. 5.

The entire analysed region lies within the boundaries of the Słowińskie (Słowino) Coastland between the Trzebiatów Coast and the Gryfino Plain.

The terrain in the discussed region is hilly and undulating, with differences in level of up to ca. 9.0 m (between elevations reaching ca. 10.0-11.0 m above sea level and depressions of ca. 2.0-5.0 m above sea level).

2. WATER RESOURCES IN THE AREA OCCUPIED BY THE WIND FARM AND ADJACENT AREAS

2.1. Underground waters

The area of the wind farm, due to major distances between individual wind turbines and the extensiveness of the site, has varying water conditions.

Within the bounds of Sarbia, two basic distinct levels of underground waters were identified. The first level, with groundwater surface at atmospheric pressure or higher, was identified at depths of between 0.8 and 21.5 m below ground level, i.e. at an elevation of between 10.5 and -11.033 m above sea level. The piezometric surface of this underground water level was identified at depths of between 0.8 and 4.61 m below ground level, i.e. at an elevation of between 4.62 and 10.5 m above sea level.

The other groundwater level with a surface at a pressure higher than atmospheric was drilled at the depth of 52.0m below ground level, which corresponds to the elevation of -40.0 m above sea level. The piezometric surface of this level was found at a depth of 23.0 m below ground level, i.e. at -11.0 m above sea level. At depths of 1.30 m below ground level, 4.60 m below ground level and 5.40 m below ground level, filtrations of water from small inserts (of 5-10 cm) of fine-grained and medium-grained sand, deposited between layers of compact glacial loam, were identified. Deeper filtrations were more intensive and their hydrostatic pressure was higher than that which was identified at a depth of 1.3 m below ground level.

On the project site, within the bounds of Karcino, two groundwater levels were identified, too. The level with a free water table, perched above loam layers in fine-grained sand deposited near the surface was identified at a depth of between 1.0 and 1.5 m below ground level, i.e. at between 4.088 and 4.77 m above sea level.

The first, basic, level of underground water with a surface at a pressure higher than atmospheric was positioned at a depth of between 14.0 and 23.0 m below ground level, which corresponds to the level of between -8.412 and -17.412 m above sea level. The piezometric surface of this groundwater level was identified at a depth of between 0.5 m above ground level and 4.61 m below ground level, which corresponds to between 3.088 and 6.27 m above sea level.

Water filtrations from small sandy inserts deposited among layers of compact loam were found at depths of between 1.00 m below ground level and 1.80 m below ground level.

2.2. Surface waters

Surface waters that are found on the project site include running waters, i.e. the Dębosznica river, the Błotnica river and the Łuzanka watercourse, and standing waters, i.e. Resko Przymorskie lake, water-filled hollows and small water ponds.

a) running waters

the Dębosznica river – water quality class III; total length of 32 km, river section within the limits of the municipality: 8.78 km, a tributary to the Błotnica river, flows into Resko Lake.

the Błotnica river – water quality class III; total length of 27 km, river section within the limits of the municipality: 10.7 km, main source in Kamienica Lake (Gościno rural municipality), flows into Resko Przymorskie Lake, main sources of contamination: villages situated in the river's catchment area.

the Łuzanka watercourse – essentially ephemeral in nature, depending on the regulation of the weir on the Dębosznica in Głowaczewo. Because no drainage works have been performed during the past several dozen years, only some sections of the Łuzanka carry water.

The rivers listed above are lowland-type, with a rather slow current, meandering. The river floor is usually covered with silt or deposits of silt and sand. The river banks in some sections are high, step, covered with vegetation, mostly reed. In other sections, the river banks are flanked by wetlands lying close to the water level. The rivers intersect the area of the municipality in the western part. The river sources are located outside the municipality: the Błotnica has its rise in Kamienica Lake, while the Dębosznica rises beyond the Leszczyn village. The length of the rivers ranges between 30 and 35 km. Within the boundaries of the municipality, the Dębosznica flows through Sarbia, and Błotnica – through Błotnica and Nowogardek. The rivers flow into Resko lake in its eastern coast. The speed of

current in the estuary section is 0.1-0.2 m/s. A right tributary of the Błotnica is the Stróżka rivulet, flowing into the Błotnica below Nowogardek. The ice-marginal valley area has a strongly developed system of drainage ditches.

b) standing waters

Resko Przymorskie lake is classified as a coastal lake. The reservoir is round in shape and its shoreline is better developed than that of other littoral lakes. The lake is a refuge for a number of animal species, e.g. for legally protected mute swans, grebes and migratory birds, e.g. bean geese.

The lake is rather shallow and has a connection with the Baltic Sea. It has a high eutrophication level, which produces algal blooms in the summer. Lake water is clouded, with a transparency rarely exceeding 1 m.

Furthermore, the area of the Kołobrzeg municipality is largely covered with cultivable lands and meadows, which is related to the occurrence of mid-field water reservoirs and ponds. These are small bodies of water, usually shallow (up to 1 m deep). Pond banks are usually covered with grain crops or herbaceous vegetation, rarely shrubs and trees. The bottom is usually silt-covered. The water is clear; oxygen deficiency is usually identified in the bottom zone. Water ponds are usually inhabited by animal species that are typical of small water reservoirs, eurytopic and cosmopolitan. Organisms inhabiting the ponds are mobile and considerably resistant to the occasional drying of water and lack of oxygen.

3. ATMOSPHERIC RESOURCES

The Kołobrzeg municipality lies in the maritime climate zone which – in a narrow strip (usually not exceeding 35 km in width) – stretches along the Baltic shoreline. The area has the Baltic-type climate whose basic properties result from the close proximity of the sea. The climate is marine and mild (acc. to Prawdziwiec). The Baltic has a warming effect on the district's climate and a cooling influence in the summer, which causes low annual temperature amplitudes. The climate is affected mainly by air masses travelling from various directions (sectors), usually from the West (NW, W, SW).

Climatic information:

- Average yearly temperature – 7.5 ÷ 7.8 °C
- Average temperature for May-July – 13.5 ÷ 14.0 °C

- Total yearly precipitation – 550 ÷ 650 mm
- Total precipitation in May-July – 160 ÷ 180 mm
- Length of the vegetation season – 215 ÷ 218 days
- Number of days with snow cover – 35 ÷ 45 days

March and the spring season are dominated by dry and often icy north-eastern and eastern winds. In the summer, cool and rain-bearing western and north-western winds prevail, while autumn is characterised by warm south-western winds.

The Kołobrzeg municipality encompasses the Coastland, stretching in a narrow belt (from several to several dozen kilometres wide) along the shore of the Baltic Sea in the northern section. The region has a typically marine climate with low temperatures in the period from May to July and only a small number of hot days. The remaining section of the municipality, lying south of the Coastland, comprises the so-called Gryfice-Białogard Land (Land II) made up of bottom moraine areas stretching in the drainage basin of the Parsęta and Rega Rivers at elevations of between 20 and 60 m above sea level. Land II was separated from Land I on account of the higher temperatures, precipitation in the May-July period, a higher number of hot days and more continental climate features. A frequent occurrence in the coastal region is a breeze. During the day, winds blow from the sea towards the land as a result of uneven heating of water and land surfaces, i.e. pressure differences. The opposite situation occurs at night in the form of a land breeze, with wind blowing from land out toward the sea. Along the coast, a breeze rarely reaches more than around a dozen kilometres into the land.

4. ECOLOGY OF LAND AND WATER POPULATIONS together with the identification of valuable environmental resources

4.1. Flora and natural habitats in the area of the project location and adjacent lands

4.1.1. Flora of forest areas

In the vicinity of the areas zoned for the construction of the wind farm, there is a forest area spreading out in a narrow belt along the railway line linking Karcino and Sarbia. The ground cover of the forest is dominated by abundantly growing wetland vegetation, including such species as ***yellow iris, remote sedge, lesser pond sedge, elongated sedge, soft rush, water mannagrass, marsh bedstraw, bittersweet nightshade,***

gypsywort. Sometimes these are also accompanied by **purple loosestrife**, **enchanter's nightshade**, **marsh skullcap**. On drier elevations there are, among others, **spinulose woodfern**, **wood horsetail**, **bilberry**, **bloody dock** and **common bugleweed**. Stagnant water pools between tree clumps are overgrown with **lesser duckweed**.

In the forest area, phytocoenoses of fertile **lowland beech forests** *Galio odorati-Fagetum* were identified. Beech communities grow on loam and sandy loam soils of end and bottom moraines, typically in mid-sections of slopes, avoiding exposed ridges and valley bottoms. Beech forests prefer flush-type water conditions, involving diluvial waters. The beech forest discussed demonstrates features of antropogenic degeneration. There are visible traces of ploughing and tree stand thinning. In addition to beech trees (max. 430 cm/23 m), there are also scattered locations of **common oak**. The undergrowth, with an average density of 10%, is composed of **beech, oak and sycamore maple**. The forest's ground cover is relatively weakly developed (as a consequence of ploughing), with prevailing low and medium-height dicotyledonous perennials and broad-leaved grasses. Common species include **sweet woodruff**, **Solomon's seal**, **yellow archangel**, **wood anemone**, **common bugleweed**, **wood violet**, **common wood sorrel**, **giant fescue**, **wood bluegrass**, **millet grass**. There are also sparse plants of the species **broad-leaved helleborine**, **hairy woodrush**, **small-flowered woodrush**, **pill sedge**, **wood sedge**, **pale sedge**, **May lily**, **common speedwell**. There are also species spreading from scattered wet hollows grown with alder plants. In one of the more shady patches, there is a very abundant community of **wood sanicle**. The moss layer is poorly developed and consists mainly of **carpet moss**, **undulate atrichum moss**, **common hair cap moss**.

No adverse effects stemming from the type of project under construction have been found.

4.1.2. Flora and habitats in river areas and wetlands

Among several little rivulets flowing through the Kołobrzeg municipality in the vicinity of the wind farm, particularly abounding and interesting aquatic vegetation is found in the Błotnica. In the river section near Nowogardek, there is an expanding community of bottom-rooted macrohydrophytes with surface-floating leaves, i.e. **Nupharo-Nymphaeetum albae**. There are numerous **white lotuses** and **yellow pond lilies**. Among their large leaves, there are small aggregations of **star duckweed** and **giant duckweed**. Closer towards the banks, there are concentrations of **frogbit rafts** which occasionally forms such large and clearly

distinct agglomerations that they can be regarded as patches of the *Hydrocharitetum morsus-ranae* association. Under water surface, there are beds of **Canadian waterweed** *Elodeetum canadensis*. There are also scattered groups of **arrowhead** and **greater water parsnip**, growing partially in water and partially on riversides.

The other longer rivulet, the Dębosznicza, is very shallow and deprived of any vegetation at some locations. Some sections, e.g. near Sarbia, are thickly overgrown with phytocoenoses including **Canadian waterweed** and **startwort**. Closer to the banks, partially immersed in water, one can find **water speedwell**.

In Sarbia and Karcino, there are communities of **rigid hornwort**, which forms rather loose clumps of underwater plants, **water smartweed** in the form with floating leaves, as well as **rigid hornwort**, **common water plantain** *Alisma plantago-aqatica*, **water buttercup** and pleustonic species.

In Karcino, there is a community of **water mannagrass** in a group of drainless mid-field hollows in the area examined. Within wet hollows and water ponds there is a stand of **broadleaf cattail** forming extensive patches which often incorporate the surrounding stagnant water and accompanying hydrophytes. More external zones are typically overgrown with bulky sedge communities. In a Karcino stand, there are scattered groups of **bulrush**, **marshland sedge** and **lakeshore bulrush**.

No adverse effects stemming from the type of project under construction have been found.

4.1.3. Flora of cultivated land

The most frequently encountered communities growing among cereal crops are representatives of the *Arnosseridion minima* association, usually phytocoenoses of the *Scleranthus annuus* community with a marked presence of **German knotgrass** *Scleranthus annuus*, **corn spurry** *Spergula arvensis*, **field pansy** *Viola arvensis*, **field forget-me-not** *Myosotis arvensis*, **thymeleaf sandwort** *Arenaria serpyllifolia*, **wild buckwheat** *Fallopia convolvulus*, **cornflower** *Centaurea cyanus*, **field poppy** *Papaver rhoeas*, **Canadian horseweed** *Conyza canadensis*, **scentless chamomile** *Matricaria maritima* subsp. *inodora*. Around Głowaczewo, there are *Arnosserido-Scleranthetum* phytocoenoses with a similar composition as above, however with a more pronounced presence of **lamb's succory** and **Morison's spurry**. Among various types of crops cultivated in the municipality one can

occasionally come across a disappearing segetal species *common corncockle*. In crops grown around Karcino, *narrow-fruited cornsalad* has been identified.

4.1.4. Tree lanes

There are a number of tree-lined roads in the municipality. These include:

- A maple lane lining both sides of the Sarbia- Karcino road,
- A maple lane lining both sides of the Sarbia-Kolonia road beyond Las-Samowo,
- A linden lane lining both sides of the road from the bridge on the Łuzanka rivulet in Karcino as far as Głowaczewo.

4.1.5. Flora and habitats on the area of the project location

Areas allocated for the erection of wind turbines and for the construction of assembly sites, access roads, power cable network, control network, telecom + IT network and a switching station are mainly cultivated lands which are used for economic purposes. The lands in question are heavily transformed biotopes. They are not classified as environmentally valuable habitats and are not legally protected. In addition to grain crop species, the areas under discussion also have vegetation species described in item 4.1.3. of this study.

There are no priority plant species requiring protection in the form of establishment of NATURA 2000 sites on the area zoned for the construction of the wind farm or lands directly adjacent to it.

No adverse effects stemming from the type of project under construction have been found.

4. 2. Fauna occurring on the area of the project location

4.2.1. Invertebrates

Despite the high environmental value of the Kołobrzeg municipality, it must be stressed that the invertebrate fauna of the investigated area is cosmopolitan, dominated by common and synantropic ecologically plastic species (eurybiontic species).

In the area of the planned project, mainly in watercourses and surface standing waters, representatives of the following groups have been identified: *Hirudinea*, *Heteroptera*, *Coleoptera*, *Diptera* and *Mollusca*.

Hirudinea: *Erpobdella octoculeata*, fresh water leech, fish leech

Aranei: water spider.

Crustacea: aquatic sowbug, scud, fresh water crayfish.

Heteroptera: water boatman, *Naucoris*, water scorpion, water stick insect, water strider.

Coleoptera: whirligig beetle, great diving beetle, diving beetle, hyphydrus, *Ilybus* sp., diving beetle.

Diptera: *Chironomus plumosus*, *Chironomus* e.g. *gripekoveni*.

Mollusca: pea cockle, great pond snail, radix ovata, fresh-water mussel, swollen river mussel, whirlpool snail, white ramshorn, ramshorn snail, great ramshorn snail, European stream valvata, spire snail.

Odonata: beautiful demoiselle, banded demoiselle, dragonfly.

On some of the cultivable areas, idle lands overgrown with herbaceous vegetation, thermophytic and hygrophilous taxa have been identified. The majority are cosmopolitan eurytopic species dominated by the groups: *Aranei*, *Orthoptera*, *Heteroptera*, *Lepidoptera* and *Hymenoptera*.

Aranei: money spider, crab spider, *Tetragnatha extensa* (long-jawed spider), wasp spider,

Orthoptera: great green bush-cricket, grasshopper.

Heteroptera: striped shield bug, firebug, stink bugs.

Lepidoptera: swallowtail, cabbage white butterfly, small white butterfly, green-veined white butterfly, orange tip butterfly, brimstone, peacock butterfly, thistle butterfly, small tortoiseshell, map butterfly, marbled white butterfly, six-spot burnet moth, European skipper, scarce copper.

Coleoptera: red longhorn beetle, fourteen-spotted lady beetle, 22-spot ladybird, two-spotted lady beetle, seven-spotted lady beetle, green tortoise beetle, weevils.

Hymenoptera: common wasp, paper nest wasp, honey bee, buff-tailed bumblebee, red-tailed bumblebee.

Mollusca: Roman snail, heath helicellid, grove snail, European ambersnail, *Pupilla* sp.

On the project site there are no priority invertebrate species requiring protection in the form of establishment of Natura 2000 sites according to the Ordinance of the Minister of the Environment issued on 16 May 2005, Journal of Laws no. 94, item 795.

No adverse effects stemming from the type of project under construction have been found.

4.2.2. Ichthyofauna

Fish species living in the running waters located in the closest vicinity to the planned project site include:

- Resko Przymorskie Lake – a pikeperch-type lake habitat – bream, tench, pikeperch, pike, roach, eel.
- Small river habitats (the Błotnica, Dębosznica, Łuzanka) – roach, gudgeon, bream, pike

On the project site adjacent areas there are no priority fish species requiring protection in the form of establishment of Natura 2000 sites, according to the Ordinance of the Minister of the Environment issued on 16 May 2005, Journal of Laws no. 94, item 795.

No adverse effects stemming from the type of project under construction have been found.

4.2.3. Amphibians

Due to a small number of mid-field water ponds, the majority of amphibians inhabit swamps and wetlands of the ice-marginal valley from the Parsęta river bed and Zieleniewo Meadows as far as the flood plains of the Błotnica, Dębosznica and Łuzanka rivers.

The following amphibian species have been identified in areas adjacent to the planned project site:

No.	Amphibian species	Latin name	Occurrence
1	Moor frog	<i>Rana arvalis</i>	<i>Fishing ponds near Głowaczewo, ponds and swampy areas near Głowaczewo, meadows along the Dębosznica River</i>
2	Grass frog	<i>Rana temporaria</i>	<i>Karcino – Polish State Railways (PKP) area</i>
3	Laughing frog	<i>Rana ridibunda</i>	<i>Rivers: Parsęta, Dębosznica, Błotnica</i>
4	Common toad	<i>Bufo bufo</i>	<i>Drainage ditch on the meadows between Karcino and Dźwirzyno</i>
5	<i>Common spadefoot</i>	<i>Pelobates fuscus</i>	<i>Meadows between Karcino and Dźwirzyno, drainage ditch on the meadows between Karcino and Dźwirzyno</i>

The amphibian species listed above are not included in the list of amphibians which require protection in the form of establishment of Natura 2000 sites according to the Ordinance of the Minister of the Environment issued on 16 May 2005, Journal of Laws no. 94, item 795.

No adverse effects stemming from the type of project under construction have been found.

4.2.4. Reptiles

The most common species occurring in the Kołobrzeg municipality is the grass snake *Natrix natrix*, a species commonly found across the entire ice-marginal valley area, including Resko Przymorskie Lake and major river valleys.

The following reptile species have been identified in areas adjacent to the planned project site:

No.	Reptile species	Latin name	Occurrence
1	Slow worm	<i>Anguis fragilis</i>	<i>Beech forest near the Karcino PKP station, the edge of the forest along the border of the municipality, allocated for Nature and Landscape Complex 2.</i>
2	Common viper	<i>Vipera berus</i>	<i>Small pine forest in the middle of the meadow near the fishing ponds in the vicinity of Głowaczewo</i>
3	<i>Grass snake</i>	<i>Natrix natrix</i>	<i>Site of ecological interest near Karcino, meadows along the Błotnica river north-east of Karcino, fishing ponds near Głowaczewo, meadows on the Dębosznica river, near the PKP Karcino area – a site of ecological interest</i>

In the project site adjacent areas there are no reptile species requiring protection in the form of establishment of Natura 2000 sites, according to the Ordinance of the Minister of the Environment issued on 16 May 2005, Journal of Laws no. 94, item 795.

No adverse effects stemming from the type of project under construction have been found.

4.2.5. Avifauna

4.2.5.1. Migration routes of migratory birds in the territory of Poland

According to the general classification of the migration system of marsh and water birds in Eurasia, the territory of Poland lies within two great migratory routes – the East Atlantic

Flyway and the Mediterranean-Black Sea Flyway, see Fig. 1), which encompass the whole of Europe, a considerable part of Africa, including the entire West African coast, as well as a sizeable portion of the North-American Arctic. In large areas of Europe, Africa and the Siberian Arctic the two routes contact the West Asia-Africa Flyway and – via this route and northernmost breeding grounds – contact the Central Asia-India Flyway and the East Asia-Australasia Flyway.

A diagram of the migration routes is presented in Fig. 1. below [17].

Objaśnienia do rycin:

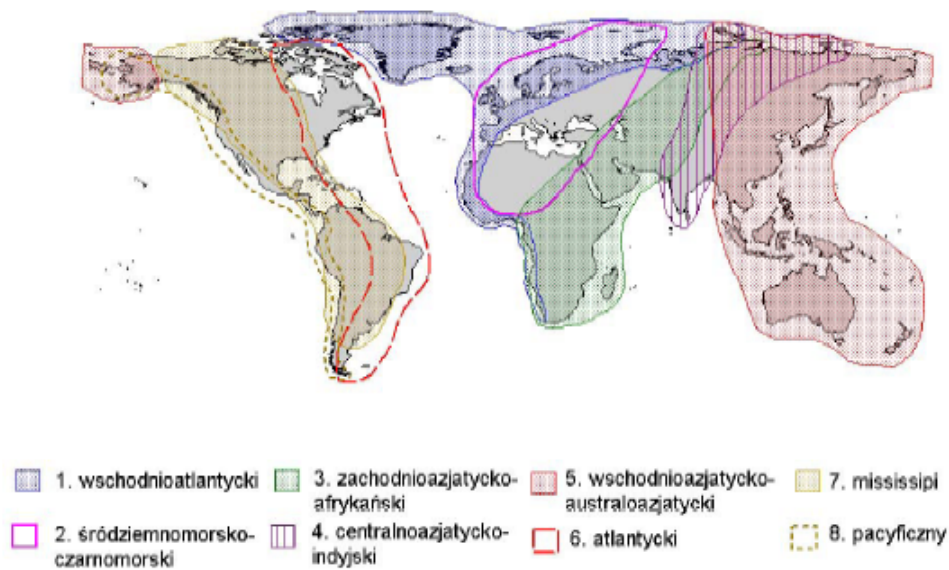


Fig. 1. Diagram showing main migration flyways of marsh and water birds around the world:

- 1- East Atlantic Flyway, 2- Mediterranean-Black Sea Flyway, 3- West Asia-Africa Flyway, 4- Central Asia-India Flyway, 5- East Asia-Australasia Flyway, 6- Atlantic Flyway, 7- Mississippi Flyway, 8- Pacific Flyway.

With reference to the problem of bird migration routes across the territory of Poland, it should be noted that they cover essentially the entire area of Poland and it would not be possible to indicate any areas in which migratory birds do not occur. Markedly higher migration concentrations are observed along the Baltic coast and along major rivers, particularly the Vistula, which is a major migration flyway for some marsh and water birds. This does not mean that migrating birds belonging to this group occur everywhere. Increased concentrations have been identified mostly in coastal regions, on the Vistula and Oder Rivers and water reservoirs, mainly in western and central western sections of Poland, as shown in Fig. no. 2 [17].

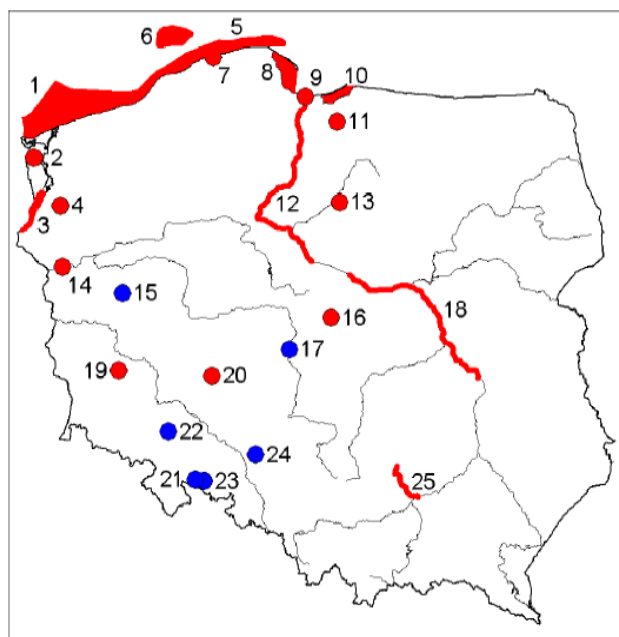


Fig. 2. Main concentrations of marsh and water birds during autumn migrations (single concentrations of more than 20,000 birds). Areas covered by the Natura 2000 European network of nature conservation sites are marked in red, while areas proposed for Natura 2000 network inclusion are marked in blue. Numbers refer to the following locations: 1. Bay of Pomerania, 2. Szczecin Lagoon, 3. Lower Oder valley, 4. Miedwie Lake, 5. Coastal waters of the Baltic Sea, 6. Słupsk Bank, 7. Słowiwo Wildlife Refuge, 8. Bay of Puck, 9. Mouth of the Vistula River, 10. Vistula Lagoon, 11. Družno Lake, 12. Lower Vistula valley, 13. Marshy Drwęca River valley, 14. Mouth of the Warta River, 15. Pszczew Lake and the Odra River valley, 16. Warsaw and Berlin Ice-marginal Valley, 17. Jezioro Lake, 18. Valley of the Central Vistula, 19. Przemków Ponds, 20. Barycza River valley, 21. Otmuchów Lake, 22. Mietkowo Lake, 23. Nysa Lake, 24. Turawa Lake, 25. Nida River valley [16].

The so-called autumn migrations, i.e. journeys from breeding grounds to wintering habitats begin in Poland as early as in May with the migrations of lapwings, starlings (northern Poland) and ducks (males and females which lost their brood) to moulting sites (locations in which birds lose and replace their feathers, which leaves them unable to fly for a certain time). The migrations last the whole June, with greylag geese starting their journeys to moulting sites (the best known moulting site of greylag geese and ducks in Poland is located in the Warta Mouth National Park). The second part of June sees the beginning of the migration of some of the shorebirds and allies (mainly breeding birds from Poland and males returning from northern breeding grounds in which they stay during the period of mating and impregnating females) and black-headed gulls. July is usually the period of migrations of shorebirds, namely gulls and terns. Other bird species in this part of Europe start migrating

in August. Their journeys last all September and October and finish in the first half of November with the migration of last species, usually setting out from the Arctic [16].

4.2.5.2. Description of avifauna inhabiting areas around the project site

The area of the ice-marginal valley, the Parsęta, Dębosznicza and Błotnica rivers and wetlands around Resko Przymorskie Lake are covered with extensive grasslands incorporating numerous swampy areas. Thanks to that the ornithological fauna of the Kołobrzeg municipality is relatively rich in bird species.

Around 1.5 km from the project area, there is Resko Przymorskie Lake, which is a migration destination for many bird species. The reed swamps of Resko Przymorskie Lake make a favourable habitat for breeding marsh and water birds. The lake is a local breeding ground for bearded tits and bitterns. In addition, the reed swamps surrounding Resko Lake are a nesting site for greylag geese and marsh harriers. The lake is also a regular preying ground for white-tailed eagles and a stopping place for large flocks (numbering several hundred birds) of wigeons and red-breasted mergansers during their autumn migrations.

The reed swamps are much less developed along the northern shore of the lake, where the reed belt is narrow, reaching barely several metres in width. In the region, the lake is also a major habitat for the more common passerine birds that are covered by species protection.

The lake is not only a breeding ground, but also a stopping place for migrating lamellirostral birds. It has been observed that in adverse weather conditions and high sea level, a number of *Anatidae* species (ducks and duck-like waterfowl) gather here in large groups – the flocks of some duck and merganser species number up to 500 individuals. In the winter period even the frozen lake is a convenient ground for geese representing the genus *Anser* and a winter ground for bearded tits.

The birds, geese in particular, use the surrounding areas as convenient feeding grounds.

Birds migrating on Resko Przymorskie Lake and the Baltic Sea arrive in their feeding and breeding grounds along migration flyways which form local **ecological corridors**. The main bird migration routes to breeding and winter grounds include the coastal areas of the Protected Landscape Area of the Koszalin Coastal Belt, coastal areas of the Natura 2000 Bay of Pomerania protected site and lands along the Dębosznicza and Błotnica rivers [14].

The locations are breeding grounds, winter grounds, feeding grounds and stopping places during migrations for a number of vertebrate and invertebrate animals. They are of particular importance for wildfowl species, providing them – in addition to food sources – with refuge during the period of spring and autumn migrations.

The local watercourses, such as the Błotnica and Dębosznica, are – for the most part – heavily altered rivers, engineered and embanked along the major section of their courses. The rivulets make optimum living grounds for swamp birds.

An analysis of site surveys shows that potential feeding grounds for geese are located east and south of the lake, excluding the forest area around which the wind farm is located.

Site surveys have not demonstrated that the project area is of any importance as a migratory route for birds of passage. Birds journey along established flyways marked by the above-mentioned ecological corridors.

At the same time, the possibility that birds will fly over the wind farm site cannot be ruled out, however – taking into account the distance to the lake and good visibility of obstructions (wind farm towers) – instances of birds hitting the wind farm installations will only be incidental.

List of species quoted in the Appendix no. 2 to the Ordinance of the Minister of Environment of 21 July 2004 (Journal of Laws no. 229, items 2312 and 2313) on Natura 2000 special bird protection areas.

No.	Bird species	Latin name	Occurrence
1	white-tailed eagle	<i>Haliaeetus albicola</i>	<i>Meadows and beech forest north of Sarbia</i>
2	marsh harrier	<i>Circus aeruginosus</i>	<i>Planned site of ecological interest near Drzonowo</i>
3	northern harrier	<i>Circus cyaneus</i>	<i>Meadows on the Dębosznica river</i>
4	white stork	<i>Ciconia ciconia</i>	<i>Karcino, Głowaczewo, Sarbia, Drzonowo, Nowogardek, Błotnica</i>
5	common sandpiper	<i>Actitis hypoleucos</i>	<i>Dębosznica, Resko Lake</i>
6	Savi's warbler	<i>Locustella luscinioides</i>	<i>Ponds near Głowaczowo, Dębosznica near Sarbia, Błotnica.</i>

7	teal	Anas crecca	<i>Fishing ponds near Głowaczewo</i>
8	garganey	Anas querquedula	<i>Fishing ponds near Głowaczewo</i>
9	lapwing	Vanellus vanellus	<i>Meadows near Karcino, Dębosznica river valley, meadows near Nowogardek, Dębosznica river valley</i>
10	corncrake	Crex crex	<i>Fishing ponds near Głowaczewo</i>
11	black woodpecker	Dryocopus martius	<i>Karcino beech forest</i>
12	northern goshawk	Accipiter gentilis	<i>Karcino</i>
13	red kite	Milvus milvus	<i>Fields north of Sarbia</i>
14	common snipe	Gallinago gallinago	<i>Łlotnica river valley</i>
15	curlew	Numenius arquata	<i>Meadows near Głowaczewo, Łlotnica river valley</i>
16	little grebe	Podiceps ruficollis	<i>Resko Lake next to Karcino, the Łlotnica river at Resko Lake, fishing ponds near Głowaczewo</i>
17	sedge warbler	Acrocephalus schoenobaenus	<i>Ponds near Głowaczewo</i>
18	woodcock	Scolopax rusticola	<i>Meadows near Karcino</i>
19	river warbler	Locustella fluviatilis	<i>Ponds near Głowaczewo, Dębosznica near Sarbia, Łlotnica.</i>
20	great reed warbler	Acrocephalus arundinaceus	<i>Ponds near Głowaczewo</i>
21	turtle dove	Streptopelia turtur	<i>Karcino forest</i>
22	water rail	Rallus aquaticus	<i>Fishing ponds near Głowaczewo</i>
26	common kingfisher	Alcedo atthis	<i>Łlotnica, Dębosznica</i>
23	common crane	Grus grus	<i>Karcino</i>
24	bittern	Botaurus stellaris	<i>Fishing ponds near Głowaczewo</i>

Avifauna species not included in the Appendix no. 2 to the Ordinance of the Minister of the Environment of 21 July 2004 (Journal of Laws no. 229, items 2312 and 2313) on Natura 2000 special bird protection areas.

No.	Bird species	Latin name	Occurrence
1	corn bunting	Emberiza calandra	<i>Meadows on the Łlotnica river</i>
2	house sparrow	Passer domesticus	<i>Cultivable lands north of Sarbia, outskirts of the beech forest in Karcino, meadows near Karcino</i>
3	raven	Corvus corax	
4	starling	Sturnus vulgaris	

5	hooded crow	<i>Corvus cornix</i>	
6	yellowhammer	<i>Emberiza citrinella</i>	

Description of bird species

White-tailed eagle (*Haliaeetus albicilla*) – a large bird of prey from the family *Accipitridae* (hawks, eagles and relatives), inhabiting northern, central and eastern Europe, Iceland, Greenland and Asia north of the Himalayas. A rare breeding bird species in Poland, inhabiting mainly northern and western portions of the country (450-500 couples).

Biotope: Old growth forests in the vicinity of large open water reservoirs. Before reaching maturity (5 years of age), young eagles lead a migratory life.

Threats: At present, mainly the loss of nesting grounds caused by land development along river banks and lake shores for recreational purposes and shrinking areas covered by old growth forests. White-tailed eagles need strong trees for building their nests. Even a hundred-year-old-trees not always meet the requirements. In addition, white-tailed eagles often die as a result of hitting overhead power lines.

Conservation status: Under strict species protection. The area around eagles' nests is regarded as a protection zone: within the radius of up to 200 m throughout the year and periodically (from 1 January until 31 June) – within the radius of up to 500 m from the nest.

Marsh harrier (*Circus aeruginosus* (L., 1758) – a large bird of prey from the family *Accipitridae* (hawks, eagles and relatives), inhabiting Europe excluding the Scandinavian Peninsula and central Asia. A migratory bird, with migrations between March and April, and July and October. The European population journeys to wintering grounds in Africa and – partially – also along the European coasts of the Mediterranean Sea. A rare breeding bird species in Poland, more numerous in the West and North-East of the country.

Biotope: Reed swamps around lakes and fishing ponds, peat bogs with willow bushes, small water ponds in the middle of cultivated fields. The species avoids forests.

Conservation status: Under strict species protection, requiring active protection.

Northern harrier (*Circus cyaneus* (L., 1766) – a large, migratory bird of prey from the family *Accipitridae* (hawks, eagles and relatives), inhabiting nearly entire Europe and a belt

across central Asia as far as the Pacific and North America. The European population winters in southern Europe and northern Africa. Migrations in March and April, and September and October, with some birds wintering in Poland. An extremely rare breeding bird species in Poland (30-40 couples).

Biotope: Open lowland areas, mostly meadows and wetlands in the valleys of major rivers. The species sometimes nests in cultivated cereal fields.

Conservation status: Under strict species protection, requiring active protection.

White stork (*Ciconia ciconia* L., 1758) – a large wader representing the family *Ciconiidae* (storks).

Biotope: Human settlements or adjacent areas, predominantly in regions with large river valleys and wet meadows.

Conservation status: Under strict species protection on account of diminishing populations. Around 45 thousand breeding-age stork couples nest in Poland (data from 2004). The species is covered by the protection programme coordinated by the "pro Natura" Polish Society of Friends of Nature (Programme of Protection of White Stork and its Habitats).

Common sandpiper (*Actitis hypoleucos* L., 1758; formerly also *Tringa hypoleucos*) – a medium-sized migratory bird from the family *Scolopacidae*, inhabiting Central and Eastern Europe, as well as the temperate zone of the Asian continent as far as the Kamchatka. The wintering grounds are in Western Europe, Western Africa, in the Middle East, as well as Southern and South-Eastern Asia and Australia.

Biotope: water banks, particularly river banks. In the mountains, the species nests in areas situated at up to 4000 m above sea level.

Conservation status: Protected species.

Teal (*Anas crecca* L., 1758) – a medium-sized migratory water bird of the family *Anatidae*, migrating in March-April and August-October.

Biotope: a variety of inland water reservoirs, preferring small, heavily overgrown water ponds.

Conservation status: Game bird with a close season.

Garganey (*Anas querquedula* L., 1758) – a medium-sized migratory water bird of the family *Anatidae*, inhabiting across almost entire Eurasia. In Europe, the species inhabits outside the northern portion of the Scandinavian Peninsula and the Iberian Peninsula, and in Asia it inhabits a belt reaching as far as the Pacific and Japan. Migrations in March and April, and between August and October. European garganeys have their winter habitats in the Mediterranean basin and in Africa, where they reach the South hemisphere. Asian populations winter in Southern Asia.

Biotope: Heavily overgrown water reservoirs, usually small ponds and even drainage ditches.

Conservation status: Protected species.

Lapwing (*Vanellus vanellus* L., 1758) – a medium-sized migratory bird of the family *Charadriiformes* (shorebirds and allies), living across almost entire Europe and Asia's temperate zone as far as the Pacific. Lapwings winter in Western Europe, islands of the East Atlantic, northern Africa, the Mediterranean basin, the Middle and Far East and India. Migrations in March and April, and June and subsequent months.

Biotope: Cultivated fields, swamps, meadows and water reservoir banks.

Conservation status: Protected species.

Corncrake (*Crex crex*) – a medium-sized bird of the family *Rallidae* (coots and rails), inhabiting Europe outside the north-eastern parts of the continent and Asia as far as the Transbaikal region, Iran and China. The species winters in Africa, south of Sudan. A rare breeding bird species in Poland, nesting across the country, though not evenly: more numerous in the North and East. Most site observations were only restricted to the bird's characteristic voice, as it is a flighty bird, leading a secretive life.

Biotope: Wet meadows with tall herbaceous vegetation and bush clumps, as well as drier locations in swamps. The bird occurs essentially in low-lying regions, though in the Caucasus and Altai regions it nests in mountain pastures up to 3000 m above sea level.

Conservation status: Under strict species protection, requiring active protection.

Black woodpecker (*Dryocopus martius* L., 1758) – a medium-sized bird of the family *Picidae* (woodpeckers and allies), inhabiting the taiga belt and Eurasia's mixed forests. Europe's largest woodpecker.

Biotope: High coniferous forests and mixed forests. In mountain regions, the birds nest as far as the upper limit of the upper subalpine forest.

Conservation status: Under species protection.

Red-backed shrike (*Lanius collurio* L., 1758) – a small migratory bird of the family *Laniidae* (shrikes).

Biotope: Forest fringes, young forests and open areas with scattered shrub clumps.

Conservation status: Under strict species protection.

Great grey shrike (*Lanius excubitor* L., 1758) – a medium-sized predatory bird of the family *Laniidae* (shrikes).

Biotope: Wetlands with forests or scattered tree clusters, as well as forest fringes. In winter also cultivated fields.

Conservation status: Under strict species protection.

Northern goshawk (*Accipiter gentilis* (L., 1758) – a large bird of prey from the family *Accipitridae* (hawks, eagles and relatives), nesting in Europe outside the British Isles, in Asia, North America, North Africa and Madagascar. A rare breeding bird species in Poland (with a population estimated at 3,500-5,000 couples, according to the Eagle Protection Committee 2002). A resident, partially migratory species. Northern goshawks often fly low, seeking the shelter of various terrain features, e.g. ditches. They skilfully steer between tree branches in forests thanks to their relatively long tails. A solitary species, interacting only during the mating season.

Biotope: Loose old growth forests in the vicinity of meadows, cultivated lands and other open areas. More common in open lands in autumn and winter.

Conservation status: Under strict species protection.

Red kite (*Milvus milvus* (L., 1758) – a large bird of prey of the family *Accipitridae* (hawks, eagles and relatives) found in Europe, Central Asia, North Africa, the Canary Islands and Cape Verde. Southern populations are sedentary, while birds inhabiting the temperate zone migrate; migrations in March and April and then between August and November. A very rare breeding bird species in Poland (600-700 couples), occurring nearly exclusively in the West of Poland (Wielkopolska, Pomerania, part of Lower Silesia, Warmia and Mazuria regions).

Biotope: Forests bordering on open fields, often in the vicinity of rivers or ponds, but also far from water bodies.

Conservation status: Under strict species protection. The area around red kite nests is regarded as a protection zone: within the radius of up to 100 m throughout the year and periodically (from 1 March until 31 August) – within the radius of up to 500 m from the nest.

Common snipe (*Gallinago gallinago* L., 1758) – a medium-sized migratory bird of the family *Scolopacidae*.

Biotope: Swamps, peat bogs and wet meadows.

Conservation status: Under strict species protection.

Curlew (*Numenius arquata* L., 1758) – a large wader of the family *Scolopacidae*.

Biotope: Wet meadows, swamps and grasslands

Conservation status: Protected species.

Little grebe (*Tachybaptus ruficollis* Pallas, 1764; syn. *Podiceps ruficollis*) – a small migratory water bird of the family *Podicipedidae* (grebes), inhabiting Europe with the exception of north-eastern fringes, as well as southern and central Africa and South Asia. The Central European population winters in Western Europe and in the Mediterranean basin. Migrations in March and November.

Biotope: Small, inland, heavily overgrown water bodies.

Conservation status: Under species protection.

Corn bunting (*Emberiza calandra* L., 1758; syn. *Miliaria calandra*) – a small bird of the family *Emberizidae* (sparrows, buntings and relatives), inhabiting Southern and Central Europe, North Africa and Asia, as far as Mongolia. An essentially sedentary species, though some birds from the north migrate southwards. A fairly common breeding bird in Poland, inhabiting lowland regions.

Biotope: Open areas: cultivated fields, meadows and pastures, treeless or with sparse trees. The species avoids forests and heavily afforested areas.

Conservation status: Under species protection.

Sedge warbler (*Acrocephalus schoenobaenus* (L., 1758) – a small migratory bird of the family *Sylviidae* (warblers), inhabiting Europe (with the exception of the Scandinavian, Apennine and Balkan Peninsulas) and western Siberia. Wintering habitats in equatorial Africa. Migrations in April and May and then in August and September. A rare breeding bird in Poland, inhabiting lowland regions (with locally numerous populations).

Biotope: Sunlit wetlands, the surroundings of lakes, water ponds, peat bogs and swamps overgrown with thick vegetation such as reeds, sedges and sweet flag.

Conservation status: Under species protection.

Woodcock (*Scolopax rusticola* L., 1758) – a medium-sized migratory birds of the family *Scolopacidae*, inhabiting Europe and Asia as far as Japan in the East and northern India and the Caucasus in the South, as well as the Azores, Madeira and the Canary Islands. Migrations in March and April and between September and November. Winter grounds in the Mediterranean basin, southern and south-eastern Asia.

Biotope: Wet mixed forests.

Conservation status: Game bird with a close season.

Great reed warbler (*Acrocephalus arundinaceus* (L., 1758) – a small migratory bird of the family *Sylviidae* (warblers), inhabiting Europe, Asia and northern Africa between 30°N and 50°N latitude, as well as the Philippines, New Guinea, Indonesia and Australia (the latter two populations are sedentary). Wintering grounds in southern Africa, in the Indian subcontinent and the Indochinese Peninsula. Migrations between April and May and in August. A rare breeding bird in Poland, inhabiting lowland regions (with locally numerous populations).

Biotope: Lakes and ponds surrounded by a belt of reeds, rushes or osiers.

Conservation status: Under species protection.

Turtle dove (*Streptopelia turtur* L., 1758) – a medium-sized migratory bird of the family *Columbidae* (doves and pigeons), inhabiting Europe, northern Africa and central-western Asia. Migrations in April and May and then in August and September. Wintering habitats in central Africa.

Biotope: Thin deciduous and mixed forests (often forest outskirts), mid-field and mid-marsh clumps of trees, parks, large gardens and – in Africa – oases.

Conservation status: Under strict species protection.

Water rail (*Rallus aquaticus*) – a medium-sized bird of the family *Rallidae* (coots and rails), inhabiting Europe, Asia and northern Africa.

Biotope: various water reservoirs, from large lakes and swamps to drainage ditches and water-filled clay pits. The species requires habitats in which shallow water is overgrown with dense vegetation. It occurs mainly in lowlands, but is also encountered at altitudes of up to 2000 m above sea level.

Conservation status: Under strict species protection.

Common kingfisher (*Alcedo atthis* L., 1758) – a small bird of prey of the family *Alcedinidae* (kingfishers and relatives), living in southern and central Europe, northern Africa and southern Asia in a belt stretching from the Decan Plateau to the Indo-Malaysian Archipelago. The species does not make regular journeys, with individual kingfishers wintering on non-freezing lakes and others flying to southern sections of the breeding area.

Biotope: Clean inland watercourses with steep banks and overhanging tree branches or roots that can serve as observation points.

Conservation status: Under strict species protection.

Common crane (*Grus grus* (L., 1758)) – a large bird of the family *Gruidae* (cranes), inhabiting northern and central parts of Eurasia. Winter grounds in the Iberian Peninsula, in northern Africa and western Asia. A rare breeding bird in Poland, inhabiting lowland regions (5000-6000 couples).

Biotope: Extensive swamps, peat bogs, moorlands, areas situated on lakes and old river beds, away from human settlements, however also finds feeding grounds in meadows and cultivated fields.

Conservation status: Under strict species protection. Protection of wetlands and marshes is recommended. The number of cranes has recently been growing.

Bittern (*Botaurus stellaris* L., 1758) – a large migratory water bird of the family *Ardeidae* (herons and bitterns), inhabiting northern parts of Eurasia and southern Africa (*B. s. capiensis*). Wintering habitats in southern Eurasia and in Africa. Migrations in March and April and between September and November. A rare breeding bird in Poland. A small number of bitterns winter on inland bodies of water.

Biotope: Water reservoirs with extensive stands of rushes, including natural lakes, fishing ponds, water-filled clay pits, old river beds, reed swamps.

Conservation status: Under strict species protection.

House sparrow (*Passer domesticus* L., 1758) – a small sedentary bird of the family *Passeridae* (sparrows and relatives), inhabiting Europe and Asia. Originally a steppe bird, the sparrow colonised human settlements probably as early as several thousand years ago and has inhabited human-occupied areas ever since. Introduced (on purpose or accidentally) in North America and Australia. A very numerous breeding bird in Poland.

Biotope: Human settlements and their closest surroundings.

Conservation status: sparrows are **covered by species protection** across Poland. The sparrow population in Europe is decreasing, e.g. in Great Britain and in the Netherlands the

number of sparrows has fallen nearly by half since the 1980s and the species is now regarded as endangered in the two countries. It is likely that the Polish sparrow population has been falling as well, though in view of the fact that there are no scientific studies on the topic, it is hard to clearly determine the scale of the phenomenon. Factors affecting the drop in the sparrow population are not known precisely; probably a combination of several factors is at play, including:

- reduced number of insects as a result of chemical contamination of the soil and increased intensity of agricultural and horticultural treatments
- predators (magpies, carrion crows, domestic cats, sparrow hawks, tawny owls)
- epidemics of diseases and parasites
- competing with other bird species (e.g. pigeons) for food
- gradually decreasing number of breeding locations (due to building renovations, elevation insulation etc.)
- general improvement in the level of hygiene and the so-called "plastic bag theory" – people pack their rubbish tightly into waste bags, which hinders birds' access to a potential source of food.

Scientific studies are carried out in order to find out whether it is the breeding productivity of sparrows that has been reduced (i.e. whether fewer nestlings reach maturity) or the mortality of adult birds has risen.

Raven (*Corvus corax*) – a large sedentary bird of the family *Corvidae*.

Biotope: Outskirts of large forest areas in which old growth forests combine with lush meadows, in the vicinity of rivers and water reservoirs, fields with scattered clumps of tall trees. The species lives in nearly all landscape types, including the mountains.

Conservation status: Under species protection.

Hooded crow (*Corvus cornix* L., 1758) – a medium-sized bird of the family *Corvidae*, essentially migratory, though a large number of crows now lead sedentary lives.

Biotope: Previously almost exclusively river valleys, lake surroundings and small coppices located close to meadows and wetlands. Currently the species inhabits outskirts of all types of forests and mid-field clumps of trees, as well as municipal parks.

Conservation status: Under partial species protection.

Starling (*Sturnus vulgaris L.*) – a small bird of the family *Sturnidae* (starlings and allies).

Biotope: Human settlements, orchards, gardens, parks, mid-field clusters of trees, forest fringes. Originally a typical forest bird.

Conservation status: A very useful bird, covered by species protection.

Yellowhammer (*Emberiza citrinella L., 1758*) – a small migratory bird of the family *Emberizidae* (sparrows, buntings and relatives).

Biotope: A variety of sunlit areas interspersed with clusters of trees and open areas, e.g. forest fringes, fields, meadows, orchards and gardens. The species avoids towns and cities, though it is encountered on the outskirts of villages.

Conservation status: Under species protection.

The bird species described above, except for corn bunting, house sparrow, raven, hooded crow, starling and yellowhammer, are listed in the Appendix no. 2 to the Ordinance of the Minister of the Environment on Natura 2000 special bird protection areas.

The habitats of priority bird species are located at a considerable distance from the wind farm. The project site, in comparison with the areas around Resko Przymorskie Lake and along rivers, is not a rich and varied food source for birds, which is why they typically occur at a considerable distance from the boundaries of the project site. Fields allocated for the construction of wind turbines are inhabited by common birds feeding on crop fields, including house sparrow, raven, hooded crow, starling and yellowhammer, typical of such biotopes.

4.2.6. Mammals

Thirty mammal species have been identified in the Kołobrzeg municipality.

Below is a list of mammal species occurring in the vicinity of lands zoned for the construction of the wind farm.

No.	Mammal species	Latin name	Occurrence
1	Eastern hedgehog	<i>Erinaceus concolor</i>	Forest near the PKP (Polish State Railways) station in Karcino
2	beech marten	<i>Martes foina</i>	Drzonowo
3	common pipistrelle	<i>Pipistrellus pipistrellus</i>	Forest near the PKP station in Karcino
4	European mole	<i>Talpa europea</i>	Meadows on the Błotnica river
5	serotine bat	<i>Eptesicus serotinus</i>	Forest near the PKP station in Karcino
6	Daubenton's bat	<i>Myotis daubentoni</i>	Forest near the PKP station in Karcino
7	root vole	<i>Microtus oeconomus</i>	Meadows on the Błotnica river
8	water shrew	<i>Neomys fodiens</i>	Meadows on the Błotnica river
9	roe deer	<i>Capreolus capreolus</i>	Forest near the PKP station in Karcino
10	brown hare	<i>Lepus europeus</i>	Fields near Karcino

On the project site there are no mammal species quoted in the Ordinance of the Minister of the Environment of 16 May 2005 on types of natural habitats and plant and animal species requiring protection in the form of establishment of Natura 2000 sites.

No adverse effects stemming from the type of project under construction have been found.

V. IDENTIFICATION OF FORMS OF ENVIRONMENTAL PROTECTION ON THE PROJECT SITE AND ADJACENT AREAS

The project under construction is not located in a protected area specified in the Act on Environmental Protection of 16 April 2004 (Journal of Laws of 2004, no. 92, item 880).

The project site is located near a Natura 2000 protected site and within an area listed in the so-called Shadow List, which obliges the investor to perform an analysis of the potential environmental impact of the undertaking on elements of the environment within the impact zone of the undertaking.

Furthermore, the project site is located on areas which have been selected for official protection in the form of a nature and landscape protection complex, a proposed area of ecological interest and in the vicinity of the protected site described below.

The impact zone of the wind farm on different elements of the environment and its location in relation to the Natura 2000 sites are shown in the map included in the Appendix no. 2 to this study.

1. Description of the Natura 2000 network of protected sites in the project site area and in the surrounding areas

The wind farm site is located in the vicinity of an approved NATURA 2000 site, namely the Trzebiatów-Kołobrzeg Coastland (code PLH320017) listed among areas of special habitat protection. The wind turbine situated in the closest proximity to the protected site is around 750 m from the boundary of the above-mentioned site.

Furthermore, the undertaking is implemented within a NATURA 2000 site proposed by non-governmental organisations in the so-called Shadow List under the name of Trzebiatów Wildlife Refuge, a special bird protection area.

Another described special bird protection area is the Bay of Pomerania (code PLB 990003), despite the fact that its boundaries are located ca. 4 km from the limits of the wind farm area.

The area is one of the most important bird migration routes in the territory of Poland, which is why the impact of the project was also discussed in relation to that site.

1.1. Environmental description of the Trzebiatów-Kołobrzeg Coastland PLH320017

DESCRIPTION OF THE AREA

The Trzebiatów-Kołobrzeg Coastland encompasses the best preserved section of the geomorphologically diverse Baltic Coast, including sea cliffs (both active, i.e. eroding, and stable, overgrown with vegetation), sand dunes, sandbars separating coastal lagoons from the sea, as well as shallow river estuaries.

The area's typically developed belt-type configuration of biotopes consists of a coastal waters zone, the beach with associations of psammophilous organisms and strips of annual vegetation of drift lines, initial formation stages of white dunes, grey dunes with low-growing plants (groups of lichens, psammophilous grass communities with sea hollies, shrub communities, initial stages of Baltic dune Scots pine woods), stable dunes overgrown with Baltic dune Scots pine woods (the region's best preserved portions of Scots pine woods between Mrzeżyno and Pogorzelica with rich populations of characteristic species, inter-dune hollows with wetland habitats (including initial stages of raised bogs). Mesotrophic mixed forests growing on sandy soils (*Betulo-Quercetum*) are a habitat for the characteristic European honeysuckle. At the back of the sand dune strip, there are stretches of swampy and riverine forests growing partially on peat soils: around Liwia Łuża Lake, between Włodarka and Mrzeżyno, south-west of Dźwirzyno and south-west of Kołobrzeg. Elevations of the ground moraine in the coastal belt are mainly covered by mixed forests with European honeysuckle. A typical element of the coastal belt are lagoon lakes separated from the sea by narrow sandbars. These include Resko Przymorskie and Liwia Łuża lakes which perform an important function as bird refuges and abound in valuable plant species.

On the south, the area of the Wildlife Refuge borders on an extensive gradual depression of the Baltic Ice-marginal Valley which is largely filled with lowmoor peat deposits, mainly dewatered in the past and now used as grasslands. The area of the ice-marginal valley is intersected by a network of channels and more or less natural watercourses (including the Rega, Stara Rega, Parsęta and Czerwonka rivers). The current and old river beds, as well as river banks, are covered with water plant communities, including halophytes. At present, a large percentage of the old ice-marginal valley is not used for agricultural purposes. On the outskirts of the ice-marginal valley there is an expanding scrub-covered area with sweet gale. Due to a deterioration of hydraulic engineering installations the land becomes swampy at some locations and is periodically flooded, also with brackish waters.

ENVIRONMENTAL VALUE

The Refuge incorporates highly representative habitats which are typical of southern sections of the Baltic Coast.

The main environmental asset of the area is the fact that typical local biotopes forming the coastal belt, particularly the accumulative coast covered with Baltic dune Scots pine woods, is in a very good state of preservation. Within the Refuge, there are also a number of halophilous plant communities.

The halophyte areas at the back of the sand dune belt stretching north of Włodarka are some of Poland's largest ecosystems of this type. Among other species, there are large communities of black grass, sea aster, seaside arrowgrass, goose tongue and sea milkwort. Numerous smaller concentrations related to saline water seepages are found, among other locations, near Kołobrzeg.

Extensive Baltic-type raised bogs have developed in the coastal strip due to favourable climate conditions. Partially dewatered in the past, they currently represent a mosaic of natural plant communities and regenerative stages. In the large "Roby" peat bog there are a number of rare plant communities, including peaty heathlands (*Ericetum tetralicis*), as well as sites occupied by raised bogs and marshy forests with rich populations of valuable peat bog plants. A total of 17 habitat types listed in Annex I to the Habitats Directive have been identified there. A long list of vascular plants (more than 1000 species) includes many taxa of protected, endangered and rare species (136 species), including 42 protected species, 3 species listed in the Polish Red Data Book of Plants and 57 species classified as endangered in Pomerania and Wielkopolska. Furthermore, nine animal species listed in Annex II to the Directive have been identified here.

Types of habitats occurring within the area discussed: shallow river estuaries, lagoons, annual drift line vegetation, Baltic cliffs, coastal marshy salt flats, initial formation stages of white coastal dunes, white coastal dunes, grey dunes, mixed forests growing on coastal dunes, wet inter-dune hollows, old river valleys and other natural eutrophic standing waters, wet moorlands with cross-leaved heath, raised peat bogs – degraded, though capable of natural and stimulated regeneration, fertile beech forests, Subatlantic broadleaved forests, marshy forests, riverine forests and riverside willow sites.

Bird species listed in Annex I to the Council Directive 79/409/EEC: red-throated loon, horned grebe, bittern, black stork, white stork, barnacle goose, white-tailed eagle, marsh harrier, northern harrier, Montagu's harrier, lesser spotted eagle, osprey, spotted

crake, corncrake, common crane, Eurasian golden plover, ruff, wood sandpiper, Mediterranean gull, little gull, sandwich tern, little tern, short-eared owl, common kingfisher, aquatic warbler, barred warbler, red-backed shrike.

Regularly occurring migratory birds: little grebe, great crested grebe, red-necked grebe, eared grebe, grey heron, mute swan, bean goose, white-fronted goose, greylag goose, shelduck, wigeon, gadwall, teal, northern pintail, garganey, shoveler, pochard, tufted duck, common eider, common goldeneye, red-breasted merganser, common merganser, common kestrel, hobby, quail, coot, oystercatcher, little ringed plover, ringed plover, grey plover, lapwing, sanderling, dunlin, common snipe, woodcock, black-tailed godwit, curlew, greenshank, green sandpiper, common sandpiper, wryneck, stonechat, grasshopper warbler, penduline tit, great grey shrike.

Mammals listed in Annex II to the Council Directive 92/43/EEC: porpoise, European otter, grey otter.

Amphibians, reptiles and fish listed in Annex II to the Council Directive 92/43/EEC: great crested newt, fire-bellied toad, European pond turtle, river lamprey, allis shad, sabrefish.

Activity conducted in the Trzebiatów-Kołobrzeg Coastland: soil cultivation, changes in soil cultivation methods, pasturing, abandonment of pasturing activity, removal of hedges and coppices, forest felling, burning, catching, poisoning, poaching, oil and gas exploration and mining, scattered buildings, paths, tourist trails, bike trails, camp and caravan sites, sports and outdoor activities, wearing down of land, excessive use, military training grounds, drainage, removal of sediments, regulation (straightening) of river beds, waste storage and disposal, deposition of dredged material, dams, embankments, artificial beaches, works related to protection against the eroding activity of the sea and coast protection.

THREATS

Pressure related to the expansion of tourism and recreation (destruction of habitats by building development, habitat destruction and wearing down by tourists, contamination and littering). Contamination of water.

Plans to afforest halophilous plant communities and riverside forest-edge communities.

Changes in water conditions (mainly drainage and isolation from the flow of saline water). Changes in habitats related to coast protection measures (np. beach cleaning, cliff protection).

CONSERVATION STATUS

The major part of the area is not protected. The area includes the Liwia Łuża nature reserve (220 ha; 1959), the Ekopark Wschodni area of ecological interest (260 ha; 1996) and a portion of the Protected Landscape Area of the Koszalin Coastal Belt (36,229 ha; 1975).

At its closest point, the project site is located around 750 m south-east of its borders.

The analysis of the area, described in the data form for the above-mentioned area and drawn up by the Institute of Nature Conservation of the Polish Academy of Sciences, researchers from the University of Szczecin, the Agricultural University of Szczecin and the Nature Conservation Office in Szczecin in 2001 and updated in September 2005, demonstrates no threats stemming from the construction of wind turbines in the vicinity of the above-mentioned area.

1.2. Environmental description of the Trzebiatów Wildlife Refuge

The project site lies within the limits of the area suggested by non-governmental organisations in the Shadow List as a special bird protection area called the Trzebiatów Wildlife Refuge. This is an extensive stretch of land situated in the north of Poland between Korzystno and Kamień Pomorski. The area has not been adequately described yet.

The area selected for the project is located on the outskirts of the Trzebiatów Wildlife Refuge in its easternmost section.

AREA DESCRIPTION

The Wildlife Refuge is located within a mesoregion called the Trzebiatów Coast. The Refuge is made up of large meadows which were intensively mown and grazed until a dozen years ago or so. Since then, they have been practically unused. The area has small clusters of mid-field coppices, while the largest forested area is located in the central and northern sections of the Refuge. Along the Świniec and Niemica rivers, as well as around the estuary of the Ryga river, local meadows are often flooded during the spring. A considerable area is

overgrown with reed and owing to the neglected drainage system, flood waters do not recede for longer periods. The area of the Refuge also includes two littoral lakes.

ENVIRONMENTAL VALUE

At least 35 bird species listed in Annex I to the Birds Directive have been identified in the Refuge, including: bittern, white stork, black stork, Bewick's swan, whooper swan, black kite, red kite, honey buzzard, marsh harrier, northern harrier, Montagu's harrier, peregrine falcon, spotted crane, golden plover, wood sandpiper, ruff, short-eared owl, little gull, little tern, common tern, Caspian tern, black tern, whiskered tern, common kingfisher, black woodpecker, middle spotted woodpecker, nightjar, woodlark, barred warbler, red-backed shrike, red-breasted flycatcher, aquatic warbler.

The Refuge was established due to the numerous presence of two migratory and one breeding bird species. The bird species, whose populations qualify the Refuge as an international Special Protection Area (the so-called Qualifying Species) include:

- bean goose
- white-fronted goose
- corncrake

Fourteen of the species identified there are included in the list of endangered bird species in the Polish Red Data Book of Animals. During seasonal migrations species not listed in the Annex I of the Birds Directive can also be identified, including cormorant, wigeon, teal and lapwing.

1.3. Environmental description of the Bay of Pomerania PLB990003

AREA DESCRIPTION

The Bay of Pomerania is a body of water with a high level of diversification of the sea bottom (ranging from sandbanks to extensive gravel- or boulder-strewn areas). The central section of the Bay occupies a large shoal patch called the Oder Bank.

ENVIRONMENTAL VALUE AND IMPORTANCE

There are at least three species listed in Annex I to the Birds Directive. During the migrations and in winter the land provides shelter to at least 1% of the total migration flyway

population (C2 and C3) of the following species: great-crested grebe, red-necked grebe, horned grebe, smew, oldsquaw, common scoter, black guillemot, red-breasted merganser and velvet scoter; there are also relatively numerous populations (C7) of black-throated diver and red-throated diver. Marsh and water birds occur in concentrations of more than 20,000 individuals (C4) and in winter – more than 100,000 individuals.

THREATS

The basic threat is related to plans to locate wind farms in the area. A threat for birds may also be posed by some forms of fishing, including set nets and set lines.

CONSERVATION STATUS

No protection

2. Planned forms of nature protection on the areas affected by or adjacent to the project site

2.1. "Ice-marginal valley and present valley of the Parsęta River" nature and landscape protection complex (ZPK-1)

The area stretches between Dźwirzyno and Grzybowo in the north and extends eastwards as far as Rozcięcino, encompassing the villages of Karcino, Głowaczewo and neighbouring on Drzonowo, Nowogardek, Stary Borek, Błotnica, Przećmino and Zieleniewo. The area occupies a major part of the municipality. The main goal of conservation activities is to preserve the unique biological diversity, protect regional landscapes, conserve bird breeding sites, shelter nesting sites of the bird population inhabiting flood meadows stretching in the beds of small watercourses, such as the Błotnica, Stróżka, Wielki Rów and Dębosznica, protect the landscape and wetlands. The area covers the ice-marginal valley and the present valley of the Parsęta river with surrounding wetlands, Resko Przymorskie lake, a stretch of a beech forest and animal breeding sites. Along the Parsęta valley there are shrub clusters which are important for sustaining the local fauna, while the naturally meandering river offers numerous refuges for animals. Due to the occurrence of precious plant species, five sites of ecological interest are planned to be established in the area. The region is also a habitat of rare animal species, including common adder, common pipistrelle, Eurasian otter and Daubenton's bat.

2.2. "Karcino Beech Forest" area of ecological interest (UE-1)

The site is located in the vicinity of Karcino, forming a part of the "Ice-marginal valley and present valley of the Parsęta River" nature and landscape protection complex. The main goal is the protection of the local complex of deciduous forests (*Quercus Fagetea*). The forest complex includes a fertile lowland beech forest which stretches in a narrow belt along the railway embankment between Karcino and Głowaczewo. Valuable plant species found in the area include broad-leaved helleborine, sweet-scented bedstraw, wood sanicle, pale sedge, pill sedge, elongated sedge, remote sedge, bloody dock. The area is a nesting site for birds of the family *Emberizidae* (sparrows, buntings and relatives) as well as a breeding ground of amphibians, reptiles and mammals, e.g. common toad, common frog, slow-worm, grass

snake, the Western European hedgehog, Daubenton's bat, serotine bat, common pipistrelle, wild boar, roe deer. The area is important environmentally on a local scale.

The main threats for the site include forest floor ploughing, tree stand thinning, partial felling and waste dumping by local inhabitants.

2.3. Mid-field water pond – (OC-1)

The site lies in the vicinity of Karcino. The water pond is surrounded by trees and is subject to periodical drying. The banks are overgrown with rushes including the associations *Acoretum calami* (dominated by sweet flag), *Glycerietum maximae* (dominated by reed mannagrass), *Phalaridetum arundinaceae* (reed canary grass), *Sparganio Glycerietum fluitantis* (water mannagrass) and false fox-sedge.

The water pond with its characteristic vegetation and inhabiting animals is not within the impact zone of the wind farm. The closest wind turbine is located 1 km south-east of the limits of the pond.

3. Conclusion

In the nature condition survey and selection of protected sites and main environmental threats for the Kołobrzeg municipality in 2001, the focus was on fauna and flora species covered by the Natura 2000 Directives.

Despite the existing area development plan which provided for the location of wind power facilities around Karcino and Sarbia, a nature conservation officer's analysis did not demonstrate that the construction of the wind farm could exert any adverse effects on the condition of the natural environment in that region. No threats involved in the operation of wind turbines were identified. Also, nature conservation recommendations do not suggest that the wind farm could have a harmful influence on any elements of the environment located within the reach of the project site.

VI. ENVIRONMENTAL IMPACT OF THE PROJECT
Identification, analysis and evaluation of the scale and importance of potential environmental impacts

Due to the fact that the set of wind turbines under discussion is located in the vicinity of the "Trzebiatów-Kołobrzeg Coastland" included in the list of planned Natura 2000 protected sites of the Minister of the Environment and encompasses the "Trzebiatów Wildlife Refuge" Natura 2000 site selected by non-governmental organisations, and in connection with paragraph 3 section 1, item 6 of the Regulation of the Council of Ministers of 9 November 2004, as amended (Journal of Laws no. 92, item 769 and Journal of Laws no. 257, item 2573), an evaluation of the undertaking's impact on elements of the natural environment was carried out with a particular emphasis on the project's impact on the Natura 2000 network of protected sites.

The evaluation of the project's environmental impact was drawn up using such methods of analysis as environmental analogy, cartographic analysis, documentation analysis and inductive descriptive analysis.

The impact of the project on the natural environment can be divided into three stages:

1. Stage of wind farm construction
2. Stage of wind farm operation
3. Stage of wind farm removal

1. CONSTRUCTION STAGE

During the stage of construction, the wind farm can influence elements of inanimate nature, the acoustic climate, atmospheric air, flora, fauna, people, cultural assets, as well as affecting the environment in terms of waste production.

1.1. Impact on abiotic environment

The impact on abiotic environment will take place mainly in the construction phase. It is at this stage that excavations for the construction of access roads, exit roads and assembly sites will be made and utility trenches for the power cable network, control network, telecom

+ IT network will be dug. In connection with the construction of access roads and assembly sites, as well as foundation trenches, it will be necessary to haul away ca. 34,435 Mg of trench soil. Material excavated from the trenches will be allocated for soil remediation, to physical persons or, free of charge, to the nearest waste storage facility.

Engineering excavations will also be made before the construction of the transformer station and utility trenches will be provided for power and telecommunication cables. All the soil excavated from utility trenches will be used for their backfilling.

Soil cover (predominantly soil belonging to the valuation class III and IV) will be removed from the wind turbine foundation area, from assembly sites located around the turbines, from land occupied by new access roads and areas selected for utility trenches. Soil will be removed from a total of 82,106 m² of land.

1.2. Impact on the acoustic climate and atmospheric air

Since the excavated material will be transported by trucks, the air condition (exhaust fumes and dust) will become subject to a temporary exacerbation. The same will apply to the acoustic climate in the vicinity of access roads, which is why traffic should take place along roads constructed specifically for the purpose of the wind farm, bypassing – as far as possible – human settlement areas and animal habitats.

1.3. Impact on flora

The undertaking's impact on the local plant cover will take place exclusively at the investment stage. Existing local vegetation, represented mainly by agrocenoses, will be destroyed on areas that will be directly occupied by wind turbines and access roads. This will not cause major damage to the biocenosis. There are no protected or endangered species growing on lands allocated for the construction of the wind farm.

1.4. Impact on fauna

During the construction stage of wind turbines, due to inconveniences resulting from the operation of construction equipment (noise, exhaust fumes, vibrations, physical danger) and truck access to the construction site, representatives of the local fauna will probably migrate temporarily into adjacent areas, with the exception of species that easily become synantropic, characterised by extensive adaptability to changeable environmental conditions. Areas directly occupied by wind turbines, the transformer station and access roads will see a total destruction of soil fauna as a consequence of the removal of the soil cover.

1.5. Production of waste

The construction of the undertaking discussed here (roads, power network, transformer station, telecommunications network, wind turbine foundations, wind turbine assembly) will produce construction waste of the following groups, according to the Ordinance of the Minister of the Environment of 27 September 2001 on waste catalogue (Journal of Laws of 8 October 2001).

Waste code	Description
17	Waste produced during construction, repair and demolition of building structures and road infrastructure (including soil and earth excavated from contaminated sites)
17 01	Waste of building materials and components and road infrastructure (e.g. concrete, bricks, tiles and ceramics)
17 01 07	Mixtures of concrete, crushed bricks, ceramic waste and fittings other than those specified in 17 01 06
17 01 82	Other types of waste, not specified above
17 03	Bituminous mixtures, tar and tarred products
17 04 11	Cables other than those mentioned in 17 04 10
17 05	Soil and earth (including soil and earth excavated from contaminated sites and dredging spoil)
17 05 04	Soil and earth, including stones, other than those mentioned in 17 05 03
13 02 06	Used oils and synthetic greases
15 02 02	Used oil-contaminated wiping cloths and protective clothing
16 01 17	Ferrous metals
20 03 01	Other municipal wastes

Means of storage of waste produced on site

Waste code	Means of storage
17 01 07	<i>Container stored on construction site</i>
17 01 82	<i>Container stored on construction site</i>
17 03	<i>Closed container stored on construction site</i>
17 04 11	<i>Closed container stored on construction site</i>
17 05 04	<i>Allocated place on construction site</i>
13 02 06	<i>Closed and protected barrels for liquid waste</i>
15 02 02	<i>Closed barrel</i>
16 01 17	<i>Closed barrel</i>
20 03 01	<i>Closed container stored on construction site</i>

Means of management and disposal of waste produced on site:

Waste code	Means of storage
17 01 07	<i>Transferring, free of charge, to a waste storage facility, for remediation or to</i>

	<i>physical persons</i>
17 01 82	<i>Transferring to a waste storage facility</i>
17 03	<i>Transferring for disposal to a specialist company dealing in the disposal of a given type of waste</i>
17 04 11	<i>Transferring for disposal to a specialist company dealing in the disposal of a given type of waste</i>
17 05 04	<i>Transferring, free of charge, to a waste storage facility or for remediation</i>
13 02 06	<i>Transferring for disposal to a specialist company dealing in the disposal of a given type of waste</i>
15 02 02	<i>Transferring for disposal to a specialist company dealing in the disposal of a given type of waste</i>
16 01 17	<i>Transferring for recycling to a specialist company</i>
20 03 01	<i>Transferring to a waste storage facility</i>

Waste produced during the construction of the wind farm will be subjected to recovery and recycling to the maximum possible extent in order to transform it into a manufacturing or reclamation material. Moreover, according to the Act on Waste Management, manufacturers are obliged to prevent the production of waste or minimise the quantity of waste, as well as to remove waste from waste production sites and reuse or neutralise it in order to prevent it from posing a risk to humans and the environment. Consequently, for safety reasons, all waste will be hauled away, disposed of and neutralised as they are produced, while the quantity of waste produced will be kept to a minimum. The quantity of waste is currently difficult to estimate. Detailed information will be recorded as the construction progresses and – according to current legal regulations – specified in waste transfer documents kept by the producer. Taking into account planned means of waste management, there is no risk that waste produced could adversely affect the natural environment and humans in any aspect.

1.6. Impact on humans

In the construction stage, the project's impact on human health will be basically limited to road transport which will deteriorate the acoustic and air quality conditions in human settlements. Since construction works will take place during the day and within the area of planned roads, no marked exacerbation of people's living conditions is expected.

1.7. Impact on cultural assets

Since the area of the project (plots no. 560/8 and 516/4 within Sarbia and no. 615 within Karcino) features archaeological sites and earth works could contribute to a destruction of cultural layers, artefacts and cultural monuments, special protection zones will be marked out around the sites and special protection rules will be established.

2. OPERATION STAGE

2.1. Impact on abiotic environment

In the operation stage of the wind farm, no impact on the earth's superficial layer is expected. The wind turbines themselves, as well as hardened surfaces related to the construction of access roads will have a minor effect on the infiltration of runoff waters into the ground. The water will flow off the surface of roads, assembly sites and foundations into directly adjacent areas, which will not significantly alter the water conditions in the area surrounding the project site.

Since the transport of heavy construction equipment and the movement of trucks along roads constructed especially for the purpose of the assembly of the wind farm will be infrequent, no adverse effects on the flora, fauna, human health and elements of the abiotic environment are expected. The impact on soil conditions made by the power cable, control network and telecom + IT network, laid in the ground at a depth of 1 m in a special insulating layer, is negligible – both in the area of the project and beyond it.

2.2. Impact on flora

No adverse effects of the operating wind farm on plant communities found in areas adjacent to the project's site and neighbouring areas are expected.

2.3. Impact on fauna

The construction of the wind turbines and the consequent deterioration of acoustic conditions in the area adjacent to the wind turbines may produce changes in the spatial arrangement of land animals and breeding sites of locally inhabiting birds, as well as contributing to the possible abandonment of current bird feeding grounds. At the same time, however, no significant interference of the wind farm in the living environment of birds and other animals which could reduce their populations is anticipated, mainly due to the considerable distance of the project site from the boundary of forests and rivers which are the basic living and feeding grounds for birds.

2.4. Production of waste

Wind turbines do not produce virtually any waste during their operation. They produce the so-called "environmentally-friendly" power, as opposed to conventional power plants which produce waste in the form of combustion products or nuclear power plants which produce hazardous radioactive waste.

The only type of waste generated in the course of the wind farm's operation can be discards produced during maintenance and repair works.

2.5. Impact on atmospheric air

Since wind power plants are environmentally-friendly installations, there is no possibility of any adverse effects on atmospheric air. The operation of wind farms and generation of renewable energy contribute to reduced emissions of gases, dusts and pollutants produced by conventional power plants.

2.6. Impact on climate

The main effect of wind turbines on local climate conditions will be the suppression of wind power within the blade zone (100-150 m above ground level).

The wind turbine construction will also reduce the intensity of direct solar radiation reaching the earth's surface (resulting in shading). These changes, however, will be insignificant for local living organisms.

2.7. Impact on cultural assets

There will be no adverse impact of the wind farm's operation on property and cultural assets.

2.8. Impact on human health

Since the locations of wind turbines were selected taking into account their necessary distance from human settlements, the operation of the wind farm will not affect the health and comfort of living of people inhabiting areas neighbouring on the project site.

2.9. Impact on the acoustic climate

Defining the range of industrial noise, it is necessary to establish the project's location and specify maximum admissible noise levels (dB A) on site and on areas bordering on the project site, according to the legal provisions in force at the time of the evaluation, while taking into account the future area development plan, and specify all sources of noise found on the area of the project site, both in the open and in buildings.

An analysis of inconveniences and the range of noise produced on the project site was performed in accordance with the Ordinance of the Minister of the Environment of 29 July 2004 on admissible noise levels in the environment (Journal of Laws no.178, item 1841).

Sound propagation calculations were performed using the computer application WindPRO, version 2.5. (the DECIBEL module)

Description of the Decibel module of the WindPro application

The calculation of the noise impact was performed using the DECIBEL Module of the WindPRO application. The programme makes it possible to specify individual locations that are subject to protection against emissions of powerful sounds (individual points – e.g. individual buildings), as well as larger areas described in the form of a polygon. The application generates noise emission levels at a point or area with the strongest noise impact and then comes up with the coordinates for a given point or area, together with the measured noise emission level.

Noise protection points or areas are entered visually into a map displayed at the bottom of the screen. For each point/area it is possible to specify the minimum distance to the closest wind turbine and the maximum admissible noise emission level (in dB(A)).

Wind power plants can be selected from the programme's directory featuring more than 500 different types and models. If no noise emission data are specified in the directory, relevant data can be keyed in manually at the beginning of the calculation.

Since the coordinates for wind turbines and points/areas that are subject to protection against the emissions of powerful sounds are given in three dimensions, it is possible to calculate the noise emission impact of different wind turbines taking into consideration variations in terrain. The programme can automatically calculate elevation differences if the analysis is performed using digital maps.

A maximum admissible noise emission level can be entered for each point or area.

The DECIBEL module is capable of performing calculations based on five different models:

- International standard ISO 9613-2
- Denmark: Guidelines of the Environmental Department
- The Netherlands: IL-HR-13-01
- Improved Danish model
- Former German guidelines VDI2714

Acoustic location of the project

The location of the project site is described in chapter II, item 1.

Admissible noise levels

According to a copy and a map extract from the local area development plan prepared for the Kołobrzeg municipality, the wind farm site – together with the surrounding areas – is classified in the local area development plan as agricultural land. Areas thus classified in applicable regulations are not subject to noise protection. However, human settlements in the villages of Karcino, Sarbia and Nowogardek are subject to protection.

Admissible noise levels in the environment, generated by different groups of sources, with the exception of noise caused by overhead power lines, as well as by aircraft take-offs and landings, with reference to projects implemented on arable lands located outside the city and dominated by home- and farmsteads are listed in item 3 of the noise level table and amount to 55 dB during the day and 45 dB at night – according to the Ordinance of the Minister of the Environment of 29 July 2004 on admissible noise levels in the environment (Journal of Laws no.178, item 1841).

Description of noise sources

Available documentation and project assumptions show that the following sources of noise can be identified on the planned project area:

Point sources:

VESTAS V90/3.0 MW electricity-generating turbines of the wind farm together with the sound of the revolving rotors.

- Number of turbines – 17
- Noise level – 102-106.7 dB
- Operation time – 24 h/day.

When determining the sound power level of the wind turbines, manufacturer-supplied data were used (operation and maintenance manual), as well as information obtained from wind power tests performed for similar projects.

Noise screens, greenery

The closest buildings are not separated from the planned wind farm area by any sound-absorbing facilities. It must also be noted that local buildings are situated in a slight depression of the terrain in relation to the location of the wind turbines.

Calculation results. Computer printouts.

Results of calculations performed for observation points and the general propagation of noise in the area discussed are presented in the form of a computer-generated topographical map and computer printouts. The results are presented in the Appendix for two source noise levels, i.e. 102 dBA and 106.7dBA – depending on the operation of different wind turbines, for different wind speeds and turbine regulation levels.

Conclusion

Based on the calculations it is concluded that the standard level of noise in the environment (within the forecast error) on the elevation of the closest existing buildings, produced by the operation of the wind farm both during the day and at night, will not be exceeded.

2.10. Impact on avifauna

Based on an environmental evaluation of the Kołobrzeg municipality and own observations it was found that during their seasonal migrations birds rest and feed mainly around Resko lake which offers them an excellent food source and shelter. Another significant fact is that the lake's tributaries are the Błotnica and Dębosznicza rivers which – together with meadows stretching along their beds – form ecological corridors ca. 1.5 km wide, enabling different animals, including migrating birds, to move around freely.

The above-mentioned rivers, in addition to their corridor function, also make a good shelter, dwelling and breeding grounds for a number of bird species. Generally, wind power plants – being ecological barriers – can have an adverse effect on migratory birds, however the location of the wind farm in question in fields between Sarbia and Karcino, i.e. outside the ecological corridor (at a distance of ca. 100 m from the Dębosznicza river at the closest point), should not disrupt birds' migrations and living conditions.

Bird migration flyways typically extend north-south and east-west, along watercourses. Consequently, the wind farm does not intersect any of the ecological corridors enabling birds to reach their feeding and breeding grounds.

At the same time, the possibility of birds flying to their feeding grounds over the wind farm site cannot be ruled out, though taking into consideration the distance from the lake and the good visibility of local terrain obstructions, i.e. wind farm towers, instances of birds crashing into the turbines will only be incidental.

Below is a detailed description of the operating wind farm's impact on priority bird species occurring in the vicinity of the project, listed in the Ordinance of the Minister of the Environment of 21 July 2004 (Journal of Laws no. 229, item 2312 and 2313):

1. **White-tailed eagle** *Haliaeetus albicola* – areas neighbouring on the project site are inhabited by one couple of white-tailed eagles dwelling in the beech forest stretching north of Sarbia. The turbine erected in the closest proximity to the eagles' location lies at a distance of ca. 450 m. According to the Ordinance of the Minister of the Environment of 28 September 2004 (Journal of Laws no. 220, item 2237), the protection zone radius for the white-tailed eagle is 200 m throughout the year and 500 m between 1 January and 31 July. The white-tailed eagle is a species whose life is tightly connected with water environment, where eagles prey. White-tailed eagles build their nests near to water bodies, on the outskirts of forests. The wind turbines discussed here can be an ecological barrier for white-tailed eagles, as they are built across the route to the eagles' preying grounds on Resko Przymorskie lake, the Baltic coast and water ponds located in the south-western part of the region. The highest frequency of flights from breeding grounds to feeding grounds is expected northwards, north-westwards and south-westwards. The only possible obstructions are turbines no. 2, 3 and 4. Other turbines are beyond the area of the most frequent flights. White-tailed eagles, similarly to other species belonging to the order *Falconiformes*, are prone to be affected by the operation of wind power plants, which is a consequence of their active flight while hunting their prey. However, the project area discussed in this Report is not an attractive feeding ground and the eagles are rather unlikely to wheel round over the site occupied by the wind farm's turbine towers.

The birds' only contact with the turbines is possible during their flights to food sources. The eagles will have to fly up to an altitude of more than 150 m, which is not a problem for the species. Since the birds have excellent vision and the turbines are very clearly visible and stand out from the surrounding area, it is possible that the birds will in fact fly at lower altitudes, having learnt to fly by obstructions of this type.

Poorly visible overhead power lines pose a much greater danger to birds of prey and migratory bird species than wind power plants. There is only scanty

information on the impact of wind power plants on the life of white-tailed eagles. The possibility of eagles crashing into the turbines cannot be ruled out, however the incidents, if they occur, will only be marginal. Similarly to other predatory birds, local white-tailed eagles will be closely monitored in order to establish the impact of the operating wind farm on the species.

2. **Marsh harrier** *Circus aeruginosus* – marsh harriers inhabit areas located near Drzonowo. Considering the considerable distance of the project's area from the bird's feeding grounds and the nature of marsh harrier's biotope, it is reasonable to conclude that the operation of the wind farm will not have any impact on this bird species. Marsh harriers live around lakes and fishing ponds, as well as inhabiting wetlands densely overgrown with rushes. Consequently, they will not be in the direct impact zone of the turbines. In view of the bird's preying style, i.e. pursuing prey over fields and meadows, it is likely that the turbines could scare the birds away from their current sources of food. Nevertheless, as with white-tailed eagles, the effect of the wind turbines on the species should be limited, since marsh harriers are predators equipped with excellent vision enabling them to pass by the wind farm towers without any problems, or rise to high altitudes in order to pass over any terrain obstructions that might occur.
3. **Northern harrier** *Circus cyaneus* – Northern harriers inhabit meadows lying on the Dębosznica river. They hunt their prey mainly over meadows and wetlands stretching across local river valleys, which is why the wind farm's impact on this bird species is practically negligible. Northern harriers most likely have their preying and feeding grounds in the land belt between the Debosznica and Błotnica rivers, i.e. ca. 200-2000 m from the closest wind turbine.
4. **White stork** *Ciconia ciconia* – storks inhabit rural areas surrounding the project site. Storks, being birds traditionally living close to human settlements, are used to elements of the technical infrastructure that are typically found in rural areas, which is why they should not be affected in any way by the proximity of the wind turbines. Storks are used to fly round obstacles and tall structures. Moreover, since white storks build their nests in the vicinity of houses and farm buildings, they will not be exposed to the noise generated by the turbines. Since storks feed mostly on wetlands and – as expected – the nearest feeding grounds are water

ponds located near Glowaczewo and Błotnica, no adverse impact of the project on the white stork population is expected.

5. **Common sandpiper** *Actitis hypoleucos* – common sandpipers inhabit areas around Resko lake and the Dębosznica river, nesting on water banks. Being a migratory bird species eagerly staying close to water, the sandpiper most likely flies along routes overlapping with ecological corridors – in this case, along the strip around the Dębosznica and Błotnica river valleys. No adverse impact of the wind farm on this bird species is to be expected, since the operating wind turbines do not affect any of the links in the bird's food chain, feeding grounds or migration flyways.

6. **Savi's warbler** *Locustella luscinioides* – Savi's warblers are found in the vicinity of the water ponds around Głowaczewo and Dębosznica near Sarbia and the Błotnica. The operating wind farm does not affect the living and feeding grounds or migration routes of these birds.

7. **Common teal** *Anas crecca* – teals live in the surroundings of the fishing ponds near Głowaczewo which make an excellent food source. Since teals neither inhabit cultivated lands, nor have their feeding grounds on meadows and fields, it must be concluded that the operating wind farm cannot have any effect on teal populations.

8. **Garganey** *Anas Querquedula* – garganeys dwell around the fishing ponds located near Głowaczewo. As with teals, the impact of the operating wind farm on garganeys is negligible. Garganeys fly along migration routes over the Dębosznica and Błotnica river valleys. They do not pass over the wind farm site and they do not nest there.

9. **Lapwing** *Vanellus vanellus* – lapwings have their feeding and dwelling grounds on meadows stretching near Karcino and in the Dębosznica river valley, as well as meadows around Nowogardek. Since the wind turbines are located at a considerable distance from lapwing habitats, the wind farm's operation will not deteriorate the living conditions of this species or reduce its populations.

10. **Corncrake** *Crex crex* – corncrakes have found convenient living and feeding areas in the vicinity of the fishing ponds situated near Głowaczewo. Corncrakes are extremely flighty birds and they are endangered by the loss of breeding habitats, e.g. due to changes in the hydrological regime of rivers altering the frequency and duration of inundations in river valleys and due to the loss of nesting habitats as a result of shrinking areas of extensively used meadows and pastures located in river valleys, transformed into cultivated fields. Furthermore, corncrake populations are also adversely affected by agricultural mechanisation involving new forms of agrotechnical treatments, e.g. the use of fast mowers or mowing the meadows earlier than it used to be in the past, as well as the growing pressure by predators including wild minks, foxes, cats, ravens and carrion crows. It does not seem likely that the wind farm, located at a distance of ca. 500 m, could have a deterrent effect on corncrake population or adversely affect it in any other way. Noise emissions at this distance are substantially reduced, while the operating wind farm is not located within the area inhabited by corncrakes. It must, therefore, be concluded that the species will not be in any way harmed as a result of the project implementation. What is more, corncrakes undertake seasonal migration to south-eastern Europe, which means that wind turbines are not an ecological barrier. In the moulting period (June and July) corncrakes leave their natural feeding grounds and settle in habitats with tall herbaceous vegetation. There are no such habitats on the site of the project. Taking into account the information given above, the project should not affect the condition and the number of corncrake populations, as the wind farm is located beyond their living and feeding grounds.
11. **Black woodpecker** *Dryocopus Martusi* – black woodpeckers dwell in the beech forest near Karcino. Woodpeckers are not predators hunting their prey in flight, therefore there is no risk of birds hitting any of the wind turbines during preying. What is more, woodpeckers dwell in forests, so the proximity of the wind turbines should not adversely affect their populations, since noise produced by the generators is largely suppressed by densely growing trees. Also, the intensity of forest sounds is often greater than that of the operating wind turbines.
12. **Goshawk** *Accipiter gentiles* – goshawks inhabit areas around Karcino. They hunt their prey in open fields and meadows, chiefly between Karcino and Resko

Przymorskie lake. They are also seen over fields between Karcino and the forest surrounding railway tracks. It is doubtful that the wind turbines located there could adversely affect goshawk populations by presenting an ecological barrier or restricting feeding grounds. The turbines no. 1 and 2 could obstruct goshawks' flights, however the distance between them is more than 900 m, so there are no grounds to fear that the turbines could pose a danger to the birds on account of huge alternative flying area. Furthermore, goshawks are birds of prey equipped with excellent vision and collisions with such large structures as wind farm towers are highly unlikely. The possibility of birds hunting their prey over fields with the wind turbines cannot be ruled out, however such incidents, if they occur, will only be marginal. Like other predatory birds, goshawks will be closely monitored in order to determine the possible impact of the wind farm on the species.

13. **Red kite** *Milvus milvus* – red kites inhabit fields stretching north of Sarbia. The operating wind farm can affect the bird's living conditions, as they typically prey in the open. However, taking into account the fact that the wind turbines are located at distances of ca. 400-1000 m, the wind farm's operation should not prevent kites from using the fields as a food source.

The possibility that the birds feeding on fields will hit the turbines cannot be ruled out, however it will be rather insignificant.

Like other predatory birds, red kites will be closely monitored in order to determine the possible impact of the wind farm on the species.

14. **Common snipe** *Gallinago gallinago* – snipes inhabit the Błotnica river valley, i.e. areas located ca. 900 m away from the closest wind turbines. Since snipes mainly dwell in wetlands, swamps and peat bogs, where they find good feeding and nesting conditions, it is concluded that snipes live beyond the impact zone of the operating wind farm. Also, the wind turbines will not disturb the bird's migrations, as they are located outside of the ecological corridor along which the birds travel.

15. **Eurasian curlew** *Numenius arquata* – birds of this species feed and nest in meadows lying around Głowaczewo and in the Błotnica river valley. They prefer wet meadows and swamps which offer good feeding conditions. The shortest distance between curlew habitats and the wind farm is ca. 500 m. In view of the fact that curlews are wading birds that do not hunt in the open, but only in wet

areas, the distant wind farm cannot affect the number and condition of curlew populations.

16. **Little grebe** *Tachybaptus ruficollis* – little grebes dwell around Resko lake, along the Błotnica river near Resko lake and in the vicinity of the fishing ponds located near Głowaczewo. They prefer small, inland water reservoirs, heavily overgrown with vegetation. Grebes do not feed on fields and meadows, while the closest wind turbine is located ca. 500 m away from their feeding grounds. No adverse effect of the wind farm on little grebe is to be expected. Also, the wind farm will not affect its population during migrations, as wind farms are located beyond the ecological corridor marked out on the basis of bird migration flyways.

17. **Sedge warbler** *Acrocephalus schoenobaenus* – sedge warblers inhabit areas around the water ponds near Głowaczewo. Since the species dwells exclusively in wetlands adjacent to bodies of water, which abound in food, it is unlikely that the wind turbines located in fields at a distance of more than 500 m from sedge warbler habitats could disturb the bird's living and feeding conditions. Sedge warblers migrate twice a year. Since they prefer flying over swampy areas with a dense plant cover, where they find refuge, it should be assumed that they use the ecological corridor over the Błotnica and Dębosznica rivers during their migrations.

18. **Woodcock** *Scolopax rusticola* – woodcocks inhabit meadows around Karcino. Since woodcock habitats are located around 1 km from the closest wind turbine, the wind farm's impact on woodcock populations will be insignificant.

19. **Great reed warbler** *Acrocephalus arundinaceus* – the species is found in areas surrounding the water ponds in Głowaczewo, i.e. at a distance of ca. 500 m from the wind farm site. Similarly to other species of birds living and feeding on the above-mentioned area, no effect of the operating wind farm on this species is expected. Reed warblers prefer lake and marshy biotopes with thick vegetation clumps. It is, therefore, highly unlikely that the bird could migrate towards the operating wind farm.

20. **Turtle dove** *Streptopelia tortur* – turtle doves dwell in forests near Karcino. The species, typically found in forest biotopes and preferring forest fringes, should not be significantly affected by the proximity of the wind turbines. The northern part of the forest is close to the wind turbines no. 1, 2 and 3. The area between the forest limit and the wind turbines forms a corridor ca. 80 m wide, while the distance between individual turbines is between 450 and 930 m, which means that turtle doves can move around freely and feed on their grounds, regardless of the operating wind farm which should not have any influence on the living conditions of turtle doves. Like other local bird species, turtle doves will be closely monitored in order to determine a possible impact of the wind farm on their populations.
21. **Water rail** *Rallus aquaticus* – water rails are found in the vicinity of the fishing ponds located nearby Głowaczewo. They prefer habitats bordering on water reservoirs and require shallow water environments. Water rails dwell in areas lying at a distance of ca. 500 m from the wind farm. Considering the wind farm's limited emissions of noise and electromagnetic waves, as well the nature of water rail's life and feeding habits (water rails are typical water birds), no impact of the wind turbines located in nearby fields on the bird species is expected.
22. **Common kingfisher** *Alcedo atthis* – kingfishers dwell along the Błotnica and Dębosznica rivers, i.e. within the ecological corridor marked out by the above-mentioned watercourses. The closest wind turbine is located ca. 200 to 1500-2000 m away from the bird's habitats. Kingfishers prefer wet biotopes. Therefore, it is highly unlikely for them to feed or nest in the vicinity of the wind farm. The proximity of the wind turbines should not have an adverse effect on the population of kingfishers, as in the case of all other species of breeding birds inhabiting areas adjacent to the wind farm.
23. **Common crane** *Grus grus* – cranes find good living conditions in the vicinity of Karcino, between Resko Przymorskie lake and the road connecting Karcino-Świerszczewo with Karcino-Rajewo. Cranes prefer wetlands abounding in food, lying far from human settlements. They have excellent feeding conditions in swamps and wet meadows stretching along lake shores. Consequently, no effect of the wind farm on the number and condition of the local crane population is

expected, since the wind turbines are located more than 1 km south and south-east of the areas inhabited by cranes.

24. **Bittern** *Botaurus stellaris* – bitterns dwell in the vicinity of the fishing ponds located nearby Głowaczewo, where they find excellent feeding conditions and shelter. The species is not affected by the wind farm, since the wind turbines are situated more than 500 m from bittern locations and they neither present an ecological barrier for bittern migration routes, nor deteriorate the birds' living conditions due to excessive noise emissions.

Summing up the separate analyses presented above, a general conclusion is to be drawn that the wind farm is located outside bird breeding areas and, furthermore, at a considerable distance from reproduction grounds and bird refuges, which is why the wind farm should not have a significant adverse effect on the population of priority bird species listed above, identified on the basis of on-site observations and the environmental description of the Kołobrzeg municipality.

The project's area is inhabited by common bird species typically dwelling in fields, meadows, tree clumps and small coppices. The area makes a potential feeding ground for such bird species as the sparrow, starling, yellowhammer, raven and hooded crow. The populations are listed among fairly numerous and numerous in Poland. It is unlikely that the project could have a negative effect on the condition of these bird populations, since fields and mid-field clumps of trees are not attractive or important bird breeding sites. Birds do not stay higher than at the altitude of trees, which is why the wind farm's rotors and blades do not pose a risk. The only expected effect will take the form of scaring birds off the area.

Moreover, marsh and water birds requiring protection in the form of establishment of Natura 2000 protected sites inhabit areas located at a considerable distance from the project. These include great grey shrikes and red-backed shrikes found in meadows nearby Głowaczewo and corn buntings which do not require protection in the form of Natura 2000 sites, dwelling in meadows along the Błotnica. Given the distance between the habitats of these birds and the wind turbine sites and considering that the birds typically feed and breed on wetlands, it seems unlikely for the project to adversely affect the populations of these birds, both during breeding, dwelling and seasonal journeys.

Since the wind turbines are located beyond environmentally valuable areas constituting local and regional bird migration flyways and considering the considerable distance from the Baltic Sea – the main bird migration route – their impact on bird migration flyways will be negligible.

2.11. Impact of electromagnetic radiation

The main source of natural electromagnetic field is the Earth which can be compared to a negatively charged sphere, being at the same time a huge magnet with poles not overlapping with the geographical poles. A purely physical analysis of the influence of those fields on living cells shows that they are very weak and do not trigger any marked changes in the human body. A full elimination of contact between humans and the natural source of electromagnetic field is not beneficial for physical and mental health, as demonstrated in scientific studies. Electromagnetic fields are an extremely varied environmental factor - from static fields (electrostatic and magnetostatic), low and high frequency, to microwave radiation (with frequencies of below 300 GHz). The environment includes both sinusoidal fields that change in time and fields that are modulated in very different ways. The way and the effects of electromagnetic fields depend on their frequency and intensity. Electromagnetic fields – in contrast to many other physical environmental factors, e.g. noise – are not generally registered by human senses, which is why it is impossible to intuitively adapt the way of conduct to the level of danger. The energy of electromagnetic fields absorbed directly in the body causes the generation of electric, induced currents, as well as heating of tissues. It can be a cause of undesirable biological effects and, consequently, the change of the health state (temporary and permanent). Despite many years of research aimed at establishing whether a prolonged chronic exposure to fields with an intensity not causing major short-term changes can influence people's health, the issue still has not been settled definitely. Electromagnetic fields of different frequencies have many practical applications in the industry, health service, telecommunications and everyday life. Based on observations, experience, experiments and medical knowledge, as well as cause and effect relationships it should be concluded that electromagnetic radiation can affect living organisms.

Important factors affecting the impact of electromagnetic radiation on human health are parameters of this field, as well as other factors related to the conditions of interaction occurring between the field and humans.

The range of admissible levels of electromagnetic fields in the environment and human surroundings is regulated in the Ordinance of the Minister of the Environment of 30 October 2003 on admissible levels of electromagnetic fields in the environment and means of checking compliance (Journal of Laws no. 192 of 14.11.2003, item 1883). Since the planned locations of the cable network, control network and telecom + IT network and the transformer station are beyond areas allocated for housing, the range of frequencies of electromagnetic fields for which physical parameters are specified describing the environmental impact of electromagnetic fields and admissible electromagnetic levels, characterised by maximum admissible levels of physical parameters, is specified for locations accessible to humans, as in the table below.

Physical parameter Frequency range of the electromagnetic field	Electric component	Magnetic component	Power density
1	2	3	4
0 Hz	10 kV/m	2500 A/m	-
From 0 Hz to 0.5 Hz	-	2500 A/m	-
From 0.5 Hz to 50 Hz	10 kV/m	60 A/m	-
From 0.05 kHz to 1 kHz	-	3/f A/m	-
From 0.001 MHz to 3 MHz	20 V/m	3 A/m	-
From 3 MHz to 300 MHz	7 V/m	-	-
From 300 MHz to 300 GHz	7 V/m	-	0.1 W/m ²

Emissions of electromagnetic fields result from the passage of electric current along power network cables. The main sources of electromagnetic field on the wind farm site will include the medium-voltage cable network (15/30kV), control network and telecom + IT network and the transformer station. Each of these emission sources is located beyond housing development areas. The cable network, control network and telecom + IT network do not have any impact or only have a negligible impact on humans and the environment as regards the generation of electromagnetic fields.

Transformer/switching station, a facility emitting electromagnetic field, is located in Nowogardek, around 200 m from the closest residential areas.

The facility incorporates an upper voltage switching station, transformers and a lower voltage switching station. Low-frequency (50 Hz) electromagnetic field occurs around the

transformer/switching station, which means that the area is affected by an intermediate electromagnetic field which has a relatively minor effect on living organisms. Since the station is practically self-operating, there is no possibility of human exposure to any effects of harmful EM fields. According to the current state of knowledge, it is assumed that radiation with a frequency of 50 Hz and lower has no negative impact on human health. However, since it may be necessary to repair the transformer/switching station during the thirty years of the wind farm's planned operation, power engineers exposed to radiation, harmless as it is, should stay within its range for the shortest period possible.

2.12. Impact of water and sewage management

In connection with the commissioning of the transformer/switching station it becomes necessary to place an insulated oil pan under each of the transformers. The oil pan capacity should be equivalent in 100% to the volume of oil in the transformer. The use of such pans makes it possible to eliminate the risk of oil leakage from the transformer into the soil in case of a breakdown and, consequently, prevent the penetration of harmful chemical compounds into underground waters, which could contaminate water bodies and harm living organisms within the range of the leakage. Water from the pans will be carried off to an isolated tank following its purification in a separator. The water will then be transported to a waste treatment plant. There is no risk of soil and water contamination with oil derivatives and other chemical compounds that are harmful to the environment.

2.13. Environmental impact in the event of a breakdown

Since the planned operation period of the wind farm is 30 years, breakdowns may occur, including failures of the transformer/switching station, a collapse of wind farm towers and exceeding the upper limit of wind speed at which the wind turbines stop working properly.

In case of a failure of the transformer/switching station in the form of a leakage of oil from the transformers, all the liquid will be collected in the oil pans protecting the soil from contamination. The content of the pans will then be removed, the defect will be eliminated and waste will be disposed of according to valid legal regulations. There is no possibility of contaminating the environment by harmful pollutants entering the soil and underground waters.

In case of a collapse of a wind turbine tower, the investor is obliged to remove and repair the damage resulting from the fall of the turbine within the shortest period possible.

However, since the structures of towers and the foundations are designed in such a way as to withstand even very strong winds, a disaster of this type is highly improbable.

If the upper wind limit (20 m/s) is exceeded, the generation of power by the wind turbines will be automatically switched off.

2.14. Cross-border environmental impact

Based on relevant analyses, no potential cross-border environmental impact of the project discussed is foreseen.

Consequently, there is no requirement to carry out a procedure evaluating the cross-border impact of the planned project on the environment.

2.15. Impact on natural habitats

According to the definition of habitat, the concept refers to a set of abiotic elements (related to the climate and soil) present in a specific location and affecting the development of different organisms, their population or the entire biocenosis.

According to the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, a natural habitat is a terrestrial or aquatic area distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural.

No valuable natural habitats listed in appendices to the Ordinance of the Minister of the Environment of 16 May 2005 (Journal of Laws no. 94, item 795) requiring protection in the form of establishment of Natura 200 sites have been identified either in the area zoned for the construction of wind turbines, or in project-adjacent areas.

The construction of the wind farm has a negligible effect on environmental abiotic conditions in the surrounding area. The wind turbines are located in cultivated fields which are not classified as environmentally valuable biotopes which are subject to protection. The areas are transformed biotopes, used for agricultural purposes and cannot be regarded as valuable natural habitats.

Furthermore, on account of the distance between the wind farm and the "Trzebiatów-Kołobrzeg Coastland" declared as a special habitat protection area, there is no possibility of the Karcino-Sarbia wind farm adversely affecting valuable natural habitats occurring in this area.

Within the "Trzebiatów-Kołobrzeg Coastland" there are no infrastructural elements of the project. All access roads, assembly yards, the cable network, control network and telecom + IT network, the transformer/switching station and the wind turbines are located outside the Trzebiatów-Kołobrzeg Coastland.

The project, therefore, is not likely to have any impact on the environmental assets of the area under discussion.

2.16. Impact on sites protected within the Natura 2000 network

The aim of selecting Natura 2000 sites is the protection of environmentally valuable and endangered elements of biological diversity.

Following a detailed assessment of the project's impact on such elements of the natural environment as the flora, fauna, cultural assets, humans, natural habitats, climate, atmospheric air, acoustic climate, avifauna and the aspects of electromagnetic radiation, production of waste and water and sewage management, it must be stated that the implementation of the project is not expected to produce any adverse effects on the Natura 2000 network, neighbouring with the location of the wind farm site.

An analysis of a number of aspects of the project's possible impacts did not demonstrate that the construction of a wind farm situated between the villages of Karcino and Sarbia could negatively affect the natural environment, though it is hard to state with absolute certainty that the undertaking will not produce any adverse effects whatsoever. Therefore, along with the implementation of the project, it is recommended to introduce a programme to reduce and compensate such possible impacts.

The location of the wind turbines in cultivated fields, as well as the construction of access roads, assembly yards, the cable network, control network and telecom + IT network on arable lands exclude the undertaking's potential to interfere with valuable natural habitats. **The project area does not feature any of the valuable natural habitats** listed in Annex I to the Habitats Directive.

Moreover, the species qualifying the Trzebiatów Wildlife Refuge as a special bird protection site are **bean goose, white-fronted goose and corncrake**. **None of these bird species occurs within the wind turbine location site.** The only bird species qualifying

the area in question for an establishment of a Natura 2000 site, inhabiting areas neighbouring on the project site is the corncrake which has its habitats at a distance of more than 500 m north-east of the closest wind turbine, i.e. within the zone with no noise impact of the wind farm and beyond corncrakes' seasonal migration flyways. What is more, corncrakes prefer swampy biotopes and wetlands, rarely occurring in fertilised croplands. Consequently, it is unlikely for corncrakes to be affected by the proximity of the wind farm – as it is the case with other breeding birds nesting around the project site which mainly inhabit the environs of Resko Przymorskie lake and along the Dębosznica and Blotnica rivers and smaller watercourses.

In view of the fact that the construction of the wind farm does not interfere with natural habitats or plant and animal habitats proposed for inclusion in Natura 2000 sites, the project is not likely to have any negative effect on the continuity of the Natura 2000 network.

It should also be noted that the wind turbines are located in areas which are outside the reach of international, regional and local bird migration flyways. Therefore, the wind farm under construction should not present an ecological barrier for migratory birds and should not cause numerous bird collisions with the wind farm's towers and blades which could reduce bird populations.

While upholding the above-mentioned thesis, the possibility of birds flying to their feeding grounds across the wind farm area cannot be ruled out, though taking into consideration the distance from the lake and the good visibility of local obstructions, i.e. wind farm towers, instances of birds crashing into the turbines will only be incidental.

2.17. Recommendation

In order to obtain a full evaluation of environmental impacts of the Karcino wind farm, it is recommended that the investor be obliged to carry out investigations into the impact of the wind farm on birds according to the schedule proposed below.

3. REMOVAL STAGE

The impact of the wind farm's removal will be mainly related to the disassembly of wind turbine structures, transport and scrapping of components and the mechanical removal of the foundations. The disassembly of the turbines will produce ca. 6,450 Mg of metal and carbon fibre. It is also estimated that the removal of parts of the foundations will produce

around 17,992.8 Mg of debris which will be transported to a waste storage facility. The debris will most probably be used for land reclamation purposes. Hollows resulting from the removal of the foundations will be backfilled and the area will be subject to reclamation. Also, the area's original structure will be restored, making it possible for the lands to be used for agricultural purposes again. The removal of the wind farm will restore the local landscape to the state from before the erection of the wind farm, eliminating noise and vibration emissions and impact on avifauna.

VII. PROGRAMME TO REDUCE AND COMPENSATE NEGATIVE ENVIRONMENTAL IMPACT OF THE PROJECT

The information supplied by the investor shows that in order to reduce the project's impact on the surrounding environment certain actions at the construction, operation and removal stage of the wind farm have been undertaken, and will be continued, with a view to significantly reduce the project's interference with the local flora, fauna, abiotic nature and human settlements.

The proposals are outlined below.

1. Impact reduction actions related to construction works

Construction works will be carried out in such a way as to reduce, as far as possible, any disruptions occurring in the vicinity of the construction site. At the stage of construction of the wind farm and access roads, there are plans to use excavated material for land reclamation purposes.

In order to eliminate the possibility of excessive air pollution by soil-transporting trucks, a transport company will be selected whose vehicles meet all the legal requirements and have all mandatory technical approvals.

In addition, the time schedule of construction works will be drawn up in such a way as not to interfere with the environment during sensitive life-cycle periods of animals inhabiting the project area and neighbouring areas. Also, the activity of workers will be limited to day work, thus reducing to the maximum possible extent the impact of noise at sensitive hours.

All waste produced during the construction, assembly, operation, overhauls, repairs and removal of the wind farm will be disposed of according to applicable legal regulations, as laid down in the Act of 27 April 2001 on Waste Management.

2. Actions reducing impact on the landscape

In order to reduce the negative visual impression of the project, the wind turbines will be pale grey in colour and will have a streamlined tower shape.

No advertisements or other objects which could have an adverse visual impact on the surrounding landscape will be placed or mounted on the turbines.

3. Actions reducing impact on cultural assets

In order to protect local archaeological sites, special protection zones will be marked out. Institutions and offices in charge of the management of these sites will be allowed free and unrestricted access.

4. Impact reduction actions related to technology

The fact that the investor opted for VESTAS turbines should also be noted. VESTAS turbines offer advanced and constantly improved technologies, thus reducing vibrations and noise emissions to the currently possible level.

Moreover, the planned turbines will have streamlined tube-shaped towers. Such towers are more visible and safer for birds than lattice towers which pose a risk of trapping birds.

5. Actions reducing impact of the wind farm on avifauna

1. In order to reduce, as far as possible, the effect of the wind farm as aviation obstructions, the wind turbines will be marked to make them visible both during the day and at night. Aviation obstruction lights also reduce the risk of birds hitting any of the wind turbines during nocturnal flights or preying. Furthermore, the tower type described above eliminates the risk of birds' deaths as a result of being trapped inside the structure.

2. As a means of compensating potential environmental effects arising from the construction of the wind farm, including – in particular – changes in breeding sites of such bird species as the white-tailed eagle, goshawk and red kite, the investor is planning to erect ten artificial nesting platforms in tree stands located in the vicinity of Resko Przymorskie lake, west of the wind farm, subject to relevant arrangements with the Gościno Forest Division and representatives of bird protection organisations, e.g. the Eagle Protection Committee.

3. Moreover, in the compensation programme the investor suggests the introduction of a **monitoring system** aimed at determining the effect of the wind farm on the habitats, populations and condition of birds dwelling within the site of the project and in adjacent areas. **The monitoring system** would involve continuous, seasonal bird observations conducted by independent specialists.

Monitoring investigations will be conducted at the expense of the investor and will involve observations of migratory birds during their migration seasons, surveys of the number and condition of bird populations inhabiting areas neighbouring on the project site and counting the number of birds that died in consequence of hitting the wind turbines during intensive migration periods, i.e. the spring and autumn, carried out at weekly intervals.

Results of the above-mentioned surveys will be analysed and included in the form of reports that will be submitted to nature conservation institutions for information purposes or in order to take steps to reduce the wind farm's impact on avifauna.

Monitoring activities will be conducted for 5 years.

6. Conclusion

The above-presented programme aimed at reducing possible environmental impacts of the wind farm, occurring in the phase of construction and operation of the facility, and the programme compensating potential negative impacts of the wind farm on birds should be recommended for implementation by the investor.

Accordingly, the investor ought to be obliged to implement the entire programme, as outlined above.

The number of artificial nesting platforms to be placed in tree stands near Resko Przymorskie lake as part of compensating actions should be discussed and decided with the investor. It should be analysed whether the number of platforms specified in the investor's programme should be increased to 20 and whether their range should be expanded beyond the area around Resko lake, along the shoreline in the Trzebiatów-Kołobrzeg Coastland.

VIII. ADMINISTRATIVE DECISIONS CONCERNING ENVIRONMENTAL PROTECTION AND LOCATION, ISSUED FOR THE PROJECT

On 23 February 2004, the Environmental Protection Department of the Kołobrzeg District Authorities issued a Decision (ref. no. OŚ.II.7633-9/2004) approving the project consisting in the construction of seventeen wind turbines located around the villages of Karcino and Sarbia, and stating that the undertaking in question will not violate current environmental protection standards.

Furthermore, the project in question is consistent with the assumptions of the local area development plan of the Kołobrzeg municipality, approved by the resolution of the Kołobrzeg Municipality Council no. XVI/84/91 of 30.12.1991, published in the Official Journal of the Koszalin Province no. 3 of 29.02.1992, together with the amendment approved by the resolution of the Kołobrzeg Municipality Council no. XXXIV/189/97 of 30.12.1997, published in the Official Journal of the Koszalin Province no. 4 of 25.02.1998. In its general implementation provisions the plan permits the location of a wind farm within the borders of the Karcino and Nowogardek villages, between the villages of Kędzielno and Stramnica, and along the edge of the upland stretching between Budzistowo and Obroty.

IX. SUMMARY AND CONCLUSIONS

The analysis of the impact of the undertaking on such elements of the environment as the abiotic environment, flora, (plant species), fauna (animal species), atmospheric air, climate, cultural assets, human health, the acoustic climate, avifauna, as well as the effect of electromagnetic radiation, production of waste, and water and sewage management and environmental impacts in case of breakdown and effect on natural habitats and elements of the Natura 2000 network in the vicinity of the constructed wind farm, carried out within the

recommended scope, did not demonstrate that the project could be significantly harmful for the natural environment.

Since the wind turbines are going to be constructed in cultivated fields, while roads, assembly yards, the cable network, control network, telecom + IT network and the transformer/switching station are planned on lands used by humans and within the area of existing local roads, no direct impact of the project on valuable natural habitats within the meaning of Annex I to the Habitats Directive, has been identified.

The evaluation of the project's impact on special habitat protection areas adjacent to the project area, i.e. the Trzebiatów-Kołobrzeg Coastland", excluded any adverse impact of the undertaking on habitats located within the above-mentioned Natura 2000 network of protected sites.

The analysis of the effect of operating wind turbines on bird species qualifying the wind farm area for the status of a special bird protection area called the "Trzebiatów Wildlife Refuge" did not demonstrate any significant effect of the wind farm on habitats of these species and did not show the project to be directly harmful for their populations, as well as other valuable bird species occurring in the vicinity of the project site. The project's location on the outskirts of the area proposed for an establishment of a Natura 2000 site, despite potential partial interactions, taking into account the analysis in question, should not have a major impact on the area.

The investor proposed a special programme to reduce, compensate and monitor any adverse changes that could occur in the environment as a result of the project.

In order to exclude or reduce possible impacts of the operating wind farm which are now difficult to define finally and unambiguously, it is recommended that the investor be obliged to implement the proposed programme, particularly in the compensation part concerning the erection of artificial nesting platforms in forest stands located around Resko Przymorskie lake and the introduction of the proposed programme of monitoring activities the moment that the wind farm is commissioned.

Taking into account the above-mentioned analyses and given the full implementation of the investor's proposed programme to reduce and compensate impacts, together with our suggestions included in Chapter VII, section 6, it is forecast that the project is unlikely to have a negative effect on the natural environment and the continuity of the Natura 2000 nature conservation network.

Summing up, it must also be noted that wind turbines are installations which – using wind power – generate environmentally friendly electric power. Each MW of power generated by the wind turbines reduces the emission of harmful gases and dust by the following quantities:

- sulphur oxides: - 5,500 g SO₂
- nitrogen oxides: – 4,200 g NO_x
- carbon oxides: – 700,000 g CO₂
- dust: - 49,000 g

Considering the emissions of harmful substances into the atmosphere and the air breathed in by living organisms, benefits stemming from the generation of electric current using alternative sources of energy, e.g. wind farms, cannot be overestimated.

It must also be noted in the summary that according to the information supplied by the investor, the latter – in cooperation with the Kołobrzeg Municipality Office – submitted an application for a Joint Implementation of the Karcino Project within the meaning of Art. 6 of the Kyoto Protocol. Thanks to the implementation of the project, it will be possible to prevent the production of ca. 60,000 ton of harmful carbon dioxide equivalents a year.

X. SUMMARY

The project consisting in the construction of 17 VESTAS V90/3.0 MW turbines together with necessary infrastructure in the form of access roads, medium-voltage power network (15/30kV), control network, telecom + IT network and a transformer/switching station, is being implemented on agricultural areas situated in the Kołobrzeg municipality in the vicinity of the villages of Karcino, Sarbia, Drzonowo and Nowogardek, based on a building permit

issued in 2004.

The wind farm is located in the vicinity of a special habitat protection area called the Trzebiatów-Kołobrzeg Coastland and within the area selected by non-governmental organisations for inclusion in the Shadow List as a special protection site called the "Trzebiatów Wildlife Refuge". Since pursuant to the Ordinance of the Council of Ministers of 9 November 2004, as amended (Journal of Laws no. 257, item 2573 and Journal of Laws no. 92, item 769) wind farms can have a major impact on the environment and given that the wind farm in question is located within and near to Natura 2000 sites, an environmental impact evaluation was performed.

The analysis of the project's environmental impact includes a detailed description of environmental conditions found within the project site and around it and the impact of the undertaking on elements of the environment and the Natura 2000 network of protected sites in the phases of implementation, operation and removal of the facility, as well as in case of breakdowns.

The analysis of environmental impact of the wind park did not demonstrate any significant effect of the undertaking on the natural environment and the continuity of the Natura 2000 network, including the species qualifying the areas in question for the status of Natura 2000 sites.

In order to reduce, as far as possible, the impact of the project on the surrounding natural environment, a special reduction and compensation programme was drawn up, which the investor is advised to implement on the stage of construction and operation of the wind farm. The aim of the programme is to markedly reduce the undertaking's interference with the surrounding flora, fauna, abiotic environment and human settlements.