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# REPORT ON ENVIRONMENTAL IMPACT ASSESSMENT OF THE CONNECTION INFRASTRUCTURE OF THE BALTICA B-2 AND B-3 OFFSHORE WIND FARMS

Applicant **Elektrownia Wiatrowa Baltica-2 sp. z o.o.**

**Elektrownia Wiatrowa Baltica-3 sp. z o.o.**

Contractor **MEWO S.A.**

**Maritime Institute**
**of the Gdynia Maritime University**

Subcontractors **National Foundation for Environmental Protection**
**(*Narodowa Fundacja Ochrony Środowiska*)**

**National Marine Fisheries Research Institute**
**(*Morski Instytut Rybacki – Państwowy Instytut Badawczy*)**

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# Abbreviations and definitions

| | |
|---|---|
| AC | Alternating Current |
| AIS | Automatic Identification System |
| APV | Applicant Proposed Variant |
| ARPA | Automatic Radar Plotting Aid. Radar interface, guiding the radar plot automatically. It allows simultaneous tracking of many objects, calculation of their motion parameters and the possibility of collisions |
| Baltica OWF | The project consisting in the implementation of the Baltica Offshore Wind Farm with the maximum total output of 2500 MW located in the Baltica-2 area (western area) and Baltica-3 area (eastern area), for which the Regional Director for Environmental Protection in Gdańsk issued a decision on environmental conditions on 24 January 2020 (ref: RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.37) |
| Baltica OWF CI | Baltica Offshore Wind Farm Connection Infrastructure |
| Baltica-2 or B-2 | sea area approved for development on the basis of the decision of 16 April 2012 (MFW/4/12) permitting the construction and use of artificial islands, structures and devices in Polish Maritime Areas; Baltica-2 constitutes the western part of the Baltica OWF |
| Baltica-3 or B-3 | sea area approved for development on the basis of the decision of 16 April 2012 (MFW/5/12) permitting the construction and use of artificial islands, structures and devices in Polish Maritime Areas; Baltica-3 constitutes the eastern part of the Baltica OWF |
| $BOD_5$ | 5-day biochemical oxygen demand |
| BŚII | Offshore Wind Farm “Polenergia Bałtyk II”, previously “Bałtyk Środkowy II” |
| BŚIII | Offshore Wind Farm “Polenergia Bałtyk III”, previously “Bałtyk Środkowy III” |
| busbar system | an element of the onshore substation made of support structures supporting air-insulated flexible overhead cables or SF6 gas-insulated busbars or rigid busbars in the form of pipes |
| cable bed area | the area (in the offshore, coastal and onshore zone) within which all cable lines as part of the Baltica OWF will be constructed |
| CBDG | Central Geological Database |
| CCTV | Closed Circuit Television |
| CIEP | Chief Inspectorate of Environmental Protection |
| CLV | Cable Laying Vessel |
| CMID | Common Marine Inspection Document |
| CoC | Certificate of Conformity |
| construction phase | a synonym of the phrase “implementation phase” used in the document, which according to the EIA Act refers to the construction stage of the project |
| CWA | Chemical Warfare Agents |
| DC | Direct Current |
| DEC | Decision on Environmental Conditions |
| DP | Dynamic Positioning |
| DW | dry weight |
| EEZ | Exclusive Economic Zone |
| EHV | Extra High Voltage |
| EIA | Environmental Impact Assessment |
| EIA Act | Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessments* (consolidated text: Journal of Laws of 2021, item 247, as amended) |
| EMF | electromagnetic field |

| | |
|---|---|
| ERP | Emergency Response Plan |
| EU | European Union |
| GREJ | the register of protected and endangered species of fungi |
| GV | Guard Vessel |
| GWB | Groundwater Body |
| HDD | Horizontal Directional Drilling |
| HELCOM | Helsinki Commission – Baltic Marine Environment Protection Commission |
| HOPN | Hydrographic Office of the Polish Navy |
| IMCA | International Marine Contractors Association |
| IMO | International Maritime Organization |
| IMWM-NRI | Institute of Meteorology and Water Management – National Research Institute |
| IUCN | International Union for Conservation of Nature |
| JSA | Job Safety Analysis |
| LOI | organic matter content in a sample, marked as Loss On Ignition |
| LOQ | Limit of Quantification |
| LSDP | Local Spatial Development Plan |
| LUA | Limited Use Area |
| MBGL | metres below ground level |
| MBSB | metres below seabed |
| MI GMU | Maritime Institute of the Gdynia Maritime University |
| MPSS | Main Power Supply Station |
| MSPPMA | Maritime Spatial Plan of Polish Maritime Areas |
| MTI | Maritime Transmission Infrastructure of the BŚII and BŚIII OWFs |
| NMFRI | National Marine Fisheries Research Institute |
| NMWPP | National Marine Waters Protection Programme |
| NPS | National Power System |
| offshore cable line | one three-phase cable with accessories and thermomechanical elements for the installation of heads and cable joints, and up to three fibre optic lines for data transmission, connecting OSS with a cable joint in which onshore and subsea cables will be joined, laid in one trench or on the seabed |
| onshore cable line | three single-phase cables and/or earthing cable with accessories and thermomechanical elements for the installation of heads and cable joints, and up to three fibre optic lines with fibre optic accessories for data transmission, connecting OnSS with a cable joint in which onshore and subsea cables will be joined, laid in one trench |
| OnSS | onshore substation |
| OSPAR | The Convention for the Protection of the Marine Environment of the North-East Atlantic |
| OSS | offshore substation |
| OWF | Offshore Wind Farm |
| OWT | Offshore Wind Turbine |
| PAHs | Polycyclic Aromatic Hydrocarbons |
| Pan-pan | a radio call made when there is an emergency aboard an aircraft or a vessel, yet there is no immediate danger to crew life |
| PCB | polychlorinated biphenyls |
| PLB | cable Post Lay Burial |

| | |
|---|---|
| PMA | Polish maritime areas within the meaning of the Act of 21 March 1991 on the marine areas of the Republic of Poland and maritime administration (Journal of Laws of 2020, item 2135, as amended) |
| POPs | Persistent Organic Pollutants |
| PSD | Power Spectral Density – level of noise power spectral density [dB re 1 $\mu Pa^2 \cdot Hz^{-1}$] |
| PSE | PSE S.A. |
| PTS | Permanent Threshold Shift |
| PUWG 1992 | flat rectangular coordinate system |
| PVHCO | Pomorskie Voivodeship Heritage Conservation Officer |
| RAV | Rational Alternative Variant |
| RDEP | Regional Directorate for Environmental Protection |
| RES | Renewable Energy Sources |
| ROV | Remotely Operated Vehicle |
| SAR | Maritime Search and Rescue Service |
| SC&DSD | Study of Conditions and Directions of Spatial Development |
| Sécurité | a procedure word used in the radio communication informing that the following message broadcast by a vessel or a coast station is a navigational or meteorological warning, but the situation is not life-threatening for the crew |
| SIMOPS | Simultaneous Operations |
| SIPAM | Maritime Administration Spatial Information System available at: https://sipam.gov.pl |
| SLB | Simultaneous Lay and Burial of a cable |
| SPS | Special Purpose Ship |
| SSPC SRI | Institute of Soil Science and Plant Cultivation State Research Institute in Puławy |
| SWB | Surface Water Body |
| TBRA | Task-Based Risk Assessment |
| TBT | tributyltin |
| TN | total nitrogen |
| TOC | Total Organic Carbon |
| TTS | Temporary Threshold Shift |
| UXO | Unexploded Ordnance |
| VASAB | Vision and Strategies Around the Baltic Sea |
| VIEP | Voivodeship Inspectorate of Environmental Protection |
| VMS | Vessel Monitoring System for fishing vessels |
| VTS | Vessel Traffic Service |
| WB | Water bodies |
| WGS 84 | World Geodetic System 1984 |

# 1 Introduction

## 1.1 Preface

This document constitutes the Environmental Impact Assessment Report for the Connection Infrastructure of the Baltica B-2 and B-3 Offshore Wind Farms (hereinafter referred to as: Baltica OWF CI). The Applicant planning the implementation of the Baltica OWF CI is Elektrownia Wiatrowa Baltica-2 sp. z o.o. and Elektrownia Wiatrowa Baltica-3 sp. z o.o., which are the companies of the PGE Capital Group – Polska Grupa Energetyczna S.A. and Ørsted A/S.

The planned project, Baltica OWF CI, is located in the offshore area [Figure 1.1] within the exclusive economic zone and territorial sea as well as in the onshore territory of the Republic of Poland [Figure 1.2].

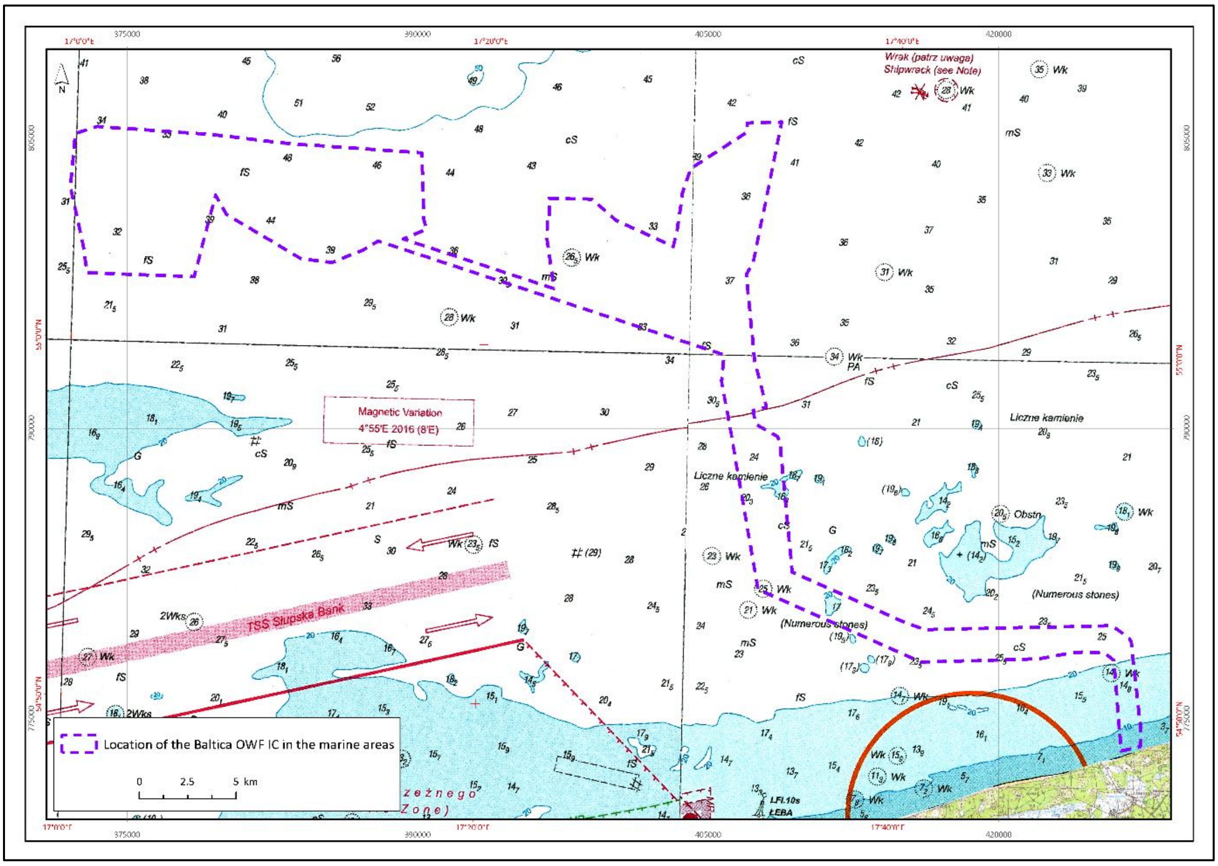



*Figure 1.1. Location of the offshore part of the planned project, the Baltica OWF CI, on a nautical chart background [Source: internal materials]*

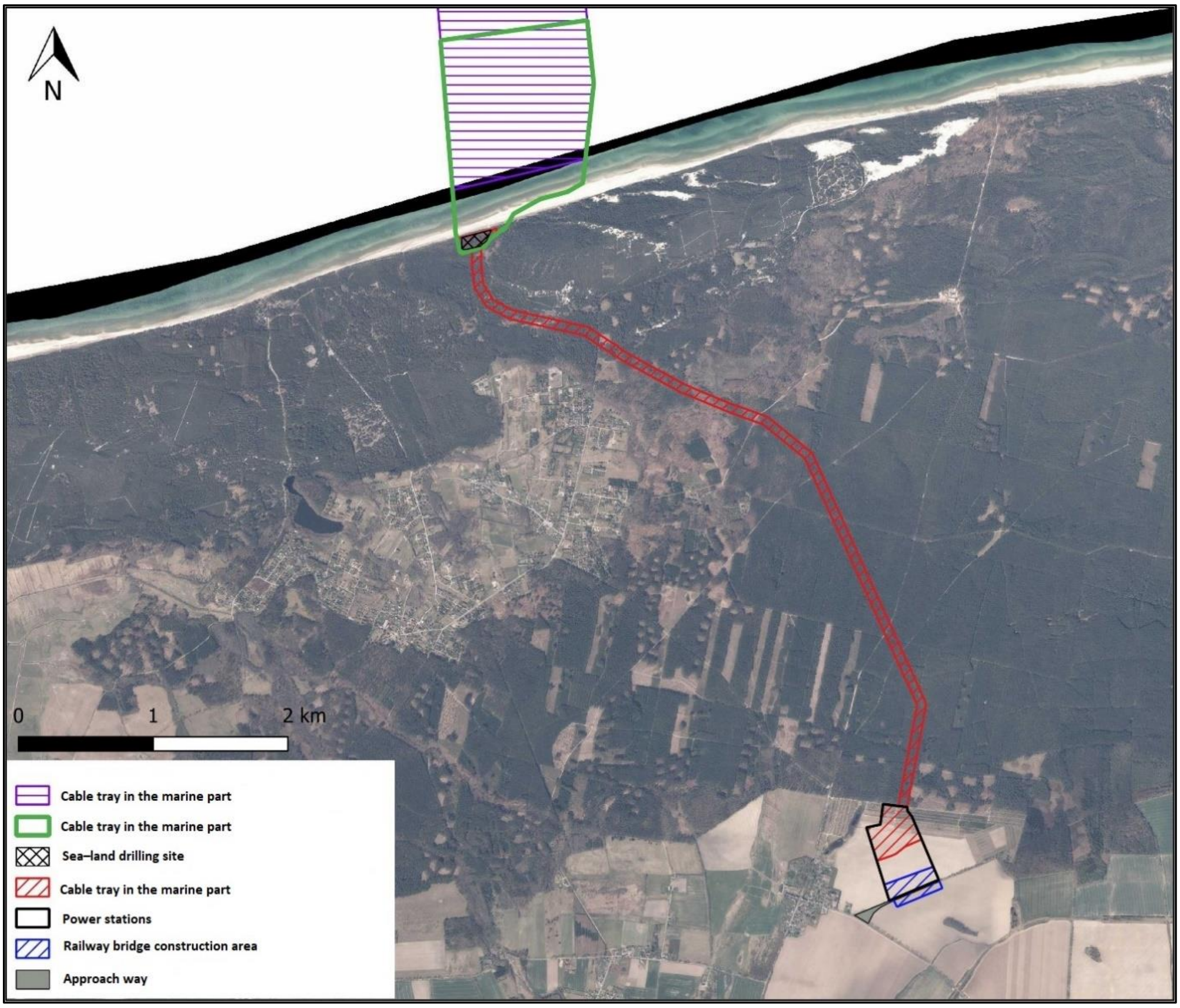



*Figure 1.2. Location of the planned project – the Baltica OWF CI. Onshore part [Source: internal materials]*

On 6 November 2020, Elektrownia Wiatrowa Baltica-2 sp. z o.o. obtained decision no. 1/DS/20 of the Director of the Maritime Office in Gdynia approving the laying and maintenance, within the internal sea waters and territorial sea, of cables transmitting electricity from the project entitled "*Zespół Morskich Farm Wiatrowych o maksymalnej łącznej mocy 1500 MW oraz infrastruktura techniczna, pomiarowo-badawcza i serwisowa związana z etapem przygotowawczym, realizacyjnym i eksploatacyjnym*" [literally: "Offshore Wind Farms Complex with a maximum total power output of 1500 MW together with technical, research and measurement, and service infrastructure related to the preparation, construction and operation stages"] (ref.: INZ5DS.8104.1.11.2020.AGB). Elektrownia Wiatrowa Baltica-3 sp. z o.o., on the other hand, obtained, on 6 November 2020, decision no. 2/DS/20 of the Director of the Maritime Office in Gdynia approving the laying and maintenance, within the internal sea waters and territorial sea, of cables transmitting electricity from the project entitled "*Zespół Morskich Farm Wiatrowych o maksymalnej łącznej mocy 1050 MW oraz infrastruktura techniczna, pomiarowo-badawcza i serwisowa związana z etapem przygotowawczym, realizacyjnym i eksploatacyjnym*" [literally: "Offshore Wind Farms Complex with a maximum total power output of 1050 MW together with technical, research and measurement, and service infrastructure related to the preparation, construction and operation stages"] (ref.: INZ5DS.8104.2.11.2020.AGB). For the part of the Baltica OWF CI located in the exclusive economic zone, the location of the Baltica OWF CI has been approved by the decisions issued by the Minister of Maritime Economy and Inland Navigation: decision no. 2/K/19 of 21 October 2019 (ref.:

DGM.WZRMPP.3.430.55.2019.JD.9) for Elektrownia Wiatrowa Baltica-3 and decision no. 3/K/19 of 28 October 2019 (ref.: DGM.WZRMPP.3.430.54.2019.JD.9) corrected by the resolution of 21 November 2019 for Elektrownia Wiatrowa Baltica-2.

The planned project consists in the construction and operation of the power transmission lines including customer substations and associated infrastructure. Table 1.1 summarises the basic parameters of the planned project in the Applicant Proposed Variant (hereinafter referred to as: APV).

*Table 1.1. Basic parameters of the Connection Infrastructure of the Baltica Offshore Wind Farm in the Applicant Proposed Variant (APV)[Source: internal materials]*

| Parameter | Value/description |
|---|---|
| **OFFSHORE AREA AND COASTAL ZONE** | |
| Maximum number of cable lines | 9 |
| Number of power cables within a single cable line | 1 |
| Type of power cables | Aluminium or copper three-core AC cables containing optical fibres with a maximum of three fibre-optic cables |
| Power cable rated voltage range [kV] | 220 and/or 275 |
| Method of power cable laying in the offshore area | Buried in the seabed or laid on the seabed surface, secured |
| Power cable burial depth range outside the Baltica-2 and Baltica-3 areas [MBSB] | 0.5–3.5 |
| Power cable maximum burial depth within the Baltica-2 and Baltica-3 areas [MBSB] | 3.0 |
| Power cable maximum burial depth in special locations (e.g. sand extraction areas) [MBSB] | 6.0 |
| Maximum cable laying depth for the lines crossing through the coastal zone [MBSB] | 20.0 |
| Power cable landfall method | Trenchless method |
| Maximum length of land–sea directional drilling [m] | 1700 |
| **ONSHORE AREA** | |
| Maximum number of cable lines | 9 |
| Number of power cables within a single cable line | 3 |
| Type of power cables | Single-phase cables with aluminium or copper cores containing optical fibres with a maximum of three fibre-optic cables |
| Power cable rated voltage range [kV] | 220 and/or 275 |
| Maximum cable bed area length [km] | 6.5 |
| Maximum length of each service road [km] | 6.5 |
| Maximum number of service roads | 3 |
| Method of power cable laying | Cables laid in a trench in a flat formation, using a trenchless method in a trefoil formation or cables laid in a trench with a bypass in a flat or trefoil formation |
| Average standard* depth of a trench for cable laying [m] | approx. 2 |
| Number of customer substations | 2 |
| Total surface area of a customer substation [ha] | 22 |

| Parameter | Value/description |
|---|---|
| Method of connecting customer substations with the Choczewo substation | 4 busbars |
| Estimated length of a single busbar [m] | up to 190 |
| Conductor bundle voltage on busbars [kV] | 400 |
| Length of access road to the OnSS [m] | approx. 700 |
| Maximum width of access roadway to OnSS [m] | 6 |
| Maximum width of access roadside to OnSS [m] | 1 |
| Surface area of access roadway to OnSS [$m^2$] | approx. 4800 |
| Surface area of access roadside to OnSS [$m^2$] | approx. 1600 |
| Type of pavement of access road to OnSS | Hardened, enhanced |

**except intersections with other structures or terrain obstacles, where the trenching depth might increase*

The purpose of the planned project is to connect the Baltica OWF to the National Power System (NPS). The Regional Director for Environmental Protection in Gdańsk issued a decision on environmental conditions for the Baltica OWF on 29 January 2020 (ref.: RDOŚ-Gd-WOO.4211.21.2017.MJ.PW.AJ.). It has been indicated, in the EIA Report for the Baltica OWF, that the connection infrastructure of the farm will be covered by a separate application for a decision on environmental conditions.

This Environmental Impact Assessment Report (henceforth: the EIA Report) constitutes the document required by the authority pursuant to the decision on the scope of the report and has been prepared in the scope indicated in:

- the resolution of the Regional Director for Environmental Protection in Gdańsk of 17.11.2021 (ref.: RDOŚ-Gd-WOO.420.47.2021.AJ.7.).;
- the resolution of the Director of the Maritime Office in Gdynia of 25.10.2021 (ref.: INZ.8103.129.2021.AD);
- the opinion of the State Border Sanitary Inspector in Gdynia of 25 October 2021 (ref.: SE.ZNS.80.4910.30.21).

The report content is compliant with the provisions of Art. 66 of the Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessments* (consolidated text: Journal of Laws of 2021, item 247, as amended). According to Article 75 section 1 point 1(c), a Regional Director for Environmental Protection is the authority competent to issue the DEC for the planned project. Taking into account the location of the Baltica OWF CI, the competent authority is the Regional Director for Environmental Protection in Gdańsk.

The Environmental Impact Assessment Report for the Baltica OWF CI was prepared by the Consortium of MEWO S.A. and the Maritime Institute of the Gdynia Maritime University in cooperation with the following subcontractors: National Foundation for Environmental Protection, National Marine Fisheries Research Institute and EKO-KONSULT Sp. z o.o. company.

## 1.2 Project classification

The classification of the Baltica OWF CI in terms of possible environmental impacts was adopted with reference to the provisions of the Regulation of the Council of Ministers of 10 September 2019 *on* *projects that may have a significant impact on the environment* (Journal of Laws of 2019, item 1839) including the §3, section 1, point 54(b) i.e. ***"industrial development, including photovoltaic system or warehouse development, including the accompanying infrastructure, with a development surface area not smaller than 1 ha in the areas other than those referred to in (a)."*** The area expected to be occupied by onshore substations, which are part of the planned project, will be approximately 22 ha. Considering the above and the character of the station structure, the Baltica OWF CI can be classified as a project that can potentially have a significant impact on the environment.

In addition, due to the fact that as part of the implementation of the Baltica OWF CI, a maximum of 3 service roads are to be built within the cable bed area, each with a maximum length of 6.5 km, and an access road to onshore substations approx. 0.7 km long, to qualify the Baltica OWF CI as having a potentially significant impact on the environment §3, section 1, point 62, applies, i.e. ***"roads with hard surface with a total length of the project exceeding 1 km other than those listed in § 2 section 1, points 31 and 32 or bridge structures in the course of the road with hard surface, excluding the reconstruction of roads or bridge structures, used for the maintenance of substations and located outside the areas under forms of nature protection, discussed in Article 6, section 1, points 1–5, 8 and 9 of the Nature Conservation Act of 16 April 2004."***

In the part of the area in which the project is to be implemented, with a maximum surface of 39.5 ha, the tree stand will be felled. The project implementation procedure adopted by the Applicant based on the provisions of the Act on the preparation and implementation of strategic transmission network projects results in the exclusion of the application of the Act on the protection of agricultural and forest land. Consequently, this area will not be excluded from forest production. The production will only have a different character. However, in the event of conducting the project on the basis of general principles and the need to include the investment in the local spatial development plan or to obtain a site selection decision for a public purpose investment, this area could be excluded from forest production. Pursuant to the provision of §3, section 1, point 88, i.e. ***"the modification of a forest, other soil with a contiguous surface area of at least 0.10 ha covered with forest vegetation – trees and shrubs as well as forest litter – or a wasteland into an agricultural use or deforestation intended to change the manner of land use: [...],*** including point (c), i.e. ***"in areas covered by forms of nature protection, referred to in Article 6, section 1, points 1–5, 8 and 9 of the Nature Conservation Act of 16 April 2004, or in the buffer zones of the forms of nature protection referred to in Article 6, section 1, points 1–3 of this Act"*** and point (e), i.e. ***"with an area of not less than 1 ha, other than those specified in points (a)–(d),"*** the planned deforestation for the construction of a cable bed area can be classified as a project that may potentially have a significant impact on the environment.

The Baltica OWF CI is a public purpose investment in accordance with Article 6 of the Act of 21 August 1997 *on real estate management* (consolidated text: Journal of Laws of 2021, item 1889) and Article 2, point 5 of the Act of 27 March 2003 *on spatial planning and development* (consolidated text: Journal of Laws of 2021, item 741, as amended).

Pursuant to Article 6 point 4(a) of the Act *on real estate management* the public purpose is the construction and maintenance of an OWF within the meaning of the Act of 17 December 2020 *on promoting energy production in offshore wind farms* (consolidated text: Journal of Laws of 2021, item 234, as amended) together with a set of devices for power evacuation within the meaning of this Act.

Article 2 point 5 of the Act of 27 March 2003 *on spatial planning and development* (consolidated text: Journal of Laws of 2021, item 741, as amended) defines public purpose investment as: *"[...] activities* *of local (municipality) and supra-local (district, voivodeship and national), as well as national (also including international and supra-regional investments) and metropolitan (including the metropolitan area) importance, regardless of the status of the entity undertaking those activities and the sources of their financing, constituting the implementation of the objectives referred to in Article 6 of the Act of 21 August 1997 on real estate management (consolidated text: Journal of Laws of 2021, item 1889)."*

In accordance with Article 3(a) of the Act of 24 July 2015 *on the preparation and implementation of strategic transmission network projects* (consolidated text: Journal of Laws of 2021, item 428, as amended) the Baltica OWF CI is a strategic project in the scope of transmission networks. Such projects, in compliance with the provisions of Article 80, section 2 of the Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessment* (consolidated text: Journal of Laws of 2021, item 247, as amended) are not subject to the requirement that the authority issuing DEC confirms the compliance of the project location with the provisions of the local spatial development plan, if the plan has been adopted.

## 1.3 Report basis

The Environmental Impact Assessment Report for the Baltica OWF CI was prepared as part of the environmental impact assessment of the project, which is part of the procedure for issuing DEC specified in the Act of 3 October 2008 *on the provision of information on the environment and its protection, public participation in environmental protection and on environmental impact assessment* (consolidated text: Journal of Laws of 2021, item 247, as amended).

Regional Director for Environmental Protection in Gdańsk on 17.11.2021 (ref. no.: RDOŚ-Gd-WOO.420.47.2021.AJ.7) after analysing the application of the Applicant: Elektrownia Wiatrowa Baltica-2 sp. z o. o. and Elektrownia Wiatrowa Baltica-3 sp. z o. o. (ref. no.: EWB2-RDOS-0074, EWB3-RDOS-0086 of 21.09.2021), supplemented on 24.09.2021 and on 06.10.2021 by the issuance of the DEC for the project in question, acting on the basis of:

- the Resolution of the President of the National Water Management Authority, River Basin Management in Gdańsk of 19.10.2021 (ref. no.: GD.ZZŚ.3.435.493.1.AK);
- the resolution of the Director of the Maritime Office in Gdynia of 25.10.2021 (ref.: INZ.8103.129.2021.AD);
- the opinion of the State Border Sanitary Inspector in Gdynia of 25 October 2021 (ref.: SE.ZNS.80.4910.30.21)

specified the scope of the Environmental Impact Assessment Report compliant with Article 66 of the EIA Act including the assessment of impact on Natura 2000 sites pursuant to Article 6.3 of the Council Directive 92/43/EEC in the scope of the project impact on the subjects of protection of Natura 2000 sites as well as species under legal protection, with particular reference to:

*a) the description of the planned project, in particular, the characteristics of the entire project and the conditions of land use during the performance of work, its implementation and operation; mainly, the characteristic features of technological processes; the expected types and amounts of pollution resulting from the project implementation;*

*b) the analyses of the impact on individual elements of the environment of the planned technological variants of the project;*

*c) the natural characteristics of the project area and the area within the range of its impact, including the species of plants, fungi and animals and their habitats, protected under the provisions of the Nature Conservation Act of 16 April 2004 (consolidated text: Journal of Laws* *of 2021, item 1098), as well as the species and habitats of species listed in Annex I of the Directive 2009/147/EC of the European Parliament and of the Council and the habitats listed in Annex I and species listed in Annex II of the Habitats Directive 92/43/EEC, which are the subject of protection in the Przybrzeżne wody Bałtyku PLB990002 site along with the presentation of the issues in graphic and cartographic form;*

d) *the assessment of the direct and indirect impact of the project and the technologies applied in it during the project implementation and operation stages, on the condition and preservation of the species and their habitats which are the subject of protection in the Natura 2000 site Przybrzeżne wody Bałtyku PLB990002; and the natural habitats and the habitats of species protected under the above-mentioned Nature Conservation Act, occurring and likely to occur in the project area and in its vicinity;*

e) *the characteristics of the direct and indirect impact of the project on the environment, in particular for the conservation objectives of the Natura 2000 site Przybrzeżne wody Bałtyku PLB990002;*

f) *the characteristics of the direct and indirect impact of the project on the conservation objectives of Natura 2000 sites:*
   1) *PLH220003 Białogóra, approx. 1.05 km east of the planned project,*
   2) *PLH220096 Jeziora Choczewskie approx. 2.55 km to the south-east of the planned project,*
   3) *PLH220018 Mierzeja Sarbska approx. 4.6 km west of the planned project;*

g) *the project impact assessment (at the construction and operation stages) after all possible measures mitigating the negative impact have been applied including the significance assessment of the impacts for individual subjects of protection in the above-mentioned Natura 2000 site, and also the possibilities of implementing protective measures and achieving conservation objectives set out in the plans of protective tasks for these sites;*

h) *the description of the hydrological system of the terrain covered by the project and the project impact range including the analysis of the project impact on that system;*

i) *the analyses of the cumulative impact of the project with other planned and implemented projects of a similar character, located in the vicinity, on individual components of the environment, including Natura 2000 site Przybrzeżne wody Bałtyku PLB990002;*

j) *the presentation of a proposal for the monitoring of the planned project impact at the stage of its operation, in particular for the conservation objectives and objects of protection of the above-mentioned Natura 2000 sites and their integrity:*

k) *the presentation of the detailed description of the methods and materials used when preparing the Environmental Impact Assessment Report for the project;*

l) *the impact assessments of the planned project on the Coastal Protected Landscape Area;*

m) *the description of the landscape, in which that particular project is to be located, including the project impact on the landscape significance and its perception from the viewing points, exposition fields and viewing axes;*

n) *the analyses of the planned project impact on wildlife corridors located within the range of its impact;*

o) *the analyses of the planned project impact on the climate and its changes (mitigation, i.e. project alleviating the climate changes) and the impact of climate and its changes on the project (project adaptation to the climate changes), taking into consideration the changes of the site development covered by the application;*

p) *the analyses of the potential social conflicts connected to the project implementation – determination whether the variant selected for implementation is the optimal one not only for the Applicant, but also for the owners of the neighbouring estates, and specification of the* *manner in which the Applicant plans to counteract social conflicts with reference to the planned project.*

In addition, Regional Director for Environmental Protection in Gdańsk indicated the need to include in the environmental impact assessment the scope indicated by the Director of the Maritime Office in Gdynia, with particular emphasis on:

*a) the analysis of the impact of the construction and operation of the power connection infrastructure from the Baltica-2 and Baltica-3 Offshore Wind Farms to the National Power System on the objects of protection of the Natura 2000 site Przybrzeżne wody Bałtyku PLB990002;*
*b) the analysis of the planned work impact on the coastal zone in the place of cable landfall, including morphodynamic and lithodynamic processes taking place within the coastal zone and on the condition of the seashore protection system;*
*c) the determination of the species composition of benthic organisms and the planned work impact on benthos in the construction and operation phases;*
*d) the analysis of the impact of electromagnetic field generated by the power cables on ichthyofauna;*
*e) the analysis of the planned project impact on the resources and recruitment of fish important for fishery;*
*f) the analysis of possible difficulties for the traffic safety of the vessels using shipping routes, in particular the traffic separation scheme TSS Ławica Słupska and the restrictions in areas intended for fishing;*
*g) the analyses of the cumulative impact of the planned project with other planned, implemented and existing projects in the vicinity of the planned project, among others, offshore wind farms, cables and other infrastructure;*
*h) the presentation of procedures to be followed in case of emergency situations during the project implementation;*
*i) the presentation of a procedure to be followed in order to prevent accidents related to unexploded ordnance, in particular to chemical warfare agents.*

The basis for the preparation of this report was:

- strategic documents, programming and planning documents at the international, national, regional and local levels;
- applicable legal regulations, including:
  - Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessments* (consolidated text: Journal of Laws of 2021, item 247, as amended),
  - Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 *on the assessment of the effects of certain public and private projects on the environment* (amended by the Directive of 16 April 2014),
  - other international, EU and national regulations;
- the Applicant's documentation:
  - Decision no. 1/DS/20 of 6 November 2020 issued by the Director of the Maritime Office in Gdynia (ref.: INZ5DS.8104.1.11.2020.AGB) for Elektrownia Wiatrowa Baltica-2 regarding the area within the territorial sea and internal sea waters,

- Decision no. 2/DS/20 of 6 November 2020 issued by the Director of the Maritime Office in Gdynia (ref.: INZ5DS.8104.2.11.2020.AGB) for Elektrownia Wiatrowa Baltica-3 regarding the area within the territorial sea and internal sea waters,
- Decision no. 2/K/19 of 21 October 2019 issued by the Minister of Maritime Economy and Inland Navigation (ref.: DGM.WZRMPP.3.430.55.2019.JD.9) for Elektrownia Wiatrowa Baltica-3 regarding the area within the exclusive economic zone,
- Decision no. 3/K/19 of 28 October 2019 issued by the Minister of Maritime Economy and Inland Navigation (ref.: DGM.WZRMPP.3.430.54.2019.JD.9) corrected by the resolution of 21 November 2019 for Elektrownia Wiatrowa Baltica-2 regarding the area within the exclusive economic zone,
- Applicant's decision regarding the location of areas where the construction of cable lines is planned within the areas of the Baltica-2 and Baltica-3 OWFs,
- design documents provided by the Applicant,
- documentation containing the results of environmental surveys and nature inventory surveys carried out between 2016–2018 for the onshore and offshore areas and carried out in 2021 in the offshore area.

Moreover, when preparing this EIA Report, sources of information specified in Section 17 were used, in particular, reports on environmental impact assessment or other documentation for projects completed, implemented or planned, located the closest to the planned project, such as:

- *Environmental Scoping Report for the Baltic Power Offshore Wind Farm Connection Infrastructure;*
- *Environmental Scoping Report for the „Budowa infrastruktury przesyłowej energii elektrycznej z Morskiej Farmy Wiatrowej BC-Wind do Krajowego Systemu Elektroenergetycznego" [literally: "Construction of the Power Transmission Infrastructure from the BC-Wind Offshore Wind Farm to the National Power System"].*
- *Environmental Scoping Report for the project entitled "Budowa stacji elektroenergetycznej 400 kV Choczewo" [literally: „Construction of a 400 kV power substation Choczewo"];*
- *Maritime Transmission Infrastructure; Environmental Impact Assessment Report for Polenergia Bałtyk III Sp. z o.o.;*
- *Environmental Impact Assessment Report for the project Baltica Offshore Wind Farm;*
- *Environmental Impact Assessment Report for the Baltic Power Offshore Wind Farm.*

## 1.4 Findings of strategic and planning documents

### 1.4.1 International and EU documents

The Baltic region is characterised by a long-standing international cooperation in fields such as development and spatial planning (VASAB), marine environment protection (HELCOM) and energy (BASREC). In 2009, the European Union Strategy for the Baltic Sea Region (EUSBSR) was adopted, constituting the first EU macro-regional intra-EU strategy.

**VASAB (Vision and Strategies Around the Baltic Sea)**

Intergovernmental cooperation between the Baltic Sea Region states responsible for development and spatial planning. In its strategic document VASAB sets out the directions of the development until 2030. One of them is to strengthen internal and external availability, and the development of offshore wind energy is indicated as a way to achieve the energy independence of the Baltic region. Measure 18 of the LTP directly indicates the need to exploit the potential in Polish Maritime Areas (PMA) in the short term. The planned project is part of the development directions for the Baltic Sea region suggested by VASAB.

**Directive 2014/89/EU of the European Parliament and of the Council establishing a framework for maritime spatial planning**

A document that specifies the framework for planning in the Baltic Sea area, which was adopted on 23 July 2014, due to, among others, the high and rapidly increasing demand for the maritime space for different purposes, such as installations for the production of energy from renewable sources, oil and gas exploration and exploitation, maritime shipping and fishing activities, ecosystem and biodiversity conservation, tourism, aquaculture installations and underwater cultural heritage, as well as the multiple pressures on coastal resources, requiring an integrated planning and management approach.

As the main objective of maritime spatial planning, Directive 2014/89/UE determines: “promoting sustainable development and identifying the utilisation of maritime space for different sea uses as well as to manage spatial uses and conflicts in marine areas” (19 and Article 1 point 1). The directive in question sets out the framework for maritime spatial planning aimed at propagating sustainable development in the maritime economy, sustainable development of the maritime areas as well as sustainable use of the marine resources.

The result of the maritime planning should be a “comprehensive plan, presenting various methods of using maritime space that takes into consideration the long-term changes caused by climate change,” which specifies “the spatial and temporal arrangement of significant, already implemented or future actions as well as methods of use of marine waters.”

**Marine Strategy Framework Directive (MSFD)**

The principles of conservation and objectives for the marine waters have been specified in the Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy – the so-called Marine Strategy Framework Directive (MSFD).

The objective of the directive is for the Member States to take the necessary measures to achieve or maintain good environmental status in the marine environment until 2020 at the latest. MSFD is the first comprehensive legal act of the EU with an objective to especially protect the marine environment and natural resources as well as to create framework for the sustainable use of marine waters.

The MSFD provisions have been implemented into the Polish legal system primarily through the Water Law Act of 20 July 2017 (consolidated text: Journal of Laws of 2021, item 624, as amended). Pursuant to the Article 145 of this Act the environmental targets for the marine waters are achieved by taking actions specified in the National Marine Waters Protection Programme (NMWPP) adopted by the Council of Ministers by the Resolution of 11 December 2017 (Journal of Laws of 2017, item 2469). NMWPP is a strategic document, the development of which is imposed on the Member States under MSFD. The objective of NMWPP is to specify the optimal set of measures, which will lead to the achievement of good environmental status of marine waters within a given period of time.

Within the NMWPP framework, the basic measures will include the following categories: legal, administrative, economic, educational, and control measures.

Bearing in mind the contents of Article 144 of the Water Law Act of 20 July 2017 (consolidated text: Journal of Laws of 2021, item 624, as amended), to protect the marine waters environment, a maritime strategy is developed and implemented, which includes the following actions:

- development of the preliminary environmental assessment of the marine water status;
- development of a set of properties typical of good environmental status of marine waters;
- development of a set of environmental targets for marine waters and the related indicators;
- development and implementation of the marine waters monitoring programme;
- development and implementation of the National Marine Waters Protection Programme

The set of environmental targets for marine waters is specified in the Regulation of the Minister of the Environment of 25 February 2021 on the adoption of the update of the set of environmental targets for marine waters (Journal of Laws of 2021, item 569), issued under Article 157 section 8 of the Water Law Act of 20 July 2017 (consolidated text: Journal of Laws of 2021, item 624, as amended). This Act specifies the environmental targets for 11 categories of characteristics – descriptive indicators, which pursuant to the provisions of the MSFD constitute the assessment criteria for determining the good environmental status of the marine environment (Annex I to the MSFD).

In accordance with the requirements of MSDF, member states were obliged to carry out the preliminary environmental assessment of marine waters until 2012. The preliminary environmental assessment of marine waters was prepared in 2013 by the Chief Inspectorate of Environmental Protection and adopted by the Council of Ministers on 10 November 2014. This assessment is used for obtaining information on the current status of the marine environment, and thus, is the starting point for the determination of the direction of actions which must be implemented for the targets set out in the MSDF to be achieved. The methodological criteria and standards for the measurement of the achievement of good environmental status of marine waters are set out in the European Commission Decision 2017/848/EU.

**1992 Convention for the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention)**

Under the Helsinki Convention, actions for the conservation of the Baltic Sea focus on the implementation of the Baltic Action Plan (BAP), adopted at the HELCOM Ministerial Meeting in 2007. The Baltic Action Plan assumes that good ecological status of the Baltic Sea will be achieved by 2021 and sets out the areas of action to achieve this. The paramount strategic objective of segment IV "Maritime activities" is that maritime transport and economic activities are carried out in the Baltic Sea in an environmentally friendly manner. One of the priorities is the minimum risk from offshore constructions. The countries have agreed within the BSAP that they will follow appropriate procedures and make efforts to eliminate, reduce or redress the potential negative environmental impacts that may be caused by offshore constructions. The 2013 Ministerial Conference in Copenhagen adopted **Recommendation 34E/1** for safeguarding important bird habitats and migration routes in the Baltic Sea from negative effects of wind and wave energy production at sea. The document emphasises a positive aspect of the development of wind energy in the context of climate change, recommending specific steps that may help to reduce the negative impact of the project on the environment. It should be emphasised that the planned project will be implemented in accordance with HELCOM Recommendation 34E/1. The provisions of this recommendation refer mainly to the activities of the States Parties to the Helsinki Convention and as such do not concern the planned project, but the Applicant assumes that the project will be conducted so as to avoid or minimise the impact of the project on the environment, including, in particular, on important bird habitats and their migration routes.

**The Convention on the Protection of Migratory Species of Wild Animals – CMS Convention**

The international treaty concluded as part of the UN environmental programme – the Convention on the Protection of Migratory Species of Wild Animals (Journal of Laws of 2003, No. 2, item 17) (Bonn Convention), was drawn up in Bonn on 23 June 1979. Poland has been a party to the convention since 1 May 1996, a member of the Standing Committee and party to the agreements on the protection of bats (EUROBATS) and small cetacean (ASCOBANS).

The objective of the convention is the protection of wild migratory animals, which constitute an irreplaceable element of the natural environment. Migratory species (or lower taxonomic groups) are considered those, a large number of which crosses state borders in various life cycles in a cyclical and foreseeable manner. A series of agreements concerning migratory species were included in the convention.

The only species of cetacean living in the Baltic Sea is the harbour porpoise (*Phocoena phocoena*). The harbour porpoise is included in Annex II, listing migratory species with inadequate conservation status, for which international agreements on protection and management should be concluded. In 1997, the parties to ASCOBANS adopted a Resolution on the by-catch of small cetacean, in which the parties to the agreement and the states from the agreement impact area were invited to develop a plan of the harbour porpoise restitution in the Baltic Sea, one element of which should be to identify the types of human activity that pose a potential danger to the restoration of the population of this species in the Baltic Sea. The final plan, the so-called "Jastarnia Plan," was adopted by the parties to ASCOBANS in 2009. Poland, which is a party to the ASCOBANS agreement since 1995, actively participating in its development, has also approved this plan for implementation.

A temporary objective specified by ASCOBANS is to restore the harbour porpoise population in the Baltic Sea up to at least 80% of the environment capacity level.

**European Green Deal**

The European Green Deal constitutes a set of political initiatives of the European Commission, the main objective of which is to achieve climate neutrality in Europe by 2050. Specific actions have been taken for each area, for example, for climate the new, more ambitious objective concerning the net emission of greenhouse gases has been set out – a reduction by at least 55% until 2030 in comparison to the levels from 1990. The European Green Deal focuses on three main principles of a clean energy transition that will help reduce greenhouse gas emissions and the quality of life. These are:

1. ensuring a secure and affordable EU energy supply;
2. developing a fully integrated, interconnected and digitalised EU energy market;
3. prioritising energy efficiency, improving the energy performance of our buildings and developing a power sector based largely on renewable sources.

To achieve this, the Commission has set out the following main objectives:

- building interconnected energy systems and better integrated grids to support renewable energy sources (RES);
- promoting innovative technologies and modern infrastructure;
- boosting energy efficiency and eco-design of products;
- decarbonising the gas sector and promoting smart integration across sectors;
- empowering consumers and helping EU countries to tackle energy poverty;
- promoting EU energy standards and technologies at global level;
- developing the full potential of Europe's offshore wind energy.

The planned project, Baltica OWF CI, is in line with the above-mentioned objectives.

**EU strategy on adaptation to climate change**

The objective of the EU strategy on adaptation is making Europe more resilient to climate change. This means increasing preparedness and response to the impacts of climate change at a local, national and EU level, preparing a coherent approach and improving coordination of actions through the implementation of the following environmental targets: integrating climate change adaptation into regional and other development projects and ensuring resilient infrastructure. The planned project is in line with the objective of the EU strategy.

The main legal acts concerning environmental protection in the maritime transport sector, divided into hazard groups at an international and EU level are:

- *International Convention for the Prevention of Pollution from Ships, 1973, adopted in London on 2 November 1973, together with Annexes I, II, III, IV, and V as well as the 1978 Protocol relating thereto, together with Annex I adopted in London on 17 February 1978* (Journal of Laws of 1987, No. 17, item 101, as amended), (MARPOL Convention);
- *The Convention for the Protection of the Marine Environment of the Baltic Sea signed at Helsinki on 9 April 1992* (consolidated text: Journal of Laws of 2000, No. 28, item 246) (Helsinki Convention).

In the scope of air emissions in maritime areas, the following legal acts are in force at an international and EU level:

- Directive 2012/33/EU of the European Parliament and of the Council of 21 November 2012 *amending Directive 1999/32/EC of the Council on the content of sulphur in marine fuels* (OJ L 327, 27.11.2012, p. 1);
- Regulation (EU) 2015/757 of the European Parliament and the Council of 29 April 2015 *on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC* (OJ L 123, 19.05.2015, p. 55);
- Commission Implementing Regulation (EU) 2016/1927 of 4 November 2016 *on templates for monitoring plans, emissions reports and documents of compliance pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on monitoring, reporting and verification of carbon dioxide emissions from maritime transport* (OJ L 299, 05.11.2016, p. 1);
- Commission Implementing Regulation (EU) 2016/1928 of 4 November 2016 *on determination of cargo carried for categories of ships other than passenger, ro-ro and container ships pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport* (OJ L 299, 05.11.2016, p.22);
- Commission Delegated Regulation (EU) 2016/2071 of 22 September 2016 *amending Regulation (EU) 2015/757 of the European Parliament and of the Council as regards the methods for monitoring carbon dioxide emissions and the rules for monitoring other relevant information* (OJ L 320, 26.11.2016, p. 1)
- Commission Delegated Regulation (EU) 2016/2072 of 22 September 2016 *on the verification activities and accreditation of verifiers pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport* (OJ L 320, 26.11.2016, p. 5).

Combating hazards and pollution at sea is regulated by the *International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC Convention)* adopted in London on 30 November 1990 (Journal of Laws of 2004, No. 36, item 323) together with the *Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS Protocol)* adopted in London on 15 March 2000 (Journal of Laws of 2007, No. 167, item 1173).

### 1.4.2 Documents at national and regional levels

The planned project directly pursues the objectives described in the national and regional documents listed below. These objectives relate mainly to avoiding the emission of harmful gases, increasing the share of energy from RES in energy production and increasing the level of energy security.

#### 1.4.2.1 National documents

**Maritime Policy of the Republic of Poland until 2020 (with an outlook to 2030)**

The document was adopted by the Resolution of the Council of Ministers No. 33/2015 of 17 March 2015 *on the Maritime Policy of the Republic of Poland until 2020 (with an outlook to 2030).*

The planned project is in line with objective 8 *Strengthening the country's energy security*, according to which the following measures were adopted to achieve the objective:

1. Creating conditions for the use of renewable energy sources at sea, i.e. wind, sea currents and wave motion energy.
2. Construction and modernisation of the maritime transmission infrastructure [...]

The Maritime Policy of the Republic of Poland until 2020 (with an outlook to 2030), specifies that the real potential of development of offshore wind energy in Poland, which may bring the greatest benefits for the Polish energy balance and the Polish economy, amounts to 6 GW of power installed in the OWF until 2030. Creating conditions for the construction of offshore wind farms has been identified as an action to improve energy security.

**Coastline protection programme**

The document adopted by the Act of 28 March 2003 *on the establishment of the long-term programme "Sea Coast Protection Programme"* (consolidated text: Journal of Laws of 2003, item 678) contains the list of projects aimed at protecting the sea shore. The planned project will be implemented in the area of 162.5–162.8 km of the coastline (according to the shoreline chainage of the Maritime Office), for which no tasks have been foreseen for implementation until 2023.

**National Spatial Development Concept 2030**

The National Spatial Development Concept 2030 (NSDC) was adopted by Resolution no. 239 of the Council of Ministers of 13 December 2011 (M.P.2012.252). It is the main document on spatial development in the long term, defining the objectives and directions of the spatial development policy of the country. It takes into account the need to develop offshore wind farms (OWF) together with connection infrastructure in order to solve the problem of underinvestment in energy infrastructure and to improve the energy security of the country. The development of offshore wind energy will contribute to the reduction of $CO_2$ emission in accordance with the arrangements of the European Union (EU). The Concept specifies that the wind energy will constitute 45% of the energy obtained from RES. The need to build new transmission lines with accompanying infrastructure, the need to take into account air corridors of bird migration and landscape protection as well as weather variability were considered as barriers to RES development in Poland. According to the findings of the Concept, the planned project is located in the development zone of dispersed renewable wind energy. The NSDC sets 6 objectives pursuing the strategic objective. The planned project is part of objective 5: “Increasing the resilience of the spatial structure to natural hazards and loss of energy security and shaping spatial structures supporting the country's defensive capabilities.” One of the directions of the actions implementing this objective is “increasing the use of renewable energy sources by building new capacities that will reduce losses related to energy transmission and improve energy security at the national, regional and local level.” “One of the elements of support for the diversification of energy sources, which also has positive effects on reducing $CO_2$ emissions, is increasing the production of energy from renewable sources. In Polish conditions, this type of sources with the greatest economic potential should include wind energy [...].” “It is planned that by 2020 at least 15% of final gross energy consumption will come from renewable energy sources.”

**Maritime Spatial Plan of Polish Maritime Areas**

On 14 April 2021, the Maritime Spatial Plan of Polish Maritime Areas (MSPPMA) was adopted by the Regulation of the Council of Ministers of 14 April 2021 (Journal of Laws of 2021, item 935). The document covers the necessity to provide sea space for the construction and maintenance of the OWF connection infrastructure. Its location is possible in those sea areas, the main function of which is the “technical infrastructure” (sea areas with letter designation I) and in the sea area with a different main function, but in which the technical infrastructure has been indicated as an acceptable function. In some sea areas with a main function other than “technical infrastructure”, sea subareas have been determined for the laying of this type of infrastructure. The location and construction method of the technical infrastructure, including the connection infrastructure, in the sea areas and subareas, is subject to bans and restrictions indicated in the detailed arrangements of the Plan.

The detailed characteristics of the subareas and the location of the planned project against MSPPMA is presented in subsection 3.10.

**Energy Policy of Poland until 2040**

In the Energy Policy of Poland until 2040 adopted by the Council of Ministers on 2 February 2021, it has been indicated that the implementation of offshore wind energy, together with the implementation of nuclear energy and increasing the role of distributed and civic energy, will be the primary way to decarbonise the energy sector. In accordance with the provisions of the Policy, OWFs will play a special role in achieving at least 23% share of RES in gross final energy consumption in 2030. The incorporation and transmission of the power generated by OWFs will be achieved through the expansion of the transmission grid in northern and north-western Poland.

**Long-term National Development Strategy Third Wave of Modernity**

This document was adopted by the Resolution of the Council of Ministers no. 16 of 5 February 2013 (M.P. 2013, item 121). Pursuant to the provisions of the Act of 6 December 2006 *on the principles governing the conduct of development policy* (Article 9, section 1 – of the current revision, consolidated text: Journal of Laws of 2021, item 1057, article repealed) it is a document specifying the main trends, challenges and scenarios of the socio-economic development of the country and the directions of the spatial development of the country, taking into account the principle of sustainable development, covering a period of at least 15 years. It constitutes the broadest and most general element of the new system of the country's development management, the assumptions of which have been specified in the Act on the principles of conducting development policy and in the document Assumptions of the Development Management System of Poland adopted by the Council of Ministers on 27 April 2009.

The Strategy sets out 11 strategic objectives and directions of intervention in the area of competitiveness and innovativeness of the economy. One of them is ensuring energy security and the protection and improvement of the environment. The intervention direction adopted is the modernisation of infrastructure and energy security, as part of which the projects modernising the electricity, oil and gas infrastructure should be implemented and financed.

The planned project is in line with the above-mentioned objective and is consistent with the Long-term National Development Strategy 2030.

**Strategy for Responsible Development for the period up to 2020 (including the perspective up to 2030)**

The Strategy specifies that the modernisation of generation sources and innovative solutions in the economy, along with the development of capacities available from renewable sources, will contribute to the reduction of greenhouse gas emissions. The Strategy states that RES sources are mostly non-controllable sources. Continuous subsidisation of RES causes serious disturbances in the functioning of energy markets, resulting in an increase in energy prices. Therefore, the Strategy identified the following as necessary:

- ensuring the possibility of balancing and interaction of RES sources with other sources (not subject to limitations by forces of nature);
- evolutionary process of changes.

**National Energy and Climate Plan for the years 2021–2030 (NECP PL)**

On 30 December 2019, the Minister of State Assets handed to the European Commission the National Energy and Climate Plan for the years 2021–2030, thus, fulfilling the obligation imposed on Poland under the provisions of Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No. 663/2009 and (EC) No. 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No. 525/2013 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1).

The National Energy and Climate Plan for the years 2021–2030 (NECP PL) was adopted by the Committee for European Affairs at a sitting on 18 December 2019.

NECP PL presents the assumptions and objectives as well as policies and measures intended to implement 5 dimensions of the Energy Union, i.e.:

1. energy security;
2. internal energy market;
3. energy efficiency;
4. decarbonisation of the economy, and
5. research, innovation and competitiveness.

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

- 7% reduction of greenhouse gas emissions in the sectors not covered by the ETS system in comparison to the level from 2005;
- 21–23% share of RES in the gross final consumption of energy (target 23% will be possible to achieve when Poland is awarded additional EU funds, including those intended for equitable transformation), taking into consideration:
  - 14% share of RES in transport,
  - annual increase in the share of RES in heating and cooling by 1.1 percentage points on average per year;
- increase in energy efficiency by 23% compared to the PRIMES2007 projections;
- reduction of the share of coal in electricity production to 56–60%.

The planned project is in line with the main objective of the energy policy, which is energy security while ensuring the competitiveness of the economy, energy efficiency and reducing the environmental impact of the energy sector and the optimum use of own energy resources.

**PRSP 2018−2027 Development Plan for meeting the current and future electricity demand for 2018−2027**

The part concerning the potential directions of transmission network extension ensuring the reliability of the power system indicates the performance of analytical works in the scope of offshore transmission network construction and indicates that among the expected system effects of the development of the extra high voltage networks (NN) is the preparation of the capability for connection and evacuation of the installed power on wind farms at the level allowing to meet the RES share in the energy balance of the country. The document also presents various OWF connection scenarios.

**National Program for Low-Emission Economy Development**

The document determines the need for greater diversification of the energy mix. As the location of wind farms mainly coastal areas have been identified. It has also been specified that modernisation and extension of the NPS is required to meet the requirements of the RES market. It was stated in the document that the maximum productivity of the OWF in the PMA is estimated at 12 GW of installed capacity and 48–56 TWh of energy per year. The real investment plans until 2030 amount to 6 GW. The document specifies that for the development of offshore wind energy in Poland, it is necessary, among others:

- to conduct analyses regarding the grounds for the OWF development in Poland;
- to develop offshore power networks.

**The Study of Conditions for the Maritime Spatial Plan of Polish Maritime Areas**

On commission from the Directors of the Maritime Offices in Szczecin and Gdynia, the Study of Conditions for the Maritime Spatial Plan of Polish Maritime Areas including spatial analyses was developed in 2015.

The study has a different character than the study of conditions and directions for commune spatial development, specified in the Act of 27 March 2003 *on spatial planning and development* (consolidated text: Journal of Laws of 2021, item 741, as amended).

Its aim was to collect and analyse information for the purposes of preparing spatial development plans for the PMA. The Study compiled information on the state of the marine ecosystem and the use of maritime areas.

**Vistula River Basin Management Plan**

The Plan was adopted by the Resolution of the Council of Ministers of 18 October 2016 (Journal of Laws of 2016, item 1911). River basin management plans are used as the basic planning document for achieving environmental objectives. The river basin water resources include: inland surface and groundwater, marine inland waters as well as transitional and coastal waters located in the river basin area, divided into surface water bodies (SWB).

#### 1.4.2.2 Regional documents

**2030 Pomorskie Voivodeship Development Strategy**

The **2030 Pomorskie Voivodeship Development Strategy** adopted by the Pomorskie Regional Assembly in Resolution no. 376/XXXI/21 of 12 April 2021 is the basic strategic document setting out the directions of development of the Pomorskie Voivodeship. The Strategy sets three key objectives: Sustainable Security, Open Regional Community and Resilient Economy. These are detailed in 12 operational objectives. The planned project contributes to the implementation of the operational objective 1.2. “Energy security” through the development of the offshore wind energy. The document implementing the Pomorskie Voivodeship Development Strategy 2020 is the *Regionalny Program Strategiczny w zakresie energetyki i środowiska* ***Ekoefektywne Pomorze*** [literally: Regional Strategic Programme for Energy and Environment Eco-efficient Pomerania] (2018) which identifies the development of low-emission energy sources as one of the priorities.

**2030 Pomorskie Voivodeship Spatial Development Plan**

The Plan was adopted by Resolution no. 318/XXX/16 of the Pomorskie Regional Assembly of 29 December 2016. In the field of spatial policy, the focus is, among others, on the growth of electricity production and the transformation of the region into the national leader in renewable energy generation. The spatial policy activities and projects included in the 2030 Pomorskie Voivodeship Spatial Development Plan (PVSDP) include, among others: “[...] the construction of transmission and distribution networks as well as substations for power evacuation from the new, systemic and renewable energy sources (wind farms, including offshore...) [...] the extension of 400/110 kV Żarnowiec substation for the possibility of connecting the offshore wind farms to the National Power System (NPS) [...].” The 2030 Pomorskie Voivodeship Spatial Development Plan (PVSDP) outlines the vision of spatial transformations of the region. One of the elements of the vision is the thesis that as a result of installation of large power capacities within the voivodeship, in the form of a nuclear power plant, coal-fired power plant and an offshore wind turbine (OWT), as well as due to the development of distributed power sector, the security of energy supply of Northern Poland will be improved and the voivodeship will become energetically self-sufficient.

**Pomorskie Voivodeship Environmental Protection Plan for the years 2018–2021 with an outlook to 2025**

The Plan was adopted by Resolution no. 461/XLIII/18 of the Pomorskie Regional Assembly of 26 February 2018. One of the objectives is the “Improvement of air quality” and the adopted direction of intervention is the development of renewable energy. The tasks implemented as part of this direction, are, for example, the generation of energy from renewable sources and promoting renewable energy sources.

**Study of Conditions and Directions of Spatial Development of the Choczewo Commune**

The Study adopted by Resolution no. VI/58/2003 of the Choczewo Commune Council of 9 June 2003 (as amended) mentions the favourable climatic conditions within the coastal strip, which have contributed to the establishment of several onshore wind turbines in the Pomorskie Voivodeship, including also in the Choczewo commune area. The study contains information on the search for the location of energy parks on land. Resolution no. XXVIII/220/2021 of the Choczewo Commune Council of 26 January 2021 introduced changes to the current Study in order to enable the development of energy infrastructure related to the operation of renewable energy production.

**Local Spatial Development Plan of the Choczewo commune**

Partially, the area of the customer substations and the entire area of 400 kV busbar systems evacuating power from the customer substations to the NPS will be located in the area covered by the provisions of the local spatial development plan "Wiatraki w Osiekach" [Wind Turbines in Osieki], Choczewo commune [Resolution no. XIV/145/2008 of the Choczewo Commune Council of 19 March 2008 (Journal of the Pomorskie Voivodeship of 25 June 2008, no. 59, item 1662)]. There are agricultural areas and areas for the location of electrical power equipment there.

In accordance with Article 3(a) of the Act of 24 July 2015 *on the preparation and implementation of strategic transmission network projects* (consolidated text: Journal of Laws of 2021, item 428, as amended), the planned project is a strategic project regarding transmission networks. Such projects, in compliance with the provisions of Article 80, section 2 of the Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessment* (consolidated text: Journal of Laws of 2021, item 247, as amended) are not subject to the requirement that the authority issuing DEC confirms the compliance of the project location with the provisions of the local spatial development plan, if the plan has been adopted.

**Choczewo Commune Development Strategy**

The Strategy was adopted by Resolution no. VIII-62/1999 of the Choczewo Commune Council on 15 October 1999. The project is in line with strategic objective 3: Maintaining a clean environment through the development of sewage infrastructure and the use of clean energy sources, subsection 1. "Construction of wind power turbines." In the SWOT analysis, one of the development opportunities for the commune is the trend towards new energy sources – wind.

**Draft Assumptions for the Heat, Electrical Energy and Fuel Gas Supply Plan for the Choczewo Commune**

The document published in August 2015 by the "Fundacja Poszanowanie Energii" [literally: Respect Energy Foundation] assumes measures and tasks of the commune energy policy that involve: enhancing local energy security through the use of renewable energy resources and the development of renewable energy sources, reducing the environmental impact of energy and reducing energy costs, in particular improving air quality.

**Low-emission Economy Plan for the Choczewo Commune**

The Plan was adopted by Resolution no. XXVI/150/16 of the Choczewo Commune Council of 23 March 2016. One of the additional strategic objectives of the plan is to increase energy production from renewable sources by a minimum of 80% compared to 2014, i.e. to a level of approximately 1170 GJ (without taking into account electricity production from the system wind turbines, i.e. producing electricity for the NPS). The planned project is in line with specific objective no. 3 "Improvement of RES use in individual households and enterprises." The document mentions issues of promoting and supporting the use of renewable energy.

**Environmental Protection Plan for the Choczewo Commune for the years 2019–2022 with an outlook to 2025**

The Plan underlines that the most important issues for the Choczewo commune, resulting from the analysis of the status and threats to the environment, are the investments and the administrative and organisational activities concerning, among others, change of heating sources, introduction of renewable energy, modernisation of the communication system to improve air quality and the environmental status within the entire zone. Strategic objective: "Improving air quality to the levels required by law, meeting emission standards from installations" is included in the specific objective no. 3, which talks about "Increasing the use of unconventional energy sources," which the planned project is in line with.

### 1.4.3 Summary of findings of strategic and planning documents

The planned project, Baltica OWF CI, remains in line with the arrangements of many policies and strategies, in particular, the ones concerning environmental protection (reduction of pollution emissions), sustainable development (use of RES) and energy security (independence from external energy sources). The connection infrastructure will enable power evacuation from the Baltica OWF and its integration into the NPS. For that reason, **the planned project is in line with the environmental objectives of the mandatory strategic and planning documents analysed which have been developed and are applicable at international, national and regional levels.**

## 1.5 Methodology of the environmental impact assessment conducted

The results of environmental surveys and inventories carried out from March 2016 to April 2017 along the entire route of the Baltica OWF CI as well as from March to July 2021 in the fragment of the offshore area of the Baltica OWF CI were used to develop this EIA Report. The surveys were conducted by the consortium of MEWO S.A. and the Maritime Institute of the Gdynia Maritime University in cooperation with National Foundation for Environmental Protection. The study also takes into account the results of the information meetings, which were used to clarify the issues of public interest and to develop the part of the report dedicated to the analysis of possible social conflicts. Moreover, the study was based on the agreements made by the Applicant with the Choczewo Forest Inspectorate regarding the course of the connection infrastructure on land as well as the information submitted to PSE S.A. on the location of the connection point.

The work was carried out in accordance with the diagram of an environmental impact assessment report preparation [Figure 1.3], including:

- the provisions of programming and planning documents at the international, national and regional level, as well as the results of environmental impact forecasts of these documents, which may have an impact on the planned project;
- the concept of the project, including the activities in the following phases: construction, operation and decommissioning, including the determination of threats to the environment and their potential effects;
- the use of environmental survey and inventory survey results;
- the results of the modelling of changes in the environment resulting from the project implementation;
- information on the projects completed, being implemented and planned;
- the results of information meetings.

While developing the EIA Report, first of all, the guidelines, manuals and other materials on the subject of the study, as well as the experience of the team of authors and generally applicable good practices were used.

The primary aim of the EIA Report preparation is the assessment of the impact on the environment of the project entitled: "Connection Infrastructure of the Baltica B-2 and B-3 OWFs" as well as the identification of the ways for the elimination or reduction of its negative impacts. The assessment is a desk study performed by a team of specialists. While developing the EIA Report, the analysis of descriptive and cartographic materials was carried out, the results of the surveys, inventories and modelling conducted were interpreted, and the original methodology for assessing the project impact on individual components of the environment was used.

When preparing the EIA Report, the following were primarily analysed:

- technical and technological aspects of the planned project affecting the type and size of the impact on individual environmental components;
- environmental, spatial and social conditions of the planned project;
- possibility of preparing different project variants (locational, technical and technological);
- type, size and significance of potential environmental impacts;
- possibility of avoiding and reducing adverse environmental impacts;
- need to record possible future environmental changes as a result of the project implementation (scope of post-implementation monitoring).

The approach used to assess the scale and significance of impacts results from the authors' experience gained during the environmental impact assessments of projects planned to be implemented in offshore areas, including cable and pipeline projects.

The approach adopted allowed identifying comprehensive actions aimed at avoiding, preventing and limiting negative impacts related to the planned project.

Figure 1.3 presents a diagram of the methods of preparation of the EIA Report in relation to the data concerning the planned project and the environmental surveys conducted.` The term "environmental surveys" used in the figure means that the report on the impact of the planned project on the environment uses both the results of environmental surveys and inventory surveys carried out for the purpose of this study, as well as the results of other studies available to the public or in literature, e.g. for the projects closest to the planned project, or related to the development of such documents as protection plans or protective task plans for protected areas.

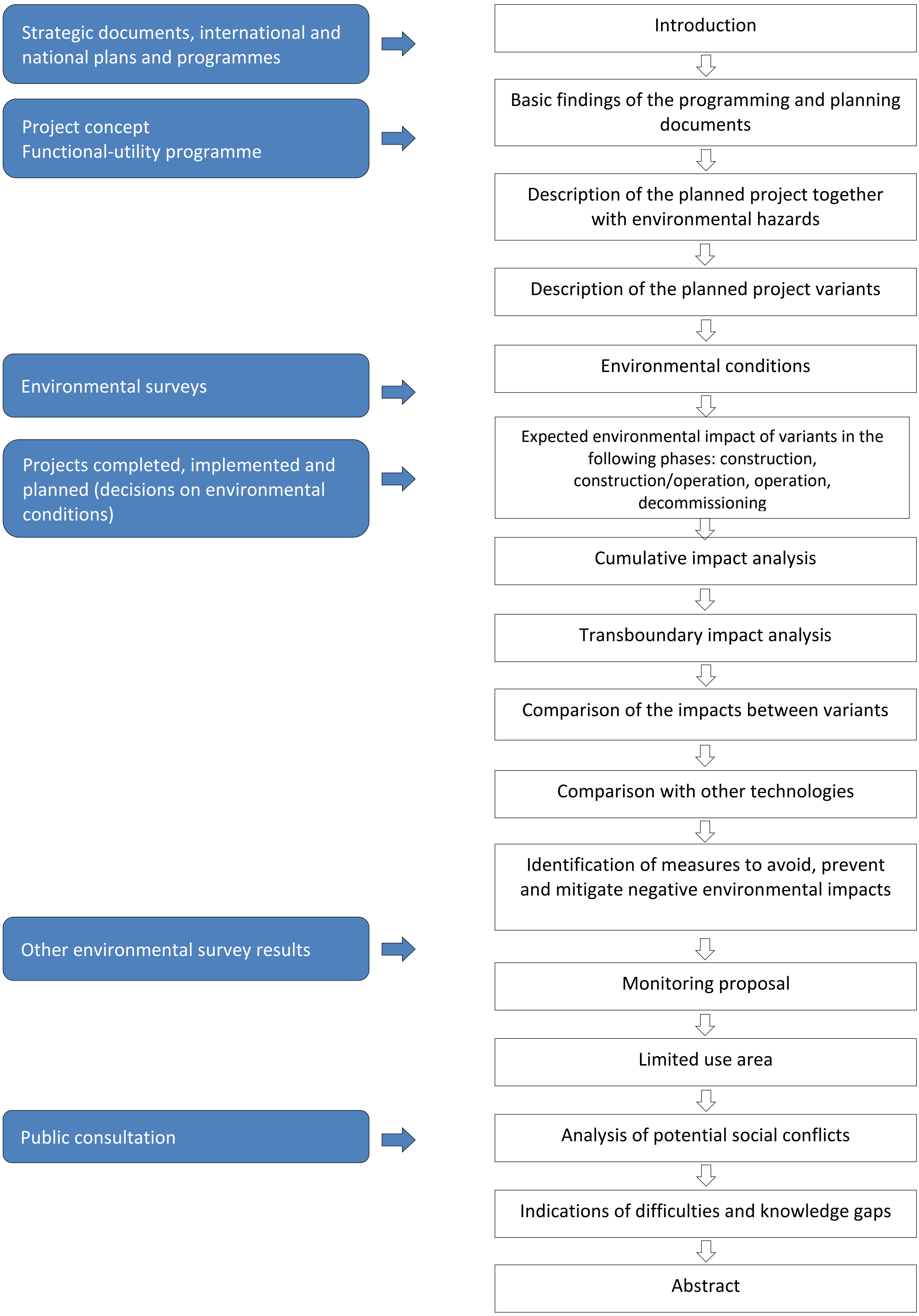



*Figure 1.3. Outline of the Environmental Impact Assessment Report preparation [Source: internal materials]*

Table 1.2 presents the characteristics of the marine and land environment surveys carried out for the purpose of the EIA Report preparation. Detailed survey methodologies for individual components of the environment are presented in the Report on inventory surveys constituting Appendix 1 to this Report.

*Table 1.2. Characteristics of the surveys on abiotic and biotic elements of the marine and terrestrial environment conducted within the Baltica OWF CI area and in its impact range [Source: internal materials]*

| **Type of surveys** | **Date of surveys [mm.yyyy]** | **Scope of surveys** |
|---|---|---|
| Marine environment | | |
| Abiotic elements | | |
| Geophysical surveys | 04.2016–07.2018<br>03.2021–07.2021 | Surveys along the profiles delineated every 90 m;<br>• bathymetric profiling was carried out using a multibeam echosounder;<br>• sonar surveys were carried out with a side-scan sonar; digital data was recorded in the Coda GeoSurvey data acquisition and processing system;<br>• magnetometer surveys (measurements of magnetic anomalies) were carried out using a caesium magnetometer;<br>• seismo-acoustic and seismic surveys were carried out using two sediment profilers operating at different frequencies (high and low).<br>Analysis of the data collected and visual inspections (conducted using an ROV) of selected objects.<br>Core sampling in an evenly delineated measurement grid with an average density of 1 core sample per 3 km² (the core sampling sites were designated on the basis of the data obtained from shallow seismo-acoustic surveys and the analysis of a bathymetric map and sonar mosaic) |
| Geochemical | 06.2016–10.2016<br>01.2017–05.2017 | Collecting 240 samples of surface sediments (during the winter campaign) and 240 samples of surface sediments (during the summer campaign) in an even grid with an average density of 1 sample per 1 km².<br>Laboratory tests based on PN-EN-ISO standards or, in the absence thereof, in accordance with test procedures prepared by an accredited laboratory or applicable test methods |
| | 02.2021<br>07.2021 | Collecting 6 samples of surface sediments (during the winter campaign) and 9 samples of surface sediments (during the summer campaign) in an even grid with an average density of 1 sample per 1 km².<br>Laboratory tests based on PN-EN-ISO standards or, in the absence thereof, in accordance with test procedures prepared by an accredited laboratory or applicable test methods |
| Hydrochemical | 04.2016<br>07.2016<br>11.2016<br>12.2016<br>01.2017–02.2017 | Collecting 37 samples of seawater each from near-surface and near-seabed water layers. Additionally, at 8 stations, collecting samples of seawater supplementing the vertical profile (in total, 41 samples during each campaign)<br>Sampling in an evenly spaced grid with a density of 1 station per 5 km², along the centre line of the cable route.<br>Laboratory tests based on PN-EN-ISO standards or, in the absence thereof, in accordance with test procedures prepared by an accredited laboratory or applicable test methods |
| | 08.2016 | Collecting 50 samples of seawater each from near-surface and near-seabed water layers. Additionally, at 8 stations, collecting samples of seawater supplementing vertical profiles (in total, 41 samples).<br>Sampling in an evenly spaced grid with a density of 1 station per 5 km², along the centre line of the cable route. |

| Type of surveys | Date of surveys [mm.yyyy] | Scope of surveys |
|---|---|---|
| | | Laboratory tests based on PN-EN-ISO standards or, in the absence thereof, in accordance with test procedures prepared by an accredited laboratory or applicable test methods |
| Biotic elements | | |
| Phytobenthos | 06.2016 | Filming along 25 transects.<br>Collecting 4 samples, including 2 quantitative and 2 qualitative ones<br>Sample analysis according to the applicable methodology |
| | 06.2021 | Filming along 10 transects.<br>Collecting 2 samples, including 1 quantitative and 1 qualitative.<br>Sample analysis according to the applicable methodology |
| Macrozoobenthos | 05–07.2016 | Sampling at 400 stations on the soft bottom and 10 stations at the hard (stony) bottom.<br>Sample analysis according to the applicable methodology |
| | 05–06.2021 | Sampling at 7 stations on the soft bottom and 4 stations at the hard (stony) bottom.<br>Sample analysis according to the applicable methodology |
| Ichthyofauna | 03.2016–06.2016<br>07.2016–08.2016<br>10.2016<br>01.2017 | Pelagic fish:<br>• Acoustic surveys according to the methodology recommended by ICES; acquisition of quantitative data on marine organisms;<br>• control catches with a pelagic trawl;<br>• ichthyological analysis.<br>Demersal fish:<br>• catches with a set of scientific nets;<br>• ichthyological analysis.<br>Fish in near-shore waters:<br>• catches with a beach seine net;<br>• ichthyological analysis.<br>Ichthyoplankton:<br>• collecting samples using a bongo net and a Neuston type net;<br>• sample analysis according to the applicable methodology |
| Land environment | | |
| Abiotic elements | | |
| Geology, soils, surface and ground water, climate, acoustic climate, air quality and waste | 04.2016–02.2017 | Study of published and unpublished data and analysis of cartographic studies |
| Biotic elements | | |
| Fungi | 04.2016–11.2016 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Lichens | 05.2016–11.2016 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Mosses and liverworts | 08.2016–10.2016 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Vascular plants and natural habitats | 05.2016–04.2017 | Inventory of natural habitats, the sites of protected and endangered species and assessment of the condition of their habitats |

| Type of surveys | Date of surveys [mm.yyyy] | Scope of surveys |
|---|---|---|
| Terrestrial invertebrates | 04.2016–10.2016 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Aquatic invertebrates | 04.2016–09.2016 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Fish and lampreys | 08.2016–12.2016 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Herpetofauna | 03.2016–10.2016 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Avifauna | 03.2016–04.2017 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |
| Mammals and bats | 04.2016–03.2017 | Inventory of the sites of protected and endangered species and assessment of the condition of their habitats |

Table 1.3 presents the methodologies of the modelling and analyses performed for the purposes of the environmental impact assessment of the Baltica OWF CI.

*Table 1.3. Compilation of the methodologies of the modelling and analyses conducted for the purposes of the assessment of the Baltica OWF CI impact on the environment in the onshore area [Source: internal materials]*

| Parameter | Methodology |
|---|---|
| Air pollution | The following, internationally recognised, methodologies were used to analyse emissions from different types of sources:<br>• emissions from combustion engines: EMEP/EEA Non-road mobile sources and machinery at Tier 1 and 2, referred to actual fuel consumption data for machinery;<br>• emissions from handling aggregate materials: methodology of U.S. EPA AP 42 13.2.4 Aggregate Handling And Storage Piles; emission analyses were conducted on the basis of the values of Silt content (s) indicators according to the experience of the U.S. EPA and own experience (sampling of road surfaces and laboratory sieve analyses);<br>• emissions from vehicle traffic on unpaved roads: methodology of U.S. EPA AP 42 13.2.2 Unpaved Roads; emission analyses were conducted on the basis of the values of Silt content (s) indicators according to the experience of the U.S. EPA and own experience (sampling of road surfaces and laboratory sieve analyses);<br>• emissions from vehicle traffic on paved roads: methodology of U.S. EPA AP 42 13.2.1 Paved Roads; emission analyses were conducted on the basis of the values of Silt content (s) indicators according to the experience of the U.S. EPA and own experience (sampling of road surfaces and laboratory sieve analyses);<br>• emissions from wind erosion of storage piles and sites: methodology of U.S. EPA AP 42 13.2.5 Industrial Wind Erosion, based on a potential wind erosion model |
| Electromagnetic field | High-voltage power cables, due to the presence of a cable operating wire screening sheaths, are not a source of magnetic field, since its normal (radial) component disappears completely as a result of the presence of a semiconductive screen surrounding the operating wire, copper or aluminium as well as the presence of a conductive screen surrounding the electrical insulating sheath. Therefore, estimating the levels of the electric field component outside the cable is unjustified.<br>For the cable bed area, the calculations of the maximum values of the magnetic field intensity (H) that can be expected above the cable line were conducted using the PolE-M computer software. The calculations were performed by determining the value of magnetic field intensity at a height of 0.2, 1.0 and 2.0 MAGL in accordance with the recommendation indicated in the Regulation of the Minister of Climate of 17 February 2020 *on methods of checking compliance with the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2020, item 258).<br>For busbar systems, the calculations of the distribution of electric and magnetic field |

| Parameter | Methodology |
|---|---|
| | intensities were performed for the cross-section in which the distance between the conductors forming the busbar system and the ground is the smallest (the place of occurrence of the maximum intensity of electric and magnetic fields).<br>The electromagnetic field distribution in the OnSS area was not calculated. Due to the fact that the station devices are located at a considerable distance from the OnSS fence, the field generated by them is not taken into account in the EMF modelling. The measurements taken outside the area of operating substations show that the levels of individual components of the electromagnetic field are negligible, except for the areas of electrical power connections entering the station. |
| Thermal conditions | The computational model for the Baltica OWF CI onshore section was developed on the basis of the so-called mirror image method using the Kennelly formula assuming the existence of two linear heat sources, i.e. the actual source representing the power loss due to phase conductor resistance and dielectric losses in the primary insulation of a power line, and its symmetrical representation with regard to the Earth's surface, with identical power value as the actual source adopted with a negative sign. |

The assessment of the impact on individual receptors was carried out according to the diagram presented [Figure 1.4].

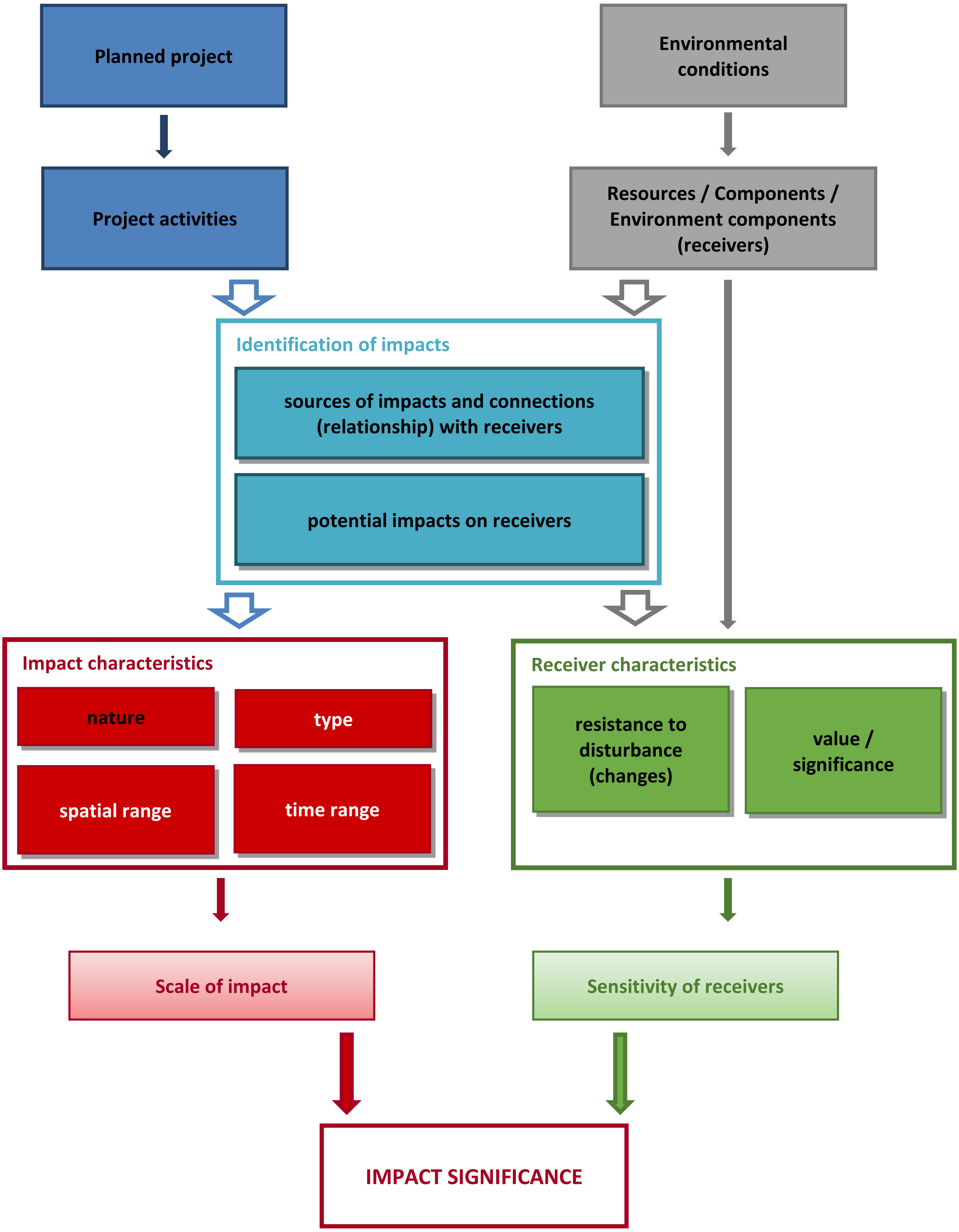



*Figure 1.4. Diagram of environmental impact identification and impact assessment, including the determination of impact significance [Source: internal materials based on ESPOO REPORT (2017)]*

An actual impact occurs only when a specific sensitive receptor is present within the impact range. A receptor is considered to be an individual component of the environment (e.g. species of plants and animals, natural habitats, abiotic elements, and landscape), but also humans.

At the first stage of the assessment, impacts that may affect individual receptors resulting from the construction, operation and decommissioning stages of the planned project were identified. Based on the environmental and inventory surveys, carried out for the purposes of the EIA Report, the receptors on which these activities may have an impact were also specified. At the second stage of the assessment, the correlations between the sources of potential impacts and individual receptors were identified on the basis of literature and experts' experience.

The impacts identified were assigned features in four categories [Table 1.4]:

- type (direct, indirect, secondary);
- range (transboundary, regional, local);
- duration (permanent, long-term, medium-term, short-term, momentary);
- permanence (irreversible, reversible).

*Table 1.4. Characteristics of the project impacts on receptors [Source: internal materials]*

| Category | Feature | Characteristics |
|---|---|---|
| Type | Direct | Impact resulting from a direct interaction between the activities related to the planned project implementation and the elements of the environment |
| | Indirect | Impact resulting from an indirect interaction between the activities related to the planned project implementation and the elements of the environment |
| | Secondary | Impact resulting from the interaction between the planned project implementation and the elements of the environment, postponed in time, which may occur as a result of direct or indirect impact |
| Range | Transboundary | Impact the effects of which are felt outside Poland on the territory of other countries |
| | Regional | Impact the effects of which reach beyond the direct vicinity of the activity related to the planned project but does not reach outside Polish Maritime Areas or the commune area |
| | Local | Impact that takes place in the close proximity of the activities related to the planned project |
| Duration | Constant | Impact, which will not subside after the conclusion of the activities related to the planned project |
| | Long-term | Impact which is limited in time and its effects are noticeable (measurable) either constantly or cyclically for 3 years or 3 vegetation periods from the beginning of the activity related to the planned project |
| | Medium-term | Impact which is limited in time and its effects are noticeable (measurable) either constantly or cyclically for 1 to 3 years or 1 to 3 vegetation periods from the beginning of the activity related to the planned project |
| | Short-term | Impact which is limited in time and its effects are noticeable (measurable) for a relatively short period but no longer than 1 year or 1 vegetation period from the beginning of the activity related to the planned project |
| | Momentary | Impact which is limited to the duration of the activity related to the planned project |
| Permanence | Irreversible | Impact, the effects of which will not disappear after the cessation of activities related to the planned project, and the resources will not return to the initial state |

| Category | Feature | Characteristics |
|---|---|---|
| | Reversible | Impact the effects of which cease to be noticeable (measurable) after the activities related to the planned project are completed |

Due to the overall characteristics of the individual impact features, in some cases, during the detailed assessments, individual concepts were clarified further, taking into account the specificity of impacts. If good practices or generally accepted and applied methodologies indicated the need for other assessment and/or definition methodologies, these were quoted directly in the place of their use.

As a result, each impact was characterised and assessed in accordance with the number of points presented in Table 1.5.

*Table 1.5. Method of assessing individual impacts on receptors [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Impact 1. | | | | | | | | | | | | | | |
| Impact 2. | | | | | | | | | | | | | | |
| Impact n | | | | | | | | | | | | | | |

As a result of the ratings assigned to the impact characteristics, the size (scale) of the impact was described according to a five-point scale:

1) 4–5 pts – irrelevant;
2) 6–7 pts – low;
3) 8–9 pts – moderate;
4) 10–12 pts – high;
5) 13 pts – very high.

In the cases of possible interaction between the impact and the receptor, the resistance of the receptors to individual impacts as well as their significance and role in the environment, including the protective status in relation to environmental components, were determined. As a result, the resistance and significance of the receptors contributed to the determination of a receptor sensitivity, which was also determined, using the expert method, according to a five-point scale: (1) irrelevant, (2) low, (3) moderate, (4) high and (5) very high.

At the next stage of the assessment, taking into account the assigned size (scale) of the impact and the receptor sensitivity, the significance of a given impact on the receptor was also determined on a five-point scale [Table 1.6]:

- negligible impact;
- low impact;

- moderate impact;
- important impact;
- significant impact.

The relationships between the scale of the impact and the receptor sensitivity indicating the significance of the impact are shown in Table 1.6.

*Table 1.6. Matrix defining the significance of the impact in relation to the impact scale and the receptor sensitivity [Source: internal materials]*

| **Impact significance** | | **Receptor sensitivity** | | | | |
|---|---|---|---|---|---|---|
| | | **Irrelevant** | **Low** | **Moderate** | **High** | **Very high** |
| Scale (size) of impact | Irrelevant | Negligible | Negligible | Negligible | Negligible | Low |
| | Low | Negligible | Negligible | Low | Low | Moderate |
| | Moderate | Negligible | Low | Low | Moderate | Moderate |
| | High | Negligible | Low | Moderate | Important | Significant |
| | Very high | Low | Moderate | Moderate | Significant | Significant |

In accordance with the EIA methodology described above, a significant impact may occur if a “very high” scale of impact is determined and at the same time at least a “high” sensitivity of the receptor as well as in the case when “high” scale of impact is determined with a “very high” sensitivity of the receptor.

The methodology described above was developed to standardise the environmental impact assessment for different types of activities, emissions and different types of receptors. This approach enables an effective comparative assessment of all impacts of the project and the assessment of the project as a whole. Due to the algorithm of the methodology adopted, it is necessary to quantify both the scale of impact and the sensitivity of the receptors (assigning the number of points from the pool available for individual evaluation criteria). Therefore, for each of the issues assessed in the tables in Section 6, one should refer directly to the text preceding the tables with regard to the detailed assessment of the impact conditions.

Correct use of standardised assessment methods requires also the correct interpretation of the phrases corresponding to the number of points awarded in each category. They should not be interpreted in the colloquial sense, but as a replacement phrase specifying the sum of the points awarded, e.g. the phrase “low” used to determine the impact scale means the value of the parameter A (impact scale) within the range of 6 to 7 points, from the set of quantified results of four criteria: type (1–3 points), range (1–3), duration (1–5), and permanence (1–2). The same is true for the quantified evaluation of receptor sensitivity (parameter B values). When interpreting the results of the assessment of the emission scale, the sensitivity of receptors and the resultant assessment – the significance of the impact, the replacement phrases for the sum of points presented in the tables in Section 6 should be interpreted together with the detailed descriptions of the impacts that precede the tables of the standardised method.

A separate category, not subject to assessment with regard to impact characteristics, are cumulative impacts occurring in combination with the impacts resulting from other current and/or planned projects, concerning the same subjects of impact. They were identified regardless of their characteristics and assessment.

# 2 Description of the planned project

## 2.1 General characteristics of the planned project

### 2.1.1 Subject and scope of the project

The project in question involves the construction and operation of the Baltica B-2 and B-3 Offshore Wind Farm Connection Infrastructure (hereinafter referred to as: Baltica OWF CI). The objective of the project implementation is to evacuate the power generated by the Baltica OWF to the NPS. The Baltica OWF Connection Infrastructure is not a part of the Baltica OWF, which was covered by a separate procedure for EIA completed with the issuance of a decision on environmental conditions (see Subsection 1.1).

The Baltica OWF will be connected with customer substations (OnSS) by cable lines routed along a common cable bed area, from which electricity will be send via busbar systems with a rated voltage of 400 kV to the designed Choczewo Substation.

The project will consist of the following main components:

- subsea extra high voltage alternating current power cable lines with fibre-optic cables inserted into special connection clamps in switchgears located on the OSS platforms, with internal connections between the OSSs;
- subsea cable line connections with accessories;
- onshore connections of subsea and onshore cable lines (individual cable lines will be interconnected in underground “chambers” located within the borehole construction site area);
- onshore power cables with fibre-optic cable lines;
- onshore cable line connections with accessories;
- onshore substations (customer OnSS) with infrastructure required for proper operation;
- busbar systems for connecting onshore substations (OnSS) with the NPS of the transmission system operator PSE S.A.;
- service roads between sea–land drilling chambers and OnSS;
- access road to substations.

### 2.1.2 Project location and the sea and land area occupied by the project

The construction and operation area of the Baltica OWF CI is located within the maritime area of the Republic of Poland, including in the exclusive economic zone, in the territorial sea and internal sea waters as well as onshore, in the Choczewo commune (Wejherowo district, Pomorskie Voivodeship).

The location of the planned project was described using the coordinates indicated in Table 2.1.

The onshore area of the connection infrastructure is located in the Choczewo commune (Wejherowo district, Pomorskie Voivodeship). The customer substations and the busbar systems connecting the customer substations with the Choczewo Substation will be located on a part of a plot which is now covered by arable land. The access road to the above-mentioned substation will be located on a plot that is currently a road plot (plot ref. no. 21, Kierzkowo precinct) and partially on a plot with arable land (plot ref. no. 25/4, Kierzkowo precinct). Almost the entire cable bed area (with the exception of the technical belt managed by the Maritime Office in Gdynia) is routed across the land areas managed by the Choczewo Forest District Inspectorate, Szklana Huta Forestry. The list of registered plots within which the planned project will be located is presented in Table 2.2.

Since, in the same part of the Baltic Sea, projects of other operators are being implemented and will be connected to the planned Substation in Choczewo, in agreement with the Choczewo Forest Inspectorate, a common draft route of the connection infrastructure across the land areas managed by the Inspectorate was prepared to ensure the minimisation of the negative environmental impacts of cable lines belonging to different operators, through:

- minimising the tree felling surface area as a result of routing the connection infrastructure of various Applicants within a single, common cable bed area;
- bypassing the environmentally valuable areas indicated by the Choczewo Forest Inspectorate at the stage of agreements;
- use of a cable technology.

*Table 2.1. Geographical coordinates of the Baltica OWF CI in the offshore area, coastal zone and onshore area [Source: internal materials]*

| Point No. | Geodetic coordinates | | | | Geographical coordinates | |
|---|---|---|---|---|---|---|
| | PUWG 1992 [m] | | PUWG 2000s6 [m] | | WGS 84 [DD°MM’SS.SSS”] | |
| | Easting | Northing | Easting | Northing | Longitude | Latitude |
| 1 | 805840.68 | 408801.17 | 6108797.61 | 6472559.34 | 17°34’12.061” E | 55°06’26.543” N |
| 2 | 798624.63 | 407336.11 | 6101557.50 | 6471196.98 | 17°32’57.846” E | 55°02’32.125” N |
| 3 | 797960.69 | 406971.96 | 6100888.07 | 6470842.18 | 17°32’38.110” E | 55°02’10.402” N |
| 4 | 796541.30 | 407108.30 | 6099470.02 | 6470998.89 | 17°32’47.452” E | 55°01’24.576” N |
| 5 | 793508.61 | 407399.62 | 6096440.21 | 6471333.72 | 17°33’07.392” E | 54°59’46.662” N |
| 6 | 791122.77 | 408014.04 | 6094062.14 | 6471982.53 | 17°33’44.726” E | 54°58’29.889" N |
| 7 | 790946.37 | 407319.82 | 6093875.73 | 6471290.54 | 17°33’05.888” E | 54°58’23.719" N |
| 8 | 790463.58 | 407408.97 | 6093394.02 | 6471386.63 | 17°33’11.463” E | 54°58’08.160" N |
| 9 | 790341.24 | 407448.36 | 6093272.18 | 6471427.78 | 17°33’13.820” E | 54°58’04.229" N |
| 10 | 790222.02 | 407527.10 | 6093154.04 | 6471508.26 | 17°33’18.387” E | 54°58’00.425" N |
| 11 | 790118.05 | 407656.47 | 6093051.88 | 6471639.17 | 17°33’25.782” E | 54°57’57.147” N |
| 12 | 789598.54 | 408584.18 | 6092545.41 | 6472574.71 | 17°34’18.543” E | 54°57’40.957” N |
| 13 | 789288.40 | 408705.56 | 6092236.87 | 6472700.58 | 17°34’25.722” E | 54°57’31.003” N |
| 14 | 782593.74 | 409337.98 | 6085548.39 | 6473428.95 | 17°35’08.881” E | 54°53’54.838" N |
| 15 | 780724.44 | 413517.24 | 6083737.98 | 6477636.72 | 17°39’05.514” E | 54°52’57.029" N |
| 16 | 780009.90 | 415114.76 | 6083045.95 | 6479245.14 | 17°40’35.917” E | 54°52’34.898" N |
| 17 | 779619.62 | 416211.02 | 6082671.16 | 6480347.46 | 17°41’37.834" E | 54°52’22.937" N |
| 18 | 779818.36 | 425724.92 | 6083005.87 | 6489862.78 | 17°50’31.433” E | 54°52’34.781" N |
| 19 | 779647.88 | 426099.15 | 6082840.66 | 6490239.61 | 17°50’52.588” E | 54°52’29.465" N |
| 20 | 779301.75 | 426574.23 | 6082501.16 | 6490719.86 | 17°51’19.562” E | 54°52’18.518" N |
| 21 | 779152.53 | 426746.74 | 6082354.33 | 6490894.58 | 17°51’29.377” E | 54°52’13.781" N |
| 22 | 779021.29 | 426824.53 | 6082224.15 | 6490974.28 | 17°51’33.861” E | 54°52’09.576" N |
| 23 | 778903.75 | 426849.67 | 6082106.91 | 6491001.11 | 17°51’35.379” E | 54°52’05.786" N |
| 24 | 777851.85 | 426965.64 | 6081056.18 | 6491132.16 | 17°51’42.843” E | 54°51’31.813" N |
| 25 | 774805.75 | 427303.78 | 6078013.53 | 6491513.94 | 17°52’04.569” E | 54°49’53.433” N |
| 26 | 774141.75 | 427372.05 | 6077350.19 | 6491591.72 | 17°52’08.995” E | 54°49’31.984” N |
| 27 | 773580.27 | 427310.23 | 6076787.57 | 6491537.88 | 17°52’06.039” E | 54°49’13.785” N |
| 28 | 773402.77 | 427290.68 | 6076609.71 | 6491520.86 | 17°52’05.105” E | 54°49’08.032” N |
| 29 | 773338.46 | 427178.83 | 6076543.78 | 6491409.88 | 17°51’58.896” E | 54°49’05.893” N |
| 30 | 773291.69 | 427003.71 | 6076494.49 | 6491235.34 | 17°51’49.126” E | 54°49’04.288” N |

| Point No. | Geodetic coordinates | | | | Geographical coordinates | |
|---|---|---|---|---|---|---|
| | PUWG 1992 [m] | | PUWG 2000s6 [m] | | WGS 84 [DD°MM'SS.SSS"] | |
| | Easting | Northing | Easting | Northing | Longitude | Latitude |
| 31 | 773282.63 | 426972.55 | 6076484.98 | 6491204.30 | 17°51'47.389" E | 54°49'03.978" N |
| 32 | 773174.99 | 426777.45 | 6076374.50 | 6491010.65 | 17°51'36.555" E | 54°49'00.393" N |
| 33 | 773072.74 | 426718.95 | 6076271.37 | 6490953.58 | 17°51'33.370" E | 54°48'57.053" N |
| 34 | 773064.72 | 426702.19 | 6076263.11 | 6490936.92 | 17°51'32.439" E | 54°48'56.785" N |
| 35 | 773020.79 | 426645.34 | 6076218.34 | 6490880.68 | 17°51'29.294" E | 54°48'55.334" N |
| 36 | 773014.49 | 426636.44 | 6076211.91 | 6490871.86 | 17°51'28.801" E | 54°48'55.125" N |
| 37 | 772971.07 | 426587.74 | 6076167.78 | 6490823.76 | 17°51'26.112" E | 54°48'53.695" N |
| 38 | 772934.65 | 426565.21 | 6076131.03 | 6490801.74 | 17°51'24.883" E | 54°48'52.505" N |
| 39 | 772925.20 | 426536.47 | 6076121.16 | 6490773.12 | 17°51'23.281" E | 54°48'52.184" N |
| 40 | 772805.30 | 426536.47 | 6076001.21 | 6490774.83 | 17°51'23.391" E | 54°48'48.304" N |
| 41 | 772649.14 | 426553.87 | 6075845.22 | 6490794.47 | 17°51'24.509" E | 54°48'43.261" N |
| 42 | 772537.19 | 426625.43 | 6075734.24 | 6490867.66 | 17°51'28.620" E | 54°48'39.676" N |
| 43 | 772459.68 | 426771.11 | 6075658.78 | 6491014.51 | 17°51'36.851" E | 54°48'37.245" N |
| 44 | 772337.37 | 427319.38 | 6075544.23 | 6491564.78 | 17°52'07.676" E | 54°48'33.575" N |
| 45 | 772335.91 | 427324.62 | 6075542.85 | 6491570.04 | 17°52'07.971" E | 54°48'33.531" N |
| 46 | 772334.44 | 427328.51 | 6075541.43 | 6491573.96 | 17°52'08.190" E | 54°48'33.485" N |
| 47 | 772332.62 | 427332.37 | 6075539.67 | 6491577.85 | 17°52'08.408" E | 54°48'33.428" N |
| 48 | 772330.32 | 427336.34 | 6075537.42 | 6491581.85 | 17°52'08.632" E | 54°48'33.356" N |
| 49 | 772327.29 | 427340.97 | 6075534.45 | 6491586.52 | 17°52'08.894" E | 54°48'33.260" N |
| 50 | 772229.34 | 427489.84 | 6075438.59 | 6491736.86 | 17°52'17.322" E | 54°48'30.169" N |
| 51 | 772203.86 | 427528.59 | 6075413.65 | 6491775.99 | 17°52'19.516" E | 54°48'29.364" N |
| 52 | 772203.58 | 427529.12 | 6075413.37 | 6491776.53 | 17°52'19.546" E | 54°48'29.356" N |
| 53 | 772203.30 | 427529.79 | 6075413.10 | 6491777.20 | 17°52'19.583" E | 54°48'29.347" N |
| 54 | 772203.15 | 427530.24 | 6075412.97 | 6491777.65 | 17°52'19.609" E | 54°48'29.342" N |
| 55 | 772203.03 | 427530.76 | 6075412.85 | 6491778.18 | 17°52'19.638" E | 54°48'29.339" N |
| 56 | 772202.95 | 427531.26 | 6075412.77 | 6491778.67 | 17°52'19.666" E | 54°48'29.336" N |
| 57 | 772202.91 | 427531.63 | 6075412.74 | 6491779.04 | 17°52'19.687" E | 54°48'29.335" N |
| 58 | 772202.87 | 427532.10 | 6075412.71 | 6491779.52 | 17°52'19.713" E | 54°48'29.334" N |
| 59 | 772202.90 | 427532.46 | 6075412.74 | 6491779.87 | 17°52'19.733" E | 54°48'29.335" N |
| 60 | 772202.97 | 427533.20 | 6075412.83 | 6491780.61 | 17°52'19.775" E | 54°48'29.338" N |
| 61 | 772203.08 | 427533.74 | 6075412.94 | 6491781.16 | 17°52'19.805" E | 54°48'29.342" N |
| 62 | 772203.27 | 427534.41 | 6075413.14 | 6491781.82 | 17°52'19.842" E | 54°48'29.348" N |
| 63 | 772203.73 | 427535.46 | 6075413.62 | 6491782.86 | 17°52'19.901" E | 54°48'29.364" N |
| 64 | 772204.08 | 427536.04 | 6075413.97 | 6491783.44 | 17°52'19.933" E | 54°48'29.375" N |
| 65 | 772204.46 | 427536.55 | 6075414.36 | 6491783.95 | 17°52'19.961" E | 54°48'29.388" N |
| 66 | 772203.40 | 427539.69 | 6075413.35 | 6491787.10 | 17°52'20.138" E | 54°48'29.355" N |
| 67 | 772183.39 | 427553.63 | 6075393.53 | 6491801.33 | 17°52'20.937" E | 54°48'28.715" N |
| 68 | 772144.87 | 427612.18 | 6075355.83 | 6491860.46 | 17°52'24.251" E | 54°48'27.499" N |
| 69 | 772061.79 | 427764.96 | 6075274.89 | 6492014.50 | 17°52'32.884" E | 54°48'24.891" N |
| 70 | 771929.81 | 428007.69 | 6075146.31 | 6492259.22 | 17°52'46.599" E | 54°48'20.746" N |
| 71 | 771909.10 | 428045.78 | 6075126.13 | 6492297.63 | 17°52'48.751" E | 54°48'20.095" N |
| 72 | 771890.89 | 428090.02 | 6075108.55 | 6492342.14 | 17°52'51.245" E | 54°48'19.529" N |
| 73 | 771873.85 | 428125.42 | 6075092.00 | 6492377.81 | 17°52'53.244" E | 54°48'18.996" N |

| Point No. | Geodetic coordinates | | | | Geographical coordinates | |
|---|---|---|---|---|---|---|
| | PUWG 1992 [m] | | PUWG 2000s6 [m] | | WGS 84 [DD°MM'SS.SSS"] | |
| | Easting | Northing | Easting | Northing | Longitude | Latitude |
| 74 | 771758.87 | 428404.69 | 6074980.95 | 6492658.85 | 17°53'08.989" E | 54°48'15.420" N |
| 75 | 771758.71 | 428405.16 | 6074980.80 | 6492659.31 | 17°53'09.015" E | 54°48'15.415" N |
| 76 | 771758.63 | 428405.79 | 6074980.73 | 6492659.95 | 17°53'09.050" E | 54°48'15.413" N |
| 77 | 771757.76 | 428413.17 | 6074979.97 | 6492667.35 | 17°53'09.465" E | 54°48'15.388" N |
| 78 | 771757.48 | 428414.90 | 6074979.71 | 6492669.07 | 17°53'09.561" E | 54°48'15.380" N |
| 79 | 771757.27 | 428415.79 | 6074979.51 | 6492669.97 | 17°53'09.611" E | 54°48'15.374" N |
| 80 | 771756.80 | 428417.33 | 6074979.06 | 6492671.51 | 17°53'09.698" E | 54°48'15.359" N |
| 81 | 771756.35 | 428418.56 | 6074978.64 | 6492672.75 | 17°53'09.767" E | 54°48'15.345" N |
| 82 | 771675.03 | 428643.51 | 6074900.49 | 6492898.97 | 17°53'22.439" E | 54°48'12.830" N |
| 83 | 771671.43 | 428652.37 | 6074897.01 | 6492907.89 | 17°53'22.939" E | 54°48'12.718" N |
| 84 | 771666.62 | 428661.70 | 6074892.33 | 6492917.28 | 17°53'23.466" E | 54°48'12.567" N |
| 85 | 771663.83 | 428666.16 | 6074889.61 | 6492921.79 | 17°53'23.718" E | 54°48'12.479" N |
| 86 | 771661.82 | 428669.33 | 6074887.64 | 6492924.99 | 17°53'23.897" E | 54°48'12.416" N |
| 87 | 771656.38 | 428676.60 | 6074882.30 | 6492932.34 | 17°53'24.309" E | 54°48'12.243" N |
| 88 | 771652.30 | 428681.60 | 6074878.29 | 6492937.40 | 17°53'24.593" E | 54°48'12.114" N |
| 89 | 771599.61 | 428746.18 | 6074826.50 | 6493002.76 | 17°53'28.257" E | 54°48'10.442" N |
| 90 | 771513.82 | 428851.34 | 6074742.17 | 6493109.20 | 17°53'34.223" E | 54°48'07.720" N |
| 91 | 771469.98 | 428905.08 | 6074699.07 | 6493163.59 | 17°53'37.272" E | 54°48'06.329" N |
| 92 | 771457.09 | 428920.88 | 6074686.40 | 6493179.58 | 17°53'38.168" E | 54°48'05.920" N |
| 93 | 771416.04 | 428973.23 | 6074646.08 | 6493232.54 | 17°53'41.136" E | 54°48'04.618" N |
| 94 | 771414.85 | 428974.69 | 6074644.92 | 6493234.01 | 17°53'41.219" E | 54°48'04.581" N |
| 95 | 771410.60 | 428979.60 | 6074640.73 | 6493238.99 | 17°53'41.498" E | 54°48'04.446" N |
| 96 | 771404.60 | 428985.37 | 6074634.81 | 6493244.84 | 17°53'41.826" E | 54°48'04.254" N |
| 97 | 771398.86 | 428989.88 | 6074629.14 | 6493249.44 | 17°53'42.084" E | 54°48'04.071" N |
| 98 | 771391.65 | 428994.52 | 6074621.98 | 6493254.18 | 17°53'42.350" E | 54°48'03.840" N |
| 99 | 771385.04 | 428997.91 | 6074615.42 | 6493257.67 | 17°53'42.545" E | 54°48'03.628" N |
| 100 | 771330.07 | 429022.93 | 6074560.79 | 6493283.48 | 17°53'43.995" E | 54°48'01.862" N |
| 101 | 771027.09 | 429160.87 | 6074259.63 | 6493425.81 | 17°53'51.988" E | 54°47'52.129" N |
| 102 | 770696.91 | 429311.19 | 6073931.45 | 6493580.91 | 17°54'00.696" E | 54°47'41.522" N |
| 103 | 770643.00 | 429335.74 | 6073877.86 | 6493606.24 | 17°54'02.118" E | 54°47'39.790" N |
| 104 | 770294.90 | 429494.22 | 6073531.87 | 6493769.76 | 17°54'11.298" E | 54°47'28.608" N |
| 105 | 770067.45 | 429597.81 | 6073305.79 | 6493876.64 | 17°54'17.297" E | 54°47'21.301" N |
| 106 | 769683.14 | 429772.74 | 6072923.80 | 6494057.14 | 17°54'27.427" E | 54°47'08.954" N |
| 107 | 769562.64 | 429827.60 | 6072804.02 | 6494113.75 | 17°54'30.603" E | 54°47'05.083" N |
| 108 | 769554.52 | 429830.78 | 6072795.94 | 6494117.04 | 17°54'30.788" E | 54°47'04.822" N |
| 109 | 769547.30 | 429832.81 | 6072788.75 | 6494119.18 | 17°54'30.908" E | 54°47'04.589" N |
| 110 | 769539.12 | 429834.28 | 6072780.58 | 6494120.76 | 17°54'30.998" E | 54°47'04.325" N |
| 111 | 769530.83 | 429834.91 | 6072772.30 | 6494121.51 | 17°54'31.040" E | 54°47'04.057" N |
| 112 | 769522.52 | 429834.69 | 6072763.98 | 6494121.41 | 17°54'31.035" E | 54°47'03.788" N |
| 113 | 769514.27 | 429833.62 | 6072755.72 | 6494120.46 | 17°54'30.983" E | 54°47'03.521" N |
| 114 | 769252.80 | 429784.96 | 6072493.43 | 6494075.51 | 17°54'28.486" E | 54°46'55.036" N |
| 115 | 769018.34 | 429741.31 | 6072258.24 | 6494035.18 | 17°54'26.247" E | 54°46'47.428" N |
| 116 | 768859.15 | 429711.67 | 6072098.55 | 6494007.80 | 17°54'24.727" E | 54°46'42.262" N |

| Point No. | Geodetic coordinates | | | | Geographical coordinates | |
|---|---|---|---|---|---|---|
| | PUWG 1992 [m] | | PUWG 2000s6 [m] | | WGS 84 [DD°MM'SS.SSS"] | |
| | Easting | Northing | Easting | Northing | Longitude | Latitude |
| 117 | 768779.29 | 429696.82 | 6072018.44 | 6493994.08 | 17°54'23.965" E | 54°46'39.671" N |
| 118 | 768774.01 | 429697.23 | 6072013.16 | 6493994.57 | 17°54'23.993" E | 54°46'39.500" N |
| 119 | 768774.01 | 429697.24 | 6072013.16 | 6493994.58 | 17°54'23.993" E | 54°46'39.500" N |
| 120 | 768745.82 | 429699.44 | 6071985.00 | 6493997.18 | 17°54'24.141" E | 54°46'38.589" N |
| 121 | 768701.64 | 429732.66 | 6071941.27 | 6494031.05 | 17°54'26.039" E | 54°46'37.176" N |
| 122 | 768534.14 | 429803.68 | 6071774.70 | 6494104.49 | 17°54'30.161" E | 54°46'31.793" N |
| 123 | 768331.09 | 429889.78 | 6071572.79 | 6494193.53 | 17°54'35.157" E | 54°46'25.266" N |
| 124 | 768234.47 | 429930.75 | 6071476.71 | 6494235.90 | 17°54'37.534" E | 54°46'22.160" N |
| 125 | 768222.29 | 429935.98 | 6071464.60 | 6494241.30 | 17°54'37.837" E | 54°46'21.769" N |
| 126 | 768222.27 | 429935.93 | 6071464.57 | 6494241.25 | 17°54'37.834" E | 54°46'21.768" N |
| 127 | 768172.01 | 429957.24 | 6071414.60 | 6494263.28 | 17°54'39.070" E | 54°46'20.153" N |
| 128 | 768032.67 | 429620.76 | 6071270.39 | 6493928.64 | 17°54'20.360" E | 54°46'15.475" N |
| 129 | 768080.50 | 429597.77 | 6071317.92 | 6493904.95 | 17°54'19.032" E | 54°46'17.011" N |
| 130 | 768078.25 | 429592.41 | 6071315.59 | 6493899.62 | 17°54'18.733" E | 54°46'16.935" N |
| 131 | 768031.25 | 429499.99 | 6071267.25 | 6493807.83 | 17°54'13.602" E | 54°46'15.368" N |
| 132 | 767988.56 | 429448.29 | 6071223.80 | 6493756.71 | 17°54'10.746" E | 54°46'13.960" N |
| 133 | 767909.86 | 429406.51 | 6071144.47 | 6493716.04 | 17°54'08.477" E | 54°46'11.393" N |
| 134 | 767930.45 | 429373.92 | 6071164.61 | 6493683.14 | 17°54'06.635" E | 54°46'12.042" N |
| 135 | 767963.65 | 429318.51 | 6071197.03 | 6493627.23 | 17°54'03.505" E | 54°46'13.089" N |
| 136 | 767969.53 | 429304.37 | 6071202.71 | 6493613.00 | 17°54'02.708" E | 54°46'13.272" N |
| 137 | 767978.28 | 429325.31 | 6071211.76 | 6493633.83 | 17°54'03.873" E | 54°46'13.565" N |
| 138 | 767998.06 | 429372.69 | 6071232.23 | 6493680.95 | 17°54'06.507" E | 54°46'14.229" N |
| 139 | 768018.05 | 429420.57 | 6071252.91 | 6493728.56 | 17°54'09.169" E | 54°46'14.900" N |
| 140 | 768023.95 | 429434.69 | 6071259.02 | 6493742.61 | 17°54'09.954" E | 54°46'15.099" N |
| 141 | 768077.99 | 429564.12 | 6071314.93 | 6493871.33 | 17°54'17.151" E | 54°46'16.912" N |
| 142 | 768079.61 | 429563.62 | 6071316.54 | 6493870.80 | 17°54'17.121" E | 54°46'16.965" N |
| 143 | 768374.91 | 429471.08 | 6071610.65 | 6493774.01 | 17°54'11.684" E | 54°46'26.473" N |
| 144 | 768375.03 | 429471.04 | 6071610.77 | 6493773.97 | 17°54'11.681" E | 54°46'26.476" N |
| 145 | 768622.10 | 429393.62 | 6071856.86 | 6493692.98 | 17°54'07.132" E | 54°46'34.432" N |
| 146 | 768643.71 | 429497.34 | 6071879.95 | 6493796.44 | 17°54'12.918" E | 54°46'35.183" N |
| 147 | 768795.87 | 429517.67 | 6072032.47 | 6493814.61 | 17°54'13.923" E | 54°46'40.117" N |
| 148 | 768786.48 | 429587.88 | 6072024.08 | 6493884.99 | 17°54'17.861" E | 54°46'39.848" N |
| 149 | 768781.56 | 429631.31 | 6072019.78 | 6493928.51 | 17°54'20.297" E | 54°46'39.711" N |
| 150 | 768786.63 | 429632.38 | 6072024.87 | 6493929.51 | 17°54'20.352" E | 54°46'39.876" N |
| 151 | 768789.94 | 429633.00 | 6072028.19 | 6493930.08 | 17°54'20.384" E | 54°46'39.983" N |
| 152 | 769525.73 | 429769.97 | 6072766.27 | 6494056.62 | 17°54'27.409" E | 54°47'03.860" N |
| 153 | 769528.36 | 429770.24 | 6072768.91 | 6494056.85 | 17°54'27.422" E | 54°47'03.945" N |
| 154 | 769530.76 | 429770.14 | 6072771.30 | 6494056.71 | 17°54'27.414" E | 54°47'04.022" N |
| 155 | 769533.67 | 429769.54 | 6072774.21 | 6494056.08 | 17°54'27.378" E | 54°47'04.116" N |
| 156 | 769535.83 | 429768.73 | 6072776.36 | 6494055.24 | 17°54'27.331" E | 54°47'04.186" N |
| 157 | 770236.63 | 429449.67 | 6073472.93 | 6493726.03 | 17°54'08.855" E | 54°47'26.700" N |
| 158 | 770838.51 | 429175.65 | 6074071.18 | 6493443.29 | 17°53'52.982" E | 54°47'46.035" N |
| 159 | 771358.25 | 428939.03 | 6074587.78 | 6493199.14 | 17°53'39.271" E | 54°48'02.731" N |

| Point No. | Geodetic coordinates | | | | Geographical coordinates | |
|---|---|---|---|---|---|---|
| | PUWG 1992 [m] | | PUWG 2000s6 [m] | | WGS 84 [DD°MM'SS.SSS"] | |
| | Easting | Northing | Easting | Northing | Longitude | Latitude |
| 160 | 771360.00 | 428938.11 | 6074589.51 | 6493198.20 | 17°53'39.218" E | 54°48'02.787" N |
| 161 | 771362.11 | 428936.60 | 6074591.60 | 6493196.66 | 17°53'39.132" E | 54°48'02.855" N |
| 162 | 771364.45 | 428934.21 | 6074593.92 | 6493194.24 | 17°53'38.996" E | 54°48'02.929" N |
| 163 | 771368.58 | 428928.95 | 6074597.97 | 6493188.91 | 17°53'38.698" E | 54°48'03.060" N |
| 164 | 771406.39 | 428880.73 | 6074635.11 | 6493140.14 | 17°53'35.964" E | 54°48'04.259" N |
| 165 | 771606.26 | 428635.72 | 6074831.58 | 6492892.16 | 17°53'22.064" E | 54°48'10.601" N |
| 166 | 771606.98 | 428634.82 | 6074832.28 | 6492891.25 | 17°53'22.013" E | 54°48'10.623" N |
| 167 | 771609.51 | 428631.22 | 6074834.76 | 6492887.61 | 17°53'21.809" E | 54°48'10.704" N |
| 168 | 771611.21 | 428628.33 | 6074836.42 | 6492884.70 | 17°53'21.646" E | 54°48'10.757" N |
| 169 | 771612.76 | 428625.17 | 6074837.93 | 6492881.51 | 17°53'21.468" E | 54°48'10.806" N |
| 170 | 771614.02 | 428622.07 | 6074839.14 | 6492878.39 | 17°53'21.293" E | 54°48'10.845" N |
| 171 | 771701.19 | 428381.02 | 6074922.91 | 6492635.98 | 17°53'07.714" E | 54°48'13.541" N |
| 172 | 771849.54 | 428020.56 | 6075066.19 | 6492273.24 | 17°52'47.391" E | 54°48'18.156" N |
| 173 | 771850.68 | 428017.99 | 6075067.29 | 6492270.66 | 17°52'47.247" E | 54°48'18.191" N |
| 174 | 771851.51 | 428016.32 | 6075068.10 | 6492268.97 | 17°52'47.152" E | 54°48'18.217" N |
| 175 | 772088.31 | 427580.82 | 6075298.79 | 6491829.89 | 17°52'22.546" E | 54°48'25.653" N |
| 176 | 772090.29 | 427577.49 | 6075300.72 | 6491826.53 | 17°52'22.357" E | 54°48'25.715" N |
| 177 | 772266.17 | 427310.14 | 6075472.87 | 6491556.56 | 17°52'07.223" E | 54°48'31.267" N |
| 178 | 772267.32 | 427308.37 | 6075474.00 | 6491554.76 | 17°52'07.122" E | 54°48'31.303" N |
| 179 | 772268.68 | 427306.09 | 6075475.32 | 6491552.47 | 17°52'06.994" E | 54°48'31.346" N |
| 180 | 772270.18 | 427303.14 | 6075476.79 | 6491549.49 | 17°52'06.827" E | 54°48'31.393" N |
| 181 | 772271.41 | 427300.27 | 6075477.97 | 6491546.60 | 17°52'06.665" E | 54°48'31.431" N |
| 182 | 772272.33 | 427297.69 | 6075478.85 | 6491544.00 | 17°52'06.519" E | 54°48'31.459" N |
| 183 | 772272.95 | 427295.60 | 6075479.44 | 6491541.91 | 17°52'06.402" E | 54°48'31.478" N |
| 184 | 772273.47 | 427293.49 | 6075479.94 | 6491539.79 | 17°52'06.283" E | 54°48'31.494" N |
| 185 | 772392.77 | 426758.71 | 6075591.66 | 6491003.06 | 17°51'36.218" E | 54°48'35.074" N |
| 186 | 772393.31 | 426756.27 | 6075592.17 | 6491000.61 | 17°51'36.080" E | 54°48'35.090" N |
| 187 | 772394.17 | 426753.00 | 6075592.97 | 6490997.33 | 17°51'35.897" E | 54°48'35.116" N |
| 188 | 772395.01 | 426750.24 | 6075593.78 | 6490994.55 | 17°51'35.741" E | 54°48'35.142" N |
| 189 | 772396.22 | 426746.83 | 6075594.94 | 6490991.12 | 17°51'35.549" E | 54°48'35.179" N |
| 190 | 772397.41 | 426743.92 | 6075596.08 | 6490988.20 | 17°51'35.385" E | 54°48'35.216" N |
| 191 | 772398.50 | 426741.51 | 6075597.14 | 6490985.77 | 17°51'35.249" E | 54°48'35.250" N |
| 192 | 772475.58 | 426596.46 | 6075672.19 | 6490839.56 | 17°51'27.053" E | 54°48'37.668" N |
| 193 | 772476.91 | 426593.98 | 6075673.48 | 6490837.06 | 17°51'26.913" E | 54°48'37.709" N |
| 194 | 772478.19 | 426591.76 | 6075674.73 | 6490834.82 | 17°51'26.787" E | 54°48'37.750" N |
| 195 | 772480.37 | 426588.34 | 6075676.87 | 6490831.36 | 17°51'26.594" E | 54°48'37.818" N |
| 196 | 772482.22 | 426585.72 | 6075678.68 | 6490828.72 | 17°51'26.445" E | 54°48'37.877" N |
| 197 | 772484.19 | 426583.18 | 6075680.61 | 6490826.15 | 17°51'26.301" E | 54°48'37.939" N |
| 198 | 772486.11 | 426580.89 | 6075682.51 | 6490823.83 | 17°51'26.171" E | 54°48'38.000" N |
| 199 | 772489.02 | 426577.76 | 6075685.37 | 6490820.66 | 17°51'25.993" E | 54°48'38.093" N |
| 200 | 772491.79 | 426575.09 | 6075688.10 | 6490817.94 | 17°51'25.841" E | 54°48'38.181" N |
| 201 | 772494.36 | 426572.83 | 6075690.64 | 6490815.65 | 17°51'25.712" E | 54°48'38.263" N |
| 202 | 772496.69 | 426570.96 | 6075692.95 | 6490813.74 | 17°51'25.605" E | 54°48'38.337" N |

| Point No. | Geodetic coordinates | | | | Geographical coordinates | |
|---|---|---|---|---|---|---|
| | PUWG 1992 [m] | | PUWG 2000s6 [m] | | WGS 84 [DD°MM'SS.SSS"] | |
| | Easting | Northing | Easting | Northing | Longitude | Latitude |
| 203 | 772499.10 | 426569.18 | 6075695.33 | 6490811.92 | 17°51'25.503" E | 54°48'38.414" N |
| 204 | 772599.32 | 426505.01 | 6075794.68 | 6490746.30 | 17°51'21.817" E | 54°48'41.623" N |
| 205 | 772613.26 | 426496.15 | 6075808.50 | 6490737.24 | 17°51'21.308" E | 54°48'42.069" N |
| 206 | 772615.41 | 426494.92 | 6075810.63 | 6490735.98 | 17°51'21.237" E | 54°48'42.138" N |
| 207 | 772617.43 | 426493.85 | 6075812.64 | 6490734.88 | 17°51'21.175" E | 54°48'42.203" N |
| 208 | 772619.66 | 426492.76 | 6075814.85 | 6490733.75 | 17°51'21.112" E | 54°48'42.275" N |
| 209 | 772621.57 | 426491.89 | 6075816.75 | 6490732.86 | 17°51'21.062" E | 54°48'42.336" N |
| 210 | 772623.50 | 426491.08 | 6075818.68 | 6490732.02 | 17°51'21.015" E | 54°48'42.398" N |
| 211 | 772625.64 | 426490.26 | 6075820.80 | 6490731.17 | 17°51'20.967" E | 54°48'42.467" N |
| 212 | 772628.71 | 426489.21 | 6075823.86 | 6490730.07 | 17°51'20.905" E | 54°48'42.566" N |
| 213 | 772632.55 | 426488.09 | 6075827.69 | 6490728.90 | 17°51'20.839" E | 54°48'42.689" N |
| 214 | 772637.01 | 426487.07 | 6075832.14 | 6490727.81 | 17°51'20.777" E | 54°48'42.833" N |
| 215 | 772639.64 | 426486.60 | 6075834.76 | 6490727.30 | 17°51'20.749" E | 54°48'42.918" N |
| 216 | 772799.13 | 426468.76 | 6075994.07 | 6490707.18 | 17°51'19.603" E | 54°48'48.069" N |
| 217 | 772801.42 | 426468.59 | 6075996.35 | 6490706.98 | 17°51'19.592" E | 54°48'48.143" N |
| 218 | 772803.45 | 426468.50 | 6075998.38 | 6490706.86 | 17°51'19.585" E | 54°48'48.209" N |
| 219 | 772805.67 | 426468.47 | 6076000.60 | 6490706.80 | 17°51'19.581" E | 54°48'48.280" N |
| 220 | 772885.82 | 426468.47 | 6076080.79 | 6490705.65 | 17°51'19.508" E | 54°48'50.873" N |
| 221 | 772898.18 | 426468.47 | 6076093.15 | 6490705.47 | 17°51'19.496" E | 54°48'51.273" N |
| 222 | 772899.92 | 426468.22 | 6076094.89 | 6490705.21 | 17°51'19.481" E | 54°48'51.330" N |
| 223 | 772901.02 | 426467.82 | 6076095.99 | 6490704.79 | 17°51'19.458" E | 54°48'51.365" N |
| 224 | 772901.96 | 426467.30 | 6076096.92 | 6490704.25 | 17°51'19.428" E | 54°48'51.395" N |
| 225 | 772902.82 | 426466.63 | 6076097.77 | 6490703.57 | 17°51'19.389" E | 54°48'51.423" N |
| 226 | 772903.50 | 426465.90 | 6076098.45 | 6490702.83 | 17°51'19.348" E | 54°48'51.444" N |
| 227 | 772898.08 | 426448.59 | 6076092.77 | 6490685.59 | 17°51'18.383" E | 54°48'51.260" N |
| 228 | 772881.85 | 426396.85 | 6076075.79 | 6490634.06 | 17°51'15.499" E | 54°48'50.707" N |
| 229 | 772893.27 | 426378.39 | 6076086.96 | 6490615.43 | 17°51'14.455" E | 54°48'51.067" N |
| 230 | 772974.41 | 426360.51 | 6076167.88 | 6490596.38 | 17°51'13.378" E | 54°48'53.683" N |
| 231 | 772989.90 | 426357.09 | 6076183.33 | 6490592.74 | 17°51'13.173" E | 54°48'54.182" N |
| 232 | 773041.73 | 426345.67 | 6076235.02 | 6490580.57 | 17°51'12.485" E | 54°48'55.853" N |
| 233 | 773097.86 | 426344.94 | 6076291.17 | 6490579.04 | 17°51'12.393" E | 54°48'57.669" N |
| 234 | 773350.32 | 426324.66 | 6076543.45 | 6490555.15 | 17°51'11.025" E | 54°49'05.827" N |
| 235 | 774461.36 | 426235.39 | 6077653.72 | 6490449.98 | 17°51'05.003" E | 54°49'41.727" N |
| 236 | 778038.74 | 425947.97 | 6081228.63 | 6490111.35 | 17°50'45.593" E | 54°51'37.321" N |
| 237 | 778354.45 | 425547.75 | 6081538.77 | 6489706.44 | 17°50'22.852" E | 54°51'47.322" N |
| 238 | 778433.95 | 425126.82 | 6081612.29 | 6489284.19 | 17°49'59.167" E | 54°51'49.668" N |
| 239 | 778463.39 | 424436.70 | 6081631.89 | 6488593.32 | 17°49'20.428" E | 54°51'50.247" N |
| 240 | 778413.34 | 423747.75 | 6081571.98 | 6487904.79 | 17°48'41.831" E | 54°51'48.251" N |
| 241 | 778108.66 | 422047.52 | 6081242.88 | 6486208.14 | 17°47'06.758" E | 54°51'37.450" N |
| 242 | 777942.18 | 416000.35 | 6080989.97 | 6480160.66 | 17°41'27.773" E | 54°51'28.539" N |
| 243 | 781700.36 | 407574.76 | 6084629.43 | 6471677.74 | 17°33'30.935" E | 54°53'24.773" N |
| 244 | 790690.16 | 406019.73 | 6093600.83 | 6469993.56 | 17°31'53.075" E | 54°58'14.554" N |
| 245 | 792437.03 | 405697.17 | 6095343.83 | 6469645.88 | 17°31'32.866" E | 54°59'10.846" N |

| Point No. | Geodetic coordinates | | | | Geographical coordinates | |
|---|---|---|---|---|---|---|
| | PUWG 1992 [m] | | PUWG 2000s6 [m] | | WGS 84 [DD°MM'SS.SSS"] | |
| | Easting | Northing | Easting | Northing | Longitude | Latitude |
| 246 | 793815.01 | 405818.43 | 6096724.12 | 6469747.48 | 17°31'38.055" E | 54°59'55.506" N |
| 247 | 796683.37 | 397112.84 | 6099469.12 | 6460997.22 | 17°23'24.464" E | 55°01'22.087" N |
| 248 | 799697.77 | 387960.46 | 6102353.74 | 6451798.02 | 17°14'44.918" E | 55°02'52.468" N |
| 249 | 799213.28 | 387160.62 | 6101857.61 | 6451004.80 | 17°14'00.549" E | 55°02'36.146" N |
| 250 | 798588.69 | 385584.95 | 6101210.23 | 6449437.44 | 17°12'32.696" E | 55°02'14.646" N |
| 251 | 798648.11 | 385066.08 | 6101262.24 | 6448917.52 | 17°12'03.388" E | 55°02'16.137" N |
| 252 | 798771.28 | 383992.20 | 6101370.09 | 6447841.46 | 17°11'02.727" E | 55°02'19.223" N |
| 253 | 801069.40 | 380124.42 | 6103613.73 | 6443939.29 | 17°07'21.421" E | 55°03'30.247" N |
| 254 | 802064.39 | 379561.92 | 6104601.05 | 6443362.33 | 17°06'48.213" E | 55°04'01.938" N |
| 255 | 797857.03 | 378458.91 | 6100376.29 | 6442319.12 | 17°05'52.503" E | 55°01'44.892" N |
| 256 | 798052.67 | 372934.11 | 6100492.94 | 6436789.45 | 17°00'41.133" E | 55°01'46.247" N |
| 257 | 799488.57 | 372726.51 | 6101926.41 | 6436561.22 | 17°00'27.140" E | 55°02'32.494" N |
| 258 | 802481.48 | 372069.11 | 6104911.01 | 6435860.72 | 16°59'45.281" E | 55°04'08.679" N |
| 259 | 805249.48 | 372328.61 | 6107683.76 | 6436080.68 | 16°59'55.436" E | 55°05'38.439" N |
| 260 | 805612.78 | 373453.11 | 6108063.30 | 6437200.40 | 17°00'58.267" E | 55°05'51.226" N |
| 261 | 805180.28 | 379525.42 | 6107717.61 | 6443281.19 | 17°06'41.408" E | 55°05'42.683" N |
| 262 | 804730.48 | 383314.13 | 6107321.90 | 6447077.80 | 17°10'15.752" E | 55°05'31.396" N |
| 263 | 804247.58 | 390217.93 | 6106937.69 | 6453991.24 | 17°16'45.783" E | 55°05'21.451" N |
| 264 | 800809.52 | 390319.63 | 6103499.71 | 6454142.21 | 17°16'56.285" E | 55°03'30.324" N |
| 265 | 800298.30 | 390445.75 | 6102990.09 | 6454275.69 | 17°17'04.099" E | 55°03'13.889" N |
| 266 | 799803.11 | 389242.88 | 6102477.49 | 6453079.43 | 17°15'57.017" E | 55°02'56.911" N |
| 267 | 797236.53 | 397035.80 | 6100021.41 | 6460912.23 | 17°23'19.408" E | 55°01'39.923" N |
| 268 | 799990.27 | 396652.45 | 6102770.79 | 6460489.31 | 17°22'54.231" E | 55°03'08.714" N |
| 269 | 800268.71 | 396683.22 | 6103049.77 | 6460516.11 | 17°22'55.602" E | 55°03'17.744" N |
| 270 | 800769.11 | 396690.31 | 6103550.49 | 6460516.04 | 17°22'55.348" E | 55°03'33.936" N |
| 271 | 800772.78 | 396819.02 | 6103556.00 | 6460644.75 | 17°23'02.597" E | 55°03'34.151" N |
| 272 | 801887.72 | 396787.33 | 6104670.95 | 6460597.09 | 17°22'59.358" E | 55°04'10.193" N |
| 273 | 801856.23 | 398995.04 | 6104671.05 | 6462806.16 | 17°25'03.847" E | 55°04'10.809" N |
| 274 | 800753.94 | 400248.75 | 6103586.26 | 6464076.16 | 17°26'15.909" E | 55°03'36.065" N |
| 275 | 799419.37 | 403191.86 | 6102293.26 | 6467039.60 | 17°29'03.411" E | 55°02'54.990" N |
| 276 | 800338.35 | 403416.48 | 6103215.84 | 6467251.17 | 17°29'14.946" E | 55°03'24.875" N |
| 277 | 802204.68 | 403676.26 | 6105086.67 | 6467484.33 | 17°29'27.315" E | 55°04'25.431" N |
| 278 | 803450.28 | 404108.76 | 6106338.99 | 6467899.18 | 17°29'50.188" E | 55°05'06.027" N |
| 279 | 805286.81 | 406971.48 | 6108217.29 | 6470736.81 | 17°32'29.470" E | 55°06'07,401" N |
| 280 | 805788.79 | 407027.70 | 6108720.29 | 6470785.86 | 17°32'32.050" E | 55°06'23,678" N |
| 281 | 805810.67 | 407788.07 | 6108753.07 | 6471546.24 | 17°33'14.930" E | 55°06'24,897" N |
| 282 | 805840.68 | 408801.17 | 6108797.61 | 6472559.34 | 17°34'12.061" E | 55°06'26,543" N |

*Table 2.2. List of registered plots located within the boundaries of the onshore part of the Baltica OWF CI (Choczewo commune, Kierzkowo precinct) [Source: internal materials]*

| No. | Project element name | Plot No. |
|---|---|---|
| 1. | Sea-land drilling area | 375, 370, 298, 297, 3/5, 3/7 |
| 2. | Sea-land drilling construction site area | 3/5, 297, 298 |
| 3. | Cable bed area | 3/5, 297, 298, 313, 312, 311, 323, 322, 321, 320, 319, 318, 330, 329, 328, 338, 337, 350, 18, 17/129 |

| No. | Project element name | Plot No. |
|---|---|---|
| 4. | Power substations | 17/129 |
| 5. | Busbar system construction area | 17/129, 21, 25/5 |
| 6. | Access road to the Choczewo Substation | 21, 25/4, 17/129 up to the entry to the district road on plot no. 24 |

### 2.1.3 Stages of the project implementation

The Applicant envisages that the construction of the Baltica OWF CI may be a continuous process or may be divided into stages. The main factor determining this process will be the implementation of the project within the period specified in the Act of 21 March 1991 *on the marine areas of the Republic of Poland and maritime administration* (consolidated text: Journal of Laws of 2020, item 2135, as amended), in order to maintain in force the decisions consenting to the construction of the Baltica OWF CI issued by the Minister of Economy and Inland Navigation and the Director of the Maritime Office in Gdynia as well as the conditions and limitations resulting from the necessity to protect the environment and counteract the negative impact of the projects, which result from legal regulations and measures indicated in Section 11 of this Report.

The intention of the Applicant is to comprehensively optimise the project in terms of its economics, e.g. by contracting the necessary services and supplies to start and complete the construction phase as quickly as possible. With high probability, the access to services and supplies will be limited by deadlines that will be binding for the suppliers and contractors due to possible simultaneous implementation of similar projects in the sector of wind-generated electric power transmission from offshore wind farms by other entities. The above-mentioned factors will be the basis for specifying the duration, dates and stages of the construction phase implementation in the building permit design. The Applicant plans also that the construction of the Baltica OWF CI in the onshore and offshore parts, which differ significantly in terms of construction technology and implementation method, will be carried out independently.

In the Applicant Proposed Variant (APV), the implementation of work at sea will last approx. 1200 days, whereas on land – approx. 600 days. Work in both parts will be carried out simultaneously. It is assumed that both at sea and on land the work will be carried out in sections. Thus, fragments of the space planned for the implementation of the Baltica OWF CI, on which construction works will be conducted at a given time, will be under the influence of the project.

## 2.2 Description of technological solutions

This subsection describes the commonly used technological and technical solutions of electric energy transmission from offshore wind farms to onshore power grids, which are planned to be used in the implementation of this project.

### 2.2.1 Description of the production process

Transmission of electric power will be carried out using EHV AC cable lines with an operating voltage of 220 and/or 275 kV, routed along a common cable bed area. Export cables will connect the OWF with two onshore customer substations which in turn will be connected with the PSE substation (Choczewo Substation) by four busbar systems with the conductor bundle voltage of 400 kV. The demand for raw materials and energy, as in the case of other power installations, will be related to the construction process of individual Baltica OWF CI components. The operation of the transmission infrastructure shall not require providing energy from the combustion of fuels and the use of other raw materials for its proper functioning. It is expected that at normal operation, the consumption of fuel and other raw materials will be generated only by inspections and possible repairs.

After the production process is completed – at the end of operation phase – the Applicant has adopted two possible solutions for the decommissioning of the Baltica OWF CI: deactivation of the transmission infrastructure or dismantling by removal of the transmission infrastructure elements. The Applicant also acknowledges the possibility of preserving the infrastructure once it is properly upgraded. The procedure will be selected in accordance with the provisions in place after the project operation is completed.

### 2.2.2 Description of the technological solutions for individual elements of the project

#### 2.2.2.1 Construction phase

OFFSHORE AREA

In the offshore area, the elements of the Baltica OWF CI will include:

- subsea extra high voltage alternating current power cable lines with fibre-optic cables inserted into special connection clamps in switchgears located on the OSS platforms, with internal connections between the OSSs;
- submarine cable line connections with accessories.

##### 2.2.2.1.1 Cable lines in the offshore area and the coastal zone

###### 2.2.2.1.1.1 Subsea power cables

In the offshore area and in the coastal zone, a maximum of nine offshore cable lines, evacuating electricity from the Baltica OWF to the shore, is planned. Each line will consist of a single three-core EHV AC cable with three aluminium or copper cores within a single cable, with an operating rated voltage of 220 and/or 275 kV with a maximum of three fibre-optic cables. Cables of the parameters indicated above will be also used within the Baltica OWF to connect between OSS.

The design of a typical subsea cable is presented in Figure 2.1. Cable phase wires are insulated and screened, and their armour consists of steel wires and artificial materials covered with a permanent plastic shielding. A bundle of optic fibres is located between phase wires, which will enable communication with the infrastructure of offshore wind farms. The maximum operating temperature of the cable is 90°C. The cables, which will be used in the project in question, will meet the standards and be certified for use in the marine environment.

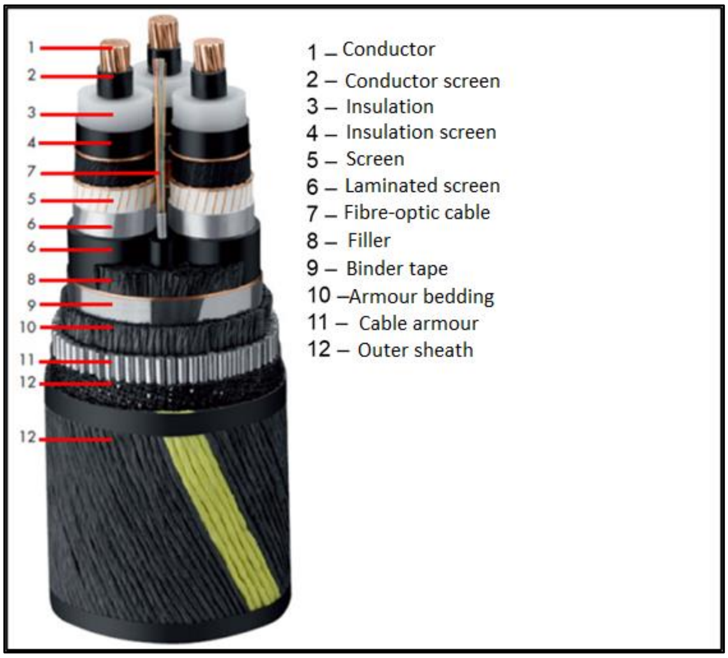



*Figure 2.1. Design of a typical three-phase power cable intended for laying in the offshore area [Source: internal materials]*

###### 2.2.2.1.1.2 Technologies of cable line laying in the offshore area

The commonly used technologies of power cable line construction in the offshore area are:

- cable laying on the seabed followed by its burial in the seabed;
- simultaneous cable laying and burial in the seabed;
- construction of a trench in the seabed, cable laying, and its subsequent burial.

The differences between individual technological variants of the cable line construction include:

- specification of vessels used for cable laying and burial;
- differences in the progress of cable laying;
- hydro-meteorological conditions;
- necessity to use specialist vessels providing protections for the cable lines laid;
- seabed specification;
- uses of maritime space;
- environmental requirements.

Depending on the subsea cable line construction technology adopted, it is possible to use up to 10 vessels of different types and uses simultaneously for every cable line. Due to the limited possibilities of carrying construction works in the sea area (taking into account environmental aspects and weather constraints), it is foreseen to optimise the works to be short-term and local. Therefore, the installation of cable lines will require continuous work until the entire planned process section has been laid. The number of vessels involved in construction works will change depending on the intensity of works carried out along a particular section of a cable bed area. The foreseen number of vessels operating simultaneously at sea during cable line laying will be between 2 and 7. It is expected that vessels of various sizes, carrying various tasks, will be involved in the process. The largest of them, specialist vessels used for transport and laying of power cables on the seabed, i.e. Cable Laying Vessels (CLV), can measure up to 200 m in length [Photo 2.1].

*Photo 2.1. Specialist vessel for laying subsea cables – Cable Laying Vessel [Source: www.nkt.com]*

Along some sections of the cable route, it may be necessary to clear the seabed of stones and boulders, level the seabed and dredge before laying the cable.

The cable line route will be prepared well in advance in accordance with the requirements developed at the designing stage. Clearance works may be carried out using a specialist plough and/or grab, mechanical dredger or jetting equipment.

The plough used for clearing the seabed is trailed behind the vessel along the cable line route and pushes the boulders on the seabed outside the cable laying area [Photo 2.2]. Some ploughs clearing the seabed may at the same time create a trench in the seabed intended for laying the cable line later on. It is possible to reconfigure the clearing ploughs into typical cable ploughs that lay cables in the seabed.

*Photo 2.2. Exemplary plough used for clearing the seabed from boulders [Source: https://globaloffshore.co.uk/vessels-trenching-assets/pre-lay-plough/]*

Another method of removing and transferring boulders from the cable line construction area is using a grab [Photo 2.3] and transferring boulders one by one or several at the same time in the vicinity of the project outside the area of the seabed on which the cables will be laid.

*Photo 2.3. Exemplary grab for transferring boulders over the seabed area [Source: www.utrov.com]*

In some seabed areas, a preliminary clearance of the seabed surface can be carried out before the cable lines are laid to clean it of physical obstacles other than boulders and stones, e.g. abandoned fishing nets, fishing gear, etc. Such clearing is carried out using various types of hooking tools trailed on the seabed behind the vessel sailing along the cable line route [Figure 2.2]. Hooking tools effectively remove obstacles up to a maximum depth of 0.5 m of the seabed sediment.

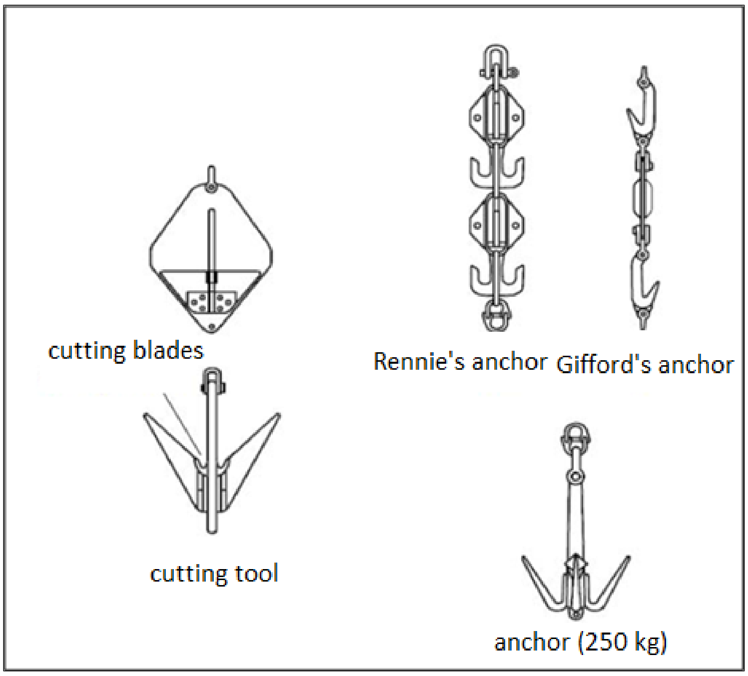



*Figure 2.2. Exemplary hooking tools used for preliminary clearing of the seabed [Source: https://www.epd.gov.hk]*

As an alternative for ploughing before cable laying, the option of a preliminary trench formation for the cable is possible. There are various types of tools with a towed head. This technology uses a flow system which, contrary to blowing tools, sucks the sediment from the seabed and subsequently removes it through the end of a discharge pipe. When the drainage pipe is dragged on the seabed, a trench is created by disrupting the deposit and sucking it through the head.

The towed head is a steel structure, which is connected with a dredger using a suction pipe. Using hydraulic winches the head and suction pipe supported by a crane or an A-frame is deployed on the seabed. The head is equipped with rakes and water nozzles which help shaping the trench. The recovered sediment is stored on the vessel, and then removed at site or in a location approved for the removal of excavated material. Alternatively, the excavated material may be stored near the trench and used for backfilling after the cable is laid. After the trench is excavated, measurements are taken using a multibeam echosounder to confirm the depth assumed. In the case of long transitional periods between excavation and cable laying, it may be necessary to carry out a preliminary cleaning of the trench to remove the backfill.

Works related to seabed levelling and dredging can be carried out by a Trailing Suction Hopper Dredger (TSHD) or a Backhoe Dredger (BHD). TSHD is a self-loading vessel that drags one or two suction heads along the seabed to suck up sand. BHD is a barge equipped with an excavator arm which can excavate material directly from the seabed.

When laying cable lines in the seabed or on its surface, various types of machinery and equipment which bury the cable in the seabed are used to construct a cable trench of an appropriate depth. The first group is jetting equipment with heavy-duty seawater pumping systems. This equipment uses seawater which is pumped under pressure into the sediment and washes away a trench the route of which coincides with the trajectory of the equipment. They are also used to bury a cable previously laid on the seabed into soft sediments such as silt or loose and medium-grained sand. Such equipment can be installed on sleighs or self-propelled crawlers [Photo 2.4]. The arms of the jetting equipment have numerous nozzles which generate water jets and loosen the seabed sediment in which the cable is buried, as shown in Figure 2.3.

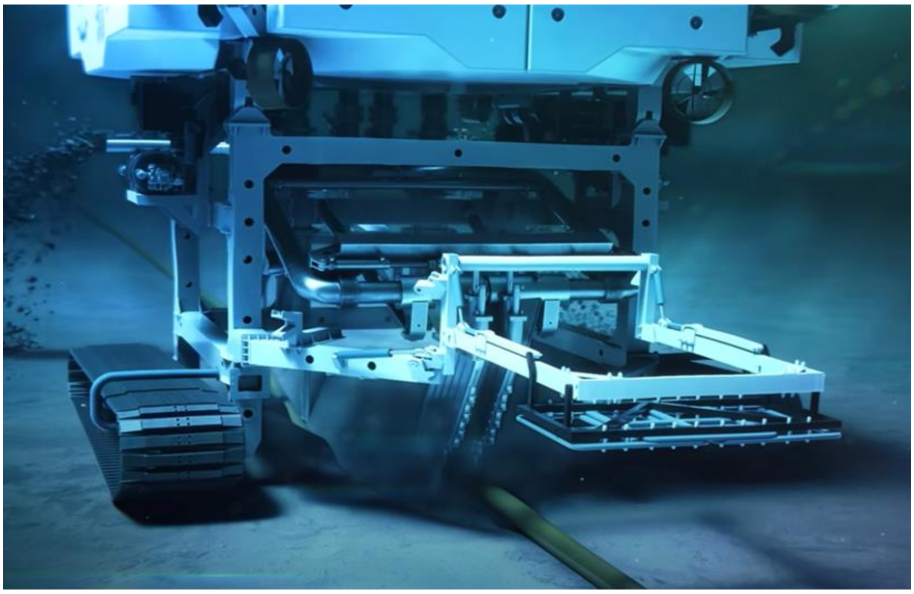


*Photo 2.4. Exemplary jetting equipment [Source: https://www.youtube.com/watch?v=wblle4zRA2M]*

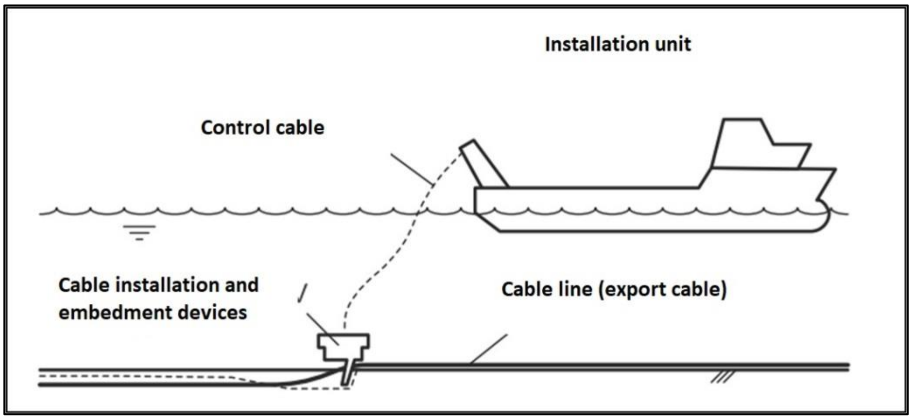



*Figure 2.3. Cable line laying technology – burial of a cable previously laid on the seabed [Source: https://rules.dnv.com]*

Another group of equipment for laying subsea cables are devices which can be used for simultaneous cable laying and burial, burial of a cable previously laid on the seabed as well as construction of a trench before cable laying in the harder sediment, such as till or compact fine-grained sand [Photo 2.5]. Work in a streaming configuration is also possible. The device is equipped with a movable chain with blades that cut a narrow trench in the seabed. The blades are replaceable and can be adjusted to specific soil conditions. When a trench is created along a seabed section with hard bottom – rocky or in compacted boulder areas – an attachments with a cutting wheel is used. A diagram of a trench excavated with a device for mechanical cable burial is shown in Figure 2.4.

*Photo 2.5. Exemplary tools for the mechanical cable burial [Source: www.boskalis.com]*

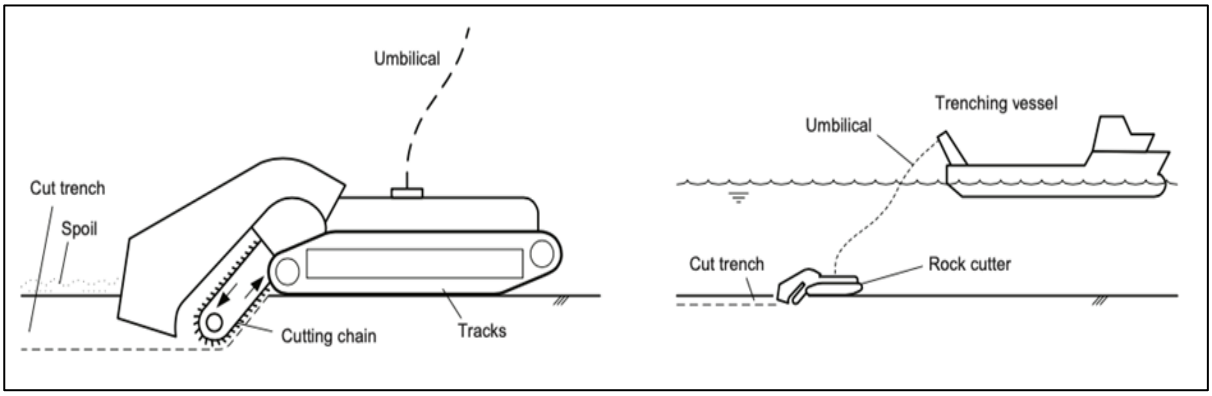



*Figure 2.4. Work diagram of a device for mechanical cable burial [Source: https://rules.dnv.com]*

Another group of equipment used during the construction of cable lines are cable ploughs [Photo 2.6]. Such devices enable simultaneous cable laying and burial in the seabed sediment. Thanks to this, they are commonly used to optimise costs and work time. The cable plough dragged behind the moving vessel creates a hollow in the seabed, at the same time laying a cable inside it using a depressor [Figure 2.5]. Some devices have additional systems for pumping water under pressure into the seabed, which loosen its structure and facilitate the penetration of the ploughshare into the substratum.

*Photo 2.6. Exemplary submarine cable plough [Source: https://www.youtube.com/watch?v=wblle4zRA2M]*

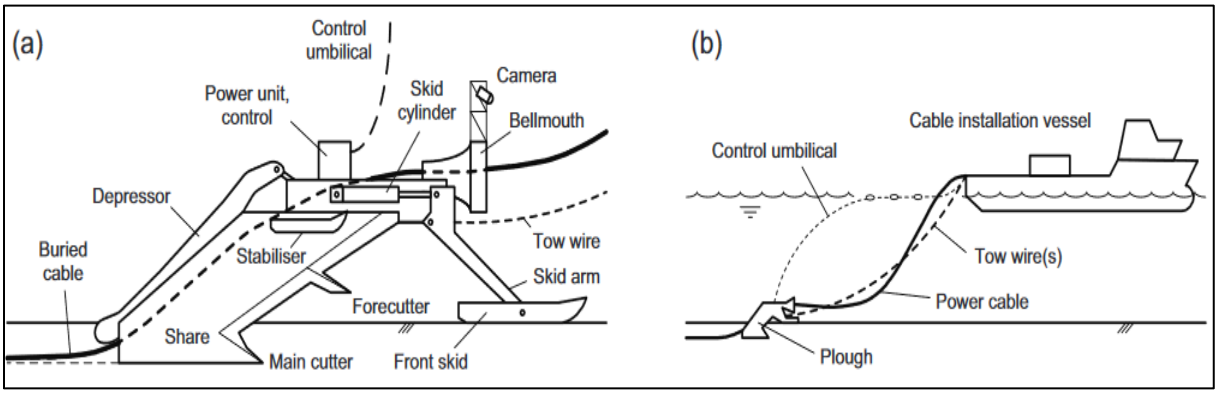



*Figure 2.5. Technology of cable line laying using a cable plough [Source: https://rules.dnv.com/]*

After the device for cable burial is dragged across the seabed, a trench is created in which the subsea cable will be laid. Trench backfilling will depend on the trench stability, its width and dynamics of the surrounding seabed. The preferred method is a natural trench filling, which means it will be filled with the passing time with no additional technical operations. Alternatively, especially when the trench width is acknowledged as too large, backfilling equipment may be used to fill the trench with the sediment from the surrounding seabed. If the amount of sediment is insufficient to fill the trench, counter-measures may be applied, such as, for example, rock material tipping in order to protect the cable.

In the offshore area, it is expected that cable lines will be laid below the seabed. Such a solution minimises the possibility of the cable damage during operation and reduces their environmental impact resulting from the electromagnetic field and heat emissions. Power cables from the OSS to the land-sea directional drilling are planned to be laid at a depth from approx. 0.5 to 3.5 MBSB (depth range preferred by the Applicant), however, within the Baltica-2 OWF and the Baltica-3 OWF areas and between the OSSs, it is planned to lay them at a depth of up to 3 MBSB. In the areas which in the future can be designated for the extraction of aggregates, cables can be buried at greater depths, i.e. up to 6 MBSB. The estimated volume of excavations in the offshore area will be maximally 11 814 008 $m^3$, including the excavations for export cables 11 114 028 $m^3$, and for internal connections between OSSs 699 980 $m^3$ at maximum.

In exceptional situations, if cable burial is impossible, they will be laid on the seabed surface. This is compliant with the administrative decisions issued by the Director of the Maritime Office in Gdynia, the Minister of Maritime Economy and Inland Navigation as well as the provisions of the MSPPSA. These will be exceptional and sporadic cases. Along such sections, the cables will be protected with permanent artificial structures, such as:

- rock embankments – the cable laid on the seabed is covered with crushed stone. This type of protection is used mainly to protect against scouring, but is also a commonly used method for protecting cables at cable intersections;
- rock bags – rock bags are usually used in the same way as rock embankments, but in that case, smaller fraction stones wrapped with a strong fibre net are used. Similarly to the embankment, it protects the cable against scouring. The vessels deploying rock bags can be much smaller than vessels with discharge pipes used for rock material tipping.
- concrete block mattresses – are most commonly used at intersections with other line infrastructures running across the cable line construction route. The mattress consists of concrete blocks with regular shapes connected with polypropylene ropes. Various sizes and profiles offer wide possibilities of adjustment to the conditions and the environment in which they are to be used. They can be deployed using a crane or specially adjusted remotely operated vehicles (ROVs).

In certain circumstances, rock protection may be unsuitable due to such factors as velocity of near-seabed currents, seabed relief, and type of seabed sediments. Use of cast iron half shells (articulated pipes) or hybrid polyurethane pipes can be an alternative system solution.

###### 2.2.2.1.1.3 Spatial scope of the cable line construction in the offshore area

Baltica OWF offshore substation (OSSs) locations will mark the beginning of the offshore cable line route and its end will be marked by the onshore connection of offshore cable lines with onshore cable lines located on land. The maximum length of a single cable line will not exceed 89 km. Cable lines (a maximum of 9 between the OSS and the land) within the cable bed area will be laid at a distance of 150 m from one another, however, in the Baltica-2 OWF and Baltica-3 OWF areas, the distances between individual cable lines will vary depending on the location of the OSS. It is predicted that the width of strips covered by works directly interfering with the seabed related to each cable line, will be approx. 16 m, and along route sections, where seabed clearance of stones and boulders will be conducted – 25 m. Moreover, within the area of the Baltica-2 OWF and Baltica-3 OWF, internal connections will be made between OSSs, the joint maximum length of which will be approx. 62 km. Therefore, the expected seabed surface covered by the works interfering with the seabed will be 17.97 km$^2$ at maximum.

##### 2.2.2.1.1.4 Construction rate for cable lines in the offshore area

Table 2.3 presents data on the construction rate for a single cable line, taking into consideration various construction technologies and types of the seabed sediment.

*Table 2.3. Construction rate for cable lines depending on the construction technology and type of seabed sediment [Source: internal materials]*

| **Type of construction technology** | **Cable line construction rate [m·h$^{-1}$]** | |
|---|---|---|
| | **Loose sediments** | **Compact sediments and boulder areas** |
| Burial of the cable laid on the seabed – pressure dredger with nozzles | 200–350 | <100–400 |
| Burial of the cable laid on the seabed – mechanical dredger/ploughing | 200–350 | 70–150 |
| Simultaneous laying and burial | 200–400 | 200–400 |

The works will be carried out linearly in compliance with the Work Schedule. Temporary occupation of the sea area fragment in which work is currently carried out, will involve the seabed clearance, excavation of trenches in the seabed, laying of cable lines and their burial, and also protection, if necessary. The time required for the implementation of the offshore part of the cable bed area is estimated at approx. 1200 days.

The traffic of vessels in the construction area will take place in accordance with the designed route of laying cables from the offshore substations to the drilling location. The vessels will return to the port, in which a warehouse of installation materials will be located.

The work carried out by the vessels and their presence in this part of the Baltic Sea area will be reported to the relevant marine navigation administration authorities, which will minimise the potential navigational risk, and the remaining users of the adjacent sea areas will be informed of the work conducted.

Vessels are equipped with radio location systems and will be visible for the remaining users of the sea, irrespective of the location, in which the installation work will be carried out.

#### 2.2.2.1.2 Cable line landfalls

##### 2.2.2.1.2.1 Characteristics of power cables in the coastal zone

Cables laid in the coastal zone have the same characteristics as the offshore cables described in Section 2.2.2.1.1.1.

##### 2.2.2.1.2.2 Technologies of cable line laying in the coastal area

From the sea side, the horizontal drilling exit/entry will be located at a zone from a depth of approx. 13 to approx. 15 MBSL. Landwards, the cable lines will be laid below the seabed using a trenchless method and in this way brought ashore. The selection of a trenchless technology in the near-shore area will take place after the building permit is obtained with all the required administrative procedures observed. Horizontal drilling will be carried out within the depth range from 2 to 20 MBGL or MBSB. Horizontal drilling exit in the offshore area will be located beyond the sandbank zone and at a distance not smaller than 700 m from the line marked by the seaward dune baseline. The maximum length of a single borehole will be 1700 m.

The borehole parameters will be dependent on many factors, including among others, geological structure of the seabed, morphodynamics in the near-seabed zone as well as geological structure on land, which ultimately determine the technological solutions and the drilling methods. Such a subsea cable landfall method will allow bypassing the sandbank zone which is subject to intensive hydrodynamic processes and strong erosion of the seabed, and is also compliant with the Decisions No. 1/DS/20 and 2/DS/20 of 6 November 2020 of the Director of the Maritime Office in Gdynia.

The construction of 9 drilling sections is planned. The estimated maximum volume of the material excavated as a result of drilling will be approx. 12 100 $m^3$. This amount results from the necessity to prepare, for example, drilling chambers and includes the material excavated during drilling.

The most commonly used trenchless technology is Horizontal Direct Drilling (HDD method). The HDD method involves drilling a parabolic borehole underground with a precisely controlled trajectory. Figure 2.6 shows a schematic representation of such a process (in the figure, the tunnel is drilled from the land side, but it is also possible to drill it from the sea side).

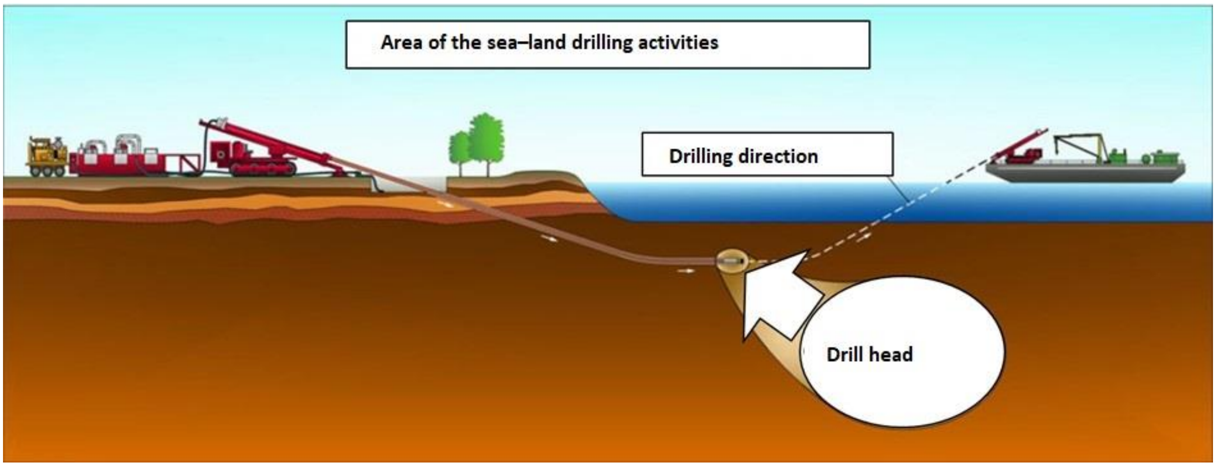



*Figure 2.6. Land-sea HDD drilling method [Source: https://www.hadleeandbrunton.co.nz/what-is-horizontal-directional-drilling/]*

The HDD method drilling process can be divided into the following phases:

- drilling of a pilot borehole;
- reaming of the pilot borehole;
- pipeline extraction;
- cable extraction including the possible sheath.

During drilling, special drilling fluid is used (a mixture of water and mineral material), which is pumped through the drilling head to soften the soil and transport the excavated material to the inlet opening, where the drilling was initiated. The mineral materials used are products safe for humans and the environment, such as bentonite. The drilling fluid will not contain chemical substances harmful to the environment.

The excavated material from the face of the borehole is removed using a drilling fluid pumping system, which enables the transport of the excavated material back to the surface where it is separated. Inside the separator, the drilling fluid is separated from the soil, and the separated drilling fluid is redirected to the greasing system. It is assumed that half the volume of the drilling fluid will be recovered and will be treated in accordance with the Regulation of the Minister of Climate of 2 January 2020 *on waste catalogue* (Journal of Laws of 2020, item 10) as waste with code 16 10 01, i.e. “aqueous liquid wastes other than those mentioned in 16 10 01”.

This type of waste (drill cuttings) will be pumped to the storage tanks or loaded on lorries (tipper lorries) or water carts (depending on their consistency), transported from the construction site and handed over to an entity responsible for appropriate waste management. The remaining drilling fluid will be lost as a result of borehole stabilisation and penetration into the ground around the location of drilling.

After drilling is completed, the remaining drilling fluid will be managed in accordance with the Regulation of the Minister of Climate of 2 January 2020 *on waste catalogue* (Journal of Laws of 2020, item 10) as waste with code 16 10 01, i.e. “aqueous liquid wastes other than those mentioned in 16 10 01”.

After drilling, the cable installation is routed through a cable installation chamber that is positioned as close to the end of the drill pipe as necessary. The end of the culvert pipe will be pulled on board the installation vessel to allow a pilot line, to which the power cable will be attached, to be pulled towards it. The pulling of the culvert pipe towards the installation vessel will begin when additional measuring instruments that monitor mechanical quantities and stress forces are mounted on the particular section. When the cable is pulled through the culvert pipe onto the vessel, additional actions related to sealing and connecting cable sections will be carried out in order to continue their laying on the seabed.

Below, other trenchless methods which can be applied for the implementation of the planned project are described.

**Microtunnelling** is a construction method that uses the hydraulic moling technology [Figure 2.7]. In this method, pipes or sleeves are installed by being pushed through the ground behind a remotely-operated small machine that drills a tunnel or a micro-tunnel using a hydraulic or other pressure extorted by a drive shaft so that the pipes are laid in a continuous manner in the ground. Using moling and microtunnelling, pipes and sleeves with a very limited linear and horizontal tolerance can be installed. Thanks to this, they can be used not only as gravity pipes but also to reduce the risk related to the lack of alignment control, when limited tolerances are necessary and expected.

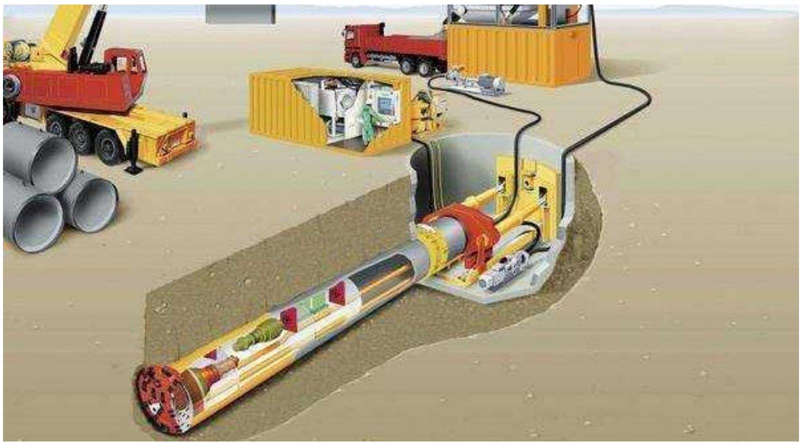


*Figure 2.7. Diagram of microtunnelling technology [Source: https://inzynieria.com/inzbezwykopowa/artykuly/18061,abc-mikrotunelingu]*

**Direct Pipe** (DP) technology combines elements of microtunnelling technology and horizontal directional drilling. The soil excavation is done using a standard micro-tunnel head [Figure 2.8]. The pushing station located on the ground surface exerts pressure on the micro-tunnel head via a steel pipeline. The transport of the excavated material is carried out via a slurry system, the pipes of which are located inside the steel pipeline. Similar to the HDD method, drilling fluid is a mixture of water and mineral material neutral to the environment (e.g. bentonite). It does not contain substances hazardous to humans and the environment. The slurry together with the excavated material are treated in the solid phase separation system and used repeatedly. The steel pipeline installed is prepared beforehand – welded in one piece at the machinery side and tested accordingly. The Direct Pipe method enables also “sectional” drilling in case there is no space for a standard pipe yard known from the HDD method.

*Figure 2.8. View of Direct Pipe technology [Source: http://www.indstt.com/pdf/HK_DirectPipe.pdf]*

The final selection of the trenchless method and the sea-land drilling parameters will be made at a later stage of the project implementation on the basis of the results of specialist surveys of the seabed, nearshore zone and land in the cable landfall location as well as on the basis of the feasible technological solutions.

###### 2.2.2.1.2.3 Spatial scope of the cable line construction in the coastal zone

It is estimated that the surface area of the construction site back-up facilities for the coastal zone trenchless crossing will be approx. 1.85 ha on shore. This is the total surface area within which machine parks will move as a result of the subsequent boreholes being constructed. A construction site, machine park and a location for collecting materials necessary to conduct drilling will be organised in the area. The subsea cables will be connected to the onshore cables in cable connection chambers.

ONSHORE AREA

In the onshore area, the elements of the Baltica OWF CI will include:

- onshore connections of subsea and onshore cable lines
- onshore power cables with fibre-optic cable lines;
- onshore cable lines connections with accessories;
- onshore substations (OnSS) with infrastructure required for proper operation;
- busbar systems for connecting onshore substations (OnSS) with the NPS of the transmission system operator PSE S.A.;
- service roads between sea-land drilling chambers and OnSS;
- access road to substations.

#### 2.2.2.1.3 Cable lines in the onshore area

##### 2.2.2.1.3.1 Onshore power cables

The onshore part of the connection will consist of cables designed and intended for laying in the ground. Single-phase cables with aluminium or copper cores will be used. Each cable line (with the assumed maximum of 9) will be equipped with maximally three fibre-optic cables including necessary accessories. The rated voltage range will be 220 and/or 275 kV.

The cable construction in the onshore area of the connection is presented in Figure 2.9. The cables, which will be used in the Baltica OWF CI, will meet the standards and be certified for use in the marine and terrestrial environment.

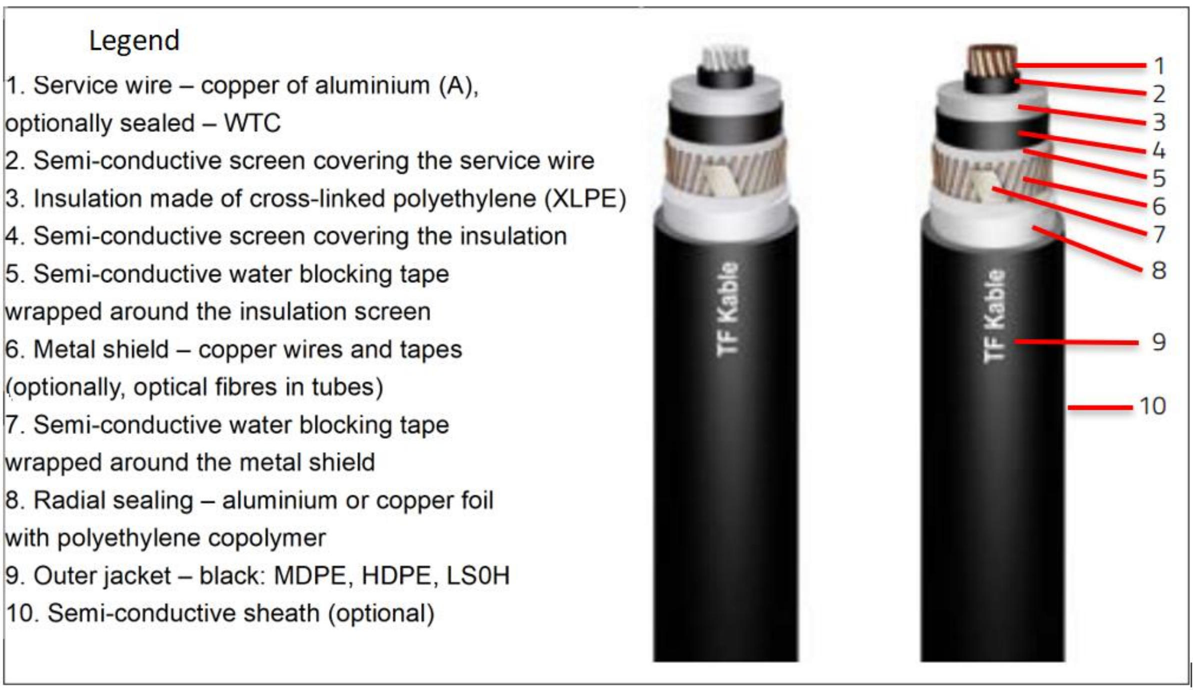



*Figure 2.9. Construction of a cable intended for laying in an onshore cable bed area [Source: TF Telefonika catalogue]*

#### 2.2.2.1.3.2 Technologies of cable line laying in the onshore area

Along most of the route in the onshore area, the cables will be laid in an open trench in a flat formation. Trenches will be constructed using mechanical equipment (diggers); in special cases, for example, in the location of the existing infrastructure, also manually. Due to the distances between individual cable lines, trenches can be constructed separately for every cable line or jointly depending on the terrain topography. The assumed depth of the trenches will be approx. 2 m, apart from the intersections with other structures or terrain obstacles, where the trenching depth may be greater locally. The estimated maximum volume of excavations in the onshore area will be approx. 1 178 500 $m^3$.

A typical, repetitive, closed cycle of works will be carried out along each construction section implemented with a trench-based method:

- phase 1 – preparatory works, access to the site, geodetic survey, felling. When the technical design is ready and all necessary building and environmental permits are obtained, the preparatory works of the site begin to make it available for construction works;
- phase 2 – ground levelling. After the strip of land intended for work is cleared, roots of felled trees are removed and selective collection of humus is completed, the land is levelled so that the cable lines are routed horizontally along short sections. In the case of differences in height over a longer distance, the cables will be laid at a constant depth below the ground level. To preserve the existing topography of the area, the Applicant intends to carry out the levelling only and exclusively in the areas where it is necessary due to the technology of cable laying. In that phase, the trench is dug, the soil and dirt are tipped and the trench is drained, if necessary. The necessity to conduct drainage works may concern only the section in the open trench. The section where the work front is currently located will be drained each time. The selection of an appropriate trench draining method will depend on the degree of irrigation (depth of the groundwater table) and the type of soil. The water pumped from the trench will be discharged outside the site. A significant part of the project is located in an area where the first aquifer lies deep (20–50 m), so the impact of draining on groundwater will have a limited spatial scope. In the construction phase, diggers or single-bucket machines or rotating excavators will be used, removing soil and tipping it near the trench or on a dump depending on the Contractor's preferences;
- phase 3 – installation works. That phase involves cable distribution and laying along the trench or inside the trench in order to connect (join) them later on. If required by the technology of the underground cable line laying, casing pipes will also be laid. Preparations for crossing terrain obstacles (e.g. public roads) is also carried out in that phase. The connections are inspected before the cable joints are insulated. Cable joining is a technological operation which involves joining sections of cable lines laid in the trench;
- phase 4 – tests, preliminary acceptance of the conductor laid;
- phase 5 – backfilling of trenches. At this stage, a partial backfilling of the trench is carried out as the final operation of the cable line section construction phase. The end sections of cable lines remain uncovered, so that the construction and cable joining for each subsequent cable section could be continued. The drainage system disassembly also takes place, if draining was necessary;
- phase 6 – restoration works. After the trench is backfilled, it will be covered with the surface soil layer removed earlier from the same location. Roads, access roads and all other objects or elements of land development damaged or affected by the construction will be restored and reconstructed as quickly as possible in accordance with the legal requirements in agreement with the owners and managers and possibly with the competent administrative authorities.

Technological roads within the installation belt and temporary access roads to the installation belt in locations where they are hardened with, for example, concrete slabs, will be dismantled. Control points that enable locating the cable lines during technical inspections will be located on the ground surface.

The trenchless methods that can be used along the onshore line routes are analogous to those described in Section 2.2.2.1.2. Moreover, in the case of short crossings, the following methods can be used:

- pneumatic moling of steel pipes open from the face side;
- non-directional drilling with hydraulic moling of pipes.

Trenchless sections on land, regardless of the technology applied, will have inspection chambers or additional abutments/intermediate chambers located along the route of cable lines. Cables will be laid in a trefoil or flat formation. To prevent damage, the cables will be laid in thick-walled protective pipes made of steel or high-density polyethylene (HDPE).

Currently, it is impossible to indicate all the locations and areas on land where the application of trenchless cable-laying method will be necessary. The length of a single borehole will not exceed 700 m. The trenchless methods of cable-laying in the onshore area can be applied, for example, in locations where the selection of a trenchless method ensures the best conditions of mechanical protection for cable lines, in locations of archaeological sites, if surveys confirm the presence of valuable artefacts, in locations of intersections with hardened roads, if this follows from the agreements with the road managers as well as in locations of weak soils (alluvial muds in the depression connected to the Bezimienna Stream valley).

In terms of infrastructure investments, all watercourses will be treated as vulnerable areas. In the case of a collision of the planned infrastructure with a watercourse in order to maintain continuity of water flow it will be necessary to apply a trenchless method in the form of directional drilling or a traditional method with the so-called by-pass, which involves redirecting the water flow to a temporary watercourse bed constructed. It will be waterproofed with a geomembrane and the slopes will be protected against subsidence. The water from the watercourse will be diverted into the temporary watercourse bed for the duration of the cable line laying. Another possibility of crossing the watercourse during the implementation of the planned project is the pumping of water from the upper to the lower side of the watercourse. The trench and the slopes of the watercourse between the bulkheads will be excavated to the appropriate elevation of the cable line foundation. The bottom of the trench will be inspected and levelled. The cable line will be laid in the excavated trench.

###### 2.2.2.1.3.3 Spatial scope of the cable line construction in the onshore area

The beginning of the onshore cable line routes is marked by the location of the openings for the landfall of the subsea cables constructed using a trenchless method, whereas, the end is marked by the customer OnSSs. The maximum length of a single cable line will be 6.5 km. The distance between cable lines in the onshore area will be approx. 5m (that value is to be increased at the stage of further design works). The width of the cable bed area will vary from 62 to 68 m along the cable route to 200 m for the sections carried out in the area designated for substations.

The temporary facilities erected for the period of project implementation involve usually:

- back-up/construction site facilities;
- preparation and prefabrication facility;

- main material storage facilities;
- intermediate material storage facilities;
- other facilities used for conducting operations as part of the project.

The construction site back-up facilities onshore for the linear part from the drilling chambers to the OnSS is estimated at approx. 0.8 ha. The back-up facilities will move along with the progress of subsequent work stages.

For the purposes of the Baltica OWF CI construction, technological roads with a maximum width of up to 8.0 m will be delineated. Currently, it is impossible to specify the exact routes of the technological roads. The designer prefers to use the cable bed area for the purposes of temporary communication, however, they also permit for the solution involving the use of the existing roads.

For the operation purposes, maximally 3 service roads will be used along the entire length of the cable lines. The width of service roads will be approx. 8 m, and the maximum length of each road will be 6.5 km (in the case of drilling, the length of the service roads will be reduced by the length of the drilling). The estimated length of service roads will be approx. 156 000 m$^2$. The service roads are planned to be hardened.

###### 2.2.2.1.3.4 Construction rate for cable lines in the onshore area

It has been assumed that the works in onshore area will be carried out simultaneously to the works in offshore area and they will be completed within the timeframe needed for the completion of the entire project. The time needed for the completion of the onshore works is estimated at 600 days.

##### 2.2.2.1.4 Customer substations

The construction of two 400/220 kV and/or 400/275 kV onshore substations is planned as part of the Baltica OWF CI implementation. The voltage level of 400 kV is necessary to connect the substation to the NPS. The expected surface area of both substations will be approx. 22 ha.

Each substation will comprise of infrastructure buildings, with the indoor 400/220(275)/MV kV switchgears and medium voltage switchgears (MV) installed inside. Additionally, customer substations will have electrical equipment, such as:

- 220(275)/MV kV and 400/220(275)/MV kV transformers;
- indoor 400 kV GIS switchgear;
- indoor 220 and/or 275 kV GIS switchgear;
- 400, 220 and/or 275 kV shunt reactors;
- 400, 220 and/or 275 kV higher harmonic filtering systems;
- compensator system for the regulation of voltage and reactive power to 220 or 275 kV voltage;
- busbar systems within the substation are used to connect station equipment;
- busbar systems including tele-technical ducts with fibre-optic cables for the connection to the NPS.

Conductors on busbar systems within the substation area will be suspended up to a maximum height of 30 m. Additionally, SF6 busbar systems will be below the elevation of the building contours, i.e. below 18 m. The highest objects in the OnSS area will be the elements of lightning protection in the form of spot lightning protection rods of a height adjusted to their distribution: their maximum height will not exceed 38 m.

In the area of all planned customer substations, the following auxiliary systems and equipment will also be located:

- power generator;
- medium voltage switchgears;
- low voltage switchgears;
- heating, ventilation, and lighting systems;
- perimeter protection, video surveillance, fire protection systems;
- communication systems;
- water and sewerage systems (including tanks for fire-fighting water);
- MV/LV auxiliary transformers;
- earthing and lightning protection systems (including lightning protection rods with a height of approx. 38);
- process systems for the proper transmission and distribution of electricity and for the safe operation of the entire substation;
- ducts and routes of cables buried in the ground;
- internal and access roads, communication routes;
- industrial buildings;
- overground structures on which the power equipment and devices will be installed;
- external fencing (made of concrete or panels) and regulatory fencing (interior – made of panels).

Substations will affect the landscape at the operation stage due to the size of the industrial buildings and connections between the station devices, the maximum height of which may reach up to approx. 38 m.

##### 2.2.2.1.5 Busbar systems to the National Power System

The onshore substations will be connected to the NPS via four busbar systems with an estimated length of 190 m each. Their rated voltage will be 400 kV. Figure 2.10 presents the parameters of the busbar system.

The total height of a busbar system may be approx. 37 m. The support structure of the busbar system will consist of:

- a busbar system gate with a height of approx. 22 m;
- lightning protection tower installed on the gate;
- lightning protection rods which can be installed on the lightning protection towers.

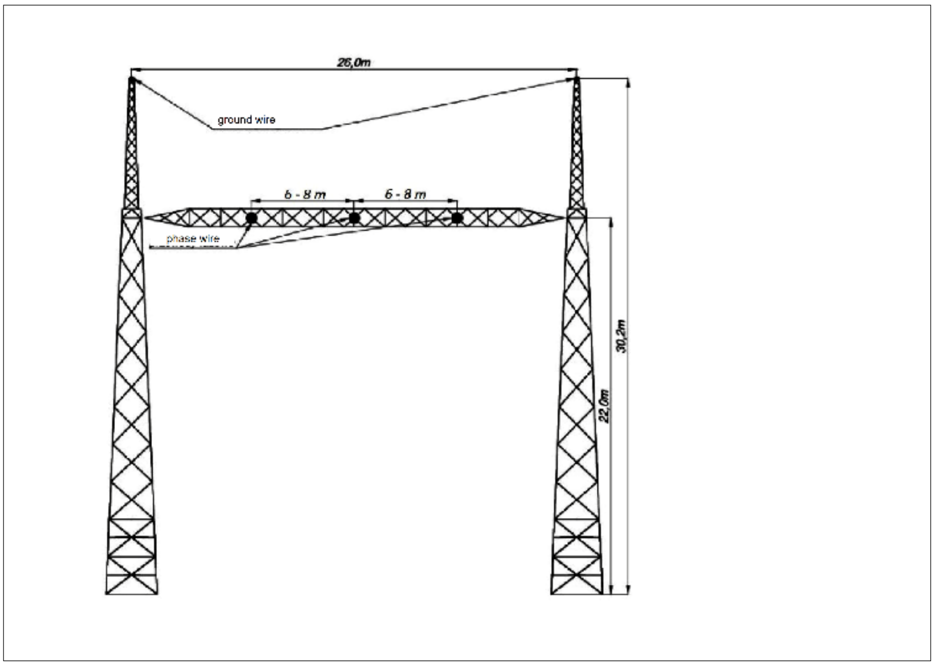



*Figure 2.10. Silhouette of the busbar system support structures [Source: internal materials]*

Steel and aluminium wires are to be used as phase conductors for the busbar systems. For a single phase, three-conductor bundle will be used, configured as a triangle with its vertex directed downwards and a side length of 40 cm.

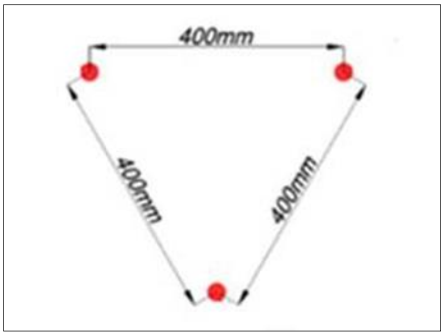



*Figure 2.11. Diagram of a conductor bundle distribution within a single phase [Source: internal materials]*

The change of the conductor configuration from a triangle to a rectangle is permitted provided that the same minimum suspension altitude is maintained ($h_{min}$ 13 m).

Phase conductors inside the span (at the lowest point), will be suspended minimum 13 m above the ground level. The distance between phase conductors inside the span will be from approx. 6 to approx. 8 m. Two separate steel and aluminium wires are to be used as ground wires.

The internal connections between the substation equipment will be located at an altitude lower than the busbar systems to the PSE Substation.

#### 2.2.2.1.6 Access road to substations

Access to the substation will be provided via an access road with a length of approx. 700 m, connected with a road exit to the existing poviat road no. 1432G Osieki Lęborskie – Lublewko with a bituminous pavement.

The access road will have:

- an enhanced, hardened pavement with a maximum width of 6 m;
- unenhanced, hardened roadsides with a maximum width of 1 m each.

To provide the access to the OnSS, an exit from the district road was designed. The exit geometry was designed in such a way as to enable the passage of vehicles with oversized loads from the district road to the access road. The exit will cover the area from the district road to the normal section of the access road.

Geometric properties of the exit:

- pavement with a width of 6 m;
- single-side hardened, enhanced roadside with a width of 4 m;
- double-side hardened, unenhanced roadside with a width of 1 m each.

#### 2.2.2.2 Operation phase

OFFSHORE AREA

In the operation phase, inspections of the transmission infrastructure will be carried out. The inspection schedule will be divided into two categories:

- planned inspections – i.e. operations carried out regularly in the scope of surveys and tests of power equipment, established on the basis of internal regulations of the Applicant and those the frequency of which is described in normative acts;
- unplanned inspections – i.e. those that will result from the unplanned situations within the Baltica OWF CI area, for example, removing the effects of a failure.

The schedule of planned inspections, depending on the location of the service base, will allow for the transit and return times as well as the estimated number of effective working hours.

Depending on the project operation strategy adopted, the Applicant envisages preparing one or more collective schedules depending on the hydrometeorological conditions as well as the climatic seasons. The strategy will be developed at a later stage of the project implementation.

At this stage of the project progress, it is impossible to indicate a precise number of vessels that will take part in inspections and maintenance works, however, it is expected that this will be at least two vessels of a relatively small size. For example, a Crew Transfer Vessel (CTV), which is used for the inspections of this type of subsea installations, is a vessel with a length of approx. 30 m and a width of approx. 10 m and is manned by two people. Service vessels will be able to use ports smaller than the ports envisaged for the support of vessels during the construction phase, i.e. the ports of Władysławowo, Ustka, Łeba, Hel, Darłówek and Kołobrzeg or Dziwnowo.

In the case of a cable line failure, a repair or replacement of the damaged cable section may be necessary. This will result in a periodical, increased traffic of vessels in the location of failure.

To minimise the risk of cable damage, and consequently, the repair works, effective methods of cable protection shall be developed and implemented during the construction phase, the most important of which will be the burying of the entirety of cable lines in the seabed sediment or protecting them with permanent protective structures, if there is a need to lay line sections on the seabed surface and use trenchless methods of the cable landfall construction. The application of the commonly used and proven solutions protecting the subsea cable lines against damage significantly reduces this risk and makes its occurrence during the operation phase unlikely, not included in the normal scope of the project functioning.

ONSHORE AREA

The operation phase of the underground cable line is a maintenance-free process. Due to the necessity to provide access to the underground cable infrastructure, trees will be felled without the possibility of replanting in an area of up to 39.5 ha. Replanting after the completion of the construction phase, in the context of several decades of the operation of cable lines, would involve the risk of cable damaging by the developing tree root systems.

As in the offshore area, also in the onshore area, it is planned to conduct inspections of the transmission system and the customer substation in accordance with the schedule of inspections, which will be developed at a later stage of the project implementation.

#### 2.2.2.3 Decommissioning phase

Two possible solutions are foreseen for the decommissioning of the Baltica OWF CI: deactivation of the transmission infrastructure or dismantling by removal of the transmission infrastructure elements. The Applicant also acknowledges the possibility of preserving the infrastructure once it is properly upgraded. The procedure will be selected in accordance with the provisions in place after the project operation is completed and will be proceeded by an analysis the aim of which will be to estimate the environmental impacts in terms of the investment costs of the variants considered.

**Transmission infrastructure deactivation**

In this variant, after the operation is completed, voltage will be cut off from the cable lines in the offshore and onshore areas and the lines will be deactivated. The cable lines running both on the seabed and on land will not be dismantled.

**Decommissioning through the removal of transmission infrastructure**

This method of offshore cable line decommissioning involves its removal from the seabed. After the cable lines are deactivated they are cut into sections and then each section is recovered on board a CLV. The vessel work is continued until all cable sections are recovered. In the onshore area, the infrastructure of the onshore substations and cable lines will be dismantled.

It is estimated that the disassembly of the Baltica OWF CI elements will take up to 3 years and will require the use of the same type of vessels, vehicles or equipment which will be used in the construction phase, with the exception of tools used for the preliminary clearance of the seabed before the laying of cable lines. It is anticipated that it will be possible for 2 vessels, such as CLVs or large supply vessels, to operate simultaneously at sea.

### 2.2.3 Expected amounts of emission and waste as well as the water, raw materials, fuels, energy and other materials used

#### 2.2.3.1 Emissions to air

In the construction and possible decommissioning phases (if a decision is made to disassembly the project elements after the operation is completed), the vehicles and construction machinery onshore as well as the vessels at sea will generate flue gases emitted to the atmosphere. High-performance vessel engines produce significant amounts of flue gases, the quality of which is determined by the quality of the fuel. The fuel and flue gas quality standards are specified by the Convention for the Prevention of Pollution from Ships (MARPOL Convention) and the Directive 2016/802 of the European Parliament and of the (EU) Council of 11 May 2016 relating to a reduction in the sulphur content of certain liquid fuels (i.e. the Sulphur Directive). The provisions of those documents were implemented into the national law by the Act of 16 March 1995 *on prevention of maritime pollution from ships* (consolidated text: Journal of Laws of 2020, item 1955). The quality of flue gases from the vessels has improved significantly in the last ten years. In the report of the European Commission on the effects of the Sulphur Directive implementation it was indicated that the reduction in sulphur content in fuels combusted by ship engines resulted in the decrease of sulphur oxides content in the air in the harbour areas or along intensive navigation routes by several dozen percent, which significantly improved air quality (the Commission Report 2018). The ship flue gases will not become concentrated due to the favourable wind conditions present in the open sea area, which will disperse the flue gases within a short time.

For the onshore area, in terms of emissions from the construction machinery, the regulations included in Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC (OJ L 350, 28.12.1998, as amended; OJ L Special edition in Polish, chapter 13, vol. 23, as amended). The implementation of the Directive into the Polish law constitutes the Act of 25 August 2006 *on the fuel quality monitoring and control system* (consolidated text: Journal of Laws of 2021, item 133, as amended) and the Regulation of the Minister of Economy of 9 October 2015 *on the quality requirements for liquid fuels* (Journal of Laws of 2015, item 1680, as amended) based on the Act.

Table 2.4 present typical emission factors for the combustion of fuel by vessels and construction machinery operating on land.

*Table 2.4. Emission factors for the combustion of diesel oil by vessels and construction machinery operating on land [Source: internal materials based on the assumptions and sources indicated below the table]*

| **Substance** | **Emission factor [g·kg$^{-1}$ of fuel]** |
|---|---|
| Nitrogen oxides ($NO_x$) | 32.629 |
| Non-methane volatile organic compounds (NMVOC) | 3.377 |
| Carbon oxide (CO) | 10.774 |
| Total suspended particulate (TSP), including up to 100% of particulate matter PM10 and PM2.5* | 2.104 |
| Sulphur dioxide ($SO_2$) | 0.02 |
| Aliphatic hydrocarbons (HC al.) | 2.195 |
| Aromatic hydrocarbons (HC ar.) | 1.182 |

**in the case of particulate matter emitted from the combustion of liquid fuels, fine fraction particulate matter (PM10 and PM2) may constitute up to 100% of total suspended particulate emissions;*
*Sulphur content in fuel – 10 mg·kg$^{-1}$ according to the Regulation of the Minister of Economy of 9 October 2015 on the quality requirements for liquid fuels (Journal of Laws of 2015, item 1680, as amended).*
*Total oxidisation of sulphur to $SO_2$ in the combustion process – emission factor $SO_2$ 0.02 g $SO_2$/kg of fuel was assumed.*
*Unit emissions of nitrogen oxide, NMVOC, carbon oxide and dust from combustion of 1 kg of diesel oil were adopted on the basis of the EMEP/EEA air pollutant emission inventory guidebook 2019 (emission factors for the group 'Non-road mobile sources and machinery').*
*It was assumed that 100% of NMVOC will consist of a mixture of hydrocarbons (HC) contained in the fuel, which were not combusted.*
*It was assumed that the emission of aromatic hydrocarbons may constitute up to 35% of the sum of hydrocarbons (HC), the remaining 65% will be aliphatic hydrocarbons (Merkisz 1998).*

Table 2.5 shows the daily pollution emissions of individual substances by the size of vessels, assuming the maximum fuel consumption and operating time values indicated in Table 2.17.

*Table 2.5. Emissions of individual substances from the combustion of diesel oil as part of the cable line construction in the offshore areas [Source: internal materials]*

| **Substance** | **Emission factor [g·kg$^{-1}$ of fuel]** | **Emissions [kg·d.$^{-1}$]** | | |
|---|---|---|---|---|
| | | **Small vessels** | **Medium vessels** | **Large vessels** |
| Nitrogen oxides ($NO_x$) | 32.629 | 65.26 | 1174.64 | 3915.48 |
| Non-methane volatile organic compounds (NMVOC) | 3.377 | 6.75 | 121.57 | 405.24 |
| Carbon oxide (CO) | 10.774 | 21.55 | 387.86 | 1292.88 |
| Total suspended particulate (TSP), including up to 100% of particulate matter PM10 and PM2.5* | 2.104 | 4.21 | 75.74 | 252.48 |
| Sulphur dioxide ($SO_2$) | 0.02 | 0.04 | 0.72 | 2.40 |
| Aliphatic hydrocarbons (HC al.) | 2.195 | 4.39 | 79.02 | 263.40 |
| Aromatic hydrocarbons (HC ar.) | 1.182 | 2.36 | 42.55 | 141.84 |

Along the onshore section of the Baltica OWF CI, the emission of pollutants to the atmospheric air from the project area (implementation and decommissioning stages) will be of unorganised character and will be connected mainly to traffic of motor vehicles and operation of construction machinery, power generator and, in places where drainage will be required, also pumps (combustion of diesel oil).

Table 2.6–Table 2.9 show the daily emissions to air of individual substances as a result of the machinery operation as part of the construction of the substation, access road to the OnSS, cable bed in an open trench and drilling of the borehole.

*Table 2.6. Emissions of individual substances from the combustion of diesel oil as part of the substation construction [Source: internal materials]*

| **Substance** | **Emission factor [g·kg$^{-1}$ of fuel]** | **Emissions [kg·d.$^{-1}$]** |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 32.629 | 160.27 |
| Non-methane volatile organic compounds (NMVOC) | 3.377 | 16.59 |
| Carbon oxide (CO) | 10.774 | 52.92 |
| Total suspended particulate (TSP), including up to 100% of particulate matter PM10 and PM2.5* | 2.104 | 10.33 |
| Sulphur dioxide ($SO_2$) | 0.02 | 0.10 |
| Aliphatic hydrocarbons (HC al.) | 2.195 | 10.78 |
| Aromatic hydrocarbons (HC ar.) | 1.182 | 5.81 |

*Table 2.7. Emissions of individual substances from the combustion of diesel oil as part of the construction of an access road to the substations [Source: internal materials]*

| **Substance** | **Emission factor [g·kg$^{-1}$ of fuel]** | **Emissions [kg·d.$^{-1}$]** |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 32.629 | 21.70 |
| Non-methane volatile organic compounds (NMVOC) | 3.377 | 2.25 |
| Carbon oxide (CO) | 10.774 | 7.17 |

| Substance | Emission factor [g·kg$^{-1}$ of fuel] | Emissions [kg·d.$^{-1}$] |
|---|---|---|
| Total suspended particulate (TSP), including up to 100% of particulate matter PM10 and PM2.5* | 2.104 | 1.40 |
| Sulphur dioxide ($SO_2$) | 0.02 | 0.01 |
| Aliphatic hydrocarbons (HC al.) | 2.195 | 1.46 |
| Aromatic hydrocarbons (HC ar.) | 1.182 | 0.79 |

*Table 2.8. Emissions of individual substances from the combustion of diesel oil as part of the construction of a cable bed using an open trench method [Source: internal materials]*

| Substance | Emission factor [g·kg$^{-1}$ of fuel] | Emissions [kg·d.$^{-1}$] |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 32.629 | 5.14 |
| Non-methane volatile organic compounds (NMVOC) | 3.377 | 0.53 |
| Carbon oxide (CO) | 10.774 | 1.70 |
| Total suspended particulate (TSP), including up to 100% of particulate matter PM10 and PM2.5* | 2.104 | 0.33 |
| Sulphur dioxide ($SO_2$) | 0.02 | 0.00 |
| Aliphatic hydrocarbons (HC al.) | 2.195 | 0.35 |
| Aromatic hydrocarbons (HC ar.) | 1.182 | 0.19 |

*Table 2.9. Emissions of individual substances from the combustion of diesel oil as part of the borehole drilling [Source: internal materials]*

| Substance | Emission factor [g·kg$^{-1}$ of fuel] | Emissions [kg·d.$^{-1}$] |
|---|---|---|
| Nitrogen oxides ($NO_x$) | 32.629 | 147.37 |
| Non-methane volatile organic compounds (NMVOC) | 3.377 | 15.25 |
| Carbon oxide (CO) | 10.774 | 48.66 |
| Total suspended particulate (TSP), including up to 100% of particulate matter PM10 and PM2.5* | 2.104 | 9.50 |
| Sulphur dioxide ($SO_2$) | 0.02 | 0.09 |
| Aliphatic hydrocarbons (HC al.) | 2.195 | 9.91 |
| Aromatic hydrocarbons (HC ar.) | 1.182 | 5.34 |

It is expected that flue gases emitted by vessels, vehicles and machinery will not result in a significant pollution of the atmospheric air.

At the project operation stage, flue gases will be emitted from two emergency power generators, which will be activated periodically for testing purposes. It is envisaged that the OnSS will be equipped with two power generators, each with a fuel combustion of approx. 121.2 dm$^3$·h$^{-1}$, which corresponds to a rated power of approx. 0.49 MW. Due to a short generator operation time (test once a month for an hour), no significant impact on the air is expected.

#### 2.2.3.2 Electromagnetic field emission (EMF)

For cable lines, only the magnetic component of the electromagnetic field (EMF) will be introduced to the environment (the electric component is shielded by a cable sheath conductor, a metal shielding braid in particular). To reduce the impact of EMF on the terrestrial environment, the cable lines are planned to be laid in trenches with a depth of approx. 2 m. The intensity of the magnetic field does not exceed the permissible values specified in the Regulation of the Minister of Health of 17 December 2019 *on the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2019, item 2448).

Busbar systems generate EMF during operation. Due to the correctly selected suspension height of the busbar system elements and the distance from the buildings, all requirements will be met with regard to the impact limits, thus:

- in the case of an electric field, the permissible value of 10 $kV \cdot m^{-1}$ will not be exceeded for the locations accessible to the public;
- in the case of a magnetic field, the permissible value of 60 $A \cdot m^{-1}$ will not be exceeded for the locations accessible to the public;

The intensity of the electric field in the vicinity of a line depends primarily on the distance between the phase conductors and the ground, and reaches its highest values at the point where the distance between the phase conductors and ground is the smallest. With distance from the line axis, the electric field intensity decreases.

In the onshore substation area and in the immediate vicinity of the electromagnetic infrastructure equipment work space, electromagnetic field values corresponding to the intermediate protection, danger or hazardous zones may occur. The measurements taken outside the area of operating substations show that the levels of individual components of the electromagnetic field are negligible, except for the areas of electrical power connections entering the station.

#### 2.2.3.3 Heat dissipation of power cables

Losses in current transmission result in the cable temperature increase. After the ambient temperature value is exceeded, the transfer of heat from the cable to the surrounding environment begins. An accurate theoretical quantification of the emitted heat is practically impossible because of the following phenomena: heat radiation, conduction and convection, subject to different physical laws [Stiller *et al.*, 2006]. The heating of sediments may lead to a change in the taxonomic composition of the benthos living on and in the seabed in the immediate vicinity of the cables (OSPAR Commission, 2009). In compliance with the Guidelines on Best Environmental Practice (BEP) in Cable Laying and Operation adopted by the Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') (OSPAR Commission, 2012), the increase in sediment temperature connected to the generation of heat in power cables should be determined on the basis of the sediment type (its thermal conductivity) as well as the type of power network (size and type of loads, thermal characteristics).

#### 2.2.3.4 Noise emissions

##### 2.2.3.4.1 Offshore area

The operation of internal combustion engines and underwater equipment will generate noise to the atmosphere and, particularly relevant to the marine area, underwater noise. Its intensity and frequency will result from the type of machinery and equipment described in Subsection 2.2.2.1.1.2, which will be used during construction and possible decommissioning of the Baltica OWF CI.

Generation of noise will refer mainly to the phases of construction and possible decommissioning, and to a much smaller degree, the operation phase, during which only periodical inspections and *ad hoc* repairs will be carried out.

#### 2.2.3.4.2 Onshore area

During the Baltica OWF CI implementation, one of the significant impacts will be the noise generated by the construction machinery. It is assumed that loud works will be carried out during daylight hours (between 6:00 a.m. and 10:00 p.m.) with the exception of possible works related to the excavation drainage, the construction of boreholes and concrete works (for example, foundation pouring, construction of water tanks for firefighting purposes, station buildings and others), which cannot be interrupted for reasons related to the process course.

In the construction area of the substations, the following construction machinery will be used: backhoe loaders, bulldozers, cranes, compactors, and lorries, whereas, in the construction area of cable lines: diggers, lorries, and power generators. In case it is necessary to carry out a trench drainage, the source of noise will be a pump aggregate that will be working 24 hours a day.

Other noise emissions will take place at the implementation stage of trenchless intersections. There will be more machinery present in the construction area of the section implemented using an open trench method; these will include: a vibro hammer, pumps, drilling fluid recycling devices and recovery equipment, mixers used for the preparation of the drilling fluid, drilling rigs and optionally power generators. Before drilling is commenced, it is necessary to prepare a start chamber using sheet piling driven into the ground with a vibro hammer. It is assumed that the vibro hammer can be operated only at daytime (6:00 a.m. to 10:00 p.m.) during the entire reference period. It is anticipated that the construction of a chamber will take approx. 20 days (including work at night). During the drilling itself, pumps, drilling fluid recycling devices and recovery equipment, mixers used for the preparation of the drilling fluid, and drilling rigs will be operating on site. During drilling, two assembly yards will be organised – for the entrance and exit. The first one will be a machine park, where the above-listed machines will be located, thus, it will generate more noise.

During the construction of the access road to the OnSS, the following construction machinery will be involved: diggers, graders, rollers, lorries, farm tractors and machines used to construct the upper layers of the road pavement.

The main sources of noise at the project operation stage will be power transformers and reactors. Harmonic and cooling water pumping filters will be of secondary importance. Moreover, for the purposes of emergency power supply, a power generator is provided, which will be activated for testing purposes once a month for approximately one hour. The corona discharge and surface discharges on the elements of the electrical insulation system may also be a potential source of noise in the substation area, especially during high air humidity (snowfall, rainfall, drizzle).

At the stage of the possible decommissioning of substations and cable lines in the onshore area, the following machines will be involved: diggers, bulldozers, cranes, lorries, and power generators. Moreover, in the case of dismantling the sheet piling used to construct chambers for drilling, vibro hammers will be used.

### 2.2.3.5 Waste and waste management

#### 2.2.3.5.1 Offshore area

During the construction and possible decommissioning phases of the connection infrastructure, various types of waste will be generated due to the operation of vessels and equipment used for laying and disassembly of cable lines, while in the operation phase, waste will generated by vessels performing maintenance work. The expected types and quantities of waste generated are provided in Table 2.10 and Table 2.12. The waste names and codes are pursuant to the Regulation of the Minister of Climate of 2 January 2020 *on waste catalogue* (Journal of Laws of 2020, item 10) At this stage of the project development, it is impossible to determine precisely the types of waste generated nor their quantities; therefore, the tables include all theoretically possible types of waste and the estimates regarding their maximum quantities anticipated, based on the information on the assumed technology of implementation of each project phase.

*Table 2.10. Compilation of the maximum estimated quantities of waste generated throughout the year in the construction phase of the offshore part of the Baltica OWF CI [Source: internal materials]*

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| **08** | **Wastes from the manufacture, formulation, supply and use (MFSU) of protective coatings (paints, varnishes, ceramic enamels), adhesives, sealants and printing inks** | |
| **08 01** | **Wastes from MFSU and removal of paint and varnish** | |
| 08 01 11* | Waste paint and varnish containing organic solvents or other hazardous substances | 0.02 |
| 08 01 12 | Waste paint and varnish other than those mentioned in 08 01 11 | 0.05 |
| 08 01 13* | Sludges from paint or varnish containing organic solvents or other hazardous substances | 0.045 |
| 08 01 14 | Sludges from paint or varnish other than those listed in 08 01 13 | 0.1 |
| 08 01 99 | Wastes not otherwise specified | 0.03 |
| **08 04** | **Wastes from MFSU of adhesives and sealants (including waterproofing products)** | |
| 08 04 09* | Waste adhesives and sealants containing organic solvents or other hazardous substances | 0.02 |
| 08 04 10 | Waste adhesives and sealants other than those mentioned in 08 04 09 | 0.04 |
| 08 04 99 | Wastes not otherwise specified | 0.03 |
| **13** | **Oil wastes and wastes of liquid fuels (except edible oils, and those included in groups 05, 12 and 19)** | |
| **13 01** | **Waste hydraulic oils** | |
| 13 01 09* | Mineral-based chlorinated hydraulic oils | 0.1 |
| 13 01 10* | Mineral based non-chlorinated hydraulic oils | 0.6 |
| 13 01 11* | Synthetic hydraulic oils | 0.4 |
| **13 02** | **Waste engine, gear and lubricating oils** | |
| 13 02 04* | Mineral-based chlorinated engine, gear and lubricating oils | 2 |
| 13 02 05* | Mineral-based non-chlorinated engine, gear and lubricating oils | 2 |
| 13 02 06* | Synthetic engine, gear and lubricating oils | 1.5 |
| 13 02 07* | Readily biodegradable engine, gear and lubricating oils | 0.15 |
| 13 02 08* | Other engine, gear and lubricating oils | 0.15 |
| **13 04** | **Bilge oils** | |
| 13 04 03* | Bilge oils from other navigation | 0.6 |
| **13 05** | **Oil/water separator contents** | |
| 13 05 02* | Sludges from oil/water separators | 0.2 |
| 13 05 06* | Oil from oil/water separators | 0.2 |
| 13 05 07* | Oily water from oil/water separators | 0.15 |
| **13 07** | **Wastes of liquid fuels** | |
| 13 07 01* | Fuel oil and diesel | 0.085 |
| 13 07 02* | Petrol | 0.085 |
| **13 08** | **Oil wastes not otherwise specified** | |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [$Mg \cdot y.^{-1}$] |
|---|---|---|
| 13 08 80 | Oily solid waste from ships | 0.05 |
| **14** | **Waste organic solvents, refrigerants and propellants (except 07 and 08)** | |
| **14 06** | **Waste organic solvents, refrigerants and foam/aerosol propellants** | |
| 14 06 02* | Other halogenated solvents and solvent mixtures | 0.085 |
| 14 06 03* | Other solvents and solvent mixtures | 0.085 |
| **15** | **Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified** | |
| **15 01** | **Packaging (including separately collected municipal packaging waste)** | |
| 15 01 01 | Paper and cardboard packaging | 0.35 |
| 15 01 02 | Plastic packaging | 0.35 |
| 15 01 03 | Wooden packaging | 0.35 |
| 15 01 04 | Metallic packaging | 0.35 |
| 15 01 05 | Composite packaging | 0.35 |
| 15 01 06 | Mixed packaging | 0.35 |
| 15 01 07 | Glass packaging | 0.17 |
| 15 01 09 | Textile packaging | 0.17 |
| **15 02** | **Absorbents, filter materials, wiping cloths and protective clothing** | |
| 15 02 02* | Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths (e.g. rags, wipes), protective clothing contaminated by hazardous substances (e.g. PCB) | 0.17 |
| 15 02 03* | Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02 | 0.17 |
| **16** | **Wastes not otherwise specified** | |
| **16 06** | **Batteries and accumulators** | |
| 16 06 01* | Lead batteries | 0.17 |
| 16 06 02* | Ni-Cd batteries | 0.17 |
| 16 06 04 | Alkaline batteries (except 16 06 03) | 0.17 |
| 16 06 05 | Other batteries and accumulators | 0.17 |
| **16 81** | **Waste resulting from accidents and unplanned events** | |
| 16 81 01* | Wastes exhibiting hazardous properties | 0.01 |
| 16 81 02 | Wastes other than those mentioned in 16 81 01 | 0.01 |
| **17** | **Construction and demolition wastes (including excavated soil from contaminated sites)** | |
| **17 04** | **metals (including their alloys)** | |
| 17 04 11 | Cables other than those mentioned in 17 04 10 | 114,750 |
| **17 09** | **Other construction and demolition wastes** | |
| 17 09 04 | Mixed construction and demolition wates other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 | 0.015 |
| **20** | **Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions** | |
| **20 01** | **Separately collected fractions (except 15 01)** | |
| 20 01 01 | Paper and cardboard | 0.17 |
| 20 01 02 | Glass | 0.7 |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| 20 01 08 | Biodegradable kitchen and canteen waste | 0.35 |
| 20 01 29* | Detergents containing hazardous substances | 0.17 |
| 20 01 30 | Detergents other than those mentioned in 20 01 29 | 0.35 |
| 20 01 33* | Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries | 0.17 |
| 20 01 34 | Batteries and accumulators other than those mentioned in 20 01 33 | 0.17 |
| 20 01 35* | Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (1) | 0.085 |
| 20 01 36 | Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35 | 0.085 |
| **20 03** | **Other municipal wastes** | |
| 20 03 01 | Mixed municipal waste | 0.17 |

**hazardous waste*
***the quantities indicated refer to the entire period*

*Table 2.11. Compilation of the maximum estimated quantities of waste generated throughout the year in the operation phase of the offshore part of the Baltica OWF CI [Source: internal materials]*

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| **13** | **Oil wastes and wastes of liquid fuels (except edible oils, and those included in groups 05, 12 and 19)** | |
| **13 01** | **Waste hydraulic oils** | |
| 13 01 09* | Mineral-based chlorinated hydraulic oils | 0.02 |
| 13 01 10* | Mineral based non-chlorinated hydraulic oils | 0.02 |
| 13 01 11* | Synthetic hydraulic oils | 0.02 |
| **13 02** | **Waste engine, gear and lubricating oils** | |
| 13 02 04* | Mineral-based chlorinated engine, gear and lubricating oils | 0.02 |
| 13 02 05* | Mineral-based non-chlorinated engine, gear and lubricating oils | 0.02 |
| 13 02 06* | Synthetic engine, gear and lubricating oils | 0.02 |
| 13 02 07* | Readily biodegradable engine, gear and lubricating oils | 0.02 |
| 13 02 08* | Other engine, gear and lubricating oils | 0.02 |
| **13 04** | **Bilge oils** | |
| 13 04 03* | Bilge oils from other navigation | 0.045 |
| **13 05** | **Oil/water separator contents** | |
| 13 05 02* | Sludges from oil/water separators | 0.02 |
| 13 05 06* | Oil from oil/water separators | 0.02 |
| 13 05 07* | Oily water from oil/water separators | 0.02 |
| **13 07** | **Wastes of liquid fuels** | |
| 13 07 01* | Fuel oil and diesel | 0.085 |
| 13 07 02* | Petrol | 0.085 |
| **13 08** | **Oil wastes not otherwise specified** | |
| 13 08 80 | Oily solid waste from ships | 0.05 |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| **14** | **Waste organic solvents, refrigerants and propellants (except 07 and 08)** | |
| **14 06** | **Waste organic solvents, refrigerants and foam/aerosol propellants** | |
| 14 06 02* | Other halogenated solvents and solvent mixtures | 0.02 |
| 14 06 03* | Other solvents and solvent mixtures | 0.02 |
| **15** | **Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified** | |
| **15 01** | **Packaging (including separately collected municipal packaging waste)** | |
| 15 01 01 | Paper and cardboard packaging | 0.09 |
| 15 01 02 | Plastic packaging | 0.09 |
| 15 01 03 | Wooden packaging | 0.09 |
| 15 01 04 | Metallic packaging | 0.09 |
| 15 01 05 | Composite packaging | 0.09 |
| 15 01 06 | Mixed packaging | 0.09 |
| 15 01 07 | Glass packaging | 0.04 |
| 15 01 09 | Textile packaging | 0.04 |
| **15 02** | **Absorbents, filter materials, wiping cloths and protective clothing** | |
| 15 02 02* | Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths (e.g. rags, wipes), protective clothing contaminated by hazardous substances (e.g. PCB) | 0.04 |
| 15 02 03* | Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02 | 0.04 |
| **16** | **Wastes not otherwise specified** | |
| **16 81** | **Waste resulting from accidents and unplanned events** | |
| 16 81 01* | Wastes exhibiting hazardous properties | 0.002 |
| 16 81 02 | Wastes other than those mentioned in 16 81 01 | 0.002 |
| **17** | **Construction and demolition wastes (including excavated soil from contaminated sites)** | |
| **17 04** | **Metals (including their alloys)** | |
| 17 04 01 | Copper, bronze, brass | 0.1 |
| 17 04 11 | Cables other than those mentioned in 17 04 10 | 0.1 |
| **20** | **Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions** | |
| **20 01** | **Separately collected fractions (except 15 01)** | |
| 20 01 01 | Paper and cardboard | 0.017 |
| 20 01 02 | Glass | 0.017 |
| 20 01 08 | Biodegradable kitchen and canteen waste | 0.035 |
| 20 01 29* | Detergents containing hazardous substances | 0.009 |
| 20 01 30 | Detergents other than those mentioned in 20 01 29 | 0.017 |
| 20 01 33* | Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries | 0.017 |
| 20 01 34 | Batteries and accumulators other than those mentioned in 20 01 33 | 0.017 |
| 20 01 35* | Discarded electrical and electronic equipment other than those mentioned in 20 01 | 0.085 |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| | 21 and 20 01 23 containing hazardous components (1) | |
| 20 01 36 | Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35 | 0.085 |
| **20 03** | **Other municipal wastes** | |
| 20 03 01 | Mixed municipal waste | 0.017 |

*Table 2.12. Compilation of the maximum estimated quantities of waste generated throughout the year in the decommissioning phase of the offshore part of the Baltica OWF CI [Source: internal materials]*

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| **08** | **Wastes from manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks** | |
| **08 01** | **Wastes from MFSU and removal of paint and varnish** | |
| 08 01 11* | Waste paint and varnish containing organic solvents or other hazardous substances | 0.06 |
| 08 01 12 | Waste paint and varnish other than those mentioned in 08 01 11 | 0.015 |
| 08 01 13* | Sludges from paint or varnish containing organic solvents or other hazardous substances | 0.015 |
| 08 01 14 | Sludges from paint or varnish other than those mentioned in 08 01 13 | 0.03 |
| 08 01 99 | Wastes not otherwise specified | 0.009 |
| **08 04** | **Waste from MFSU of adhesives and sealants (including waterproofing products)** | |
| 08 04 09* | Waste adhesives and sealants containing organic solvents or other hazardous substances | 0.006 |
| 08 04 10 | Waste adhesives and sealants other than those mentioned in 08 04 09 | 0.012 |
| 08 04 99 | Wastes not otherwise specified | 0.009 |
| **13** | **Oil wastes and wastes of liquid fuels (except edible oils, and those included in groups 05, 12 and 19)** | |
| **13 01** | **Waste hydraulic oils** | |
| 13 01 09* | Mineral-based chlorinated hydraulic oils | 0.03 |
| 13 01 10* | Mineral based non-chlorinated hydraulic oils | 0.18 |
| 13 01 11* | Synthetic hydraulic oils | 0.12 |
| **13 02** | **Waste engine, gear and lubricating oils** | |
| 13 02 04* | Mineral-based chlorinated engine, gear and lubricating oils | 0.6 |
| 13 02 05* | Mineral-based non-chlorinated engine, gear and lubricating oils | 0.6 |
| 13 02 06* | Synthetic engine, gear and lubricating oils | 0.45 |
| 13 02 07* | Readily biodegradable engine, gear and lubricating oils | 0.045 |
| 13 02 08* | Other engine, gear and lubricating oils | 0.045 |
| **13 04** | **Bilge oils** | |
| 13 04 03* | Bilge oils from other navigation | 0.18 |
| **13 05** | **Oil/water separator contents** | |
| 13 05 02* | Sludges from oil/water separators | 0.06 |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| 13 05 06* | Oil from oil/water separators | 0.06 |
| 13 05 07* | Oily water from oil/water separators | 0.045 |
| **13 07** | **Wastes of liquid fuels** | |
| 13 07 01* | Fuel oil and diesel | 0.025 |
| 13 07 02* | Petrol | 0.025 |
| **13 08** | **Oil wastes not otherwise specified** | |
| 13 08 80 | Oily solid waste from ships | 0.015 |
| 14 | Waste organic solvents, refrigerants and propellants (except 07 and 08) | |
| 14 06 | Waste organic solvents, refrigerants and foam/aerosol propellants | |
| 14 06 02* | Other halogenated solvents and solvent mixtures | 0.025 |
| 14 06 03* | Other solvents and solvent mixtures | 0.025 |
| **15** | **Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified** | |
| **15 01** | **Packaging (including separately collected municipal packaging waste)** | |
| 15 01 01 | Paper and cardboard packaging | 0.105 |
| 15 01 02 | Plastic packaging | 0.105 |
| 15 01 03 | Wooden packaging | 0.105 |
| 15 01 04 | Metallic packaging | 0.105 |
| 15 01 05 | Composite packaging | 0.105 |
| 15 01 06 | Mixed packaging | 0.105 |
| 15 01 07 | Glass packaging | 0.05 |
| 15 01 09 | Textile packaging | 0.05 |
| **15 02** | **Absorbents, filter materials, wiping cloths and protective clothing** | |
| 15 02 02* | Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths (e.g. rags, wipes), protective clothing contaminated by hazardous substances (e.g. PCB) | 0.05 |
| 15 02 03* | Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02 | 0.05 |
| **16** | **Wastes not otherwise specified** | |
| **16 06** | **Batteries and accumulators** | |
| 16 06 01* | Lead batteries | 0.05 |
| 16 06 02* | Ni-Cd batteries | 0.05 |
| 16 06 04 | Alkaline batteries (except 16 06 03) | 0.05 |
| 16 06 05 | Other batteries and accumulators | 0.05 |
| **16 81** | **Waste resulting from accidents and unplanned events** | |
| 16 81 01* | Wastes exhibiting hazardous properties | 0.003 |
| 16 81 02 | Wastes other than those mentioned in 16 81 01 | 0.003 |
| **17** | **Construction and demolition wastes (including excavated soil from contaminated sites)** | |
| **17 04** | **Metals (including their alloys)** | |
| 17 04 11 | Cables other than those mentioned in 17 04 10 | 114 750 Mg/project duration |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| **17 09** | **Other construction and demolition wastes** | |
| 17 09 04 | Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 | 0.45 |
| **20** | **Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions** | |
| **20 01** | **Separately collected fractions (except 15 01)** | |
| 20 01 01 | Paper and cardboard | 0.05 |
| 20 01 02 | Glass | 0.05 |
| 20 01 08 | Biodegradable kitchen and canteen waste | 0.105 |
| 20 01 29* | Detergents containing hazardous substances | 0.05 |
| 20 01 30 | Detergents other than those mentioned in 20 01 29 | 0.105 |
| 20 01 33* | Batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries | 0.005 |
| 20 01 34 | Batteries and accumulators other than those mentioned in 20 01 33 | 0.005 |
| 20 01 35* | Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components (1) | 0.025 |
| 20 01 36 | Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35 | 0.025 |
| **20 03** | **Other municipal wastes** | |
| 20 03 01 | Mixed municipal waste | 0.05 |

The waste and sewage generated during the construction, operation and decommissioning phases will be properly stored and secured on vessels, in accordance with a pollution prevention plan in force on each vessel, drawn up in accordance with the requirements of the Act of 16 March 1995 *on prevention of maritime pollution from ships* (consolidated text: Journal of Laws of 2020, item 1955). In harbours, waste and sewage shall be transferred to harbour reception facilities and handled in accordance with the applicable ship-generated waste and cargo residues management plan [Regulation of the Minister of Infrastructure of 21 December 2002 *on waste and cargo residues management plans for ports* (Journal of Laws of 2002, No. 236, item 1989, as amended)]. Additionally, in compliance with the MARPOL Convention, faecal sewage generated on vessels may be discharged into the sea after treatment in on-board treatment plants.

#### 2.2.3.5.2 Onshore area

In the construction and possible decommissioning phases of the connection infrastructure, various types of waste will be generated as a result of the operation of the equipment used for the laying and disassembly of cable lines. Generation of waste at the operation stage will be associated with the operation of the substation and the maintenance work enabling the project operation.

The expected types and quantities of waste generated are provided in Table 2.13 and Table 2.15. The waste names and codes are pursuant to the Regulation of the Minister of Climate of 2 January 2020 *on waste catalogue* (Journal of Laws of 2020, item 10). At this stage of the project development, it is impossible to precisely determine the types of waste generated nor their quantities; therefore, the tables include all theoretically possible types of waste and the estimates regarding their maximum quantities anticipated, based on the information on the assumed technology of implementation of each project phase.

*Table 2.13. Compilation of the maximum estimated quantities of waste generated throughout the year in the construction phase of the onshore part of the Baltica OWF CI [Source: internal materials]*

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [$Mg \cdot y.^{-1}$] |
|---|---|---|
| **08** | **Wastes from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks** | |
| 08 01 11* | Waste paint and varnish containing organic solvents or other hazardous substances | 1.5 |
| **10** | **Waste from thermal processes** | |
| **10 12** | **Wastes from manufacture of ceramic goods, bricks, tiles and construction products** | |
| 10 12 08 | Waste ceramics, bricks, tiles and construction products (after thermal processing) | 0.2 |
| **13** | **Oil wastes and wastes of liquid fuels** | |
| 13 03 07* | Readily biodegradable engine, gear and lubricating oils | 0.085 |
| **15** | **Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified** | |
| **15 01** | **Packaging (including separately collected municipal packaging waste)** | |
| 15 01 01 | Paper and cardboard packaging | 0.6 |
| 15 01 02 | Plastic packaging | 0.6 |
| 15 01 03 | Wooden packaging | 0.9 |
| 15 01 06 | Mixed packaging | 0.5 |
| 15 01 10* | Packaging containing residues of or contaminated by hazardous substances | 5 |
| **15 02** | **Absorbents, filter materials, wiping cloths and protective clothing** | |
| 15 02 02 | Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths (e.g. rags, wipes), protective clothing contaminated by hazardous substances (e.g. PCB) | 0.5 |
| 15 02 03 | Absorbents, filter materials, wiping cloths (e.g. rags, wipes) and protective clothing other than those mentioned in 15 02 02 | 0.5 |
| **16** | **Wastes not otherwise specified** | |
| **16 10** | **Aqueous liquid wastes intended for off-site treatment** | |
| **16 10 02** | **Aqueous liquid wastes other than those mentioned in 16 10 01** | 40 000 $m^3$/ entire implementation period |
| **17** | **Construction and demolition wastes (including excavated soil from contaminated sites)** | |
| 17 01 81 | Wastes from road renovations and reconstructions | 6 |
| 17 02 01 | Wood | 1.6 |
| 17 03 01* | Bituminous mixtures containing coal tar | 1.5 |
| 17 04 01 | Copper, bronze, brass | 1 |
| 17 04 02 | Aluminium | 0.05 |
| 17 04 05 | Iron and steel | 1.7 |
| 17 04 11 | Cables other than those mentioned in 17 04 10 | 0.85 |
| 17 05 04 | Soil and stones, other than those mentioned in 17 05 03 | 11 |
| 17 09 03* | Other construction and demolition wastes (including mixed wastes) containing hazardous substances | 0.3 |
| 17 09 04 | Mixed construction and demolition wates other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 | 1 |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| **20** | **Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions** | |
| **20 01** | **Separately collected fractions (except 15 01)** | |
| 20 01 21* | Fluorescent tubes and other mercury-containing waste | 0.05 |
| **20 03** | **Other municipal wastes** | |
| 20 03 01 | Mixed municipal waste | 2 |

*Table 2.14. Compilation of the maximum estimated quantities of waste generated throughout the year in the operation phase of the onshore part of the Baltica OWF CI [Source: internal materials]*

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| **08** | **Wastes from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks** | |
| 08 01 11* | Waste paint and varnish containing organic solvents or other hazardous substances | <0.15 |
| 08 01 17* | Wastes from paint or varnish removal containing organic solvents or other hazardous substances | <0.05 |
| **13** | **Oil wastes and wastes of liquid fuels** | |
| 13 02 05* | Mineral-based non-chlorinated engine, gear and lubricating oils | 0.085 |
| 13 02 07* | Readily biodegradable engine, gear and lubricating oils | <0.15 |
| 13 05 02* | Sludges from oil/water separators | 0.07 |
| 13 05 06* | Oil from oil/water separators | 0.035 |
| 13 05 07* | Oily water from oil/water separators | <1.7 |
| **15** | **Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified** | |
| 15 01 10* | Packaging containing residues of or contaminated by hazardous substances | 0.1 |
| 15 02 02* | Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths (e.g. rags, wipes), protective clothing contaminated by hazardous substances (e.g. PCB) | <0.17 |
| 15 02 03 | Absorbents, filter materials, wiping cloths (e.g. rags, wipes) and protective clothing other than those mentioned in 15 02 02 | 0.35 |
| **17** | **Construction and demolition wastes (including excavated soil from contaminated sites)** | |
| 17 01 01 | Concrete | 0.1 |
| 17 01 07 | mixtures of concrete, bricks, tiles and ceramics other than those listed in 17 01 06 | 0.05 |
| 17 02 01 | Wood | 0.06 |
| 17 04 01 | Copper, bronze, brass | 0.06 |
| 17 04 05 | Iron and steel | 0.06 |
| 17 04 11 | Cables other than those mentioned in 17 04 10 | 0.06 |
| 17 09 03* | Other construction and demolition wastes (including mixed wastes) containing hazardous substances | <0.07 |
| **20** | **Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions** | |

| **Waste code (*hazardous waste)** | **Waste type** | **Maximum quantity estimated [Mg·y.$^{-1}$]** |
|---|---|---|
| **20 01** | **Separately collected fractions (except 15 01)** | |
| 20 01 36 | Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35 | 0.1 |
| **20 03** | **Other municipal wastes** | |
| 20 03 01 | Mixed municipal waste | 0.1 |

*Table 2.15. Compilation of the maximum estimated quantities of waste generated throughout the year in the decommissioning phase of the onshore part of the Baltica OWF CI [Source: internal materials]*

| **Waste code (*hazardous waste)** | **Waste type** | **Maximum quantity estimated [Mg·y.$^{-1}$]** |
|---|---|---|
| **08** | **Wastes from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks** | |
| 08 01 11* | Waste paint and varnish containing organic solvents or other hazardous substances | 0.3 |
| **10** | **Waste from thermal processes** | |
| **10 12** | **Wastes from manufacture of ceramic goods, bricks, tiles and construction products** | |
| 10 12 08 | Waste ceramics, bricks, tiles and construction products (after thermal processing) | 0.2 |
| **13** | **Oil wastes and wastes of liquid fuels** | |
| 13 03 07* | Readily biodegradable engine, gear and lubricating oils | 0.05 |
| **15** | **Waste packaging, absorbents, wiping cloths, filter materials and protective clothing not otherwise specified** | |
| **15 01** | **Packaging (including separately collected municipal packaging waste)** | |
| 15 01 01 | Paper and cardboard packaging | 0.4 |
| 15 01 02 | Plastic packaging | 0.4 |
| 15 01 03 | Wooden packaging | 0.5 |
| 15 01 06 | Mixed packaging | 0.4 |
| 15 0110* | Packaging containing residues of or contaminated by hazardous substances | 1 |
| **15 02** | **Absorbents, filter materials, wiping cloths and protective clothing** | |
| 15 02 02 | Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths (e.g. rags, wipes), protective clothing contaminated by hazardous substances (e.g. PCB) | 0.7 |
| 15 02 03 | Absorbents, filter materials, wiping cloths (e.g. rags, wipes) and protective clothing other than those mentioned in 15 02 02 | 0.7 |
| **16** | **Waste not otherwise specified** | |
| **16 02** | **Waste electrical and electronic equipment** | |
| 16 02 13* | Discarded equipment containing hazardous elements (5) other than those mentioned in 16 02 09 to 16 02 12 | 0.8 |
| **17** | **Construction and demolition wastes (including excavated soil from contaminated sites)** | |
| **17 01** | **concrete, bricks, boards, ceramics** | |
| 17 01 01 | Concrete | 35 |
| **17 02** | **Wood, glass and plastic** | |

| Waste code (*hazardous waste) | Waste type | Maximum quantity estimated [Mg·y.$^{-1}$] |
|---|---|---|
| 17 01 81 | Wastes from road renovations and reconstructions | 6 |
| 17 02 01 | Wood | 1.2 |
| 17 04 01 | Copper, bronze, brass | 18 330<br>(in the case of decommissioning) |
| 17 04 02 | Aluminium | 0.2 |
| 17 04 05 | Iron and steel | 2.5 |
| 17 04 11 | Cables other than those mentioned in 17 04 10 | 1 |
| 17 05 04 | Soil and stones, other than those mentioned in 17 05 03 | 1.5 |
| 17 09 03* | Other construction and demolition wastes (including mixed wastes) containing hazardous substances | 0.25 |
| 17 09 04 | Mixed construction and demolition wates other than those mentioned in 17 09 01, 17 09 02 and 17 09 03 | 1 |
| **17 03** | **Bituminous mixtures, tar and tar products** | |
| 17 03 01* | Bituminous mixtures containing coal tar | 1512 |
| **20** | **Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions** | |
| **20 01** | **Separately collected fractions (except 15 01)** | |
| 20 01 21* | Fluorescent tubes and other mercury-containing waste | 0.2 |
| 20 01 36 | Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35 | 1.5 |
| **20 03** | **Other municipal wastes** | |
| 20 03 01 | Mixed municipal waste | 2 |

Pursuant to Article 2.3 of the *Waste Act* of 14 December 2012 (i.e. Journal of Laws of 2021, item 779, as amended), the contractor of works is regarded as the producer of waste generated during construction works. The contractor will be responsible for managing the waste in accordance with the provisions of the Act, i.e. in the first place for preventing waste generation, and in the event of generation − for selective collection and transfer of such waste to entities holding permits for their transport or collection.

All waste generated during construction works, operation and possible disassembly of the elements of the project will be stored selectively. Hazardous waste will be collected in designated locations adjusted for that purpose and in conditions preventing the release of harmful substances into the environment and access by third parties. It will be stored in sealed and specially labelled packaging. The excavated soil and earth masses will be used for trench backfilling and land levelling.

Operating materials and liquids from the site and those generated during operation and possible demolition will be stored in sealed and designated tanks.

Waste will be handed over to the companies that have the necessary permits to transport and manage the waste generated in the project area. The drilling fluid will be pumped to the containers intended for that purpose and handed over to entities with appropriate authorisations.

In summary, waste generated during the construction, operation and decommissioning phases, both offshore and onshore, will be consistently collected, segregated and safely stored. Subsequently, the waste will be transferred to or collected by waste recycling or disposal entities. The observance of regulations regarding waste handling and the application of the highest standards of performance for the implementation of the Baltica OWF CI, including the adoption of principles preventing excessive waste generation, allows to exclude the possibility that the waste generated during the implementation of the Baltica OWF CI could adversely affect the environment in its vicinity.

#### 2.2.3.6 Power, raw material and water demand

##### 2.2.3.6.1 Water use

###### 2.2.3.6.1.1 Personnel everyday needs

Demand for water for the everyday needs of the personnel working aboard vessels will be 36 $m^3 \cdot d.^{-1}$ (it is assumed that the personnel working abroad all vessels during the period of the maximum intensity of installation works may count approx. 600 people). The drinking water tanks will be refilled during port stopovers. Freshwater can be delivered by a supply vessel or produced by the vessels at sea. After use, the water will be stored in waste water tanks and handed over for treatment at the next port call or disposed of in accordance with the MARPOL regulations.

At the stage of the Baltica OWF CI implementation in the onshore area, works will be carried out by approx. 700 persons, which at an average water consumption by a single employer equalling 60l/person results in a water demand equalling 42 $m^3 \cdot d.^{-1}$.

During the operation phase, water demand will result from the functioning of the onshore substations and the maintenance work conducted. It is predicted that water demand for the everyday needs of personnel will be 300 $dm^3 \cdot d.^{-1}$.

Within the immediate vicinity of the planned onshore substations, there is no existing water supply system of appropriate parameters to meet the anticipated demand. Water supply is foreseen from the water supply system, if developed, or from an individual water intake. Water distribution within the station area will be carried out by means of a designed internal water supply system.

###### 2.2.3.6.1.2 Technological processes

Seawater will be used to bury cables in the seabed using pressurised equipment. The device will collect the water from the environment and inject it under pressure into the surface layer of the seabed sediment, in order to loosen its structure, which will enable cable laying. During this process, neither the chemical composition of the water nor its temperature shall be changed. The entire water collected shall be returned to the environment. Depending on the device used, it is expected that the water flow may reach from approx. 800 to approx. 5000 $m^3 \cdot h^{-1}$.

Water will be also utilised during construction works carried out using trenchless methods. It is predicted that the water demand for the purposes of preparing a drilling fluid for all boreholes will be approx. 80 000 $m^3$. For the purposes of preparing a drilling fluid, depending on the local conditions, it is predicted that water can be drawn from:

- a bore well (if the water salinity is not too high) – the justification for use is based on the local hydrological conditions – the depth at which the water occurs and the required well output. The optimum maximum well output is 20–30 $m^3 \cdot h^{-1}$; drilling downtime may occur for wells with lower outputs;
- water supply system (also as a temporary connection – e.g. a flexible hose laid along the access road to the construction site);
- water supply by means of water carts.

The method of supplying water for drilling will in each case depend on the decision of the drilling contractor and their internal economic calculations.

#### 2.2.3.6.1.3 Firefighting

Two sets of water storage tanks are envisaged for fire protection purposes:

- with a capacity of 100 m³, used as a tank for fire water pumping stations for the protection of transformer stations, refilled from the water intake each time after the functional test of the sprinkler system. Pursuant to the requirements of PN-B-02857:2017-04, the maximum filling time of 100 m³ tanks supplied from the water intake is 72 hours. For this project, 24 hours was assumed as a safe time for filling the tanks, ensuring a quick return of the sprinkler system to readiness each time after the functional test;
- with a capacity of 200 m³, used as a tank for external firefighting purposes, refilled by tanker trucks only after a firefighting operation. The water demand for external fire extinguishing was calculated on the basis of Table 2 of the Regulation of the Minister of Internal Affairs and Administration of 24 July 2009 *on firefighting water supply and fire roads* (Journal of Laws of 2009, No. 124, item 1030), with the assumed surface area of the fire zone of 2000–4000 m² and fire load density of 200–500 $MJ \cdot m^{-2}$. It is estimated that it will equal 20 $dm^3 \cdot s^{-1}$. The water used for external fire extinguishing will be stored in tanks with a total capacity of 200 m³ in accordance with the conversion factor of 10 m³ of capacity per every 1 $dm^3 \cdot s^{-1}$ of water demand pursuant to § 5 section 2 of the above-mentioned Regulation. A set of at least four tanks (each with a capacity of 50 m³) is foreseen. The tanks will be equipped with draw-off points for the fire brigade and filling sensors connected to the station monitoring system. Due to the use of sealed tanks and the low frequency of their emptying (only during a fire in the substation area), the tanks will not be equipped with overflows, drains and water supply connections. The tanks will be filled form the water supply system or a deep water well or using road tankers.

At the designing stage, the capacities indicated will be verified by an expert on fire protection.

It is planned to equip each substation independently with the same set of storage tanks and fire pumping stations for the protection of transformer stations and external fire extinguishing.

### 2.2.3.6.2 Use of raw and other materials

The Baltica OWF CI construction will mainly involve an assembly of prefabricated components delivered to the site from production facilities. The demand for raw and other materials for the entire project at the stage of its implementation is presented in Table 2.16.

*Table 2.16. Demand for raw and other materials for the entire project at the stage of its implementation [Source: internal materials]*

| Raw and other materials | Description of the process/stage | Consumption expected for the project |
|---|---|---|
| Casing pipes (HDPE or steel) | Construction of casing pipes | approx. 110 km |
| Weights | Additional weighting – it is predicted that a need for application may arise, the decision to apply will be linked to the results of geological surveys | Impossible to estimate at this stage |
| Cable lines (export cables and internal connections) | Laying of cables with accessories | In total for all sections approx. 550 km |
| Mineral-asphalt mixture or concrete paving blocks | Materials required for the construction of an access road to the | approx. 1800 Mg |

| Raw and other materials | Description of the process/stage | Consumption expected for the project |
|---|---|---|
| | OnSS | |
| Aggregate, cement-sand ballast | Materials required for the construction of an access road to the OnSS | approx. 10 000 Mg |

#### 2.2.3.6.3 Use of fuels and energy

Fuels will be consumed by ships, vehicles, and equipment involved in both the construction and operation phases of the plant and its disassembly (if this decommissioning scenario is selected).

The vessels and equipment involved in offshore work will consume electricity produced by the combustion of fuel – low sulphur diesel oil (<0.1%). The amount of fuel consumed shall be influenced by many factors, among which the most important are the type and intensity of works, thus, the type and number of vessels used, as well as weather conditions during their implementation – the scale of wave motion as well as the strength and direction of the wind, which to a large extent shape the way a vessel is manoeuvred as well as the load of the propulsion engines [including, by the dynamic positioning system (DP)]. Since at this stage, the vessels that will be involved in the project implementation, much less the weather conditions of the construction phase are not known, it is also impossible to estimate the amount of fuel which will be consumed by the vessels in the construction phase. It is predicted that less fuel will be consumed in the decommissioning phase than in the construction phase, if a decision is made to dismantle elements of the transmission infrastructure. At the project operation stage, energy consumption will be related to maintenance work enabling the operation of the transmission infrastructure. Table 2.17 contains the average values of fuel consumption per hour for vessels of various sizes, which gives a certain idea about the amount of fuel consumed during the construction and disassembly works.

*Table 2.17. Average fuel consumption for different types of vessels [Source: internal materials based on Borkowski (2009)]*

| Vessel size | Purpose | Average fuel consumption (diesel) [$kg \cdot h^{-1}$]* | Nominal daily working time [h] |
|---|---|---|---|
| Small vessels | Small supplies, personnel transport, one-day service, emergency operations – for each phase | 50–200 | 8–10 |
| Medium vessels | Supplies, construction works and support for construction works, towing operations, multi-day stationary service – for each phase | 500–2000 | 12–18 |
| Large vessels | Construction works, storage – construction and decommissioning phases | 2500–5000 | 12–24 |

**fuel consumption was determined on the basis of catalogue sheets of exemplary vessels*

With reference to the Baltica OWF CI, it is predicted that, as part of the implementation of:

- a power substations, the machines will consume approx. 4912 kg of diesel oil per day;
- a single borehole, the machines will consume approx. 4516.6 kg of diesel oil per day;
- cable bed in an open trench, the machines will consume approx. 157.5 kg of diesel oil per day;
- access roads to the power substation, the machines will consume around 665.2 kg of diesel oil per day.

The same values should be assumed for a possible decommissioning of the substation, boreholes, and cable bed in an open trench.

At the operation stage of the onshore part of the project, the energy consumption will be related to the maintenance work enabling the operation of the cable lines and substations. In the scope of onshore works, the energy consumption is estimated at a level of 10–50 kWh depending on the type of maintenance works within a period of 3 working days. The OnSSs demand in terms of auxiliary needs will amount to 8 MW at maximum.

## 2.3 Project variants considered

The analysis of alternative solutions of the Baltica OWF CI implementation was carried out with regard to:

- method of implementation of the project objective;
- determination of the project location;
- determination of technological solutions of the project necessary to be included in the construction design, significant from the point of view of environmental protection;
- determination of project functioning methods that are essential from the point of view of environmental protection.

The key assumption in the design process is to determine the route of the connection infrastructure, taking into account environmental aspects, technical capabilities, minimising the risk of social conflicts and potential failures, as well as ensuring economic optimisation of the project.

The analyses concerning the possibility of variant preparation for the Baltica OWF CI by the Applicant had been conducted since the first statements of connection conditions were obtained in 2014, allowing power evacuation (approx. 1045 MW) from a part of the Baltica OWF (2550 MW) to the NPS, with the connection point at the substation in Żarnowiec. Due to the long period of analyses aimed at the preparation of final variants, it was possible and even necessary to take into account the following changes: legal and regulatory conditions, NPS development plans and ways of PMA use, which sanction the principles of coexistence and use of space by other stakeholders. Moreover, the administrative approvals obtained, and arrangements made were taken into account together with the planned development of power transmission technologies and their availability at the time of detailed design and construction of the Baltica OWF CI. The above conditions led to multiple modifications, and in consequence to the exclusion of numerous variants and reduction of their number. Apart from the above-mentioned environmental, social and technical criteria, the remaining ones determined the fact that in the current situation, out of a wide spectrum of hypothetical location, technological and organisational variants, most of them lost the attribute of being rational; therefore, they cannot be considered as rational alternative variants for the purpose of preparing the documentation necessary to obtain the Decision on Environmental Conditions pursuant to Article 66 Section 1 point 5 of the EIA Act.

### 2.3.1 Location variants

In order to analyse the possible variants of the Baltica OWF CI, and make a selection afterwards, the Applicant commissioned environmental surveys in a wide spatial scope, covering both offshore and onshore areas, enabling the determination of environmentally, socially and technically rational connection routes. The scope and the area covered by the surveys in 2016–2018 were determined so that between the Baltica OWF and the then determined connection point to the NPS at the Żarnowiec substation, it was possible to determine rational variants enabling not only the implementation of the connection infrastructure but also compliance with the purpose of implementation of the entire project plan, which is the Baltica OWF together with the Baltica OWF CI. Figure 2.12 and Figure 2.13 illustrate the scope of surveys on marine and terrestrial environment for the purpose of preparing the environmental documentation for the Baltica OWF CI. As part of the offshore survey, the seabed relief and geological structure were determined, the chemical composition of sediments was analysed, potential deposits of raw materials were identified and the existence of anthropogenic objects on the seabed was examined. As regards biotic components in the offshore area, phytobenthos, zoobenthos, ichthyofauna and marine mammals were surveyed, i.e. the components expected to be subject to possible negative impacts.

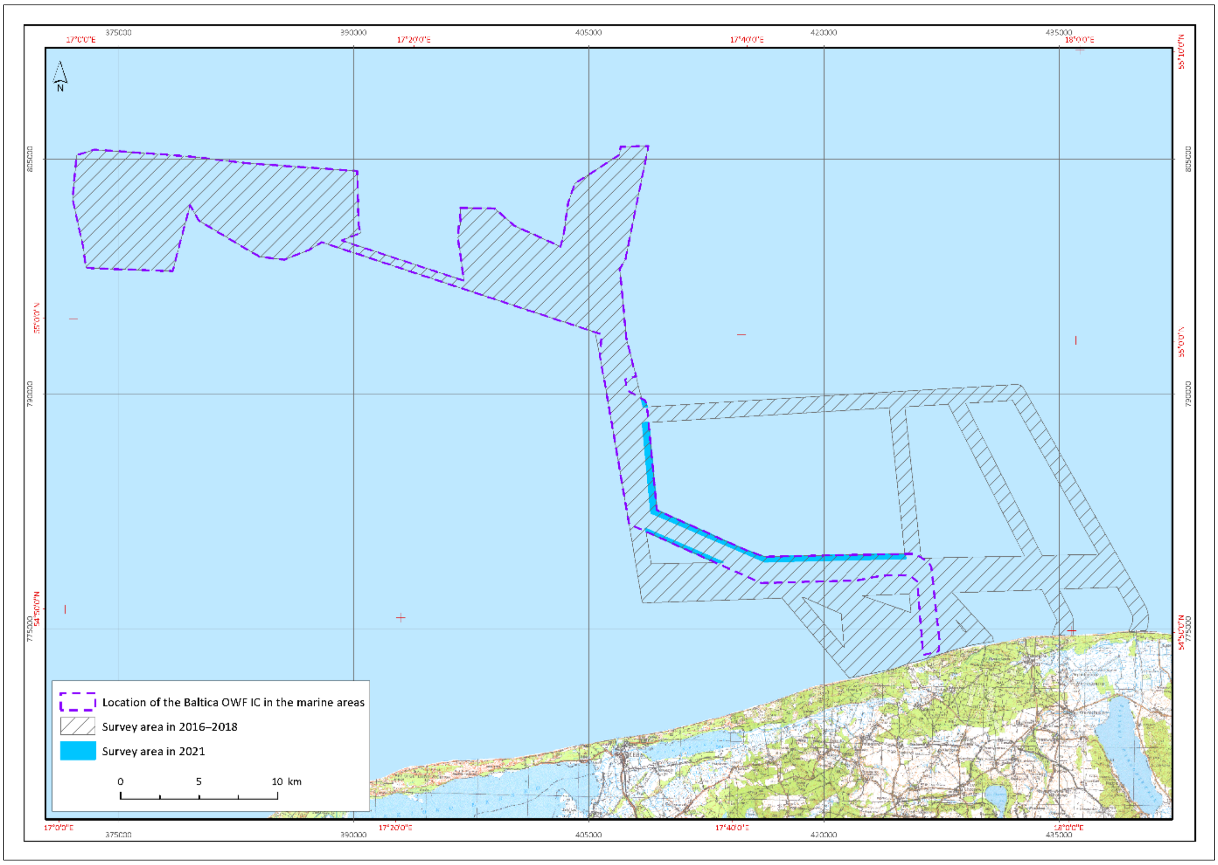



*Figure 2.12. Area of environmental surveys conducted in 2016–2018 and in 2021 for the purpose of determining the route of cable lines from the Baltica OWF in the offshore area [Source: internal materials]*

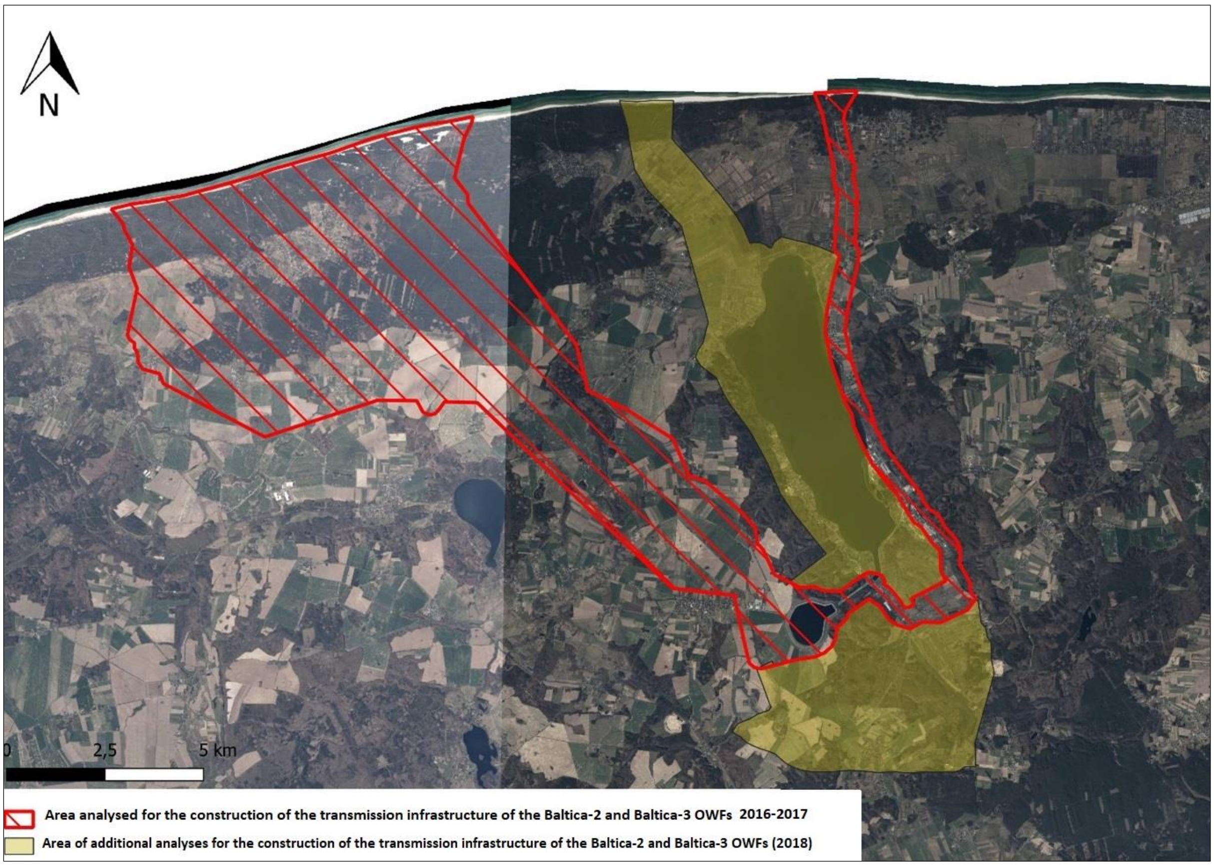



*Figure 2.13. Spatial extent of the survey of the Onshore Connection Area in 2016–2017 and in 2018 [Source: internal materials]*

In terms of the possibility of preparing location variants both in the offshore and onshore area, the key and determining factor for further search of variants was obtaining additional statements of connection conditions for the Baltica OWF by Elektrownia Wiatrowa Baltica-2 sp. z o.o., in 2019, for the Choczewo Substation designed by the transmission system operator PSE S.A., situated closer to the coast. Consequently, a decision was taken to amend the statement of connection conditions obtained by Elektrownia Wiatrowa Baltica-3 sp. z o.o. in order to change the connection point at the Żarnowiec substation to the planned Choczewo Substation. For this purpose, on 23 December 2020, Elektrownia Wiatrowa Baltica-3 sp. z.o.o. concluded an agreement on "Cooperation and confidentiality of information" with the transmission system operator PSE S.A.[1], under which the parties expressed their intention to conclude an annex to the Agreement in order to change the location of the connection point from the 400/110 kV Żarnowiec substation to the planned 400 kV Choczewo Substation.

After changing the location of the connection point for the Baltica OWF, the eastern routes of the cable lines, including in particular the eastern landfalls, were obviously excluded from further analyses, as they could only be considered for the connection to the Żarnowiec substation. However, the change of the connection point itself, particularly in the onshore part of the Baltica OWF CI, enabled a significant shortening of the connection route, and thus, a significant reduction of the

[1] Internal document EWB-3.

environmental impact, which is also part of the actions aimed at determining the most environmentally sound variant.

**OFFSHORE AREA**

The analysis of the environmental survey results for the offshore area, including in particular the valorisation of the elements associated with the seabed (e.g. presence of benthic organisms, fish feeding grounds), indicated that the remaining routes of the cable lines have similar qualitative and quantitative characteristics. Therefore, the sensitivity of the environment to possible impacts and the value of its elements in the offshore area, where the Baltica OWF CI should be located to achieve the rational variant to the Choczewo Substation, will not be significant for the determination of the location variant in the offshore area. The length of the variant will be of key importance for the environment in terms of determining the most environmentally sound rational variant, as the magnitude and duration of impacts are directly related to it. Generally, it should be expected that the shorter the route of the Baltica OWF CI, the smaller the impacts will be. In this regard, the environmental impact criterion corresponds to the technical and economic criterion of the project implementation. From the perspective of obtaining geometrically the shortest possible route from the Baltica OWF to the landfall point, which is approx. 26 km, the cable line has a length of approx. 32 km. However, due to the below-described legal context and the widely understood principles of shared use of maritime areas, which also result from the adopted MSPPMA, the implementation of a straight line route in the territorial sea area, connecting the Baltica OWF with the landfall point, is currently not feasible. The obtained route of the cable line, account for the conditions described below, follows the shortest possible course, in this scope incorporating features of the most environmentally sound variant.

Another group of factors/criteria limiting the possibility of free choice of rational variants of location in the offshore area is the fact of sharing the space with other users of the sea area and the safety of maritime transport.

In view of the above, the selection of the location variant accounted for the works on the MSPPMA draft, which proposed designating the sub-area 34.628.C for the purpose of securing the possibility of acquiring sand accumulations for artificial shore nourishment [Figure 3.17]. Given the need for minimising the potential interference in this sub-area, and at the same time ensuring technological rationality of the project, it was necessary to exclude the south-western variant, i.e. opposite Sarbsko Lake [Figure 2.12]. For the proposed Baltica OWF CI route, the maximum length of the intersection with the sub-area 34.628.C is approx. 2 km. In comparison, for the south-western route the interference with this sub-area would be approx. 7 km, with the overall connection route being longer as well. The south-western variant, which is characterised by greater interference in the sub-area 34.628.C, should be considered non-rational due to its conflict with the formal conditions resulting from the adoption of the MSPPMA and incompatibility with the decisions obtained by the Applicant for laying and maintaining cables in the territorial sea area.

Another criterion determining the possibility of selecting the location variants in the offshore area is the planned development of offshore wind energy and the related onshore development of the NPS, as well as the necessity to aggregate – and hence put in order – connection infrastructure routes, including the avoidance of their conflicts at intersections. Among the currently planned projects, the Baltica OWF is the westernmost OWF to be connected to the Choczewo Substation. The neighbouring projects, namely the Bałtyk III OWF and Bałtyk II OWF, have obtained statements of conditions for connection to the Wierzbięcino Substation located in the vicinity of Słupsk; therefore, the location of the Baltica OWF CI along its westernmost course allows maintaining a conflict-free alignment with the infrastructure of the neighbouring offshore wind farm projects from the west and south. However, in the context of maintaining an aggregated and orderly course of the connection infrastructure together with other offshore wind farms connected to the Choczewo Substation, the development of OWF projects such as the Baltic Power OWF and Baltica-1 OWF excludes the possibility of considering the location variants located east of the currently indicated course of the Baltica OWF CI within the territorial sea, as they would necessitate multiple intersections of the infrastructure on the seabed, which is currently not imposed by any environmental, social or technological considerations. In particular, it should be noted that the Baltica OWF CI – along its entire route in the territorial sea area – borders to the east with the planned connection infrastructure, for which another applicant (Elektrownia Wiatrowa Baltica-1 sp. z o.o.) obtained the decision regarding cable installation and maintenance in the territorial sea. For technical and formal reasons, at the present stage, this circumstance in the inability to move the Baltica OWF CI eastwards, as such an undertaking would infringe upon the interest of another entity and might be unfeasible in the case of the lack of consent of that entity, which is also planning to implement a similar project in accordance with the law. In this case, the location variants situated in the eastern part should be excluded from further analyses, as they are non-rational due to the above-mentioned technical and legal conditions, and due to the overall principles of spatial order development resulting from the MSPPMA.

Another factor limiting the validity of variant planning in the southern section of the Baltica OWF CI route is that the MSPPMA designates sea area 39a.I [Figure 3.17] for the purpose of implementing linear elements accompanying nuclear power facilities (nuclear power plant cooling system), which excludes the possibility of locating other linear technical infrastructure, except for infrastructure necessary for a nuclear power plant; therefore, considering variants situated south of the indicated course – also within sea area 39a.I – cannot be considered rational given the legal context.

Another criterion taken into account when determining the possible location variants in the offshore area is the navigational safety. Within the area of the Baltica OWF CI, the customary shipping route along the Polish coast is situated, along with the eastern part of the traffic separation scheme TSS "Słupska Bank" established in 2021 [Figure 3.18]. In order to reduce the project impact on navigational safety and to mitigate possible difficulties for the implementation and operation of the project, in the context of the shipping route operation, the length of the connection infrastructure within the shipping routes is to be kept as short as possible. The shortest route can be obtained if the connection is perpendicular to the shipping route. In the project in question, already at the stage of determining the spatial extent of the survey and at the stage of searching for possible variants the aim was to obtain the Baltica OWF CI route that would be as close as possible to a perpendicular intersection with the usual shipping route. The planned location of the project is a variant enabling the creation of the shortest possible route of the Baltica OWF CI in the area of the shipping route and the newly created eastern part of the TSS "Słupska Bank"; at the same time, further modification and shortening of the Baltica OWF CI route is limited at this stage, given the above-mentioned conditions resulting from the MSPPMA provisions, the fact of sharing the space with other users of the sea, and in the light of decisions issued to other applicants for cable installation and maintenance in the territorial sea. Bearing in mind the criterion of impact on the marine environment, the shift of the route to the west, beyond the designated eastern part of the TSS "Słupska Bank", would result in extending of the Baltica OWF CI, which would consequently increase the magnitude of environmental impact, and at the same time it would exclude the possibility of reducing the intersection with the usual shipping route; therefore, such a change would fail to mitigate the impact on navigational safety and the hindrance to the implementation and operation of the project resulting from the presence of shipping routes. Further extension of the connection route is contrary to the rationality of project variants as it does not allow reducing the interaction of the project with shipping activities and, at the same time, it would increase the impact magnitude and would be technically unreasonable.

During the administrative procedure for obtaining the decision on cable laying and maintenance in the territorial sea, despite the indication of two possible cable landfall locations to be used for the Baltica OWF CI, which were determined on the basis of the above-mentioned onshore surveys, due to the comments of the parties to the proceedings questioning the possibility of using the area on the eastern side of the Wydma Lubiatowska dune, near the western boundary of the *Białogóra* PLH220003 Natura 2000 site for the purposes of the Baltica OWF CI, the Applicant revised the application for cable laying and maintenance in the territorial sea. Consequently, the possibility of preparing location variants at the stage of obtaining the Decision on environmental conditions was excluded also for this section, and the only possible landfall was allowed in the area between the Lubiatówka River and the Wydma Lubiatowska dune.

Bearing in mind the above-mentioned conditions, which led to the determination of one feasible and rational variant of the project location in the offshore area, the Applicant obtained the following decisions, which determine the route of the Baltica OWF CI:

- Decision no. 2/K/19 of 21 October 2019 of the Minister of Maritime Economy and Inland Navigation (ref. no.: GDM.WZRMPP.3.430.55.2019.JD.9) within the exclusive economic zone;
- Decision no. 3/K/19 of 28 October 2019 of the Minister of Maritime Economy and Inland Navigation (ref. no.: DGM.WZRMPP.3.430.54.2019.JD.9) corrected by the resolution of 21 November 2019 within the exclusive economic zone;
- Decision no. 1/DS/20 of 6 November 2020 of the Director of the Maritime Office in Gdynia (ref. no.: INZ5DS.8104.1.11.2020.AGB) within the territorial sea and internal sea waters;
- Decision no. 2/DS/20 of 6 November 2020 of the Director of the Maritime Office in Gdynia (ref. no.: INZ5DS.8104.11.2020.AGB) within the territorial sea and internal sea waters.

Considering the fact that those decisions have been obtained and bearing in mind the above-mentioned conditions regarding the shared use of the sea area, at present, it is unreasonable to assume the obtaining of further administrative decisions for the implementation of the Baltica OWF in another location in the offshore area due to the lack of technological, environmental, social and economic premises. Bearing in mind the above-described environmental, technical and legal context, as well as conditions resulting from the adopted MSPPMA, the possibility of indicating other rational location variants in the offshore area, which are also coherent with the project location in the onshore area, was ruled out.

**ONSHORE AREA**

The considerations regarding the cable line route on land were preceded by the performance of surveys on the biotic and abiotic environment in the area where the location of the onshore transmission infrastructure was assumed. The Applicant conducted large-scale environmental surveys related to the acquisition of possibly the most precise information on the environment in the spatial context, which involved determining a probable route of the connection cable bed from the offshore part to the connection point at the Żarnowiec substation. The survey was conducted in 2016–2017 over a total area of 93.6 $km^2$, while in 2018 additional environmental survey was conducted, covering an area of 52.63 $km^2$ [Figure 2.13]. The following types of surveys and verification of available archival documentation were conducted, in terms of:

a) abiotic elements

- geology,
- hydrogeology,
- surface waters,
- soils,
- acoustic environment,
- atmospheric air,
- electromagnetic radiation,
- landscape,
- cultural values, historic monuments and archaeological sites,
- spatial planning;

b) biotic elements:

- fungi,
- lichens,
- mosses and liverworts,
- vascular plants and natural habitats,
- terrestrial invertebrates,
- aquatic invertebrates,
- fish and lampreys,
- herpetofauna,
- avifauna,
- mammals, including bats,
- areas and objects subject to protection under the Nature Conservation Act.

The survey results obtained and analyses conducted were used as information material for the designer in order to determine the variant of the cable connection route, and as an input to the environmental documentation, based on which the Applicant applies for obtaining the Decision on environmental conditions. On the basis of the surveys and detailed site inventory, large-scale data was obtained, which allowed determining possible variants of the connection route in the onshore part and to indicate the habitats that should remain undisturbed. Above all, a site of the smooth snake was bypassed as the route was designed. Furthermore, on the basis of the results obtained, the Applicant decided to avoid the Wydma Lubiatowska dune, which is the most valuable natural element, and to avoid other habitats considered valuable. However, these variants were not aggregated with the route of the shared cable bed area for all applicants, which was agreed with the Choczewo Forest Inspectorate and is discussed below. This would lead to defragmentation of the forest and additionally, considering the location in relation to the valuable habitats, it would prevent shortening of the connection route and hence reducing tree felling. The steadily expanding knowledge of the area made it possible to project the design and formal layer (Applicant's later activities) on the cognitive layer expressed through the detailed site inventory, which led to the final determination of the connection route.

As indicated above, a crucial factor for the selection of the connection route in the basic and alternative course was the change of the connection point in relation to the original connection point at the Żarnowiec Substation, which determined the final method of variant preparation and allowed a significant – almost threefold – shortening of the connection route in the onshore part.

The indication of potential landfall locations was also crucial for the determination of the Baltica OWF CI route. For this purpose, the Applicant conducted a number of internal analyses in the environmental and design areas. Locations subject to legal forms of nature conservation (e.g. the

Białogóra reserve located to the east of the locations designated for the drilling works) were taken into account, including locations protected as Natura 2000 sites. Moreover, the planned location of a nuclear power plant was taken into account – it is situated to the west of the landfall point indicated (west of the Lubiatówka River). In addition, account was taken of the geomorphological features of the area as well as the results of the above-mentioned environmental inventory surveys, which led to the Applicant's decision to locate the landfall to the west of the Wydma Lubiatowska dune. Thus, the Wydma Lubiatowska dune will not be covered by construction works.

In order to take the final decision on the onshore section of the connection route, key arrangements were made between the Applicant involved in the project, other applicants implementing similar projects and the Choczewo Forest Inspectorate, concerning the onshore part of the Baltica OWF CI route within the forest district area (see Subsection 2.1.2). Arrangements with the Choczewo Forest Inspectorate concerned primarily the avoidance of habitat fragmentation for the purpose of implementation of connection infrastructure for various applicants. Therefore, a decision was made to implement a single shared cable bed area along the section from the connection of the applicants' cable routes in the onshore part to the Choczewo Substation. Such an approach made it possible to accumulate works in one part of the forest without the need to carry out parallel clearing operations. In the course of further works, the route of the connection line was determined in such a way so that its main part would run through a commercial forest. That route was also presented to the authorities of Choczewo municipality and was communicated to the local community.

### 2.3.2 Technological variants

In the first phase of the planning and technological works, the Applicant considered two methods of power transmission from the offshore substations (OSS) to the onshore substations (OnSS) by applying direct current (DC) or alternating current (AC) technology.

Given the available technical knowledge regarding the forecast of available technologies and the possibility of applying them in the case of the Baltica OWF CI implementation, as well as considering the distance between the OWF and the land (connection point to the Choczewo Substation) and the experience gained by other investors implementing offshore wind farm projects, the Applicant decided to apply the AC transmission technology. Bearing in mind the planned length of the connection line and existing solutions available on the industrial scale, the AC transmission technology is a justified and feasible solution in the context of the entire project, whereas DC power transmission to the NPS is not a technologically and economically justified solution in the case of the Baltica OWF.

One of the technological aspects considered by the Applicant was to decide on the technological layout of the onshore substations for the Baltica-3 OWF CI and Baltica-2 OWF CI.

The following OnSS implementation options were considered:

- substation systems with 400/275/220 kV overhead switchgear;
- substation systems with 400/275/220 kV switchgear for indoor installation, GIS technology.

Construction of the OnSS with overhead switchgear would require acquisition of the land for switchyards with a surface area approximately 6 times larger than for indoor switchgear employing GIS technology. The OnSS implementation for the Baltica-3 OWF and Baltica-2 OWF is limited by the availability of land in the vicinity of the Choczewo Substation, which amounts to approximately 11 ha (for each of the substations). This unambiguously determined the implementation of substations with switchgear for indoor installation, employing GIS technology. An application of the OnSS with fully overhead switchgear, in addition to a significant increase in space occupancy and hence greater transformation of the environment, would necessitate a relocation of the OnSS outside the immediate vicinity of the Choczewo Substation, which would ultimately increase the total length of the Baltica OWF CI, and also would probably prevent using busbar systems to connect the OnSS with the Choczewo Substation. Therefore, the variant adopted for implementation (i.e. substations employing GIS technology) is also the variant with smaller influence on the environment due to limited acoustic, EMF and landscape impacts in comparison with overhead switchgear substations.

Another technological aspect taken into account during the variant analysis, which was considered by the Applicant at the stage of planning works, was the preparation of implementation variants in the onshore part (from the sea–land drilling site to the connection point at the Choczewo Substation) with the transmission infrastructure in the form of:

- overhead power line;
- underground power line.

Construction of the overhead line in the area where the following areas can be found:

- Coastal Protected Landscape Area;
- Special Protection Area (SPA) for Birds
- wildlife corridors and patches;
- forest areas;

could face opposition from both public administration bodies responsible for environmental protection and environmental groups actively involved in monitoring of projects in specially protected areas. The Applicant considered various solutions, including pylons above the forest canopy, but this option was rejected for the reasons presented above, among others.

The Applicant decided that the construction of overhead power lines would not be supported by the local community either, as they would constitute a disharmonic feature in the landscape, disturbing landscape values and having a negative impact on tourist destinations located along the possible route of the overhead line from the sea–land drilling site to the connection point at the Choczewo Substation. Construction of the overhead line in forest areas is also connected with tree clearance in the belt along the line and the necessity to keep the area free of trees and shrubs.

In view of the above, the variant involving the connection infrastructure implementation in the form of an overhead line was considered non-rational for the purpose of the Baltica OWF CI implementation in the onshore section.

In the planning process, the interests of all stakeholders were taken into account, including the local community and other investors constructing offshore wind farms with connection lines, as well as the position of the State Forests – Choczewo Forest Inspectorate. All parties agreed on the need for implementing the transmission infrastructure in the onshore part as an underground cable line, which in consequence excludes the feasibility of the project with the use of an overhead line for the entire route, i.e. from the sea–land drilling site to the Choczewo Substation.

Following consultations with individual investors, the Choczewo Forest Inspectorate proposed a cable line route with the least possible impact on forest management, and at the same time acceptable for the investors.

An additional argument is that the implementation of power lines in the form of underground cable lines will not have a negative impact on the landscape values of the area and will be accepted by the local community, as well as by the population visiting holiday resorts located within the range of the investment impact. The proposed location of the cable bed for all Applicants identified at the current planning stage was presented at the Choczewo Commune Office and communicated to the local community.

Given the above, the variant involving the implementation of the connection infrastructure in the form of a cable line was recognised as the variant preferred by the contractor for the possibility of implementing the Baltica OWF CI projects.

The Applicant Proposed Variant (APV) assumes the project implementation in accordance with the state-of-the-art and commonly applied technologies for the construction of EHV power lines. As regards the offshore area outside the Baltica OWF area, the route of the project does not reach beyond the area indicated in the location decisions issued by the Minister of Economy and Inland Navigation Maritime[2, 3]and the Director of the Maritime Office in Gdynia[4, 5].

The variant accounts for all environmental protection requirements as well as optimisation between planning, environmental and technical conditions for energy transmission. This variant provides for the burial of the power cables in the seabed and in the ground (onshore), which is in line with the assumptions of the *Polish Energy Policy until 2040* that indicates the necessity for power grid cabling. Although the provisions of the above-mentioned document refer directly to medium and low voltage grids, it should be acknowledged that the rationale behind their introduction (e.g. the mitigation of causes and consequences of overhead network failures, impacts on the landscape) should also be applied to the design of EHV power lines, the high importance for ensuring national energy security of which determines the need for their highest protection. A description of the technology and techniques of construction of the power connection in the APV can be found in Subsection 2.2.

## 2.4 Risk of major accidents or natural and construction disasters

### 2.4.1 Types of accidents resulting in environmental contamination

In accordance with the definition set out in Article 3 point 23 of the Act of 27 April 2001 *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973), a "major accident" is understood as an "*event, in particular an emission, fire or explosion resulting from an industrial process, storage or transportation, in which one or more dangerous substances are involved, resulting in an immediate threat to human life or health, or threat to the environment, or a delayed occurrence of such a threat"*.

The planned project, Baltica OWF CI, will not be a place of storage of hazardous substances determining the project classification as a plant with an increased or high risk of a major industrial accident indicated in the Regulation of the Minister of Development of 29 January 2016 *on the types and quantities of hazardous substances present in the industrial plants, which determine the plant*

[2] Decision no. 2/K/19 of 21 October 2019 of the Minister of Maritime Economy and Inland Navigation (ref. no.: GDM.WZRMPP.3.430.55.2019.JD.9) within the exclusive economic zone.

[3] Decision no. 3/K/19 of 28 October 2019 of the Minister of Maritime Economy and Inland Navigation (ref. no.: DGM.WZRMPP.3.430.54.2019.JD.9) corrected by the resolution of 21 November 2019 within the exclusive economic zone.

[4] Decision no. 1/DS/20 of 6 November 2020 of the Director of the Maritime Office in Gdynia (ref. no.: INZ5DS.8104.1.11.2020.AGB) within the territorial sea and internal sea waters.

[5] Decision no. 2/DS/20 of 6 November 2020 of the Director of the Maritime Office in Gdynia (ref. no.: INZ5DS.8104.11.2020.AGB) within the territorial sea and internal sea waters.

*classification as a plant with an increased or high risk of a major industrial accident* (Journal of Laws of 2016, item 138).

In the construction phase followed by possible decommissioning by dismantling of the Baltica OWF CI, the potential hazards to the marine environment of the greatest significance will be emergency situations, which will lead to spills of petroleum products, mainly fuel, hydraulic, transformer and lubricating oils from vessels. To a lesser extent, the marine environment may incidentally be endangered by an accidental release of hazardous substances or materials containing hazardous substances, if used. The same hazards were identified for the operation phase. However, the probability and effect will be lower due to the much smaller predicted vessel involvement in this phase of the project implementation – relatively small service vessels performing periodic or interim maintenance work.

A spill of hazardous substances in an emergency situation may cause a long-term and significant negative impact on the biotic and abiotic environment of open and coastal waters and, if it reaches the shore, also on the coastal environment, mainly beaches. The extent of this impact will depend on the size of the spill; in extreme cases it may cover an area of several dozen square kilometres. In order to address this risk, all vessels involved in each phase of the project will meet the requirements and will comply with the regulations resulting from the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78); in particular, they will have and follow the procedures contained in “Shipboard Oil Pollution Emergency Plans”, developed individually for each vessel.

#### 2.4.1.1 Spill of petroleum products during normal operation of vessels and in an emergency situation

During normal operation of vessels, small spills of petroleum substances, i.e. fuel oils, lubricants and petrol, may occur.

The magnitude of petroleum substance contamination can be classified as follows (Reszko, 2017):

- Tier 1 (small spill) – small spills of petroleum products that do not require the intervention of external forces and resources and are possible to be removed with own resources. These spills have a local character, their removal does not present particular technical difficulties and they do not pose a great threat to the marine environment;
- Tier 2 (medium-sized spill) – spills of petroleum products, the scale of which requires a coordinated counteraction within the maritime area under the authority of the Director of the Maritime Office who decides on the scale of the counteraction required;
- Tier 3 (catastrophic spill) – spills of petroleum products that are extremely dangerous to the environment, the neutralisation of which involves forces and resources subordinate to more than one Director of the Maritime Office.

In most cases, the released petroleum products cause tier 1 spills.

From the environmental point of view, the most sensitive areas in case of possible spills will be the coastal area approximately between Lubiatowo in the east and Łeba in the west. Considering the prevailing westerly wind direction and the occurrence of coastal currents, the areas at risk are the coastal strip with tourist resorts (Białogóra, Dębki and Karwia) and the harbour in Władysławowo.

It should be emphasised that the key issue here is not so much the size of the spill as the place where it has occurred. There are known cases of high bird mortality due to small oil spills into the sea. Extensive oil slicks drifting away from the coasts, in sea areas with very low numbers of birds, do not cause as much population loss as smaller spills in areas of large seabird concentrations (Meissner, 2005). The area of the planned Baltica OWF CI runs through the Natura 2000 site *Przybrzeżne wody Bałtyku* (PLB990002), where large concentrations of wintering birds occur periodically. It should be emphasised, however, that in case of tier 1 spills, the dispersal of petroleum products threatening the protected areas and the objects of protection in those areas is unlikely, providing that proper organisation of prevention and counteraction is ensured.

The determination of the actual extent of spillage will be technically possible only during the event, on the basis of the current meteorological data and the data on the type and potential quantity of the contaminant. Therefore, at the stage of this Report, it is impossible to make a more detailed assessment of the impact on marine organisms that are the most exposed to the effects of oil spills.

The number of potential leaks is proportional to the number of vessels used to carry out the project implementation, its operation or decommissioning.

The largest petroleum product spills may occur as a result of vessel failure or collision, sinking or grounding, as well as during seepage and operational leaks from vessels, and oil spills related to the maintenance and repair of cable lines. In the worst-case scenario, during the construction and decommissioning stages, tier 3 spills (catastrophic spills) will occur. The probability of a major vessel accident has been calculated to be very low, approximately in the order of 1/10 000 years (1/200 probability of an event occurring in 50 years) (Reszko, 2017).

Assuming the worst-case scenario and the release of several hundred cubic metres of diesel fuel into the marine environment, as well as taking into account its type, behaviour in seawater, the time of oil dispersion and drift, it is estimated that the range of pollution will not exceed 5 to 20 km from the Baltica OWF CI area.

### 2.4.2 Other types of releases

#### 2.4.2.1 Release of municipal waste or domestic sewage

During the construction of cable lines, and their possible decommissioning involving dismantling, waste will be generated aboard vessels – mostly municipal and other waste, not related to the construction/dismantling process directly – as well as domestic sewage. Waste and sewage can be accidentally released into the sea, e.g. during a collection by another vessel and in the case of failure, causing local increase of nutrient concentration and the deterioration of water and sediment quality.

No releases of municipal waste or domestic sewage are expected on land. They will be managed in compliance with the binding regulations.

#### 2.4.2.2 Gas emissions to the atmosphere

A failure of the customer substations may result in emissions of gases used as refrigerants in air conditioning systems. In the case of gas-insulated switchgears (GIS) insulated with SF6, which is used as an insulating medium in the MV and HV apparatus, an emergency situation leading to a gas release into the atmosphere cannot be ruled out. Moreover, there may be exhaust emissions from power generators used at the substation.

With regard to the mitigation of accident effects, the following measures are assumed:

- for transformers and reactors – use of leakproof bunds connected to a rainwater pre-treatment system (oil separation) and an additional closure allowing the outflow to be shut off immediately to protect the sewerage system in the event of an oil leak or fire emergency;
- for batteries – use of trays or pans to contain the electrolyte in the event of spillage.

The release of insulating gases to the atmosphere will be prevented thanks to automatic gas density monitoring. If the sensors detect a drop in the gas density below a permissible level, the control system of the switchgear is locked. Moreover, regular periodic checks of enclosure leak-tightness will be carried out, along with gas leakage tests using a sensor, in case of suspected leakage.

#### 2.4.2.3 Contamination of water and seabed sediments with antifouling agents

In order to protect ship hulls against fouling, biocides are used, the composition of which may include for example: copper, mercury and tributyltin compounds (TBT). These substances can transfer into water and eventually be retained in the sediments. It should be assumed that emissions of these compounds will be insignificant. Among the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. Currently, the usage of tributyltin (TBT) (the most harmful substance) in antifouling paints is prohibited. However, the presence of these compounds in the protective coatings of older vessels cannot be excluded. This impact can be reduced by controlling the type of protective coats applied on vessels that will be used to perform activities during the construction, operation and disassembly phases.

#### 2.4.2.4 Release of contaminants from anthropogenic objects on the seabed

It cannot be ruled out that during the preparatory work for the Baltica OWF CI construction process, and particularly during the seabed surveys focused on the occurrence of UXO and chemical weapons, man-made objects can be discovered, the disturbance of which could result in the release of contaminants contained therein (e.g. containers with chemicals or unexploded ordnance).

In 2016, magnetometer surveys were carried out in the Baltica OWF CI in order to detect ferromagnetic objects lying on the seabed or under the sediment layer. The visible continuous magnetic anomalies indicate little variation in the seabed structure. As part of a thorough analysis and verification of magnetic field anomalies, all magnetic anomalies were compared with bathymetric and sonar data to confirm the possible presence of objects lying on the seabed. These analyses revealed the presence of broken anchor lines, among others.

Before the commencement of the construction, the Applicant will conduct surveys on the presence of duds and UXOs on the seabed. In case any chemical warfare agents/UXOs are found during these surveys, the Applicant will notify the relevant authorities and institutions accordingly and will comply with their instructions. In order to determine the way of dealing with such finds, the Applicant will prepare a plan for handling dangerous objects, both from the point of view of operational work at sea (for example, rules for conducting work in the vicinity of potentially hazardous objects) and from the point of view of possible removal or avoidance of such objects. The basic assumption of the plan for dealing with dangerous objects is to avoid threats to human life and health and to avoid the spread of contaminants from such objects.

The Applicant uses a risk management platform suggested by the ORDTEK company (https://ordtek.com/services/marine-based-projects/). In line with the document, before the actual work on the seabed is commenced, an ALARP (as low as reasonably practicable) certificate should be obtained for the possibility of contact with the UXOs or chemical warfare agents deposited in or on the seabed. The risk management in this respect involves taking coordinated action in a sequence consisting of 5 stages:

1. Desk study provides an estimation of the risks associated with UXOs and CWAs.

   The study is aimed at reviewing the geophysical and geotechnical information in the context of the presence of UXOs and chemical warfare agents. Additionally, it should include the historical and current knowledge on the possible presence of UXOs and CWAs, including in particular the information on the natural environment, which may point to the possible burying or movement of UXOs and CWAs within the area of potential operations. The risks identified should be catalogued together with the assessment of the probability of their occurrence and an assessment of potential consequences.

2. Strategy for counteracting risks associated with UXOs and CWAs.

   The preparation of the counteracting strategy is intended to determine the scope of actions necessary to minimise the risks associated with UXOs and CWAs and reduce them to the ALARP level. That stage is used to find the level of risk which can be accepted with economically justifiable minimisation measures.

3. Geophysical surveys on the presence of UXOs and CWAs.

   If identified as necessary in the counteracting strategy, special geophysical surveys can be carried out aimed at detecting UXOs and CWAs. They can be carried out in the areas known to be required for the purposes of the project implemented and for which an increased risk of the UXOs and CWAs occurrence was identified. These can include high-resolution magnetometer, bathymetric and sonar surveys as well as visual inspections.

4. Identification of possible UXOs and CWAs.

   On the basis of all the information collected, the location of possible occurrence of UXOs is selected. The selected locations are compared with the complete set of information that served as the basis for the conclusion of the possible occurrence of UXOs and CWAs. In case it is impossible to select any potential locations for the presence of UXOs and CWAs on the basis of the data available, the next step is taken, which is the issuance of the ALARP certificate. In the case such locations are selected, they are subject to further actions.

5. Actions minimising the risks associated with UXOs and CWAs

   There are many possible ways in which the risk associated with UXOs and CWAs can be minimised. The main action at the stage of linear project planning may be the change of the project route to bypass hazardous locations. Another way to reduce the risk may be to decide to physically remove the hazardous objects either by detonation at the location or by relocation and elimination elsewhere. Such actions will be undertaken in compliance with the binding regulations and contracted to specialised and legally authorised companies. Such entities have their own procedures in place which are aimed at ensuring safety during such operations. Minimisation actions may lead to the need to repeat some previous operations (e.g. if a project needs to be routed beyond the area surveyed).

After the completion of all the above-mentioned stages, the ALARP certificate is issued for individual operations connected to the work on the seabed, for example, for geotechnical or installation works. The ALARP certificate relates to specific operations in particular locations and is subject to external audits to confirm that the risks associated with UXOs and CWAs have been reduced to the acceptable level.

Despite best efforts, at the procedure stages described above, it cannot be excluded that UXOs and CWAs may be encountered in the area of seabed activities. In this case, it is essential that the seabed survey personnel is aware of the possible hazards, trained for such events and equipped with resources and measures to mitigate the effects of contact with UXOs and CWAs. In practice, this comes down to training personnel in hazard recognition, equipping them with personal protective and countermeasure equipment, providing emergency support of UXO and CWA specialists, as well as access to specialist medical care in the event of contamination or detonation.

### 2.4.3 Environmental threats

#### 2.4.3.1 Construction and decommissioning phase

The construction phase and the possible decommissioning by dismantling of the transmission infrastructure will be similar in terms of technologies, equipment and workload applied. Therefore, it can be assumed that the scope of potential threats to the environment in both phases will be the same.

Based on the data obtained from other projects implemented in offshore areas and similar undertakings, as well as the authors' knowledge and experience, the following potential environmental threats, which may become a source of negative impact of on the environment, have been identified for the construction phase and possible decommissioning:

- spillage of petroleum products as a result of collision of ships in an emergency situation;
- spillage of oils from the equipment used to bury cables in the seabed;
- accidental release of municipal waste or domestic sewage;
- accidental release of chemicals;
- contamination of water and seabed sediments with antifouling agents.

As a direct result of emergency situations and incidents, the abiotic environment, especially seawater and – to a lesser extent – seabed sediments, can become contaminated. On the other hand, these events can also indirectly affect living organisms, those inhabiting or otherwise using the seabed, water column and the surface of the sea. The contamination of water or seabed sediments with municipal waste or domestic sewage is a direct negative impact, temporary or short-term, reversible and of local range. The scale of the impact is negligible.

The collision of ships and the resulting release of hazardous substances into the environment (especially petroleum products) is a factor which can cause increased mortality and diseases of marine organisms, including those that are subject to protection in such areas. The likelihood of such events can be considered low. The implementation of a collision and leakage management plan for the duration of the project, in accordance with the applicable laws, is aimed at minimising the impact of such events on marine organisms and the protected areas.

In the onshore part, during the construction and possible decommissioning of the Baltica OWF CI elements, potential accidents may be related to the incidental pollution of soil caused by hazardous substances originating from the leakages from vehicles and equipment involved in the construction works, which may lead to local soil contamination. When analysing potential threats consisting in contamination of soil by petroleum products from damaged machines and vehicles, it should be noted that the impact of this kind may only be of short-term character (even momentary) and actually a one-off in terms of occurrence frequency. In such cases only small quantities of pollutants may be released to the environment and the spatial range of such impacts should be considered spot-like.

The Applicant assumes that the most probable form of the decommissioning phase will be deactivation of the Baltica OWF CI. Following the end of operation, the power cables will remain buried in the seabed sediment and soil. Neither the OnSS nor the busbar systems will be dismantled. In this case, no environmental hazards will occur.

#### 2.4.3.2 Operation phase

During the operation, due to maintenance activities, threats to the marine environment may result from the contamination of water and, to a lesser extent, sediments with:

- petroleum products;
- antifouling agents;
- accidentally released municipal waste and domestic sewage;
- accidentally released chemicals.

Waste and sewage will be generated by people on service vessels periodically carrying out inspections of the connection infrastructure and on vessels involved in works aimed at rectifying potential failures.

The impacts caused by the occurrence of emergency situations during the operation phase are partially identical to those which may occur during the construction phase. Only the aspect regarding the accidental release of chemicals and waste is slightly different. Periodic inspections of the cable lines will be carried out during the operation. An accidental release of small quantities of waste or operating fluids into the sea cannot be excluded.

Cable lines buried in the seabed sediment and soil – as opposed to those laid on the seabed without protection as well as overhead lines – are less exposed to adverse environmental factors but their potential damage is usually permanent, and their repair is more expensive and time-consuming. It should be noted, however, that the failure rate of underground cable lines is extremely low, considerably lower than that of overhead lines. The following cable line failures can be distinguished (Pędzisz, 2007):

- simple: single-, two- and three-phase earth faults; one-, two- or three-phase interruptions and transient short circuits;
- complex: including two or more simple failures, e.g. a single-phase short circuit with a simultaneous phase break.

Two types of causes of cable line damage are distinguished:

- external: any damage resulting from other human activities (e.g. earthworks on land, anchoring of vessels at sea as well as the use of active bottom-set fishing gear in the locations of the cable line installation) and random incidents (sinkholes, ground settlement, damage caused by animals, etc.);
- internal:
    - design errors and technological defects not found upon acceptance,
    - incorrect installation and assembly errors,
    - electrical, including partial discharge,
    - ageing, material fatigue,
    - inadequate protection of lines against atmospheric and switching surges,
    - inadequate protection of lines against overcurrents (increase of electric current in the circuit above the permissible value),
    - inadequate protection of lines against corrosion.

Most often, damage to cable lines is a process consisting of many aspects occurring in succession. According to literature, electrical causes have the largest share (approx. 40% of failure incidents). These usually include lightning surges and overcurrents. Non-selective operation of the protection automation during a short circuit can cause thermal damage to the cable in many places, making fault location difficult and increasing failure repair time.

In the case of the OnSS failure, gas emissions to the atmosphere may occur (flue gases from the power generator activated in emergency situations, leaks of cooling agent from the cooling system or leaks of SF6 insulating gas if a gas-insulated switchgear is used). There is also a risk of a leakage of electrolytes, fire extinguishing agents and the power generator fuel.

A hazardous substance which will be used within the area of the substation is a transformer oil. In total, all transformer units may contain up to approx. 1550 Mg of transformer oil.

To minimise the risk of contamination with the oil from the equipment installed in substations, installations with separators and leak-proof tanks will be used to collect the substance in case of failure. Equipment containing oil will be equipped with oil sumps with a capacity of at least 10% larger than the volume of oil contained in them.

Onshore substations will be classified as plants with increased or high risk of a major industrial accident.

### 2.4.4 Failure prevention

Failure prevention covers a comprehensive range of activities related to the protection of human life and health, the natural environment and property, as well as the reputation of all participants in the processes related to the construction, operation and decommissioning of the Baltica OWF CI. The highest risk of a failure resulting in a serious threat to the environment concerns the works performed in the offshore area. In order to eliminate or minimise such risks various actions will be taken, including (among others):

- drafting engineering-geological documentation to enable optimisation of the route and consequently the duration of laying the cable lines, particularly in the area of the TSS Słupska Bank;
- developing plans for the safe construction, operation and decommissioning of the Baltica OWF CI in accordance with the applicable legal regulations for the duration of the project implementation;
- developing plans for navigational safety;
- developing rescue plans and training of crews and personnel, including the principles of updating and verification by conducting regular exercises, in particular determining the procedures for the use of own vessels and external vessels, including helicopters;
- developing a plan for counteracting threats and pollution arising during the construction and operation of the Baltica OWF CI;
- selecting subcontractors, suppliers as well as certified parts and components of the Baltica OWF CI;
- designating safety zones for the Baltica OWF CI, its facilities and vessels moving within the area;
- planning offshore operations, in particular for several operations conducted simultaneously (SIMOPS);
- applying the standards and guidelines of the International Maritime Organisation (IMO), recognised classification societies and maritime administration recommendations, including;
    - for large ships – the SPS Code,
    - for small ships – the Certificates of Compliance (CoC);

- providing adequate navigational support in the form of maps, navigational warnings and, where relevant, navigational markings;
- providing direct or indirect navigational supervision using a surveillance vessel or remote radar surveillance and AIS (Automatic Identification System);
- continuous monitoring of vessel traffic regarding the vessels involved in the construction, operation and possible decommissioning phase;
- establishing a coordination centre supervising the respective phases of the project implementation;
- maintaining regular communication lines between the Baltica OWF CI coordination centre and the coordinator of works at sea and other coordination centres (Maritime Rescue Coordination Centre in Gdynia and maritime administration).

The likelihood of a major failure in the onshore part of the connection infrastructure is lower than in the offshore section. In the event of a need to remove an accidental oil spill from vehicles and equipment involved in construction and possibly demolition works, construction and maintenance crews will be equipped with sorbents to absorb oil-derived substances and construction workers will be required to permanently remove any small spills they notice. The used sorbents will be collected and handed over for recovery or neutralisation by specialised companies. Such companies must have appropriate permits in accordance with the provisions of the Waste Act.

Customer substation equipment containing oil is not expected to cause oil spills to the environment or soil and surface water contamination, since it will be equipped with oil sumps to collect any possible spillage.

Such situations involving equipment failures in substations are extremely rare, have a small scale and are local in terms of impact.

Preventive measures that can be applied to minimise the risk of a failure on land include:

- implementing procedures aimed at mitigating failure consequences by identifying the site of the failure and containing it as quickly as possible in order to secure the uninterrupted operation of the substation;
- during construction works, conducting ongoing inspections of machinery and equipment in order to detect possible spills at an early stage;
- during substation operation, conducting periodic inspections of the technical condition of equipment to detect irregularities and prevent technical failures that could cause adverse environmental impacts;
- implementing a leak detection system and using sealed sumps under transformers and oil-insulated shunt reactors within substations. Oil sumps for such equipment will have appropriate dimensions to ensure that entire spill is collected plus a reserve volume of at least 10% of the oil volume contained in the units;
- using an $SF_6$ gas leak detection system.

### 2.4.5 Design, technology and organisational security expected to be applied by the Applicant

The risk of a major accident, natural and construction disasters is minimal. The Applicant intends to use state-of-the-art technologies to ensure high reliability of electricity transmission and to comply with relevant environmental and economic standards and requirements.

Design, technological and organisational security mainly relies on carrying out navigational risk assessments and developing prevention plans against:

- threats to human life – evacuation plans, search and rescue plans;
- fire hazards on ships involved in the project implementation;
- environmental pollution risks – action plan for counteracting threats and contamination from oil spills by ships involved in the project implementation.

In order to ensure safety, prior to the commencement of installation works, the entity responsible for the implementation of the Baltica OWF CI will develop a navigational safety plan, including:

- a preliminary schedule accounting for the division of labour and areas of operation, including:
  - construction activities,
  - vessel names,
  - planned commencement and completion dates,
- for the vessels, their technical specifications will be made available. Before each vessel is mobilised, a work readiness audit will be carried out to verify their suitability and efficiency as well as the documentation of the works. The audit will be carried out in accordance with the requirements and guidelines of the Common Marine Inspection Document (CMID) using IMCA inspection documents and the Common Marine Inspection Document (eCMID) database. Vessels will be inspected in terms of occupational safety and environmental protection before and during mobilisation. A recognised organisation will conduct an independent Marine Warranty Survey on all construction vessels;
- with regard to offshore operations planning, the following will be presented:
  - organisational chart,
  - emergency response plan (ERP);
- each offshore operation will include:
  - assembly procedures and analyses,
  - task-based risk assessment processes (TBRA, JSA),
  - readiness review,
  - analysis of simultaneous operations (SIMOPS),
  - weather forecasting and decision-making assistance for offshore operations,
  - calibration of vessel equipment;
- for the purpose of marine operations, the following will be determined:
  - safety zones for specific areas, for cable laying vessels (CLV) and support vessels, including barges and other vessels with limited manoeuvrability,
  - safety zones in the event of UXO or CWA discovery,
  - use of a patrol vessel or indirect monitoring,
  - rules for communicating (e.g. Securite messages), direct monitoring by guard vessels (GV) and technical monitoring (e.g. CCTV, ARPA, AIS) as well as responding to security zone violations (e.g. Pan-Pan messages),
  - ERP activation procedures;
- principles of alerting and exchanging information with maritime administration and other operational services (SAR, Border Guard, Navy, Hydrographic Office of the Polish Navy).

Additionally, by virtue of the decisions referred to in Section 1.1, the Minister of Maritime Economy and Inland Navigation and the Director of the Maritime Office in Gdynia obliged the Applicant to fulfil a number of conditions and requirements for the project implementation, the majority of which refer to the protection of people and the environment from the negative impacts of the project, i.e.:

According to the decision of the Director of the Maritime Office in Gdynia it is necessary to:

- control the technical condition of machinery and equipment on an ongoing basis throughout the project implementation, and employ equipment characterised by favourable acoustic and environmental properties;
- include a description of the monitoring and management of the investment and operation process in the building permit design;
- carry out appropriate waste management in accordance with the Waste Act;
- perform the works within the planned project in a manner having the least possible impact on the marine environment;
- provide the Hydrographic Office of the Polish Navy with information in the form of geodetic coordinates of the project and give appropriate advance notice of the commencement of the works, the expected date of their completion and the scope of the works, in order to include the above information in official publications;
- agree on possible conflicts of the project in question with other planned linear objects, covered by ongoing administrative proceedings, in relation to projects characterised by a similar scope;
- account for the passage of cables through the approach area to the TSS Słupska Bank by designing an appropriate depth of cable laying in the seabed, and apply additional protective measures, if required by any analyses or arrangements;
- carry out analyses of the risk posed by conducting works in the approach area to the TSS Słupska Bank in the phases of construction, operation and cable decommissioning;
- plan the cable laying process in a manner ensuring safety and the minimum disturbance to vessel traffic in the approach area to the TSS Słupska Bank;
- take into account the abrasiveness of the seashore and the possibility of exposing the cable, when designing the area of cable intersection with the technical belt,
- design the cable landfall using the directional drilling technology; the axis of the borehole should run perpendicular to the line of the seashore;
- design the drill exit points in the sea area beyond the sandbank zone and at a distance of not less than 700 m from the line marked by the seaward dune baseline:
- agree with the Maritime Office in Gdynia on the locations of drill exit points in the onshore area;
- take into account cable crossings through the Łeba 1 area of prospective occurrence of sands for artificial shore nourishment, by designing appropriate depth of cable burial in the seabed and applying possible additional protective measures to enable sand excavation to the depth of 2.5 m, in case the deposit is unused;
- on completion of the works, provide the Hydrographic Office of the Polish Navy and the Maritime Office in Gdynia with information (materials) on the location of the cables, including the cable route and its depth below the seabed, in order to update navigation publications; all coordinates should be recorded in the WGS84 system;
- provide the Maritime Office in Gdynia with post-completion geodetic documentation containing the cable locations under the seabed.

By decision of the Minister of Maritime Economy and Inland Navigation, the following is required:

- prior to the commencement of the planned works, provide the Hydrographic Office of the Polish Navy in Gdynia and the Director of the Maritime Office in Słupsk *[note: the Maritime Office in Słupsk was dissolved after this decision was issued, the relevant office for the purpose of submitting coordinates is now the Maritime Office in Gdynia]* the geocentric geodetic coordinates of the project and notify in advance of the commencement of the works, the expected date of their completion and the scope of the works, and upon the completion of each stage and of the entire project – provide the Hydrographic Office of the Polish Navy in Gdynia and the Director of the Maritime Office in Słupsk *[note: as above]* the post-completion documentation indicating: ordinates of the cables, their course and coordinates of turn points, in order to update nautical charts and publications;
- in the case of encountering archaeological objects during works in the PMA, notify the director of the relevant Maritime Office accordingly, and follow the principles specified in Article 32 section 1 points 1–3 and 32 section 10 of the Act of 23 July 2003 *on the protection and care of monuments* (consolidated text: Journal of Laws of 2017, item 2187, as amended);
- in the case of planned disposal of spoil or waste to the sea, obtain a permit from the Director of the relevant maritime office, in accordance with § 2 or § 3 of the Regulation of the Minister of Transport and Construction of 26 January 2006 *on the procedure for issuing permits for sea disposal of dredged material and for dumping waste or other substances at sea* (Journal of Laws of 2006, No. 22, item 166);
- submit a detailed work schedule to the Director of the Maritime Office in Słupsk *[note: as above]* and two weeks prior to the commencement of cable installation and immediately after the completion of these works or each stage thereof – submit information to be included in Navigational Warnings and Notices to Mariners to the Hydrographic Office of the Polish Navy in Gdynia and the Director of the Maritime Office in Słupsk *[note: as above]*, i.e. entities responsible, pursuant to Article 41(b) section 1 point 5 of the Act, for the coordination of the national system of circulation of nautical information and navigational warnings;
- fulfil the requirements specified in the Regulation of the Minister of Maritime Economy of 23 October 2006 *on the technical conditions of use and the detailed scope of inspection of marine hydro-engineering structures* (Journal of Laws of 2006, No. 206, item 1516), and in particular conduct depth soundings in order to determine the maximum draught of vessels that will be able to pass over the cables;
- take into account the applicable national plan for combating threats and pollution, in accordance with the provisions of the Regulation of the Council of Ministers of 8 August 2017 *on the organisation and methods of combating threats and pollution at sea* (Journal of Laws of 2017, item 1631, as amended), and in particular:
  - conduct the works in a manner that excludes the contamination of marine waters, maintain cleanliness and order in the area of the works,
  - limit and regularly remove from the water any contaminants resulting from the works conducted,
  - use non-mechanical means of petroleum hydrocarbon removal from the water surface only after obtaining the consent of the director of a relevant Maritime Office,
  - immediately notify the appropriate harbour master's office or VTS of environmental contamination.

### 2.4.6 Potential causes of failures including extreme situations and the risk of natural and construction disasters

In the case of the offshore area, the greatest potential risks will occur during the construction phase and possible decommissioning; however, the risk of a disaster is minimal given the fact that the planning of offshore operations always takes into account weather conditions and the possibility of modifying work schedules. Every offshore operation has its limitations in terms of visibility, wind speed, sea state or ambient temperatures. Adverse weather conditions such as too strong wind or too high waves can only result in the extension of the construction cycle and an increased demand for energy – fuel consumption. During the construction and operation phases, no extreme situations are expected to occur that would result in serious damage to the export cables or to the vessels involved in the construction and maintenance works.

The Baltica OWF CI is situated beyond the zone of landslides and areas prone to mass movements according to the "Register of Landslides and Areas Prone to Mass Movements of the Earth" (Polish Geological Institute, 2011) and the Landslide Counteracting System (SOPO).

According to the flood risk map prepared pursuant to the Regulation of the Minister of Maritime Economy and Inland Navigation of 4 October 2018 *on the development of flood hazard maps and flood risk maps* (Journal of Laws of 2018, item 2031), the Baltica OWF CI is located outside the fluvial flood risk areas. An area at risk of flooding from the sea is the strip of the beach up to the dune base, i.e. the area where the cable lines are landed using a trenchless method well below the ground surface. The area of works will be located in the technical belt within the meaning of Article 36 section 2 point 1 of the Act of 21 March 1991 *on the marine areas of the Republic of Poland and maritime administration* (consolidated text: Journal of Laws of 2020, item 2135, as amended), which according to Article 16 section 34 of the *Water Law Act* of 20 July 2017 (consolidated text: Journal of Laws of 2021, item 624, as amended) is a special flood hazard area. When planning the project, the Applicant will take into account the conditions arising from the location in the flood risk area and will consider the appropriate means of protection against damage. As a result, it can be ruled out that the Baltica OWF CI will be at risk of failures caused by flooding.

Within the meaning of Article 73 of the *Construction Law* of 7 July 1994 (Journal of Laws 2020, item 1333, as amended), a construction disaster is understood as an unintentional, sudden destruction of a civil structure or its part, as well as structural elements of scaffolding, elements of forming devices, sheet piling and excavation lining. The risk of a construction disaster is unlikely to emerge in the context of cable lines, which will be buried in the ground in the offshore and onshore areas, beyond landslide and flood-prone areas that could expose the buried cables. The occurrence of a construction disaster with reference to OnSS buildings and equipment as well as relatively short busbar systems (up to 190 m each) is expected to be minimal. The equipment and buildings will be erected in an area that is not at risk of landslides and flooding, non-urban, flat, not overgrown with trees and shrubs, with the best standards of construction and OHS observed. The equipment and buildings erection design will also include protective measures against extreme weather phenomena such as hurricane force winds, storms and hailstorms that could endanger their construction and operation.

### 2.4.7 Risk of major failures and natural or construction disasters, taking into account the substances and technologies applied, including risks related to climate change

The power sector was listed as one of the climate-sensitive sectors (Ministry of the Environment, 2013) due to the predominance of overhead lines in the Polish power system, which are highly vulnerable to failures caused by strong winds and excessive icing, as opposed to cable networks.

The risk of a major failure, natural or construction disasters in the context of the construction, operation and possible decommissioning of the Baltica OWF CI will be minimal. The Applicant intends to use the state-of-the-art technologies to ensure high reliability of electricity transmission and to comply with the relevant environmental and economic standards and requirements. The implementation of these tasks will be achieved by means of:

- using conductive, insulating and structural materials characterised by high operating parameters;
- using technically sound vessels, vehicles and equipment;
- selecting the most reliable and safest construction methods for power lines, customer substations and busbar systems;
- conducting maintenance operations.

The most significant risk may be related to the spills of petroleum products at sea, which can adversely affect the marine and coastal environment. The probability of such an event is, however, minimal and equals approx. 1/10 000 years (a 1/200 chance probability of such an event within 50 years).

The effects of climate change observed in recent decades are manifested in particular by an increase in temperature as well as in the frequency and severity of extreme events. Under the United Nations Framework Convention (the so-called Climate Convention) on Climate Change of 9 May 1992, in order to avoid the most serious threats from climate change, measures were agreed to reduce greenhouse gas emissions, which have a significant impact on the global energy balance of the climate system. The reduction of greenhouse gas emissions on a global scale is a complex issue. In the foreseeable future, greenhouse gas emissions will not be reduced sufficiently to contain climate change. In this situation, one of the priorities, apart from mitigating the effects of climate change, is a possible adaptation to it, also in the scope of the planned undertakings.

Climate change scenarios for Poland, developed for the KLIMADA project (Ministry of the Environment, 2013), provide descriptions of probable future climate conditions up to 2030. They are based on the results of hydrodynamic simulations of atmosphere and ocean models. Due to a significant level of uncertainty, they cannot be regarded as certain climate projections, but they represent the best available approximation of future change.

Extreme events (heavy rainfall, floods, deluges, landslides, heat waves, droughts, storms, landslides, etc.) resulting from climate change are projected to increase in frequency and intensity in the future. These phenomena will occur with increasing frequency and intensity and will affect larger areas of the country. Climate change is associated with adverse changes in hydrological conditions. Although the annual sums of precipitation do not change significantly, their character becomes more random and uneven, resulting in longer periods without rainfall, interrupted by sudden and heavy rainfalls.

Impacts of climate change in the coastal zone primarily include an increase in the frequency, intensity and duration of storms. This can be accompanied by an increased irregularity of these events, i.e. long periods of relative calm can be followed by repeated storms preventing coastal regeneration. An additional factor accelerating the process of coastal erosion is an increase in average winter temperatures, as a result of which a reduction in the ice cover protecting the beaches from storm surges, and thereby safeguarding them against coastal erosion, should be expected. The scenarios of sea level changes demonstrate that in the period 2011–2030 the average annual sea level along the entire coast will be approximately 5 cm higher compared to the values from the reference period, i.e. 1971–1990 (Jakusik *et al.*, 2012). An increase in the frequency of storm floods and more frequent flooding of low-lying areas, as well as the degradation of the coastal cliffs and seashore, which will entail a strong pressure on the infrastructure located in these areas, are very important effects of the climate change. This was also an important premise for the Applicant with regard to bringing the subsea cable lines ashore using a trenchless method to avoid disturbing the coastal zone and the beach, which are subject to the strongest hydrodynamic influence, and to locate the offshore cable landfall in the onshore area to reduce the risk of drilling chamber damage. When planning the project, the Applicant will take into account the conditions arising from the location in the Flood Risk Area and will consider the appropriate means of protection against damage.

## 2.5 Relations between the parameters of the project and its impacts

The matrices of connections between the planned project parameters and the impacts for the offshore and onshore part are presented in Table 2.18 and Table 2.19.

*Table 2.18. Matrix of connections between the project parameters and impacts – offshore part [Source: internal materials]*

| Project parameter | Impact (type of emission / disturbance) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Heat | EMF | Above-water noise | Underwater noise | Waste | Light effects | Seabed disturbances | Resuspension of contaminants | Creation of an artificial reef | Water contamination | Air pollutions | Increased vessel traffic and collision risk |
| Length and type of cables | X | X | | | | | | | | | | |
| Method of cable line construction, construction belt width and depth of cable burial | X | X | | X | | | X | X | | | | |
| Method of cable lying on the seabed and cable protection | X | X | | | | | X | X | X | | | |
| Traffic of construction, inspection and service vessels | | | X | X | X | X | | | | | X | X |
| Horizontal drilling | | | | X | X | | X | X | | X | X | |

*Table 2.19. Matrix of connections between the project parameters and impacts – onshore part [Source: internal materials]*

| Project parameter | Impact (type of emission / disturbance) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Destruction of the ground surface – tree felling | New buildings | Noise | Waste | Sewage | EMF | Heat | Air pollutions |
| Cable length and number | X | | | | | X | X | |
| Voltage range | | | | | | X | X | |

| Project parameter | Impact (type of emission / disturbance) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Destruction of the ground surface – tree felling | New buildings | Noise | Waste | Sewage | EMF | Heat | Air pollutions |
| Method of cable line construction, width of the permanent and temporary belts, depth of cable burying | X | | X | X | X | | | X |
| Number, type and location of customer substation components | | X | X | X | X | X | | X |
| Horizontal drilling | | | X | X | X | | | X |

# 3 Environmental conditions

## OFFSHORE AREA

### 3.1 Location, seabed topography

The offshore area of the Baltica OWF CI begins within the area of the northern slope of the Słupsk Bank and runs landwards across the Stilo Bank area until the coastline near the 162.5 km of the seashore (according to the Maritime Office shoreline chainage). It covers the seabed with a depth from approx. 50 MBSL to 0 m [Figure 3.1].

Based on the analysis of the bathymetric data obtained during the measurement and survey campaign, the seabed relief was identified. The analysis of sonar data enabled the interpretation of seabed features. Based on the analysis of seismo-acoustic data, drilling data and using the literature data on the survey area, the seabed relief structure and main types of seabed sediments were identified [Dadlez, 1995a, 1995b; Gudelis and Jemielianow, 1982; Kramarska *et al.*, 1999; Kramarska, 1995a, 1995b, 1995c; Mojski (ed.), 1995; Pikies, 1995; Uścinowicz, 1995a, 1995b, 1995c, 2014; Uścinowicz and Zachowicz, 1991a, 1991b].

The northern part of the Baltica OWF CI covers a seabed with a varied relief. A significant part is an area of kame terrace plains [Figure 3.2]. They cover the seabed at depths from approx. 32 to approx. 38.0 MBSL. The seabed surface is slightly undulated, with small height differences associated with the presence of sand formations and outcrops of older sediments. The seabed slopes reach 2–3°, up to a maximum of over a dozen degrees within the slopes of the outcrops of older sediments. In the central part of the northern fragment of the Baltica OWF CI area, the seabed has the character of an abrasive-accumulative platform [Figure 3.2]. The seabed in this area is situated at a depth from approx. 33 to approx. 50 MBSL. The seabed is level, with height differences of 0.5–1.0 m, maximally up to 2.0 m, associated with the presence of sand accumulations on the surface of cohesive sediments and the outcrops of older sediments. The seabed slopes reach 2–3°, up to a maximum of over a dozen degrees within the slopes of the outcrops of older sediments. In this part of the Baltica OWF CI, there are also fragments of the seabed with the character of a moraine upland, an upland slope and an area of relict hills of old tills transformed by glaciotectonic activity [Figure 3.2].

Landwards, the Baltica OWF CI route crosses a seabed area with an abrasive-accumulative plain character, with the seabed fragments structured like an accumulation platform – sandy seabed areas with a level, slightly undulated surface, with traces of sandy material moving eastwards [Figure 3.2].

In the southern part of the area analysed, there is a foreshore slope [Figure 3.2]. It covers the seabed at depths from approx. 12–13 to approx. 24–25 MBSL. In the southern and central part of the foreshore slope, the seabed depth ranges from approx. 12–13 to 19–20 MBSL. In the northern part, it gently descends from approx. 17–18 m to approx. 24–25 MBSL. In this part of the foreshore slope, the seabed slope varies between 1 and 2°, whereas in the southern part of the foreshore slope the seabed slope is up to 1°. The seabed in the northern part is even, whereas in the central and southern part it is undulated, with numerous sandy formations such as bars and domes with a relative height of up to 3 m above the surrounding seabed.

The shallowest section of the Baltica OWF CI route is the sandbank zone. It covers a strip of sandy seabed with a width of 1200–1300 m, stretching from the shore into the sea, up to a depth of approximately 12–13 m. Within this strip, three sandbanks have developed. The sandbank closest to the shore (sandbank 1) has the most varied, wavy course. Its ridge is at a depth of approx. 1–2 m and is located from approx.50 to approx. 150 m from the waterline. The ridge of sandbank 2 is situated approx. 250–350 m from the waterline at a depth of 3.5 to 4 m. The ridge of sandbank 3 is situated approx. 500–700 m from the shoreline at a depth of 4 to 5 m. The seaward slope of sandbank 3 is long and descends gently towards the sea. Its gradient does not exceed 1°. The slope surface is even and only in the area of the base of the sandbank slope is the unevenness of the seabed visible, which is related to the development of sandy formations within the foreshore slope.

The sandbank zone is subject to intensive changes within a storm cycle. During storms, the sandbanks are washed out and transformed. Already in the storm dissipation phase and after the storm, during the period of calm wave conditions, the sandbanks are restored. The number of sand bars before and after the storm usually remains unchanged and is related to the volume of sand material from which the sandbanks are formed, accumulated in the nearshore seabed area. The sandbanks are subject to continuous transformation; they may be locally washed out, e.g. by rip currents, but the position of their ridges in relation to the shoreline is approximately constant (Sitkiewicz *et al.*, 2020).

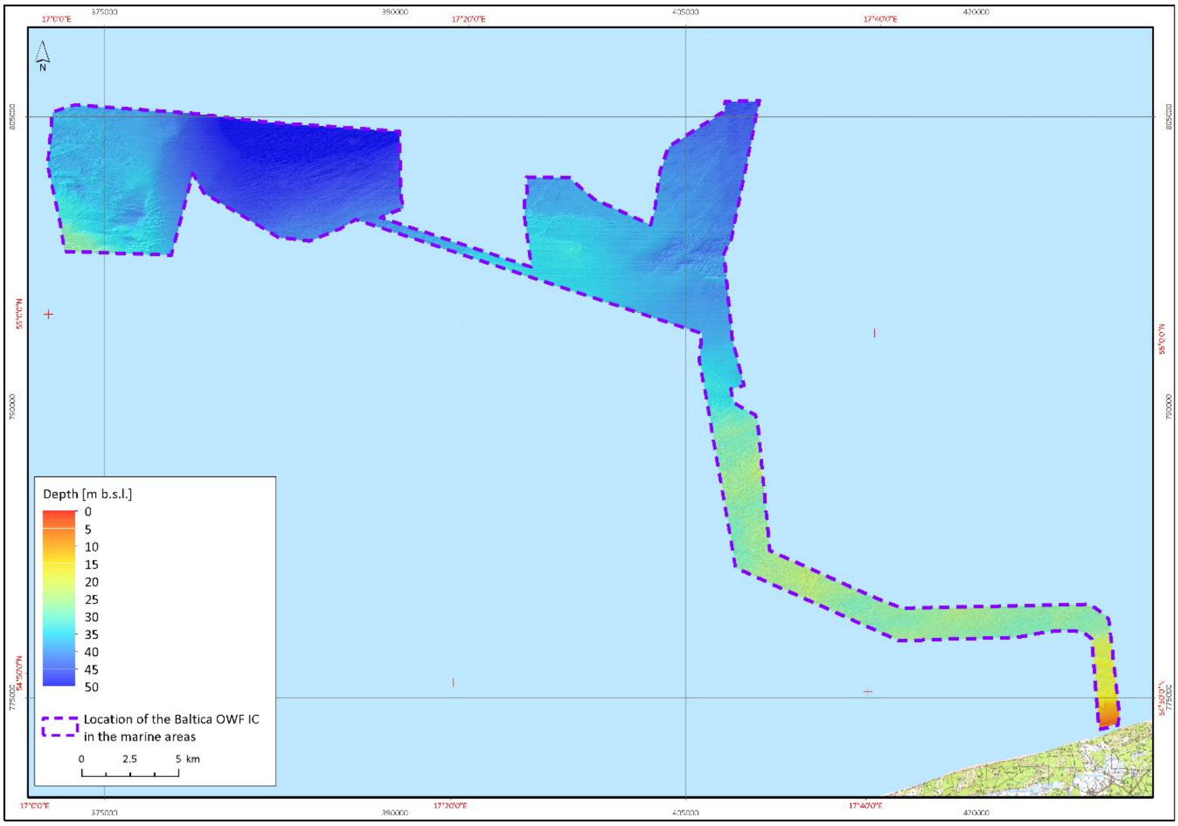



*Figure 3.1. Bathymetric map of the offshore area of the planned Baltica OWF CI [Source: internal materials]*

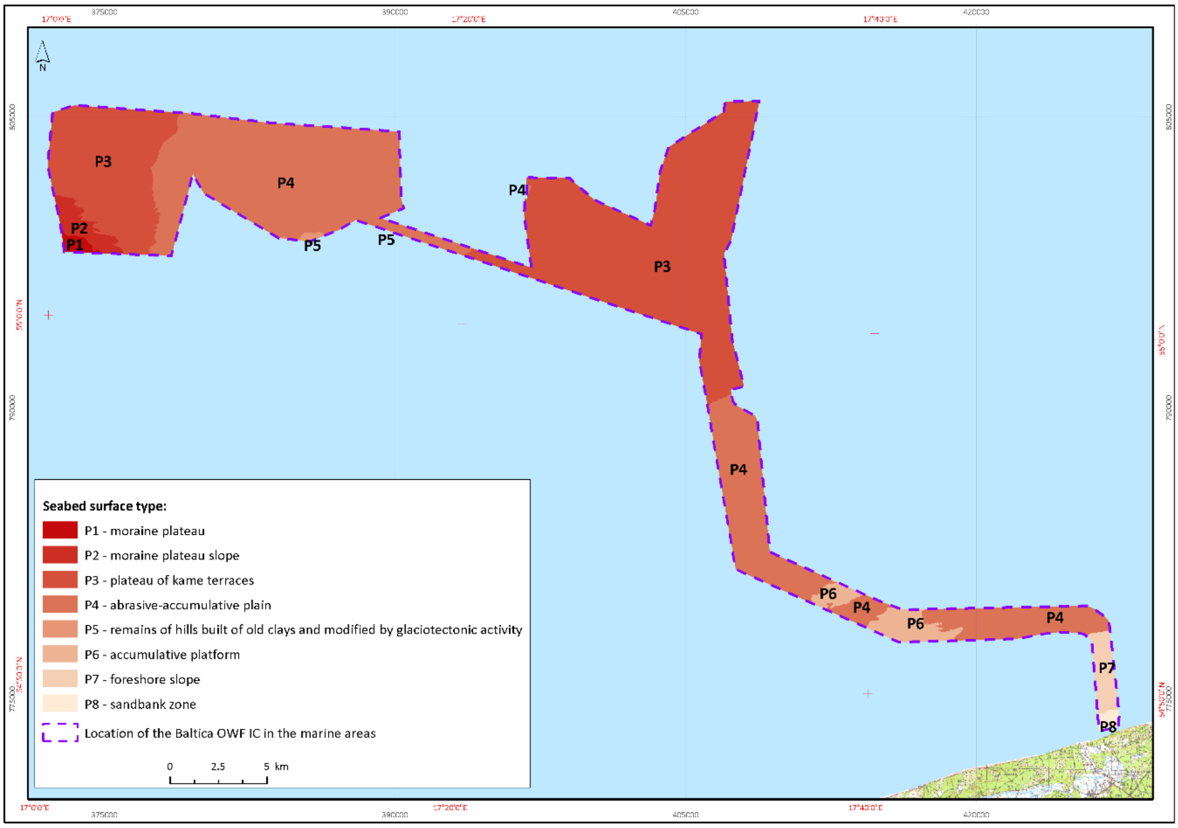



*Figure 3.2. Seabed types in the offshore area of the planned Baltica OWF CI [Source: internal materials]*

## 3.2 Geological structure, seabed sediments, raw materials and deposits

### 3.2.1 Geological structure, geotechnical conditions

Within the area analysed, the crystalline basement is situated at depths from approx. 2600 m to approx. 3000 m. Within the crystalline basement, there are the "Białogóra" fault and the "Smołdzino" fault, renewed only in the Palaeozoic sediments (Cambrian-Silurian) [Dadlez 1995b, Mojski (ed.), 1995]. The sedimentary cover is made up of Cambrian, Ordovician, Silurian and Permian formations. These are mainly Cambrian sandstones and silt-clay sediments, Silurian clays as well as Zechstein dolomites, anhydrites and rock salts. Mesozoic sediments are present only in the substrate structures of the southern part of the Baltica OWF CI and are represented by Triassic and Cretaceous sediments. These are mainly Triassic claystones, siltstones and sandstones as well as Cretaceous quartz-glauconite sands and sands with phosphorites. Quaternary formations lie directly on the Paleogene and Neogene sediments represented by sands and silty clays often mixed with carbonaceous substances. The top of the Paleogene and Neogene formations is erosive in nature and is located at a depth from several to more than 30 m. The Quaternary is represented mainly by glacial sediments, mostly till and sand and till sediments, fluvioglacial sand and sand and gravel sediments, as well as local accumulations of clays, silts and fine-grained sands of glacio-lacustrine origin, covered with modern marine sands. The thickness of the Quaternary formations in the survey area is between 20–30 m on average. The exception is the last, southern section of the Baltica OWF CI. In this region, in the Pleistocene deposits, a depression with the character of a subglacial valley was identified [Figure 3.3] [Uścinowicz, 1995a]. It can be over 100 m deep. It is formed in glacial sediments and the underlying Palaeogene and Neogene deposits. The valley can be filled with fluvioglacial sediment, with a high ratio of sand and glaciolacustrine sediments. Within its area, the sand thickness may be equal to the depth of the valley. In the vicinity of the valley, just below a thin layer of modern marine sands, at a depth of 10–15 MBSB, glacial deposits in the form of tills, sands and gravels can occur.

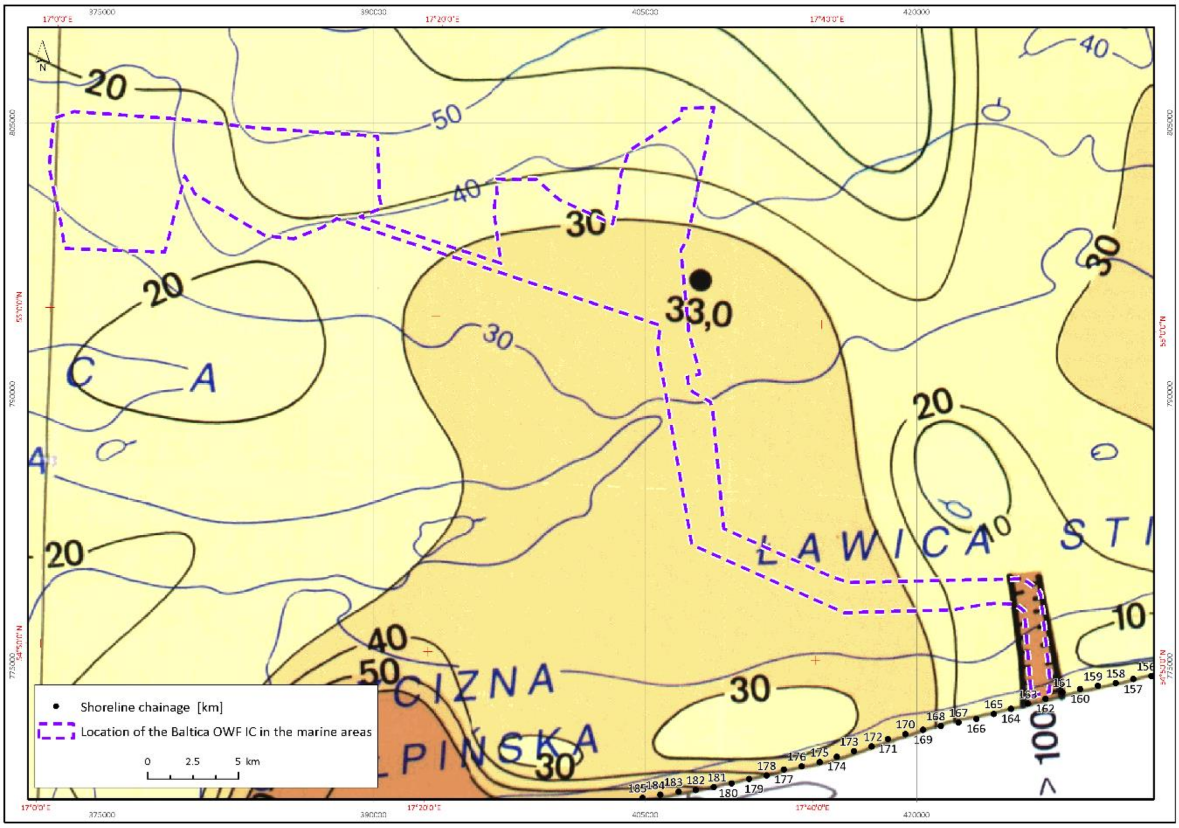



*Figure 3.3.* *Fragment of the thickness map of Quaternary sediments showing the location of a subglacial valley with its axis approximately perpendicular to the coastline and its approximate depth in metres; shoreline chainage indicated in accordance with the Maritime Office data [Source: internal materials based on Uścinowicz, 1995a]*

### 3.2.1.1 Sub-Quaternary formations

The oldest formation, identified on the basis of the analysis of seismo-acoustic data and data from literature [Dadlez, 1995a, 1995b; Mojski ed., 1995; Kramarska *et al.*, 1999], is the top of Silurian sediments. Above the Silurian sediments, only in the southern part of the Baltica OWF CI, there are Mesozoic sediments covered by a layer of Paleogene and Neogene sediments with a thickness ranging from approx. 30 to approx. 90 m. The Paleogene and Neogene sediments directly underlie Quaternary sediments. They are mainly fine-grained sediments (sands and silts). Their top is uneven, erosive, with valley-like incisions. They are deposited on the entire surface of the area analysed.

### 3.2.1.2 Quaternary formations

The thickness of Quaternary sediments is approx. 20–30 m (the valley in the southern section of the Baltica OWF CI − approx. 100 m). Based on a detailed analysis of seismo-acoustic data, four main groups of deposits were distinguished within the Quaternary formations:

- glacial and fluvioglacial deposits with a predominant share of tills in the top part. The top surface is diverse, without significant height differences. The deposits of this unit were identified in the greater part of the area analysed [Figure 3.4, Figure 3.7];

- glaciolacustrine deposits, mainly clays, silts, fine sands of the Pleistocene and Holocene. They form a discontinuous layer with a thickness of up to approx. 20 m, occupying a considerable portion of the northern part of the area, having been recognised also in the southern part of the area [Figure 3.5, Figure 3.7];
- multi-grained sediments, mainly gravels and sands with gravel, fluvioglacial (Pleistocene/Holocene), forming accumulations characterised by a low thickness, usually on the surface of tills [Figure 3.6, Figure 3.7];
- fine- and medium-grained sands as well as modern fine- and medium-grained marine sands (Holocene). They form a discontinuous layer of surface sediments. Their greatest thickness was identified within the foreshore slope and the sandbank zone, where it reaches up to 5 m, as well as at several points along the route.

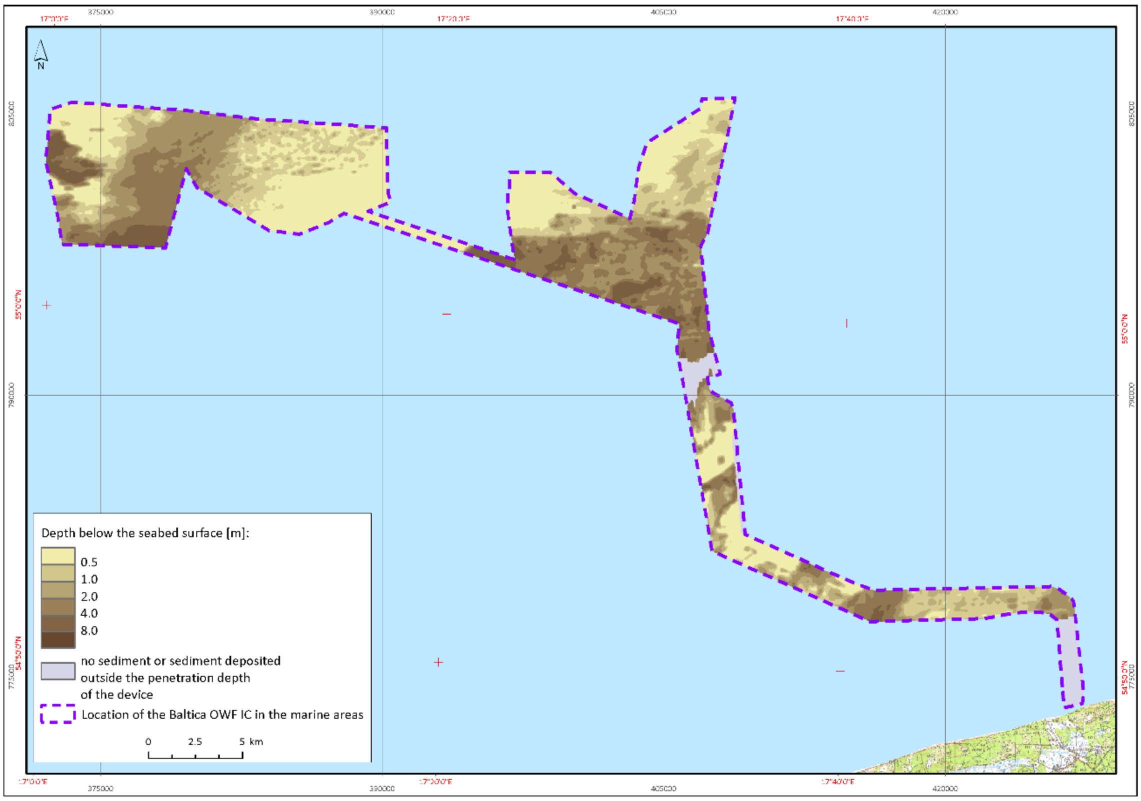



*Figure 3.4. Map of the glacial deposit top – depth of deposition below the seabed in the Baltica OWF CI area [Source: internal materials]*

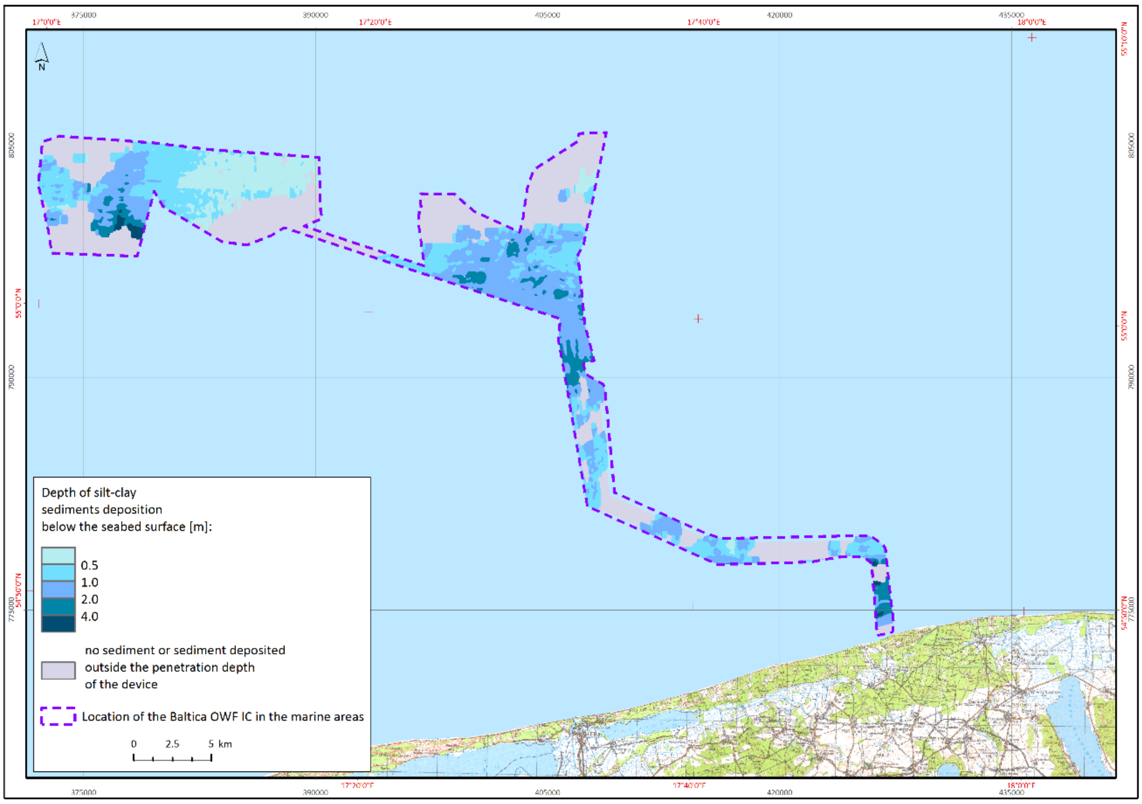



*Figure 3.5.* *Map of the silt and clay deposit top – depth of deposition below the seabed in the Baltica OWF CI area [Source: internal materials]*

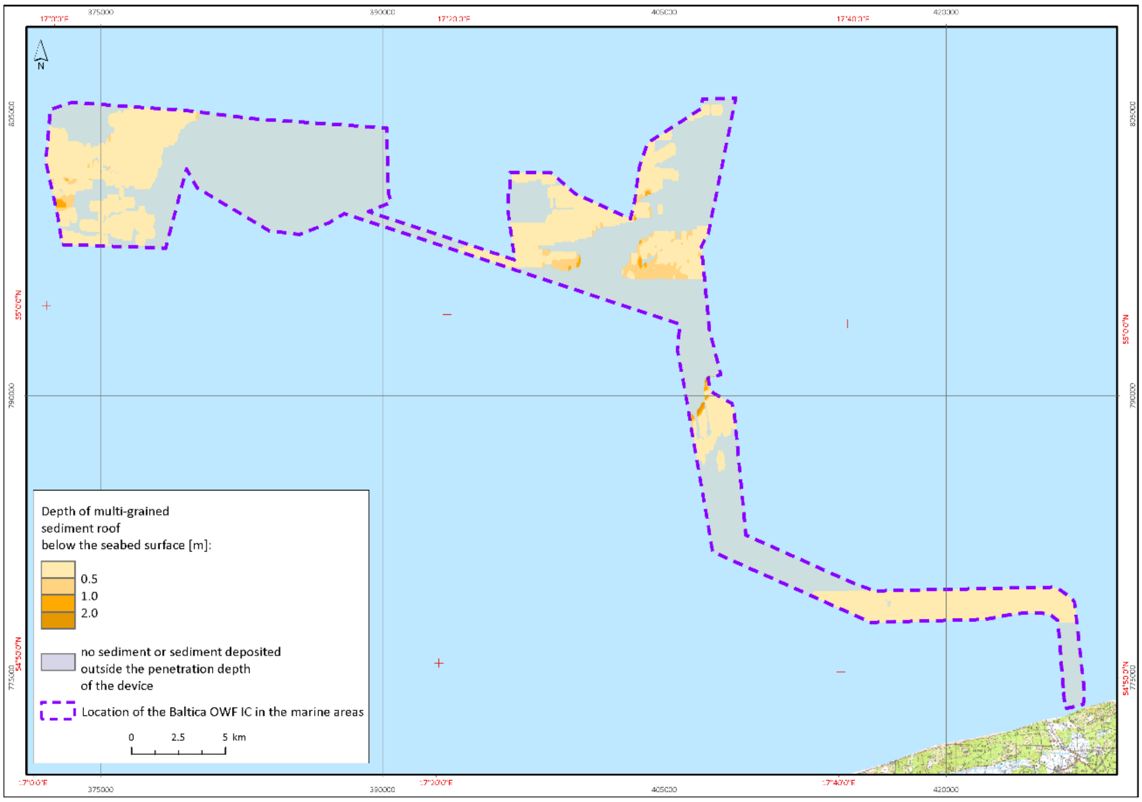



*Figure 3.6.* *Map of the multi-grained deposit top – depth of deposition below the seabed in the Baltica OWF CI area [Source: internal materials]*

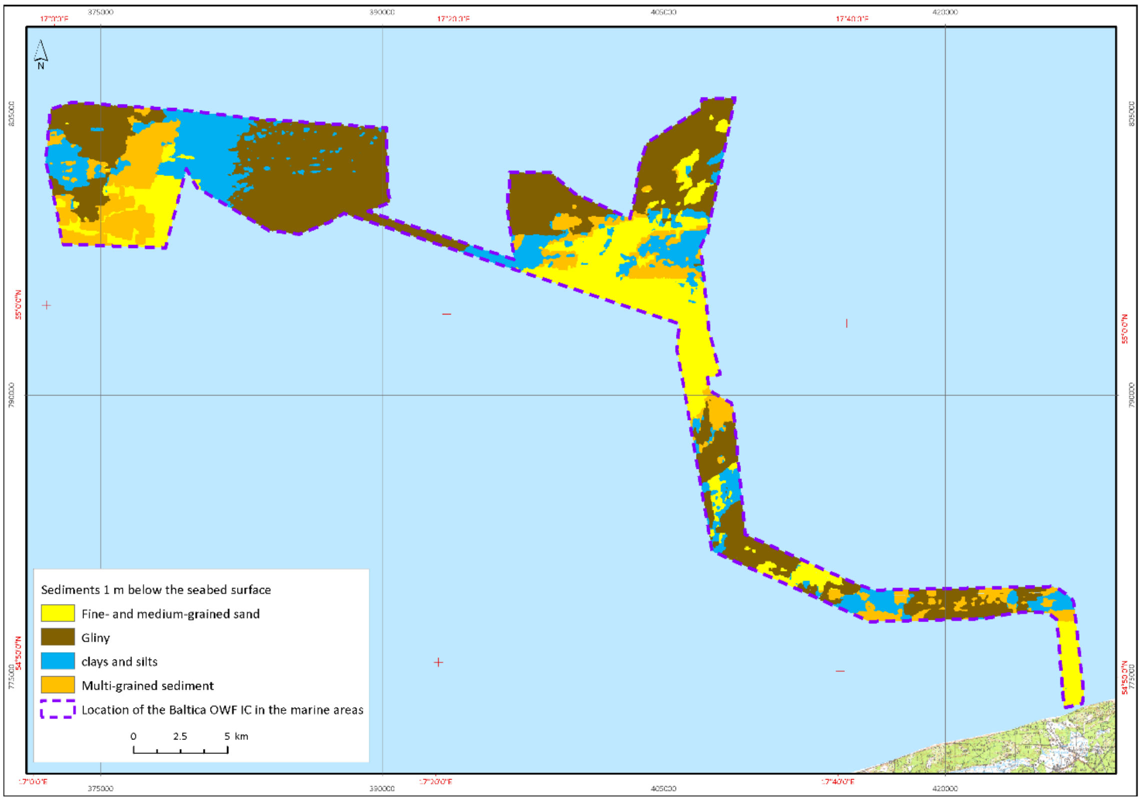



*Figure 3.7.* *Deposits at a depth of 1 m below the seabed in the Baltica OWF CI area [Source: internal materials]*

### 3.2.2 Seabed sediments and their quality

On the basis of the analysis of bathymetric and sonar data, a map of surface sediments was prepared [Figure 3.8]. Two predominant types of sediments were identified: fine- and medium-grained sands as well as seabed areas consisting of cohesive sediments with stone-gravel abrasive pavement and a sandy cover.

Almost the entire seabed surface of the area analysed is covered with a discontinuous layer of fine- and medium-grained sands. In places, accumulations of multi-grained sediments, boulder clusters and cohesive sediment outcrops occur on the surface. The cohesive sediments are mainly Pleistocene glacial tills and glaciolacustrine sediments (Pleistocene/Holocene).

The fine- and medium-grained sands form covers with flat, locally rippled surfaces. Within their area, the sand layer thickness is up to several meters. Below the sandy sediments, there are glaciolacustrine sediments [Figure 3.5] and locally glacial and fluvioglacial deposits (mainly tills, sands and gravels).

In places, peats may occur within the sandbank zone. No peats were found on the basis of the survey, but the occurrence of gyttjas was identified. Therefore, the occurrence of peats and lacustrine sediments in this zone cannot be ruled out. Peats, occurring in the sandbank zone, in terms of their origin, are related to the development of glaciolacustrine reservoirs and peat bogs on land prior to the Littorina transgression. Along with the development of the Baltic Sea, after the Littorina transgression, these areas were covered by the waters of the transgressing sea. The glaciolacustrine deposits and peatlands sediments were covered with migrating barrier formations of the coastal zone, and later, the latter were covered with the sands of the sandbanks zone.

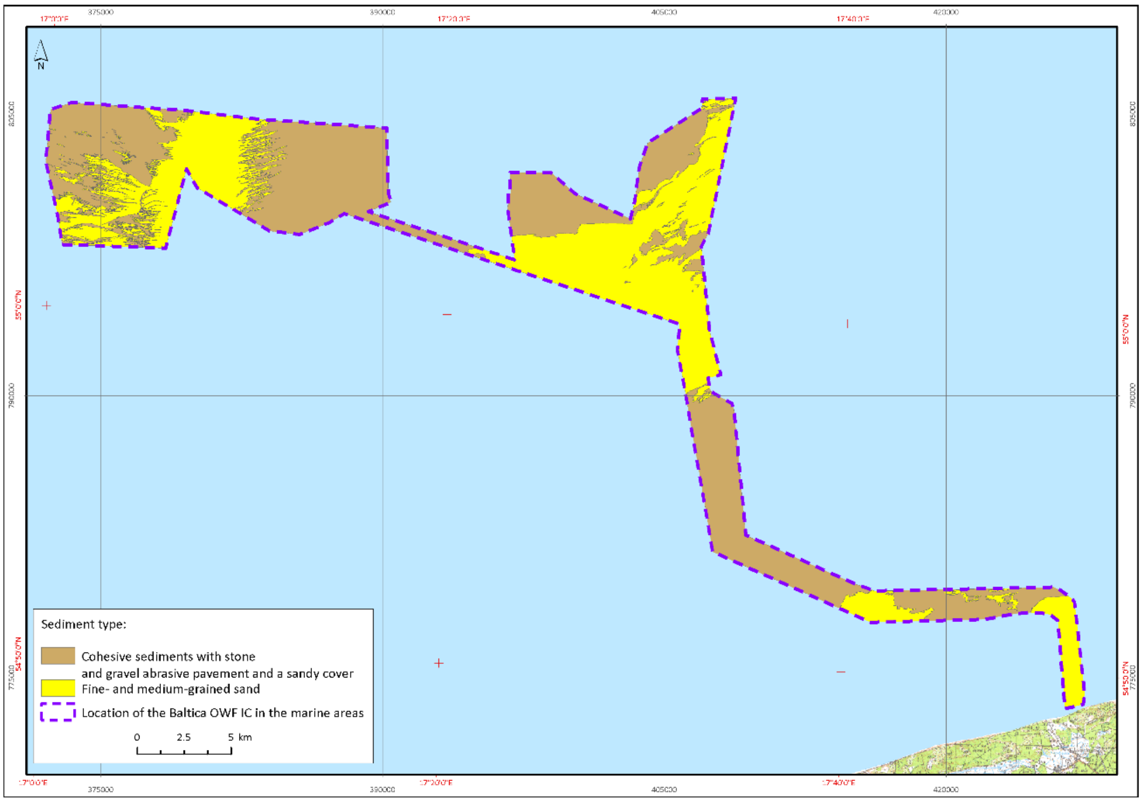



*Figure 3.8. Map of surface sediments in the Baltica OWF CI area [Source: internal materials]*

Seabed sediments constitute a very important element of the aquatic ecosystem of the Baltic Sea, which is a shallow sea, with limited water exchange and a surface area approximately four times smaller than its catchment area. Such conditions mean that every interference in the marine environment, including the exploitation and development of the seabed, affects the delicate ecological balance of the marine ecosystem.

The transfer of contaminants from the sediment into the water (and hence the change of water quality) depends on the type of sediment. The most contaminants and nutrients will be transferred into the water from a sediment with an increased amount of organic matter (e.g. silty, clayey sediments, characterised by higher concentrations of metals and persistent organic pollutants). In the case of sandy deposits with low organic matter content (e.g. coarse-grained sandy sediments), the processes described will be less intense. These sediments are generally characterised by a small number of fine fractions and low concentrations of metals and persistent organic pollutants.

The analysed surface seabed sediments from the Baltica OWF CI area belong to the inorganic deposits with organic matter content expressed as loss on ignition (LOI) of less than 10%.

The seabed sediment samples collected during the environmental surveys were analysed in terms of the content of nutrients, $^{137}Cs$, persistent organic pollutants (POPs) (i.e. PAHs, PCBs, TBT, mineral oils) and metals (see Appendix 1. Report on inventory surveys).

None of the sediment samples tested exceeded the limit values specified for the concentration of metals, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs), according to the Regulation of the Minister of the Environment of 11 May 2015 *on the recovery of waste outside installations and facilities* (Journal of Laws of 2015, item 796), which allows the classification of a sediment as clean in the context of practical applications, and although it does not apply to a sediment transferred within water, they may form the basis for assessing the seabed sediment contamination with chemical compounds.

Primary processes influencing the nutrient content in the sea are the geophysical and geochemical processes, which control not only the supply of such elements to seawater but are also responsible for the dispersion and removal of such compounds.

Nitrogen compounds present in the seabed sediments undergo cyclical changes as a result of biogeochemical processes. Oxidation of ammonia and its compounds by nitrifying bacteria leads to the formation of nitrogen oxides, and later nitrates. Too intense nitrification, however, is not desirable, as nitrates are more easily eluted from sediments than ammonium ions. Under anoxic conditions, denitrification processes take place, involving the conversion of nitrates into molecular nitrogen [O'Neil, 1998; Trzeciak, 1995].

In the Baltic Sea sediments, nitrogen occurs mainly in organic form and its regional variability is analogous to the variability of carbon [Carman 2003]. Usually, inorganic forms of nitrogen constitute no more than 10% of the total nitrogen (TN) in the sediments [Carman and Rahm, 1996]. An increase in the percentage share of inorganic nitrogen forms is possible in the area of erosion and transport of fine particle dispersion sediments [Uścinowicz 2011].

Given that the circulation of nitrogen in the environment is a very complex process, the intensity of which depends on many factors (e.g. oxygenation, temperature, season, primary production, etc.), as well as on the size of nutrient supply from the point or diffused sources, and the deposition from the atmosphere [Boynton *et al*., 1995; Fisher*et al*., 1988], the precise calculation of the nitrogen load, which would enter the water column from a sediment during construction work has an approximate character. According to the data from literature, nitrogen content in the Southern Baltic sediments ranges between 98–2604 mg $N \cdot kg^{-1}$ DW in sandy sediments, 1106–3094 mg $N \cdot kg^{-1}$ DW in sand and clay sediments, 1904–9506 mg $N \cdot kg^{-1}$ DW in clays and 1694–4606 mg $N \cdot kg^{-1}$ DW in tills [Pęcherzewski 1972].

In the seabed sediments of the area surveyed, the content of total nitrogen both in summer and winter was below the limit of quantification of the method applied, i.e. 100 $mg \cdot kg^{-1}$ DW. Consequently, the risk of water contamination related to the remobilisation of nitrogen compounds from the seabed sediment during the construction of the Baltica OWF CI was acknowledged as negligible and no further analyses were conducted. Phosphorus (P) in the seabed sediments is conventionally divided into labile (mobile, reactive) and refractive. Refractive forms are a combination of phosphorus with calcium, aluminium and clay minerals, as well as degradation-resistant organic forms of this element. Refractive phosphorus is subject to deposition, and thus, is removed from the circulation in the water depth. Labile phosphorus is the phosphorus contained in fresh organic matter, phosphates present in the interstitial waters, the combinations of phosphorus with $Fe^{3+}$ and phosphates loosely bound by adsorption with different elements of the sediment. Such forms easily re-enter the circulation in the water depth, mainly due to the mineralisation of organic matter and the dissolution of combinations of phosphorus with $Fe^{3+}$ as a result of the decrease in the value of the redox potential [Alloway and Ayres, 1999; Uścinowicz, 2011]. Phosphorus can act as a productivity-limiting factor for marine ecosystems [Weiner, 2005]. In aquatic environment, when primary production is limited by the quantity of phosphorus, the introduction of 1 mg of phosphorus means a 100 mg growth of algae DW per single biological cycle [Dojlido, 1995].

The content of total phosphorus in the area surveyed did not exceed the values typical for the sediments of the Southern Baltic. The amount of phosphorus that may be released into the water (the so-called available phosphorus) is estimated at 10–20 % of the total amount of phosphorus contained in the sediments [Wiśniewski *et al*., 2006]. The mean concentration of phosphorus in the seabed sediments surveyed was 254 mg·kg$^{-1}$ DW in the winter and 281 mg·kg$^{-1}$ DW in the summer (mean value: 268 mg·kg$^{-1}$ DW).

The concentrations of persistent organic pollutants (PAHs, PCBs) and harmful substances such as metals or mineral oils, in the area surveyed were low and did not exceed the values typical for the sandy sediments of the Southern Baltic.

PAHs and PCBs present in the sediments may undergo numerous transformations and have a significant impact on the environment. The scope of impact depends on the transformations that these compounds undergo. These can be abiotic processes such as sorption, elution, oxidation, photodegradation, reactions with other compounds, and biological processes such as microbiological transformations. They may hamper or stimulate the growth of microorganisms, have a phytotoxic or stimulating effect on plant growth, and a toxic impact on fauna (Galer *et al*., 1997). The accumulation of PAHs and PCBs in sediments is promoted by, among others, a high percentage of silt and clay fractions with the size of sediment particles <0.063 mm and characterised by a large specific surface area and significant ability for adsorption of hydrophobic pollutants and organic compounds of phosphorus, sulphur, and nitrogen.

Pyrogenic PAHs as well as PCBs exhibit an exceptionally high persistence in seabed sediments, which is caused by the occlusion of these chemical compounds in very fine sediment particles [Bolałek, 2010]. Therefore, the phenomenon of desorption of these substances from the sediments into the water is limited. Usually, it is maximally 0.5% for PCB congeners, and up to 5% for the analytes from the PAH group [Gdaniec-Pietryka, 2008; Gdaniec-Pietryka *et al*., 2013]. Assuming that such amounts of these substances will transfer to the water, it can be concluded that the risk of water contamination related to the remobilisation of PAHs and PCBs in the area surveyed is insignificant.

The concentrations of PAHs and PCBs in the sediments examined and their availability are presented in Table 3.1.

*Table 3.1. Concentrations of PAHs and PCBs in the seabed sediments analysed [Source: internal materials]*

| **Indicator** | **Mean concentrations in the sediments analysed (calculated as dry weight) [mg·kg$^{-1}$ DW]** | **Available form [%]** |
|---|---|---|
| Congeners from the PCBs group | <0.0001 | 0.5 |
| Analytes from the PAHs group | 0.010 | 5 |

PCB concentrations (LOQ <0.0001 mg·kg$^{-1}$ DW) in the sediment analysed were below the lower limit of quantification. Consequently, the risk of water contamination related to the remobilisation of such chemical compounds from the seabed sediment during the construction of the Baltica OWF CI was acknowledged as negligible and no further analyses were conducted.

Metal concentrations in the sediments analysed from the Baltica OWF CI were low. Additionally, their availability (i.e. the ability to permeate into the water depth), which depends on their physico-chemical form, should be taken into consideration [Siepak, 1998]. Metals permanently bound in the crystalline structure of minerals are immobilised and will not transfer into the water in natural conditions. On the other hand, metals in the mobile (labile) form are prone to permeating into the water from the sediment [Siepak, 1998; Dembska, 2003; Dembska, 2015].

The labile form of metals may constitute (depending on the type of the sediment in relation to particular metals) from 30 to 80 % [Parkman *et al*., 1996; Siepak, 1998; Usero, 1998; Dembska, 2003; Davutluoglu *et al*., 2010]. The results of the analysis of the labile form of metals in the sediments analysed showed that in unfavourable conditions approx. 70% of lead, approx.46% of copper and approx. 43% of zinc can transfer from the sediment into the water. In the case of nickel and chromium, which are more permanently bound with the sediment, this can occur in approx. 38% and 24%, respectively.

The mean concentrations of metals in the sediments analysed and the concentrations of the labile form are presented in Table 3.2.

*Table 3.2. Mean concentrations of metals in the seabed sediments analysed [Source: internal materials]*

| Metal | Mean concentration in the sediments surveyed (calculated as dry weight) [mg·kg$^{-1}$ DW] | Mean concentration of the available (labile) form [mg·kg$^{-1}$ DW] |
|---|---|---|
| Lead (Pb) | 3.78 | 2.66 |
| Copper (Cu) | 1.42 | 0.65 |
| Zinc (Zn) | 9.61 | 4.12 |
| Nickel (Ni) | 1.75 | 0.67 |
| Chromium (Cr) | 3.81 | 0.93 |

The concentrations of cadmium (LOQ <0.05 mg·kg$^{-1}$ DW), mercury (LOQ <0.01 mg·kg$^{-1}$ DW) and arsenic (LOQ <1.25 mg·kg$^{-1}$ DW) as well as TBT in the sediment surveyed were at trace level and usually below the lower limit of quantification. Consequently, the risk of water contamination related to the remobilisation of such chemical compounds from the seabed sediment during the construction of the Baltica OWF CI was acknowledged as negligible and no further analyses were conducted.

The sediments analysed were also characterised by a low activity of the radioactive isotope of caesium $^{137}$Cs, typical for sandy sediments.

### 3.2.3 Raw materials and deposits

In order to identify the potential areas of raw materials useful for future exploitation in the Baltica OWF CI area, the seismo-acoustic, bathymetric data, sonar data as well as vibrocorer drilling data were analysed.

Based on the analyses conducted, no accumulations of fine and medium sands as well as gravels which could constitute a mineral deposit [within the meaning of the Act of 9 June 2011 – *Geological and Mining Law* (consolidated text: Journal of Laws of 2021, item 1420) and the Regulation of the Minister of the Environment of 1 July 2015 *on the geological documentation of mineral deposits, excluding hydrocarbon deposits* (Journal of Laws of 2015, item 987)] were identified. In the majority of the seabed surface identified as a seabed with a sandy cover, sands form a layer with a thickness from 0.5 to 0.2 m; locally, in the northern part of the area analysed and within the foreshore slope and the sandbank zone, the sand thickness exceeds 2 m. Sands are deposited on a silt and clay substrate, locally on a till substrate.

According to the Regulation of the Minister of the Environment of 1 July 2015 *on the geological documentation of the mineral deposit, excluding hydrocarbons* (Journal of Laws of 2015, item 987), a deposit should have an at least 2 m thickness (limit values for the parameters defining a deposit and its boundaries for individual minerals – gravel deposits, gravel and sand as well as sand and gravel with a sand point below 75%).

In the area of the Polish Exclusive Economic Zone of the Baltic Sea, three concessions for oil and gas prospecting, exploration and production are in force (Gotland 36/2001/Ł, Łeba 37/2001/Ł, Rozewie

38/2001/Ł). The Baltica OWF CI area neither borders on nor is situated within the area covered by these concessions.

## 3.3 Seawater quality

The results of analyses of individual chemical parameters of water in the Baltica OWF CI area, such as pH level, 5-day biochemical oxygen demand ($BOD_5$), total organic carbon (TOC), nutrients, PCBs, PAHs, mineral oil, cyanides, metals, phenols, caesium, and strontium, did not essentially deviate from the values typical for the waters of the Southern Baltic.

These waters were characterised by an alkaline pH (approx. 8.03), alkalinity of approx. 1.70 $mmol \cdot dm^{-3}$ and relatively good oxygenation, with a seasonal variability characteristic of the Southern Baltic waters. The assessment of the water quality index for the Baltica OWF CI area, on the basis of the oxygen content in the near-seabed layer in summer indicates a good water status (no oxygen deficit). The average contents of dissolved oxygen during this period were above the limit value of 6 $mg \cdot dm^{-3}$ [Krzymiński (ed.), 2013].

In the entire survey period, the average biochemical oxygen demand ($BOD_5$) in the water samples collected from the Baltica OWF CI area in individual measurement periods mostly remained below 0.50 $mg \cdot dm^{-3}$. Only in the spring-summer period (April, July) $BOD_5$ of 0.6–1.3 $mg\text{-}dm^{-3}$ was observed. Also the content of suspended solids in individual measurement periods was typical of the Southern Baltic waters. Mean concentrations in individual measurement periods were at 0.5–2.4 $mg \cdot dm^{-3}$.

The concentrations of nutrients, such as total nitrogen, mineral nitrogen (total nitrates, nitrites and ammonia), phosphates and total phosphorus in the waters surveyed were characterised by seasonal variability typical for the waters of the Southern Baltic. The lowest concentrations of the substances surveyed were recorded in the spring-summer period, whereas in the winter months their significant increase was observed, in accordance with the seasonal trend of nutrient pool recovery [Andrulewicz, 2008].

The waters of the region surveyed were characterised by low concentrations of particularly harmful substances. Mean concentrations of PCBs, mineral oils (mineral oil index), free and bound cyanides, metals [Pb, Cd, Cr, Cr(VI), As, Ni, Hg] and phenols were at trace levels.

The waters tested were also characterised by low activity values of caesium $^{137}Cs$ and strontium $^{90}Sr$, typical for the waters of the Southern Baltic, which confirms a slow downward trend of $^{90}Sr$ and $^{137}Cs$ concentration in the Baltic Sea area [Zalewska, 2012].

In the Baltica OWF CI area, marginally higher PAH concentrations were observed, compared to the ones specified by the data from literature [HELCOM, 2002; Witt, 2002], which may have resulted from the differences at the stage of sample preparation for analyses (PAHs were determined in water without the separation of suspended solids).

Comparing the results obtained for the indicators of the waters surveyed with the limit values specified in the Regulation of the Minister of Infrastructure of 25 June 2021 *on the classification of ecological status, ecological potential, chemical status and the method of classifying the status of surface water bodies (SWB) and the environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475), the physico-chemical elements analysed in the Baltica OWF CI area surveyed can be classified as having water quality class 1 (very good status) due to the concentrations of dissolved oxygen near the seabed, total phosphorus and total organic carbon (TOC), free and bound cyanides, phenols, mineral oil index, as well as metals (As, Cr (VI), Cu). The average concentration of inorganic nitrogen compounds (nitrates and DIN, the average concentration of which in water was 0.07 mg·dm$^{-3}$) and the pH value contribute to the classification of this area as water quality class 2. On the other hand, considering the total nitrogen and phosphate phosphorus content (with the average concentrations in the water column of 0.30 mg·dm$^{-3}$ and 0.026 mg·dm$^{-3}$, respectively) the waters tested do not reach a good status. However, in the case of total nitrogen, the exceedance is slight and oscillates around the limit value set for water quality class 2 (<0.30 mg·dm$^{-3}$).

Also, no exceedance of the limit values for PAHs (anthracene, fluoranthene, naphthalene, benzo(a)pyrene, benzo(b)fluoranthene and benzo(k)fluoranthene) was found in terms of the water quality class specified in the above-mentioned regulations. Moreover, no exceedances were found regarding the limit values of such indicators as cadmium, lead, mercury and nickel.

## 3.4 Climatic conditions and air quality

### 3.4.1 Climate and the risk related to climate change

The area of the Southern Baltic is located in the humid temperate climate zone with the influence of the Atlantic climate due to prevailing oceanic winds. The vicinity of the Atlantic Ocean, due to the large air masses inflow, largely determines the climate of the Baltic Sea. As a result, the winters are mild and warmer, while the summers are cooler. In addition, it is characterised by predominantly westerly and south-westerly winds and, during storms, strong winds from northerly sectors and a large variation in air humidity.

Within PMAs and in the coastal zone, long-term recordings of near-ground (near-water) atmospheric parameters (air pressure, temperature and humidity, wind conditions and insolation as well as precipitation intensity and type) and water parameters (sea level, water temperature and salinity and dynamic conditions – flows within the water depth and wave motion) are carried out both at onshore stations, as well as on the high seas. This includes, in particular, the comprehensive measurements performed operationally for several decades by the Institute of Meteorology and Water Management – National Research Institute (IMWM-NRI) at monitoring stations and points, and for several years also on buoys anchored at sea. In addition, IMWM-NRI performs monitoring surveys in the Southern Baltic area several times a year, recording the hydro-physical and physico-chemical parameters of the sea within a designated grid of points. Hydrological and meteorological surveys are also carried out by other scientific and research units. Wind, air temperature and humidity as well as the mean sea level are measured at the Coastal Research Station (CRS) in Lubiatowo, owned by the Institute of Hydro-Engineering of the Polish Academy of Science (IHE PAS), while the Institute of Oceanology of the Polish Academy of Sciences with a monitoring station located at the Sopot Pier monitors air temperature, pressure and humidity, insolation, as well as seawater temperature and salinity. As part of the SatBałtyk project, carried out in 2010–2015, satellite measurements were conducted enabling the determination of the characteristics of the sea and atmosphere in the form of maps presenting, for example, temperature distributions, ice covers, momentary water flow velocity, water mixing and turbidity. At the Maritime Institute of the Gdynia Maritime University, in various research projects and at the request of investors, the recordings of the parameters of the near-water atmospheric layer as well as hydrophysical and dynamic values for the entire water column have been conducted in the last dozen years, at various locations within the Polish Exclusive Economic Zone of the Baltic Sea.

The environmental surveys, including monitoring of meteorological conditions of the near-water layer of the atmosphere (pressure, temperature, air humidity and wind parameters), dynamic conditions of the sea (wave motion on the surface, flows in the entire water depth and changes in the height of the free water surface), as well as hydrophysical conditions of the sea (water temperature, electrolytic conductivity and salinity) were conducted for a period of one year: from 14 April 2016 to 30 April 2017. The surveys were conducted in the area of the Baltica OWF, the area of connection of export cable lines to the OSS and in the nearshore zone of the Baltica OWF CI. The monitoring system consisted of two measurement buoys fitted with an automatic meteorological station and a set of instruments intended for conducting hydrophysical measurements at different levels of the water depth – 1 m (under the buoy), 4, 8 and 16 m (on the strand) and above the seabed (at the current profiler). In addition, six current profilers were deployed on the seabed (two at the buoy anchoring location, two in the shallowest part of the Baltica OWF and two current profilers in the nearshore zone of the connection line. Survey stations MFW12 and MFW11 in the Baltica-2 OWF area were deployed at the depths of 24 and 47 m, respectively, while stations MFW21 and MFW22 in the Baltica-3 OWF area were deployed at the same depth of 35 m. Survey stations PM1 and PM2 in the Baltica OWF CI area were set up near the shore at the depths of 16 and 10 m, respectively. All measurements were performed automatically, with recordings made and saved in 1-hour increments. Service cruises were performed approximately every 6 weeks in order to collect survey data recorded and to perform inspections, maintenance and repairs.

The surveys presented, which are associated with similar recordings conducted by the neighbouring Baltic countries, allow determining the current trends and the anticipated directions of changes in the basic climatic parameters of the Southern Baltic. Additionally, the information from the simulation calculations of the climatological numerical models of the Global Atmospheric Circulation Model available, for example, from the research conducted as part of the BALTEX Assessment of Climate Change for the Baltic Sea Basin are used for the above-mentioned determinations.

The climate specific for the coast and the adjacent sea areas can be classified as a coastal strip climate with small air temperature amplitudes, high humidity, mild winters, cooler summers and strong winds. Winds from the west and south-west directions prevail. In the open sea areas, climatic conditions are characterised by smaller air temperature amplitudes and mean wind velocities higher than in the adjacent land areas.

On the basis of the data and analyses available, it is possible to present the most important forecasts regarding changes of particular elements of the atmosphere and water in the Baltic Sea region:

- the increase in air temperature is faster here than the average global increase, this trend is expected to continue;
- the increase in surface water temperature is greater than in its deeper layers, this may result in stronger thermal stratification and the stabilisation of the thermocline throughout the year;
- the predicted salinity changes are not clearly defined and depend, on the one hand, on the changes in the air circulation conditions and the volume of water exchange with the North Sea and, on the other hand, on the volume of river water inflow; a decrease in salinity level is predicted;
- an increase in atmospheric precipitation is forecast for the entire Baltic Sea basin in winter, while in summer only in the northern part; the prevalence of extreme precipitation will increase;
- in terms of forecasting the changes in sea level, the effects of its global increase will not be felt to a significant extent. This is due to the fact that the Baltic Sea, which is a relatively small and shallow shelf sea, is connected with the North Sea by the rather narrow Danish straits, through which an exchange of oceanic waters (the so-called inflows) takes place only incidentally. Moreover, most of its area (in the northern part) is located within the

Scandinavian plate, which is characterised by visible uplift processes (so-called isostatic rebound), which result in a decrease of the mean sea level. In the southern part, the impact of these processes is practically negligible, and the water level is determined mainly by the atmospheric circulation conditions;

- forecasts regarding changes in wind climate are subject to considerable uncertainty, mainly due to the formation of atmospheric circulation conditions. It is assumed that an increase in the mean surface water temperature will be accompanied by an increase in the mean wind speed over sea areas;
- changes in wave climate are mainly related to the development of wind conditions over the sea surface as well as to the frequency and intensity of storms – an increase in extreme events is anticipated;
- model calculations indicate that there will be an increase in the extent of low oxygen area in the water and anaerobic areas near the seabed.

Forecasts of climate change for Poland, including the coastal zone and sea areas under the jurisdiction of the Polish state, as well as scenarios of adaptation activities aimed at mitigating and counteracting the effects of changes have been the subject of intensive work carried out by the Ministry of the Environment and the Institute of Environmental Protection, as part of the "Polish National Strategy for Adaptation to Climate Change by 2020 with forecasts until 2030" and the KLIMADA project.

Taking into account the conclusions and recommendations related to the coast and adjacent areas of the Baltic Sea, it was determined that the climate changes observed and projected will have a negative impact on the functioning of coastal zones. An adverse influence of the periodic sea level rises is predicted, resulting mainly from the increase in frequency and intensity of heavy storms. In the case of the Baltic Sea, this refers to a possible increase in the number, intensity and duration of storms, with an increase in the irregularity of their occurrence, i.e. after long periods of relative calm, series of rapidly succeeding storms of considerable force may occur.

An additional factor that accelerates the process of coastal erosion is the warming of winters, the expected result of which will be a reduction in the ice cover protecting the beaches from storm surges, and thereby safeguarding them against coastal erosion. The scenarios of sea level changes demonstrate that in the years 2011–2030 the mean annual sea level along the entire coast will be by approx. 5 cm higher in comparison to the values from the reference period, i.e. 1971–1990. An increase in the frequency of storm floods and more frequent flooding of low-lying areas, as well as the degradation of the coastal cliffs and seashore, which will entail a strong pressure on the infrastructure located in these areas, will be very important effects of the climate change.

Due to the increase in the average water temperature and an increased inflow of biogenic pollutants into the sea (nitrogen and phosphorus compounds), a negative phenomenon that will occur will be the progressive eutrophication, especially on the water surface (algae blooms).

The activities undertaken as part of the near-shore zone adaptation to the climate change concern the areas situated along the Baltic Sea coastline. However, there are no detailed guidelines and recommendations relating to the open sea areas, including installations and structures located there, which present the scope of activities aimed at counteracting the effects of the climatic condition changes forecast.

### 3.4.2 Meteorological conditions

Meteorological conditions over the sea surface are monitored in terms of wind velocity and direction, as well as air temperature, pressure and humidity. Over the sea areas surveyed, meteorological measurements of the above-mentioned weather parameters were carried out for a period of one year (04.2016–04.2017), with the use of sensors of two automatic meteorological stations fitted on buoys anchored in the central locations of both areas planned for the construction of the Baltica OWF. As a result, a mean value of 7.22 $m \cdot s^{-1}$ was recorded for wind speed, while the maximum value reached 20.90 $m \cdot s^{-1}$. The prevailing winds were from the south-west direction. Air temperature ranged from approx. -6.4°C in the winter to approx. 23°C in the summer. Atmospheric pressure was between 979 and 1043 hPa. The relative humidity was characterised by high variability, oscillating between 50% and 100% (88% on average).

### 3.4.3 Air quality

Due to the lack of detailed measurement data regarding the parameters of air purity over the sea areas intended for the construction of the Baltica OWF CI, the air quality assessment of the atmosphere layer near the water surface is compared with the information obtained as part of the measurements carried out by the Inspection for Environmental Protection under the State Environmental Monitoring for the nearest coastal research station (Łeba). However, it should be noted that due to the lack of significant pollution emission sources over the sea area under analysis, the parameters of air purity should not be inferior to those measured at the shore.

The evaluation of air quality in Poland, including coastal stations, was carried out on the basis of the Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 *on ambient air quality and cleaner air for Europe*. In Poland, the tasks related to conducting surveys and assessments of the state of the environment, including air quality monitoring, are carried out by the Inspection for Environmental Protection under the State Environmental Monitoring, whose program is developed by the Chief Inspector for Environmental Protection and approved by the Minister of the Environment. As part of this program, the tasks related to the fulfilment of the requirements contained in EU regulations and in Polish law as well as in international conventions signed and ratified by Poland are implemented.

Due to the fact that the monitoring of air quality is conducted only in onshore areas, the results obtained from the measurements for the Pomeranian Voivodship, and in particular for the coastal zone, have been taken as the reference level for the offshore areas. For the majority of substances measured by the State Inspection of Environmental Protection in 2020, the criteria for concentrations corresponding to purity class A were obtained. This status has not changed significantly in relation to measurements conducted in previous years. Detailed values from the last decade are presented in Table 3.3. In the sea areas covering the territory of the planned connection, no measurements have been made to assess the air quality in terms of greenhouse gas presence, dust concentrations and other hazardous volatile substances. The closest coastal zone location in which the air pollution monitoring is conducted is the coastal research station in Łeba, distant from land emission sources, where concentrations of sulphur dioxide, nitrogen dioxide and ozone are recorded. On the basis of the measurement data made available by the Chief Inspectorate for Environmental Protection (CIEP) and the Voivodeship Inspectorate for Environmental Protection (VIEP) in Gdańsk, the following concentrations of the above-mentioned gases were identified for the year 2020:

- sulphur dioxide ($SO_2$) – the average 24-hour concentration in 2020 amounted to 1.17 µg·m$^{-3}$ with a permissible value of 125 µg·m$^{-3}$; this is the lowest value recorded in the Pomorskie Voivodeship;
- nitrogen dioxide ($NO_2$) – the average annual content measured in 2020 was 4.39 µg·m$^{-3}$ with a permissible value of 40 µg·m$^{-3}$; this is the lowest value recorded in the Pomorskie Voivodeship;
- ozone ($O_3$) – the mean annual content measured in 2020 was 59.19 µg·m$^{-3}$, while the maximum 8-hour running mean was 139.20 µg·m$^{-3}$, with the assumed target value of 120 µg·m$^{-3}$ – this is one of the highest values recorded in the Pomeranian Voivodeship; however, according to the assessment included in the VIEP report, the mandatory criteria regarding the target level for the protection of human health and plant protection are met in the Pomeranian Voivodship.

These values were compared with the values from the last decade 2011−2020 [Table 3.3].

*Table 3.3. Air pollution values in Łeba [Source: CIEP data; available at: http://powietrze.gios.gov.pl/pjp/archives]*

| Component measured | Period covered | Annual values [µg·m$^{-3}$] | | |
|---|---|---|---|---|
| | | Mean | Minimum | Maximum |
| Sulphur dioxide $SO_2$ | 2020 | 1.17 | 0.20 | 3.20 |
| | 2011–2020 | 1.39 | 0.20 | 14.20 |
| Nitrogen dioxide $NO_2$ | 2020 | 4.39 | 0.70 | 18.40 |
| | 2011–2020 | 4.62 | 0.30 | 24.90 |
| Ozone $O_3$ | 2020 | 59.19 | 0.80 | 139.20 |
| | 2011–2020 | 60.94 | 0.00 | 169.61 |

Such level of the parameters recorded means that the onshore area in the coastal zone near Łeba has air quality class A. Moreover, there is a slight decrease in the concentration of the gases analysed in the air in 2020, compared with the values recorded in the 2011–2020 decade.

Similar values for the concentrations of these pollutants are to be expected for nearshore sea areas, especially as these sea areas are at a considerable distance from onshore sources of $SO_2$ and $NO_2$ emissions. Those substances are emitted only by vessels, the traffic intensity of which is relatively low. The offshore areas surveyed are free from any terrain obstacles impeding the spread of these substances. Therefore, the average concentrations of the above-mentioned compounds in the air should have lower values.

## 3.5 Ambient noise

To determine the initial level of ambient noise, noise monitoring was conducted using a SM2M sound recorder deployed in the northern part of the Baltica OWF CI area. The sound recorders captured all underwater sounds in the frequency range from 2 Hz to 48 kHz (www.wildlifeacoustics.com, SM2M manual, 2012), with sounds ranging from 2 Hz to 22 kHz being analysed, as recommended by the technical subgroup on underwater noise (Van der Graaf *et al*., 2012).

The results of ambient noise surveys indicate that the ambient noise levels are characteristic of the shallow waters of the Baltic Sea. Seasonal differences in noise levels at stations and between them have been found. For all stations, the average sound pressure level (SPL) was the highest in the winter, whereas the spring and summer levels were significantly lower. These results are consistent with the information from the BIAS project (Folegot *et al*., 2016). This is most likely caused by seasonally specific sound propagation conditions in the sea (Folegot *et al*., 2016) and higher noise levels caused by atmospheric factors in the winter and autumn months.

The most important source of anthropogenic low-frequency noise is the traffic of vessels. The intensity and frequency of noise generated by vessels depends largely on the size and speed of the vessel, with large, slow moving vessels generating lower frequency noise, and small, fast vessels generating noise with higher energy at higher frequencies. OSPAR Commission (2009) introduces the following division:

- small leisure craft and boats less than 50 m in length, generating variable noise with source levels of 160–175 dB re 1 µPa at a distance of 1 m;
- medium-size ships ranging from 50 to 100 m in length, generating variable noise with source levels of 165–180 dB re 1 µPa at a distance of 1 m;
- large vessels exceeding 100 m in length, generating variable noise with source levels of 180–190 dB re 1 µPa at a distance of 1 m.

In conclusion, the frequencies of noise generated by ship traffic are mostly below 1 kHz [Richardson *et al*., 1995]. That is why most surveys focus on low frequency noise components generated by ships.

In the case of the cetaceans, such as the porpoise, which are sensitive also to high frequencies, all noise components (from low to high frequencies) are problematic. Hermannsen *et al*. (2014) studied the impact of noise components generated by vessels from medium to high frequency in Danish waters. They found that the noise generated by various types of vessels significantly increases noise levels in the surrounding environment in the entire band recorded from 0.025 to 160 kHz at a distance of 60 m and 1000 m from passing vessels. They also found that vessels passing at a distance of 1190 m reduce the hearing threshold by more than 20 dB (at 1 and 10 kHz), whereas vessels passing at 490 m or less cause a reduction of over 30 dB (at 125 kHz). Therefore, although there may be masking effects due to high frequencies, the range of these impacts is low. Dyndo *et al*. [2015] noted that harbour porpoises held in semi-natural conditions showed a response to incoming ships, which – according to the authors – indicates a behavioural response of porpoises to low levels of high frequency noise.

A high correspondence can be observed between the results of the surveys conducted in the Baltica OWF CI area and the regional-scale surveys. Figure 3.9 illustrates the results of Tougaard *et al*. (2016) obtained from BIAS and concerning noise levels in the 125 Hz third-octave band. For most of the time, the noise levels in the Baltic Sea are relatively high in the central part of the basin. These levels correspond to areas with high traffic density according to AIS data.

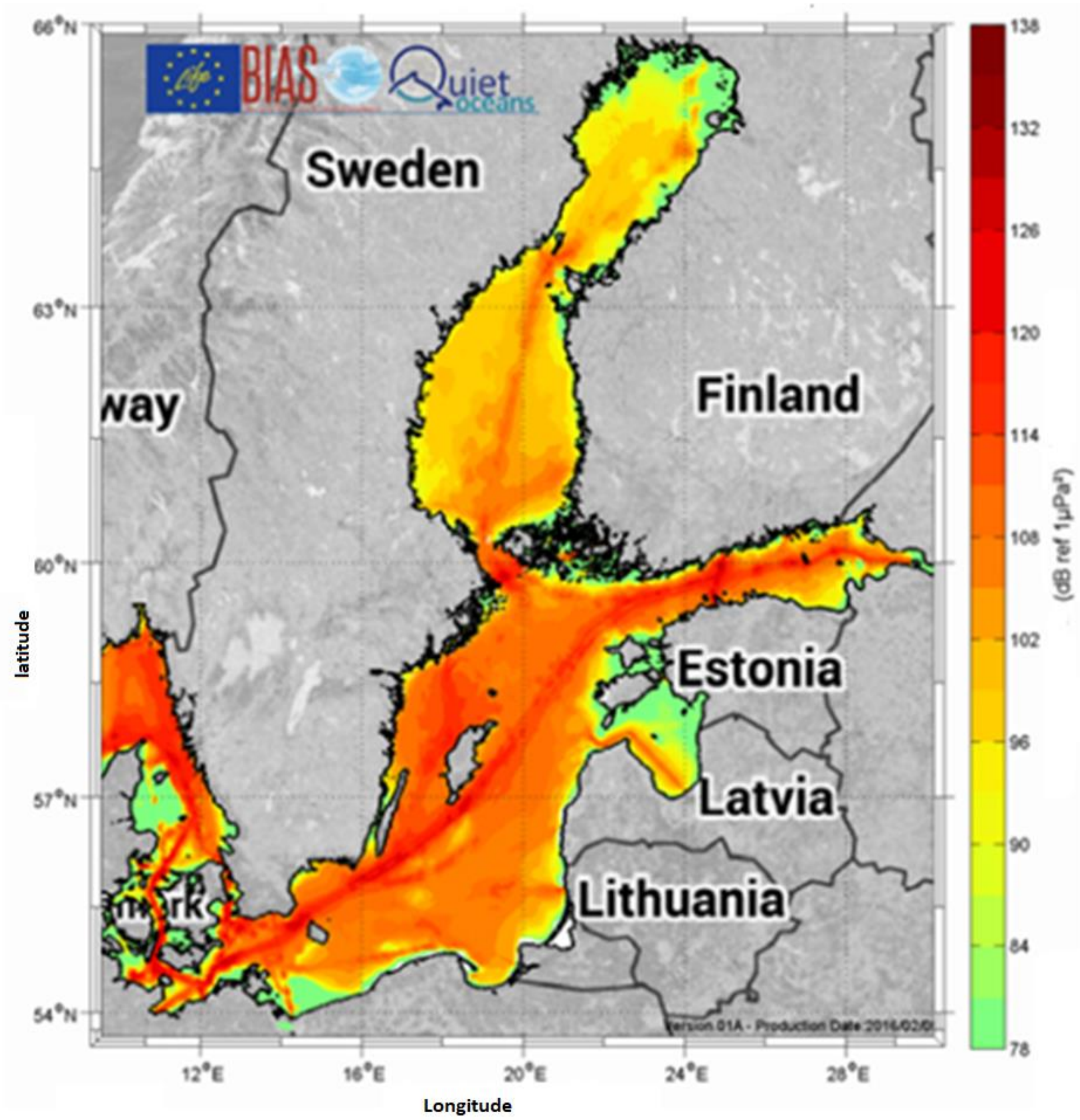



*Figure 3.9.* *The maximum noise level received in the entire water depth in the 125 Hz third-octave band in February 2014 (the 10th percentile – $L_{10}$) [Source: Tougaard et al., 2016]*

Figure 3.10 illustrates the results of the BIAS project covering the southern part of the Baltic Sea [Tęgowski *et al*., 2016] and the location of the Baltica OWF CI. Based on the figure, it can be concluded that in February 2014, in the Baltica OWF CI area, the noise level recorded in the 125 Hz frequency ranged from 85 to 95 dB re 1 μPa$^2$.

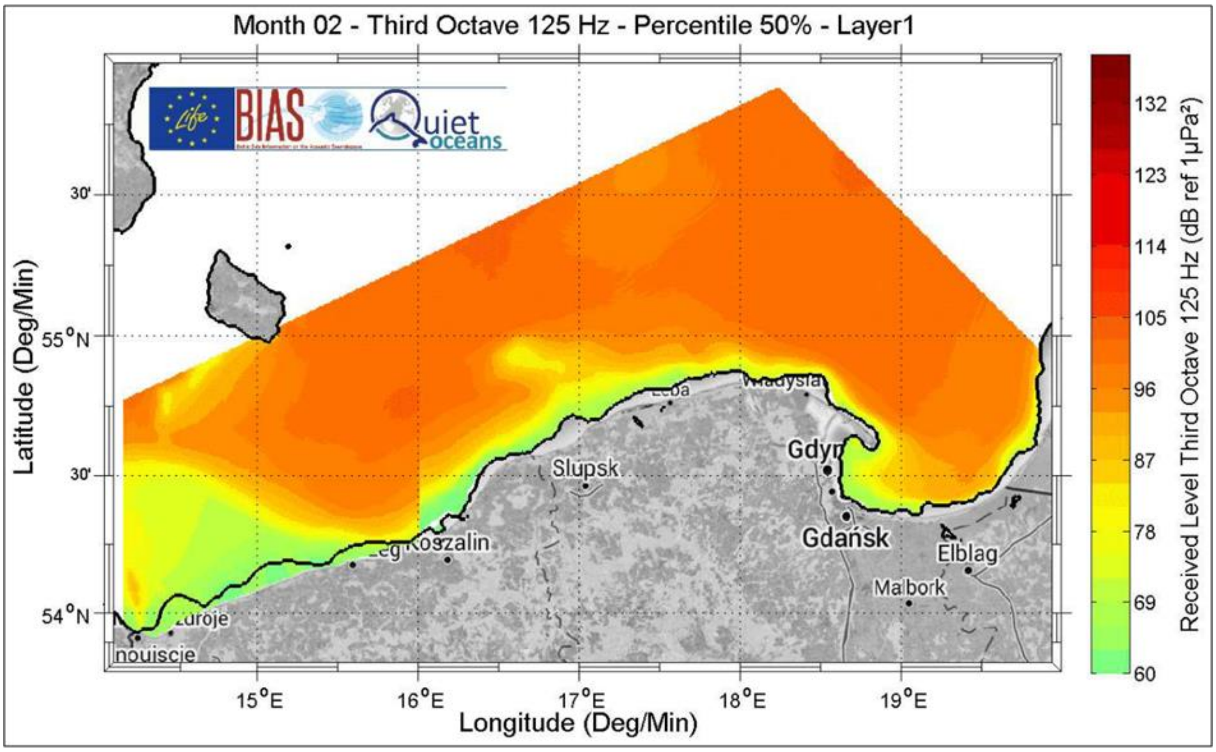
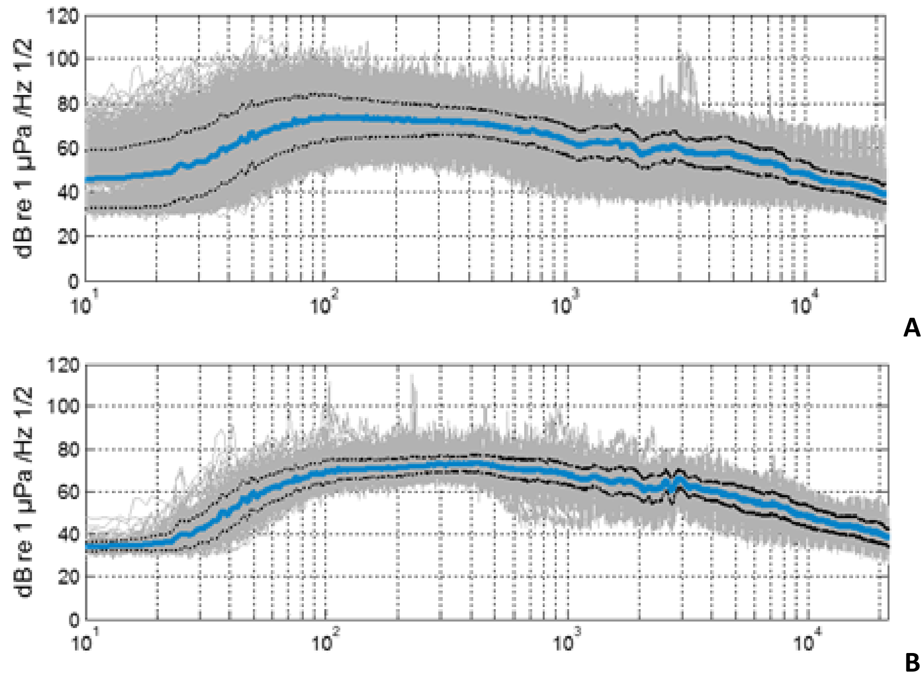



*Figure 3.10. The maximum noise level received in the entire water depth in the 125 Hz third-octave band for the 50th percentile ($L_{50}$) in the southern part of the Baltic Sea in February 2014 [Source: Tęgowski et al., 2016]*

The results of ambient noise analyses indicate that the ambient noise in the Baltica OWF CI area is typical of the shallow waters of the Baltic Sea [Figure 3.11].



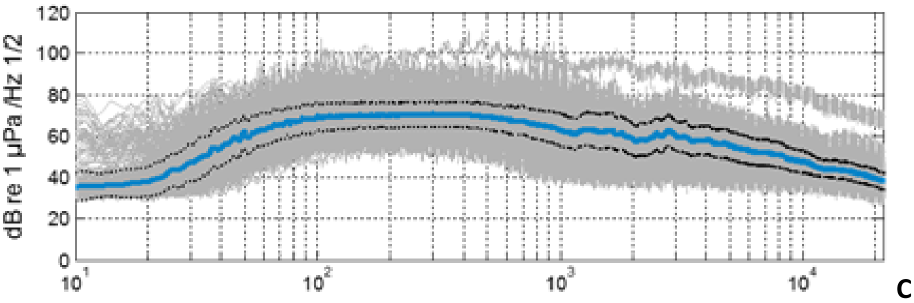



*Figure 3.11. Ambient noise in the survey area at stations SM2M_01 (A), SM2M_02 (B) and SM2M_05 (C) in total for all seasons (power spectral density in 1 Hz bands; grey lines − individual samples; bold line − mean; dashed lines − standard deviation; n-A: 2058, n-B: 2735, n-C: 1323 [Source: internal materials]*

Figure 3.12 compares the results of the ambient noise measurements from station SM2M_01 (March 2017) with the results of the BIAS project (March 2014). The ambient noise recordings made in winter were selected for comparison purposes, since noise levels are the highest in winter. The results from BIAS 3 station were used due to the geographic proximity of this station to the Baltica OWF CI area. The spectra shown have a similar general shape. The spectrum generated on the basis of the BIAS project results shows a peak at 63 Hz, which is not present in the data collected. This is due to the proximity of BIAS 3 station to the shipping route. At higher frequencies, the shapes are identical. This example and similar noise levels at 125 Hz show that the results obtained in the surveys for the EIA Report are highly consistent with those obtained from the BIAS project.

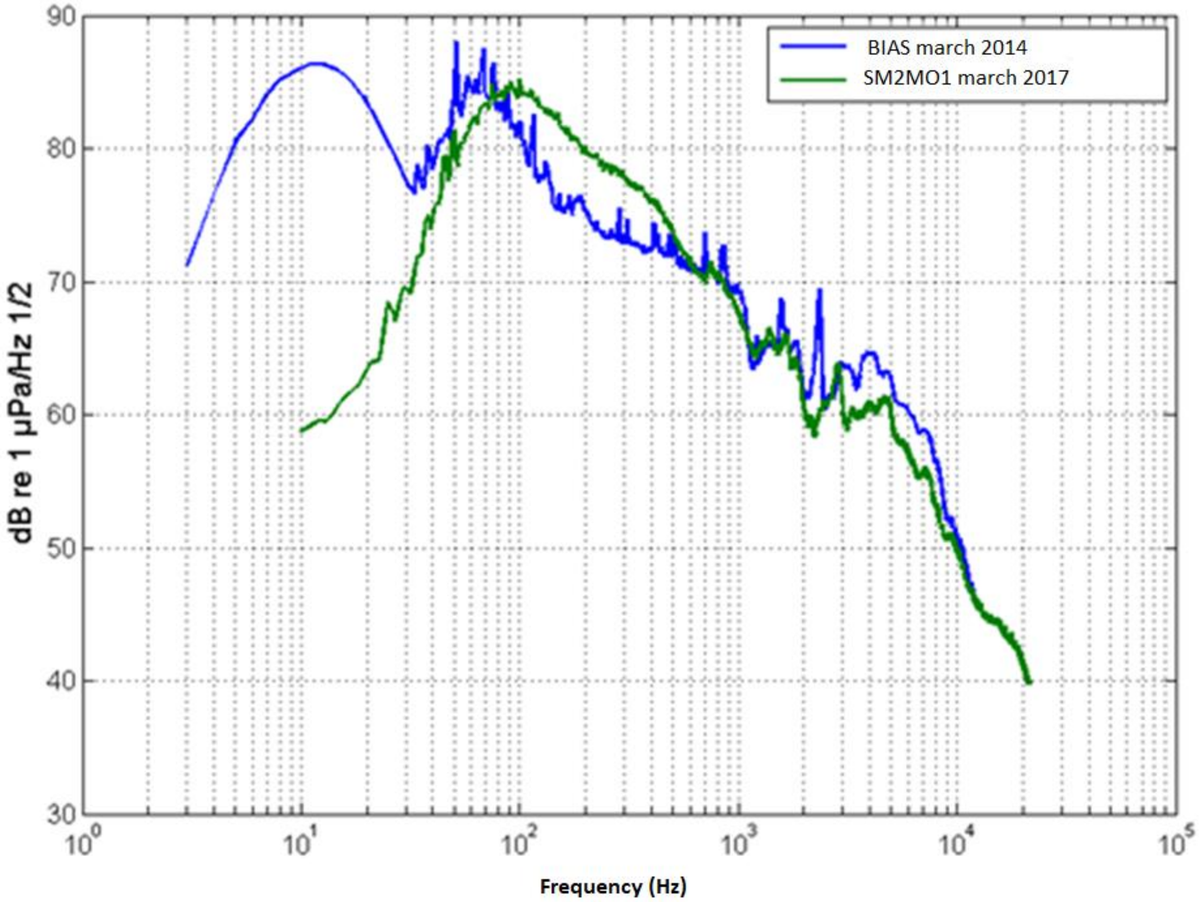



*Figure 3.12. Averaged noise spectrum level from BIAS 3 station (March 2014) compared to the data from SM2M_01 station (March 2017). [Source: internal materials and BIAS project results, based on: Tęgowski et al., 2016, data provided by J. Tęgowski]*

## 3.6 Electromagnetic field

Electromagnetic fields in the environment can be divided into natural fields and fields of anthropogenic origin (called artificial fields). Among the natural fields, the best recognised one is the geomagnetic field of the Earth, the intensity of which ranges from 16 to 56 $A \cdot m^{-1}$. On the surface of the Earth, an electric charge is accumulated, which is the source of the natural electric field. The intensity of the Earth's natural electric field at moderate weather conditions is approximately 120 $V \cdot m^{-1}$.

In the marine environment, the above-mentioned values of the electric field and the geomagnetic field are similar. In the vicinity of the Baltica OWF CI, there are no artificial sources of electromagnetic radiation. The existing 450 kV DC Sweden-Poland transmission system is located several kilometres from the location of the planned project.

Changes in natural electric fields have no direct impact on living organisms or human wellbeing. Natural magnetic fields show differences depending on the geographical location. They have a significant impact on some living organisms.

Electromagnetic fields created by the flow of electric current can change the natural migration behaviour of marine mammals, they can also be a source of thermal energy introduced into the sea. However, these factors are difficult to measure and in compliance with the "Update of the preliminary environmental assessment of the marine waters status" (CIEP, 2018), are not currently monitored in Poland. It has been known for years that some animals, such as dolphins, birds and certain species of insects are guided by the position of the magnetic poles in their underwater migrations or long-distance flights. These abilities to recognise the direction of the Earth's natural magnetic field can be disturbed as a result of a very strong intensity of a constant magnetic field of 1–50 teslas.

## 3.7 Description of natural elements and protected areas

### 3.7.1 Biotic elements in the maritime area

#### 3.7.1.1 Phytobenthos

Environmental surveys of phytobenthos in the Baltica OWF CI survey area were carried out in 2016 and 2021 on a total of 24 transects – 14 and 10, respectively – situated in the seabed areas potentially overgrown by macroalgae and hence covered by cobbles and boulders in the zone down to 25 m in depth. Within the survey area, a sandy seabed was inventoried to a depth of 10 m in 2016. No vascular plants were found in this zone (Appendix 1. Report on Inventory Surveys).

The survey assumptions and seabed filming were based on the method used in the surveys conducted in 2013 in the areas of BŚII (Błeńska *et al*., 2015b), BŚIII (Błeńska *et al*., 2014) and MTI for BŚII and BŚIII (Błeńska *et al*., 2015a). Along transects with a length of at least 100 m, seabed filming was carried out with an ROV controlled from a vessel. Afterwards, sampling was conducted at designated stations – in 2016 with a stone grab, whereas in 2021 sampling was carried out with a scraper due to the presence of large boulders (Nowak *et al*., 2017) (Appendix 1. Report on Inventory Surveys).

The surveys showed only a trace presence of phytobenthos in the south-western part of the Baltica OWF CI. The occurrence of phytobenthos was confirmed in 25% of the transects surveyed, which were determined on the basis of a sonar mosaic as potential sites of phytobenthos occurrence, at depths from 17.75 to 25.85 m. These have been individual specimens of small size, very sparsely distributed on the seabed. Less than 1% of the seabed was overgrown with macroalgae, i.e. cobbles and boulders were covered by one to several specimens within a transect with an average length of 106 m. It was concluded that the Baltica OWF CI area is not a favourable area for phytobenthos.

In the Baltica OWF CI, macroalgae were represented by 2 species which had been so far recorded in the Southern Baltic. Those were brown algae *Desmarestia viridis* and red algae *Vertebrata fucoides*. No protected species were found, within the meaning of the Regulation of the Minister of the Environment of 9 October 2014 *on the protection of plant species* (Journal of Laws of 2014, item 1409).

The presence of trace amounts of macroalgae (small number of taxa, very low percentage of seabed coverage, negligible biomass) in the Baltica OWF CI area is a result of prevailing environmental conditions that are not favourable for the development of macroalgae, such as great depths. The low abundance of phytobenthos is typical for the open water areas of the Baltic Sea with depths of approximately 20 m. At such depths, the conditions for macroalgae development become extreme. The access of light necessary for plants to carry out photosynthesis is limited; therefore, these depths constitute a boundary zone for the occurrence of macroalgae, or more precisely, their residual forms. In these regions, cobbles and boulders are mainly colonised by animal organisms, such as bay mussels and coelenterates (Schiewer, 2008; Feistel *et al*., 2008; Kruk-Dowgiałło *et al*. (eds), 2011; Kautsky *et al*., 2017; Błeńska *et al*., 2014, Błeńska *et al*., 2015a, Błeńska *et al*., 2015b).

The analysis of the criteria for phytobenthos evaluation in the Baltica OWF CI area [Table 3.4] demonstrated that the following two crucial criteria are not met – the phytobenthos does not form communities, which are a favourable habitat for the development and existence of the phytophilic invertebrate fauna or ichthyofauna, and neither rare nor protected species occur here. Macroalgae occur predominantly in the form of residual or singular and small specimens very sparsely distributed over the seabed.

*Table 3.4. Analysis of the nature value of the Baltica OWF CI area on the basis of phytobenthos [Source: internal materials based on: Brzeska-Roszczyk and Kruk-Dowgiałło, 2018]*

| No. | Evaluation criteria | Phytobenthos characteristics |
|---|---|---|
| 1. | Macroalgae occurrence | Within 6 out of 24 transects (25% of all transects) |
| 2. | Community occurrence | None. Macroalgae occurred in the form of individual specimens (seabed coverage <1 to 3%) |
| 3. | Presence of rare and protected species | None |
| 4. | Lack of dominance in the biomass of eutrophication indicator species | No dominance of *Pylaiella littoralis* – single specimens in 6 transects (25% of all transects) |

Macroalgae occurring in trace amounts in the OWF Baltica CI Area were represented by the following species: red algae *Vertebrata fucoides* and brown algae *Desmarestia viridis*, the latter being recorded in PMA at depths of 11–18.9 m [SEM 2010–2019; Michałek *et al*., 2020]. *Vertebrata fucoides* overgrows the boulder area of Rowy (most abundantly at depths of 5–6 m), the stony seabed near Gdynia Orłowo in the Bay of Puck (most abundantly at depths of 3–7 m) and, in small quantities, the boulder area of the Słupsk Bank [Osowiecki and Kruk-Dowgiałło (ed.), 2006; Brzeska *et al*., 2009; Kruk-Dowgiałło *et al*. (eds), 2011; Błeńska *et al*., 2014; Błeńska *et al*., 2015b; Kruk-Dowgiałło *et al*., 2019; SEM 2010–2019; Michałek *et al*., 2020].

No vascular plants were found in the Baltica OWF CI area. Their development in the sandy nearshore zone is limited by the high water dynamics, as indicated by the ripple marks on the seabed, which are documented in videos recorded during the inventory survey of the area (Appendix 1. Report on Inventory Surveys). It prevents plants from rooting in the seabed. Thus far, no environmental surveys have demonstrated the presence of vascular plants in the Polish nearshore area of the Baltic Sea – from Świnoujście to the Hel Peninsula [Ciszewski and Ringer, 1966; Pliński and Jóźwiak, 2004].

Compared with the underwater vegetation of the PMA, e.g. in the Bay of Puck or the Słupsk Bank boulder area, where phytobenthos forms multispecies communities densely overgrowing wide areas of the seabed [Osowiecki and Kruk-Dowgiałło, 2006; Kruk-Dowgiałło and Brzeska, 2009; Kruk-Dowgiałło *et al*. (eds), 2011,] the phytobenthos of the Baltica OWF CI area is characterised by negligible nature value.

#### 3.7.1.2 Macrozoobenthos

Macrozoobenthos is defined as a size fraction of zoobenthos – a group of invertebrate animal organisms inhabiting seabeds of water bodies, retained on a sieve with a mesh size of 1 $mm^2$ mesh after the seabed sediment is washed away (HELCOM, 1988).

Macrozoobenthos inventory surveys in the Baltica OWF CI area were conducted in 2016 and 2021, at a total of 256 stations on the soft bottom and hard bottom. In effect, the full characteristics of the qualitative composition, quantitative structure and ecological quality status of the macrozoobenthos of the area were identified.

The results of the qualitative surveys of zoobenthos, i.e. taxonomic composition and constancy of taxa occurrence at stations located on sand and gravel seabed in the Baltica OWF CI, in 2016 and 2021, demonstrated that this area was inhabited by taxonomically diversified benthic macrofauna. 31 species and higher taxonomic units of zoobenthos were identified. Prevailing species were ones typical of shallow and medium deep seabed (up to 50 MBSL) of the Southern Baltic open waters. Among the most common species, three species of bristle worms were found *Marenzelleria* sp., *Pygospio elegans* and *Bylgides sarsi*, bivalves *Limecola balthica* and *Mytilus trossulus*, oligochaetes and a representative of the Malacostraca class – *Diastylis rathkei*. No protected or rare zoobenthos species were found in the entire survey area.

In the zoobenthos samples collected at 10 stations from the hard bottom of the survey area (inhabiting the stone surfaces) 17 macrozoobenthos taxa were found. The taxa most common at the hard bottom stations were the *Bylgides sarsi* polychaete and the species typical of the Southern Baltic periphyton fauna: *Mytilus trossulus*, *Amphibalanus improvisus* and *Einhornia crustulenta*.

In the dominance structure of the total abundance of the soft-bottom zoobenthos in the Baltica OWF CI area, the *Pygospio elegans* polychaete accounted for the largest share (46.7%). The species whose share in the total abundance exceeded 10% was the *Limecola balthica* bivalve (16.1%). The highest share in the structure of the total biomass of the zoobenthos in the Baltica OWF CI area was attributable to the *Limecola balthica* bivalve (46.3%). A significant component of the total biomass was the *Mytilus trossulus* mussel (32.8%).

The values of macrozoobenthos abundance and biomass in the Baltica OWF CI in 2016 and 2021 did not differ from those found in the planned location of the BŚII and BŚIII OWFs in the Polish zone of the Southern Baltic, which were located on a similar type of seabed sediment and in a similar depth range [Błeńska *et al*., 2014 and 2015b].

The evaluation of the Baltica OWF CI area demonstrated that the soft-bottom zoobenthos did not have a high nature value. Within the Baltica OWF CI area, its status was defined as moderate [class 3 out of 5 in terms of ecological quality, according to the Regulation of the Minister for Infrastructure of 25 June 2021 *on the classification of ecological status, ecological potential and chemical status and the method of classification of the status of surface water bodies and the environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475)]. The assessment of the hard bottom indicated a high degree of value for that habitat, because the status of the zoobenthos communities was determined as "very good" (ecological quality class 1).

#### 3.7.1.3 Ichthyofauna

The ichthyofauna surveys in the Baltica OWF CI area were conducted in a year-long cycle, including 5 survey campaigns covering all seasons of the year, held between March 2016 and January 2017.

On the basis of the survey results supplemented with the analysis of the data obtained during the BITS (Baltic International Trawl Survey) cruises, which are conducted annually within the entire PMA by NMFRI, as well as on the basis of the knowledge from literature, the following were determined: potential spawning grounds, feeding grounds, migration routes and fry distribution across the survey area.

In the Baltica OWF CI area, above the 30 m isobath, ichthyoplankton was moderately diversified in terms of taxa (12 taxa) throughout the survey period. The highest number of taxa was observed in the late spring and summer months (8), while the lowest number was recorded in the autumn (5).

Considering data from the literature and the analysis of the results obtained during the surveys, it can be assumed that the following taxa may spawn in the deep zone (over the 30 m isobath): sprat, autumn spawning herring, ammodytids, turbot, gobies and common seasnail. However, the higher abundances and more frequent occurrence of some larvae of the taxa characterised by demersal spawning at shallow depths (common seasnail, ammodytids, gobies, shorthorn sculpin), observed at the stations located in the western part of the Baltica OWF CI area adjacent to the Słupsk Bank may indicate their origin from this area. The appearance of larvae of species whose spawning is impossible in the Baltica OWF CI area because of insufficient salinity (cod, flounder, fourbeard rockling, plaice) is the effect of the juvenile individuals drifting in with the water currents from the spawning grounds in the Słupsk Furrow and their continued active journey in search of food.

The total abundance of ichthyoplankton in the Baltica OWF CI below the 30 m isobath (roe and larvae) varied within a very wide range. The most abundant ichthyoplankton components were the larvae and juveniles of gobies (more than 80%), while sprat and ammodytid larvae were much less abundant. The ichthyoplankton was characterised by medium taxonomic diversity (12 taxa); the highest number of taxa was observed in late spring and summer (6 and 8, respectively), while the lowest – in early spring and winter (4 and 5).

Considering the data from literature and the analysis of the results obtained during the surveys, it can be assumed that the following taxa may spawn in the water depth reaching 30 m: sprat, spring spawning herring, gobies, ammodytids, rock gunnel, scarp, shorthorn sculpin, straightnose pipefish and common seasnail.

Some larvae of the fish species surveyed which lay demersal eggs (onto the seabed, at shallow depths) and show a tendency for wide dispersal in the water depth (common seasnail, ammodytids, gobies, shorthorn sculpin) may have originated, but with lower probability, from the spawning in the Słupsk Bank.

The appearance of larvae such as cod, flounder and fourbeard rockling is a result of juveniles drifting with water currents from the spawning ground in the Słupsk Furrow and their further active migration in search of food.

The larvae of fish covered by partial species protection listed in the Regulation of the Minister of the Environment of 16 December 2016 *on the protection of animal species* (Journal of Laws of 2016, item 2183) have been found in the entire Baltica OWF CI area. These were gobies, which occurred abundantly from late spring to winter (June–January), straightnose pipefish in the summer and autumn, and the considerably less abundant common seasnail, which occurred in the spring, summer and autumn.

In the Baltica OWF CI area, during the pelagic control hauls aimed at investigating the proportions of individual species for the purposes of estimating pelagic fish biomass, in addition to herring and sprat, also a few specimens of cod, great sand eel, mackerel, anchovy, flounder, lumpsucker and three-spined stickleback were caught.

The result of demersal catches with bottom-set nets, conducted in the Baltica OWF CI area above the 30 m isobath, is 1560.75 kg of fish belonging to 12 taxa. Flounder and cod prevailed, and the other species (plaice, shorthorn sculpin, turbot, herring, lumpfish, great sand eel, mackerel, pogge, viviparous eelpout and sprat) have constituted a small by-catch.

Below the depth of 30 m, 1467.36 kg of fish representing 20 taxa were caught. Flounder and cod prevailed, whereas other species were a small by-catch (plaice, round goby, great sand eel, shorthorn sculpin, mackerel, European perch, common roach, zander, anchovy, common whitefish, turbot, smelt, sprat, herring, lumpsucker, lesser sand eel, viviparous eelpout and greater weever).

Beach seine net catches yielded 43.6 kg of fish belonging to 14 taxa. Great sand eel and lesser sand eel prevailed, whereas other species recorded were juvenile flounder and turbot as well as smelt, common bleak, three-spined stickleback, herring and single specimens of perch, zander and fourbeard rockling. Two partially protected species were also recorded: common goby and twaite shad.

Summing up, fish belonging to 30 taxa were caught into all survey gear. Permanent fish communities of this area included cod, flatfish, herring, sprat, shorthorn sculpin, three-spined stickleback, lumpfish and viviparous eelpout.

The results of acoustic tests of the biomass volume, control fishing efficiency and the biological surveys demonstrated that **herring** occurred sparsely, except during the summer season, when it could be fished commercially.

The results of pelagic fishing surveys indicate that small parts of the Baltica OWF CI area were the place of seasonal spawning migration of **sprat**, taking place in early spring (March) and early summer (June) between the main deep-water spawning grounds of this species, which are situated outside the survey area. In addition, the area was the place of intense post-spawning foraging of some adult sprats and temporary (March) aggregation of juveniles.

The results of biological surveys of cod showed considerable length variation of cod inhabiting the Baltica OWF CI area. This indicates that these areas serve as nursery grounds for the smallest cod, but are also suitable for larger cod, which is commercially fished. The depth range (up to 50 m) within the Baltica OWF CI area is also favourable for the occurrence of cod with a wide range of lengths. Such a wide range of depth allows for the separation of smaller cod, preferring shallower waters (approx. 20 m deep), from adult cod inhabiting deeper waters. Such a division helps to avoid cannibalism periodically happening in cods. The size variation of cod occurring in the survey area is also due to the large surface of the Baltica OWF CI area in the context of the current cod distribution (mainly Southern Baltic). The considerable latitudinal extension and location of both these areas between the depths of the Baltic Sea (the Słupsk Furrow and the Bornholm Deep) and the shallow nearshore zone makes it inevitable for cod to migrate through these areas to spawning grounds and then return to the shores where cod feeding grounds are situated. The identified prevalence of crustaceans in the diet of cod testifies to a favourable food base for both smaller and larger cod, as both these length groups feed on crustaceans. The situation would be less favourable, if there were only adult clupeids or ammodytids, which are unavailable to cod of the smallest size (around a dozen centimetres). The analysis of the gonad maturity stages confirms that the Baltica OWF CI area is not a cod spawning ground. However, the presence of fish stage 8 (spent) and stage 2 (resting) confirms that the Baltica OWF CI area is an area of cod occurrence after spawning, mainly for feeding and the preparation of this fish species for the next cycle of spawning migration and spawning itself.

The Baltica OWF CI area is situated along the flounder larvae drift route from the spawning grounds, probably in the Słupsk Furrow, to the shallow coastal waters, where juveniles settle, feed and grow up. The construction of the Baltica OWF CI in spring will undoubtedly disturb not only the drift of larvae but also the migration of individuals from spawning grounds in the Słupsk Furrow to the coastal waters, which serve as feeding grounds. While adult individuals swim actively and will be able to avoid the area characterised by unfavourable conditions, larvae rely mainly on sea currents and hence their access to coastal waters may be obstructed.

The survey area is also a temporary habitat for freshwater species migrating from inland waters, for example perch, zander, roach, smelt and common bleak.

#### 3.7.1.4 Marine mammals

There are four species of marine mammals found in the Baltic Sea: the grey seal (*Halichoerus grypus*), the harbour seal (*Phoca vitulina*), the ringed seal (*Pusa hispida*) and the harbour porpoise (*Phocoena phocoena*).

The **grey seal** can be found throughout the Baltic Sea, concentrating in the northern and north-western parts of the area where it forms numerous colonies. The total population in the Baltic Sea is estimated to be 40 000 individuals. In Polish maritime areas, grey seals are observed irregularly along the entire coastline; with several hundred cases of live or dead animals recorded in recent years. The only place where a group of grey seals can be observed for most of the year is the Vistula Estuary area in the Gulf of Gdańsk, which is a resting place for over 100 individuals [Barańska *et al*., 2018]. There are no colonies of this species on the Polish coast, understood as resting, moulting or breeding areas.

Grey seals breed in undisturbed resting places in February and March. They travel up to several hundred kilometres to reach their feeding grounds. They feed on fish; in the Baltic Sea, their main food source is herring, but sprat and Atlantic cod are also important food sources.

The **harbour seal** is rare in Polish maritime areas. This species can be observed on the sandbanks forming in the Vistula Cut estuary. The population in the Baltic Sea was 1700 individuals in 2016. Feeding grounds of the harbour seal are usually not very far from the colonies, which are located in the western Baltic Sea and in the Danish Straits; occasionally, individuals are recorded feeding at greater distances.

The harbour seal mates in May–June and the young are born in August–September. Notably, pups are sensitive to disturbance near the colony because they need resting areas where they suck their mothers' milk. They feed on fish, squid and crustaceans. Seals' eyes are adapted to see underwater and above water. Their hearing is better adapted to marine than terrestrial environments. Vibrissae, i.e. whiskers distributed around the snout, are important for their tactile sense; the animals can dive to depths reaching 100 m.

Due to a shortage of surveys on the impacts of offshore linear infrastructure projects on individual seal species in the Baltic Sea, further impact assessment was carried out jointly for both species together, i.e. the grey seal and the harbour seal, assuming that animal responses will be similar.

The **ringed seal** is an Arctic species occurring in the north-eastern part of the Baltic Sea: the Gulf of Bothnia, the Archipelago Sea, western Estonia (Gulf of Riga and Estonian coastal waters) and the Gulf of Finland, where they find resting, moulting and haul-out grounds, whereas breeding areas of this species are strictly limited to the ice cover. The areas occupied by ringed seals have declined in comparison to those previously observed, and the population status in previous centuries declined due to intense hunting and environmental degradation; currently, the population status is described as unsatisfactory [HELCOM, 2019].

Ringed seals are not observed in Polish waters, no impacts on this species are anticipated during the planned project implementation; therefore, it is not included in the further assessment.

The **harbour porpoise** is the only cetacean species present in the Baltic Sea. Two populations of this species are distinguished: the Baltic Sea (or Baltic Proper) population and the Belts population. The Baltic Sea porpoise population is an endangered population, with an estimated number of animals living in the Baltic Proper being 447 individuals (95% confidence interval: 90–997). In 2012, the abundance of the Belts Sea population was estimated at approximately 18 500 individuals [Sveegaard *et al*., 2013], and during the SAMBAH survey it was estimated at over 20 000 individuals [SAMBAH, 2016]. The two populations are clearly separated in the summer, with a north-south boundary of occurrence along the eastern coast of Bornholm. In winter, the animals are more dispersed. Areas of particular importance for this species are therefore mainly based on their distribution in the summer. In the SAMBAH project, a concentration of the harbour porpoise was found to develop in the summer, in the areas of the Middle Bank and Hoburgs Bank in the Baltic Proper. This concentration coincides with the birthing time and the mating season [SAMBAH, 2016]. Porpoise breeding in the Baltic Sea takes place from mid-June to the end of August, calving – between May and June, and mating – in July and August. Females give birth to one calf, which is dependent on the mother during the lactation period that lasts 8–11 months.

The main food source of the harbour porpoise is a variety of fish species, especially cod, herring and sprat. The diving depth generally does not exceed 50 m, which means that harbour porpoises can dive at all depths in the Baltica OWF CI area.

Porpoises use sound for echolocation and communication. Their acute sense of hearing is one of the key characteristics of the harbour porpoise species, but this species is also known to have good underwater vision.

According to SAMBAH project data, the area of the planned project is characterised by low detection, which indicates a low occurrence of these animals in the area [SAMBAH, 2016] [Figure 3.13].

In 2016–2018, under the project entitled “Pilot implementation of species and marine habitats monitoring in 2015–2018”, surveys were carried out regarding the occurrence of the harbour porpoise in the Pomeranian Bay and in the Stilo Bank area. The results of these surveys also showed that the presence of the harbour porpoise is characterised by seasonality. In the Pomeranian Bay, the highest number of detections was recorded in summer months, while in the Stilo Bank – in spring [Opioła *et al*., 2018].

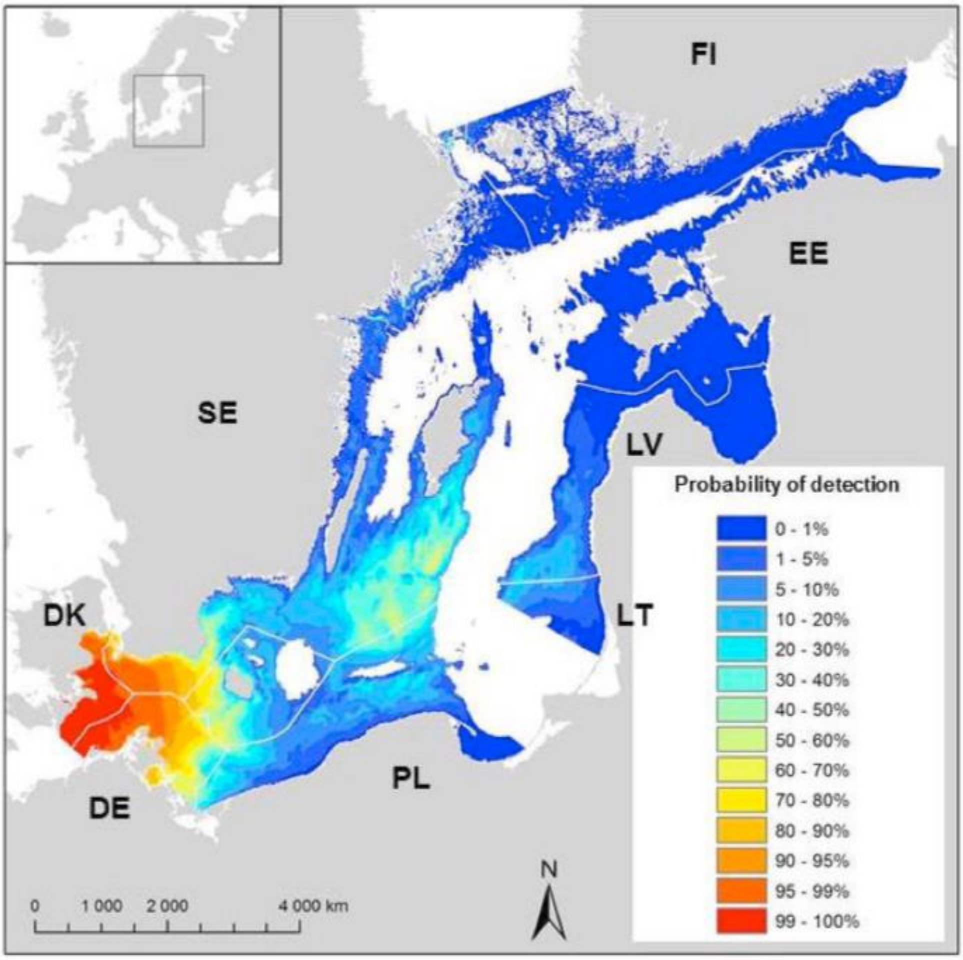



*Figure 3.13. Probability of the harbour porpoise detection in the Baltic Sea in August [Source: SAMBAH 2015]*

The results of the surveys conducted in 2016–2017 in the area of the Baltica OWF CI area also confirmed the sporadic occurrence of marine mammals in this part of Polish maritime areas. The survey included acoustic recording with C-POD devices as well as aerial observations. Only single detections were recorded with C-PODs, while no marine mammals were recorded during aerial observations.

#### 3.7.1.5 Seabirds

The results of the three-month observations of marine avifauna in the period from the beginning of March 2016 until the end of March 2017, indicated that the northern part of the Baltica OWF CI area is not a location of very high concentrations of seabirds.

Within the observation period, the presence of 12 seabird species was confirmed in the survey area. Among them, there are three species mentioned in Annex I of the EU Birds Directive: the black-throated diver, the red-throated diver, and the little gull. However, their abundance was really low. Moreover, seven species of waterbirds unrelated to the marine environment were observed; in marine areas, they are primarily found near the shore. They are rarely observed on the water, away from the coast, and this was also the case during the survey discussed. The most abundant species encountered in the survey area was the long-tailed duck, which is typical for the Baltic Sea areas located at a distance from the shoreline [Durinck *et al*., 1994; Skov *et al*., 2011]. This species is widespread in the Baltic Sea – these birds concentrate mostly in areas of moderate depth (up to 20–30 m) rich in zoobenthos, which constitutes their food supply [Durinck *et al*., 1994; Skov *et al*., 2011].

In the northern part of the Baltica OWF CI area, the velvet scoter was observed sporadically, and instead the common guillemot and the razorbill – two species which feed mainly on pelagic fish (sprat and herring) – appeared there in great abundance. Probably, that area is an important area of their concentration due to a rich food supply. The high abundance of razorbills and common guillemots, considering the Polish zone of the Baltic Sea [cf. Chodkiewicz *et al*., 2016], indicates the high importance of the sea area in question for both these species. A species that was observed relatively frequently was the European herring gull. It is widespread in the Baltic Sea area, and these birds often seek food by accompanying fishing boats to fishing grounds, away from the coast. This is why most observations of herring gulls involved specimens flying over the surface of water. Other waterbird species present in the survey area were very rare and their presence will not be taken into account in the analysis of environmental impact of the planned project.

The dynamics of changes in the abundance of most of the species present in both areas generally corresponds with the knowledge on their occurrence in the Polish Baltic Sea area [Meissner 2011a]. The relatively high number of adult common guillemots with their young in the summer has not been reported yet in the national literature, which may partly result from the small number of surveys conducted on the high seas in the period immediately after breeding. However, the observations carried out in the nearby BŚII and BŚIII OWF areas have not provided data on such large groups of this species. Therefore, it is probable that the common guillemot remained here because of the abundance of pelagic fish, which constitute their main food supply. It is worth noting that piscivorous species constituted up to 20% of the grouping in the survey area, and another piscivorous species, namely the razorbill, was similarly distributed as the common guillemot, which is an additional indication of the food supply as the reason for the abundance of common guillemots in the area. Apart from the common guillemot and the razorbill, the most abundant seabird species present in the survey area were the long-tailed duck and the European herring gull, which is typical for most Baltic Sea areas with depths ranging from 25 to 40 m, situated away from the coast. Other species were observed infrequently and in small numbers.

Seabird surveys covering the southern part of the Baltica OWF CI were conducted in the period from March 2017 to February 2018 (data provided by PEJ sp. z o.o.). The surveys included a division into two zones: coastal zone (bird observations from land in the zone up to the depth of approx. 10 m) and nearshore zone (bird observations from vessels in the zone up to the depth of approx. 24 m).

The southern part of the Baltica OWF CI was characterised by higher bird densities compared to its northern part. The highest densities of the entire grouping of seabirds were recorded in the winter, both in the coastal zone (slightly more than 100 individuals per $km^2$) and nearshore zone (more than 260 individuals per $km^2$) The lowest densities of seabirds in the area were recorded in the summer, with more birds in the coastal zone (approx. 27 individuals per $km^2$) than in the nearshore zone (ca. 6 individuals per $km^2$).

Among the birds recorded, the most abundant species were the velvet scoter and the long-tailed duck, with average densities of just over 180 individuals per $km^2$ for the velvet scoter in the winter season in the nearshore zone and just under 180 individuals per $km^2$ for the long-tailed duck in the spring, also in the nearshore zone. Other species were recorded at much lower densities, including: the European herring gull – 10 individuals per $km^2$ in the spring and autumn in the coastal zone; the razorbill – 7 individuals per $km^2$ in the spring in the nearshore zone; and the black-headed gull – just over 14 individuals per $km^2$ in the autumn in the coastal zone.

### 3.7.2 Protected areas, including Natura 2000 sites

In the offshore part of the Baltica OWF CI, there is one site protected under the Nature Conservation Act of 16 April 2004 (consolidated text: Journal of Laws of 2021, item 1098, as amended), namely the Natura 2000 site *Przybrzeżne wody Bałtyku* (PLB990002) [Figure 3.14]. The southern part of the construction area, with a length of approx. 24 km, crosses the eastern part of the site.

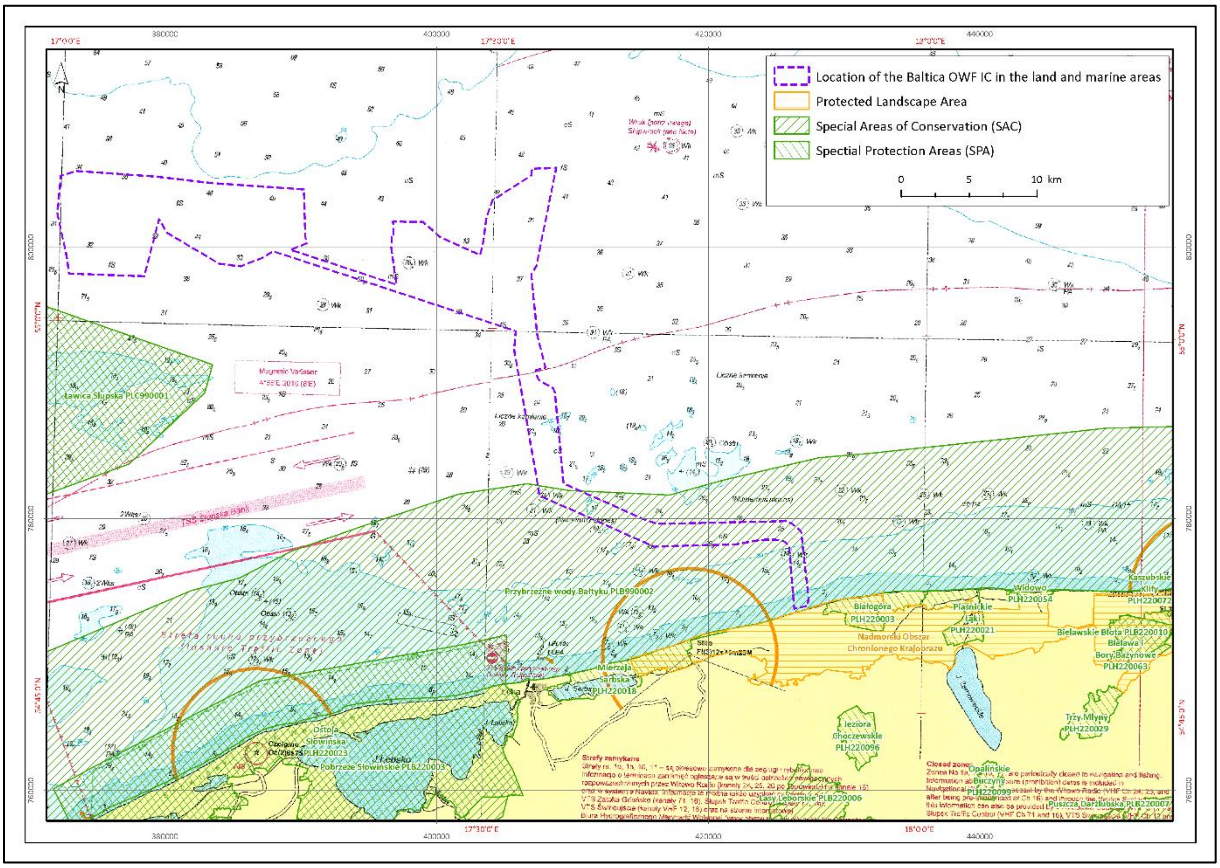



*Figure 3.14. Location of the Baltica OWF CI construction area in relation to selected areas protected under the Nature Conservation Act of 16 April 2004, projected on the navigational chart [Source: internal materials]*

The **Natura 2000 site *Przybrzeżne wody Bałtyku* (PLB990002)** was established by the Regulation of the Minister of the Environment of 21 July 2004 *on the Natura 2000 special protection areas for birds* (Journal of Laws of 2004, No. 229, item 2313). The primary function of the site is to provide protection for birds wintering in the nearshore zone of the Baltic Sea, mainly the long-tailed duck (*Clangula hyemalis*), the velvet scoter (*Melanitta fusca*), the common scoter (*Melanitta nigra*), the black guillemot (*Cepphus grylle*), the razorbill (*Alca torda*) and *Gaviiformes* [Meissner, 2010]. The surface of the area is 194 626.73 ha, covering coastal waters of the Baltic Sea up to a depth of approximately 20 m, and its boundaries extend for 200 km, from the base of the Hel Peninsula to the eastern border of the Pomeranian Bay [GDEP, 2020].

Approximately 12% of the velvet scoter, 2% of the common scoter and 35% of the long-tailed duck wintering in PMA gather within the area [Meissner, 2010; CIEP, 2020]. Due to its importance for wintering birds, the *Przybrzeżne wody Bałtyku* PLB990002 site is classified as a bird refuge of European significance (refuge code E 80). In the short-term, high abundances of gulls may be recorded in the area, mainly the European herring gull [Meissner, 2010; CIEP, 2020]. It is a phenomenon of synanthropic origin – gulls appear in large numbers over the sea area when they accompany fishing boats in search of easily accessible food source [Tomiałojć and Stawarczyk, 2003; Sikora *et al*., 2011].

Six species of birds listed in Annex I to the Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 *on the conservation of wild birds* are subject to protection in the area [Table 3.5]. Most of them are the species wintering in the Polish Baltic area, with the exception of the European herring gull, which may appear over the sea area throughout the year [Tomiałojć *et al*., 2003, Sikora *et al*., 2011].

*Table 3.5. Bird species subject to protection in the Przybrzeżne Wody Bałtyku site (PLB990002), as listed in Annex I to the Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds [Source: GDEP, 2020]*

| No. | Species | |
|---|---|---|
| | Name of species | Binomial nomenclature |
| 1. | Razorbill | *Alca torda* |
| 2. | Black guillemot | *Cepphus grylle* |
| 3. | Long-tailed duck | *Clangula hyemalis* |
| 4. | European herring gull | *Larus argentatus* |
| 5. | Velvet scoter | *Melanitta fusca* |
| 6. | Common scoter | *Melanitta nigra* |

In the SDF of the Natura 2000 site *Przybrzeżne wody Bałtyku* (PLB990002), two negative impacts on the site were identified [GDEP, 2020]. The first one is: "Other urbanisation, industrial and similar activities" (code E06), and the other is: "No threats and pressures" (code X). The impact labelled "No threats and pressures" was also indicated in the SDF of the area as a positive impact. Three impacts are classified as the "medium" level (M), meaning a "moderate direct or immediate influence, predominantly indirect and/or relating to approximately half of the area" [Explanatory Notes to the Natura 2000 Standard Data Form, 2012]. Regarding impact E06, it was indicated that the impact is internal (generated within the site boundary), whereas the sources of impact X are classified as external and intrinsic [GDEP, 2020]. No protection plan has been prepared for the *Przybrzeżne wody Bałtyku* (PLB990002) site.

### 3.7.3 Wildlife corridors

A wildlife corridor, pursuant to the Nature Conservation Act of 16 April 2004 (consolidated text: Journal of Laws of 2021, item 1098, as amended), is an area enabling the migration of plants, animals or fungi. A network of wildlife corridors connecting the Natura 2000 European network of protected areas in Poland was developed in 2011 [Jędrzejewski *et al*., 2011]; however, no wildlife corridors for PMA were indicated therein. Krost *et al.* [2017] emphasise the necessity to indicate wildlife corridors for benthic organisms. However, this is a relatively poorly recognised issue. There are also no relevant studies on the Southern Baltic in that scope.

According to the general classification of the migration system of aquatic and wetland birds in Eurasia, Poland, including its marine areas, is located within two large flyways: the East Atlantic and the Mediterranean/Black Sea flyways. The migration tactics, as well as flyways of seabirds in the Baltic region are very poorly recognised. In summer (July and August), the flight of sea ducks (mainly the common scoter males) from the Gulf of Finland in the direction of the moulting grounds located in the Danish straits is observed. They are accompanied by the common eiders *Somateria mollissima* and velvet scoters, however, the number of both species is much lower than that of the common scoter. These birds make a stop in the sea areas of the Southern Baltic only in exceptional cases. The period of seabird autumn migration is very extended in time. Starting in August, a number of water bird species can be observed within the PMA. Some of them are only passing and do not winter there (e.g. the terns of the *Sterna* and *Chlidonias* genera), others are observed throughout the entire migration and wintering periods (sea ducks, razorbills, divers, grebes). In the spring, large flocks of sea ducks (the long-tailed duck, the velvet scoter and the common scoter) moving towards feeding grounds make a stop in the Polish zone of the Baltic Sea [Sikora *et al*. (eds), 2011].

Also, for the marine mammals occurring in the Southern Baltic, no areas that could meet the criteria for wildlife corridors can be identified. Both seals and porpoises travel in search of food with no preference for specific routes.

### 3.7.4 Biodiversity

#### 3.7.4.1 Phytobenthos

As a result of the surveys conducted in the Baltica OWF CI area no phytobenthos communities were recorded. Macroalgae specimens were sparse and were represented by 2 taxa: brown algae *Desmarestia viridis* and red algae *Vertebrata fucoides*.

Due to the research effort, the surveys conducted in the Baltica OWF CI area can only be compared to the inventory surveys carried out for the BŚII and BŚIII OWFs, as well as BŚII and BŚIII MTI, and with the area intended for the planned Baltica OWF, which was surveyed in 2016. In the case of phytobenthos species, 2 species were found in the Baltica OWF CI area, while 8, 4 and 8 taxa were found in BŚII, BŚIII and MTI, respectively, whereas in the Baltica OWF area there were 6 macroalgae taxa in 2016. The indicated values of the number of taxa do not entitle to the conclusion that the compared areas differ in terms of biodiversity.

Macroalgae found in the Baltica OWF CI were characterised by very low species diversity. In the PMA, in areas where macroalgae have been identified so far, i.e., the boulder area of the Słupsk Bank, the boulder area of Rowy and the stony seabed near the Orłowo Cliff in the Bay of Puck, the number of species is significantly higher, amounting to 12, 12 and 23, respectively (SEM, 2002–2019; Kruk-Dowgiałło *et al*., 2011; Kruk-Dowgiałło *et al*., 2019).

#### 3.7.4.2 Macrozoobenthos

Two components of biodiversity were examined in the Baltica OWF CI in the context of acquiring knowledge on the macrozoobenthos of the area:

- diversity of seabed habitats;
- taxonomic diversity of macrozoobenthos inhabiting the seabed area surveyed.

The surveys carried out by remote sensing methods (side-scan sonar, echo sounder) and further confirmed by *in situ* surveys with the van Veen grab sampler showed the occurrence of two types of habitats in the Baltica OWF CI area:

- soft bottom on the surface covered by different grades of sands and gravels;
- hard bottom formed by accumulations of cobbles and boulders.

Soft bottom was found at 211 out of the 256 stations surveyed. In this type of seabed, samples were collected with a 0.1 $m^2$ van Veen grab sampler. Three grab operations were carried out at each station, each of which was a separate sample for laboratory analysis. In the material analysed, the occurrence of 31 species and higher taxonomic units of macrozoobenthos were found, representing the following classes: Hydrozoa, Priapulida, Polychaeta, Oligochaeta, Hexanauplia, Malacostraca, Gastropoda, Bivalvia and Gymnolaemata.

In terms of frequency, the prevailing taxa were those typical of shallow and medium-depth seabeds (up to 50 MBSL) in the open waters of the Southern Baltic: polychaetes: *Marenzelleria* sp., *Pygospio elegans* and *Bylgides sarsi*, bivalves *Limecola balthica* and *Mytilus trossulus*, oligochaetes and a representative of the Malacostraca class – *Diastylis* rathkei.

Hard bottom was found at 45 stations, which represents 17.6% of the stations analysed. Hard bottom samples were collected at 10 selected stations. A stone grabber fitted on an underwater ROV was used [Nowak *et al*., 2017]. According to experts, the method applied guaranteed quantitative collection of periphyton fauna (*Mytilus trossulus*, *Amphibalanus improvisus* and *Einhornia crustulenta*) and qualitative collection of mobile associated fauna, inhabiting the spaces between mussel individuals and algal thalli. Seventeen zoobenthos taxa were found in the hard-bottom (stone surface) zoobenthos samples. The most common taxa were the polychaete *Bylgides sarsi* and species typical of the Southern Baltic periphyton fauna: *Mytilus trossulus*, *Amphibalanus improvisus* and *Einhornia crustulenta*.

#### 3.7.4.3 Ichthyofauna

The analysis of the catch results and catch efficiency for the fish community inhabiting the Baltica OWF CI area demonstrates that the area is typical for the Southern Baltic in terms of species diversity, with a distinct prevalence of cod and flounder in demersal catches and of herring and sprat in pelagic catches.

A total of 31 fish species were observed in the Baltica OWF CI area during the surveys.

In the case of ichthyoplankton, during the entire survey period, the roe of one species of fish (sprat) and the larvae of 12 taxa were caught. These were gobies, sprat, flounder, herring, ammodytids, shorthorn sculpin, rock gunnel, common seasnail, cod, straightnose pipefish, fourbeard rockling and turbot.

During pelagic catches, 9 fish species were caught, 99% of the biomass being sprat and herring. There were also a few specimens of cod, great sand eel, mackerel, anchovy, flounder, lumpfish and three-spined stickleback.

During demersal fish catches, fish belonging to 21 taxa were recorded. Flounder and cod prevailed, whereas other species were a small by-catch (round goby, great sand eel, plaice, shorthorn sculpin, pogge, mackerel, European perch, greater weever, common roach, zander, anchovy, common whitefish, turbot, smelt, sprat, herring, lumpsucker, lesser sand eel, viviparous eelpout).

During catches using beach seine nets in the nearshore zone, 15 fish taxa were recorded. Great sand eel and lesser sand eel prevailed in the catches.

#### 3.7.4.4 Marine mammals

The Baltica OWF CI area is not a place of regular occurrence of marine mammals. Considering the specific nature of these animals, including primarily their mobility, they use the area only occasionally, while passing through.

#### 3.7.4.5 Seabirds

In the northern part of the Baltica OWF CI area, a total of 14 bird species were recorded, including 12 associated with the marine environment. In the southern part, the number of birds observed, both in the nearshore and offshore zone, was significantly higher and amounted to 41. Eight bird species, i.e.

the long-tailed duck, the common scoter, the little gull, the great black-backed gull, the common gull, the European herring gull, the black-headed gull and the red-throated diver were recorded in all parts of the Baltica OWF CI area.

### 3.7.5 Environmental valorisation of the sea area

The environmental evaluation of the offshore area of the Baltica OWF CI was performed as an assessment of individual biotic and abiotic resources, together with an attempt at indicating their significant and unique relationships, which could testify to a higher nature value of the entire area or its fragments in the context of the nature value of the southern part of the Baltic Sea within the PMA boundaries.

Macrophyte surveys demonstrated that in the offshore area of the Baltica OWF CI there are only trace amounts of macroalgae – mostly in the residual form or single small specimens, very sparsely distributed on the seabed. Neither rare nor protected species were found. The lack of macroalgae communities and their very low biomass is not a sign of anthropogenic environmental degradation, but rather a sign of natural relatively poor environment of the Southern Baltic. Therefore, on the basis of phytobenthos, the nature value of the Baltica OWF CI area should be assessed as moderate – natural for seabed areas covered by sandy and gravelly sediments with abrasive pavement.

Also the macrozoobenthos surveys showed that its qualitative and quantitative resources in the Baltica OWF CI area do not differ from other areas in the southern part of the PMA. On the soft and hard bottom, typical species of polychaetes, crustaceans and bivalves were identified, among which no protected and rare species were found. Therefore, on the basis of macrozoobenthos resources, the nature value of the area of the planned project should be assessed as moderate, similarly as in the case of macrophytes.

The analysis of the nature value of the offshore area on the basis of benthic organisms is largely determined by abiotic conditions – the relation between the type of seabed and the organisms inhabiting it. The seabed in the area of the planned project is mostly covered with sandy and gravelly sediments, locally covered with abrasive pavement. This type of seabed is common in the southern part of Polish maritime areas and therefore the benthos resources identified in the surveys do not differ from those identified in other parts of the sea area. The most valuable sites in the offshore area, in terms of nature value, are the extensive boulder areas situated at depths reaching 20 MBSL (the boundary of macroalgae development). Such boulder areas are located e.g. in the north-western part of the Słupsk Bank and in the coastal zone near Rowy. They are richly overgrown by macroalgae and bivalves, and the plant-animal complex formed by them is referred to as a habitat-forming complex because it creates favourable habitat for the existence and development of other organisms, particularly for numerous species of phytophilic invertebrate fauna. For this reason, shallow-water boulder areas represent some of the most abundant and valuable natural sites in the PMA.

The analysis of ichthyological data does not indicate that the offshore area of the Baltica OWF CI is particularly valuable in terms of ichthyofauna resources. The conditions for fish reproduction, development and foraging resemble other areas of the southern part of the PMA. Also in the case of ichthyofauna, the moderate rating of the nature value could be raised under the influence of the boulder areas covered by habitat-forming communities, which create favourable conditions for the development of ichthyofauna, including rare phytophilic species – straightnose pipefish and broadnosed pipefish.

Marine mammals most probably occur in the area of the planned project occasionally – during migration and foraging. The analysis of SAMBAH data indicates that the area is of average importance for the harbour porpoise – no seasonal accumulation of the porpoise was identified in the area. The shore in the vicinity of the cable landfall area is not a place of frequent and abundant seal sightings, which would also indicate intense use of the adjacent sea area by seals. Within the Polish coast, seals are most frequently observed on sandbanks formed in the area of the Vistula Cut estuary, where it is not uncommon to see groups of grey seals totalling around a dozen or several dozen individuals. Although the presence of marine mammals in the offshore area of the Baltica OWF CI most probably has a short-term character, resulting from migrations and foraging, their high significance in the conservation activities undertaken in the Baltic Sea environment suggests that the nature value of the area of the planned project should be assessed as moderate.

The southern part of the offshore area of the Baltica OWF CI is located within the Natura 2000 *Przybrzeżne wody Bałtyku* PLB990002 site, designated for the protection of seabirds. The eastern part of the area, where the planned project is located, is characterised by average densities of wintering birds in comparison to other parts of the area. In terms of environmental conditions, the entire protected area is characterised by low diversification, and therefore across its entire extent birds can find similar conditions for wintering, which encourages their dispersal and leads to the lack of distinct areas of concentration. The highest numbers of wintering birds in PMA are observed in the Słupsk Bank, Pomeranian Bay and the Gulf of Gdańsk. Beside wintering birds, gulls may occur in large numbers in the offshore area of the Baltica OWF CI. However, their presence is highly dependent on the presence of fishing vessels and boats, which are accompanied by these birds during fishing activities. The nature value of the Baltica OWF CI area for seabirds was assessed as moderate.

In conclusion, the abiotic conditions in the Baltica OWF CI offshore area are typical of the southern part of the PMA. The qualitative and quantitative resources of benthic organisms, determined mainly by the abiotic conditions, also do not deviate from those identified in other parts of that sea area. Moreover, no rich and unique resources of ichthyofauna, marine mammals and birds nor the presence of habitats that would indicate an important role of the area of the planned project for the existence and development of their species were found. In view of the above, the nature value of the Baltica OWF CI offshore area was assessed as moderate.

## 3.8 Cultural values, monuments and archaeological sites and objects

There are three wrecks in the construction area of the Baltica OWF CI [Figure 3.15]. In the deepest place (ambient depth of 35 m) there is a wreck with identification number WK-0506 (no. 1 in Figure 3.15). The wreck is nearly 20 m long, over 5 m wide and 0.7 m high (SIPAM). The second wreck (identification no. WK-0428) within the Baltica OWF CI area (no. 2 in Figure 3.15) is a wreck of a capsized flat-bottomed metal barge. The wreck is almost 48 m long, more than 8 m wide and more than 7 m high (SIPAM). The third wreck within the Baltica OWF CI area (no. 3 in Figure 3.15) is probably a German WW II bomber aircraft type JU-88, JU-188, JU-87 B-1 or B-25 (identification no. WK-0416). It is situated at a depth of 26 m. This wreck is over 18 m long, 8 m wide and 0.6 m high (SIPAM). According to SIPAM data, none of the wrecks indicated above are identified as cultural heritage.

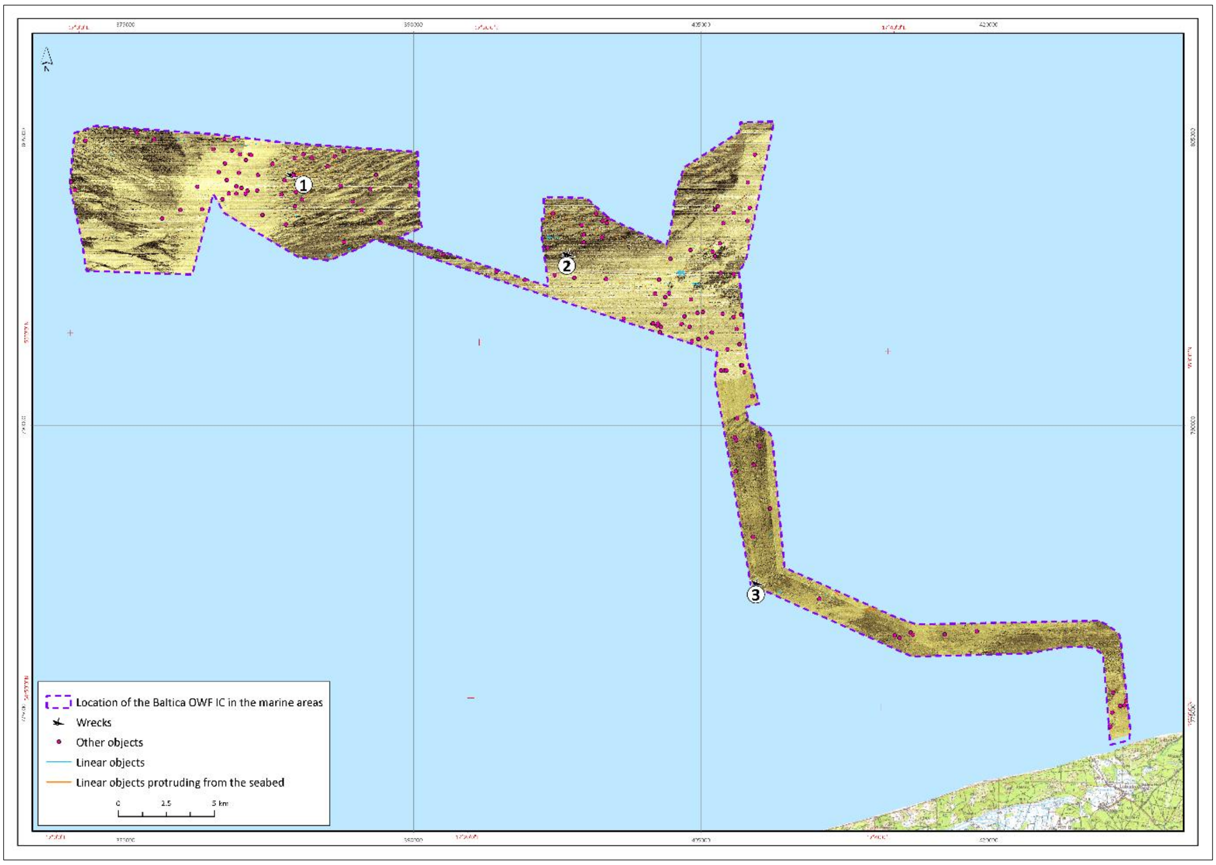



*Figure 3.15. Location of the Baltica OWF CI in relation to the identified wrecks [Source: internal materials]*

In the area of the Baltica OWF CI, no conventional warfare agents from the period of either world war have been found so far. However, their presence on the seabed of the analysed area cannot be excluded. A similar approach should be taken to the potential occurrence of containers with chemical weapons, which were dumped after World War II, mainly in the Baltic deeps – the Gotland Deep and the Bornholm Deep – as well as in the Skagerrak, the Little Belt and the Gdańsk Deep [Knobloch *et al*., 2013; Bełdowski *et al*., 2016] [Figure 3.16]. In light of the current analytical results and incidental discoveries, it is known that some chemical warfare agents were dumped from ships into the sea during transfer to their intended deposition sites [Knobloch *et al*., 2013]. Taking a precautionary approach, it should therefore be assumed that conventional and unconventional warfare agents from periods of war may also be deposited on the seabed in the Baltica OWF CI area, posing a potential threat to the safety of the project implementation.

## 3.9 Other anthropogenic objects

In 2016, magnetometer surveys were carried out in the Baltica OWF CI area in order to detect ferromagnetic objects lying on the seabed or under the sediment layer. As a result, a map of magnetic anomalies, which were found in several hundred locations, was developed. All magnetic anomalies were compared with bathymetric and sonar information to verify the possible presence of objects on the seabed. Selected objects the character of which could not be identified using bathymetric and sonar data were inspected by an ROV. The visible continuous magnetic anomalies indicate little variation in the seabed structure. These analyses revealed the presence of broken anchor lines, among others.

Before the commencement of the construction, the Applicant will conduct detailed surveys in the scope of the presence of duds and UXOs on the seabed. If any chemical warfare agents/UXOs are found, the Applicant shall notify the relevant authorities and institutions, and shall comply with their instructions.

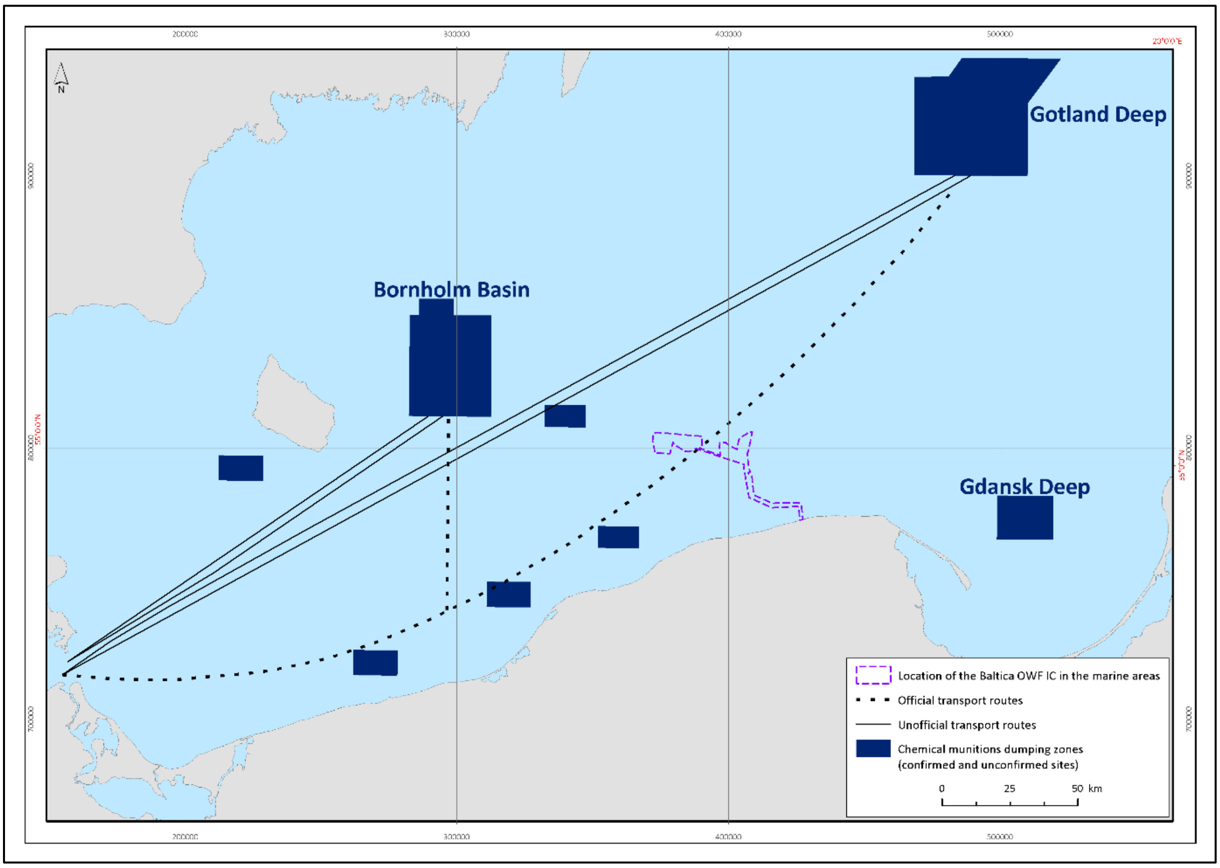



*Figure 3.16. Location of transport routes and areas of chemical weapon deposition in the Baltic Sea [Source: internal materials based on Bełdowski et al., 2014]*

## 3.10 Use and management of the water area and tangible property

The sea area, in which the Baltica OWF CI will be situated, plays various functions resulting from the previous human activity and the natural and environmental resources occurring in it. The most comprehensive list of the forms of the current and planned future use of sea space has been presented in the MSPPMA approved by the Regulation of the Council of Ministers of 14 April 2021 *on the adoption of the maritime spatial plan for internal sea waters, the territorial sea and the exclusive economic zone at a scale of 1:200 000* (Journal of Laws of 2021, item 935).

According to the PMA division resulting from the MSPPMA, the offshore part of the Baltica OWF CI is located in the following sea areas and sub-areas [Figure 3.17]:

1) sea area POM.45.E, including sub-area 45.201.I;
2) sea area POM.16.Pw, including sub-areas 16.201.I and 16.926.B;
3) sea area POM.34.T, including sub-areas 34.926.B, 34.201.I and 34.628.C;
4) sea area POM.54.T, including sub-area 54.201.I;
5) sea area POM.41a.P, including sub-areas 41a.201.I and 41a.926.B;
6) sea area POM.40a.C, including sub-areas 40a.201.I and 40a.800.S.

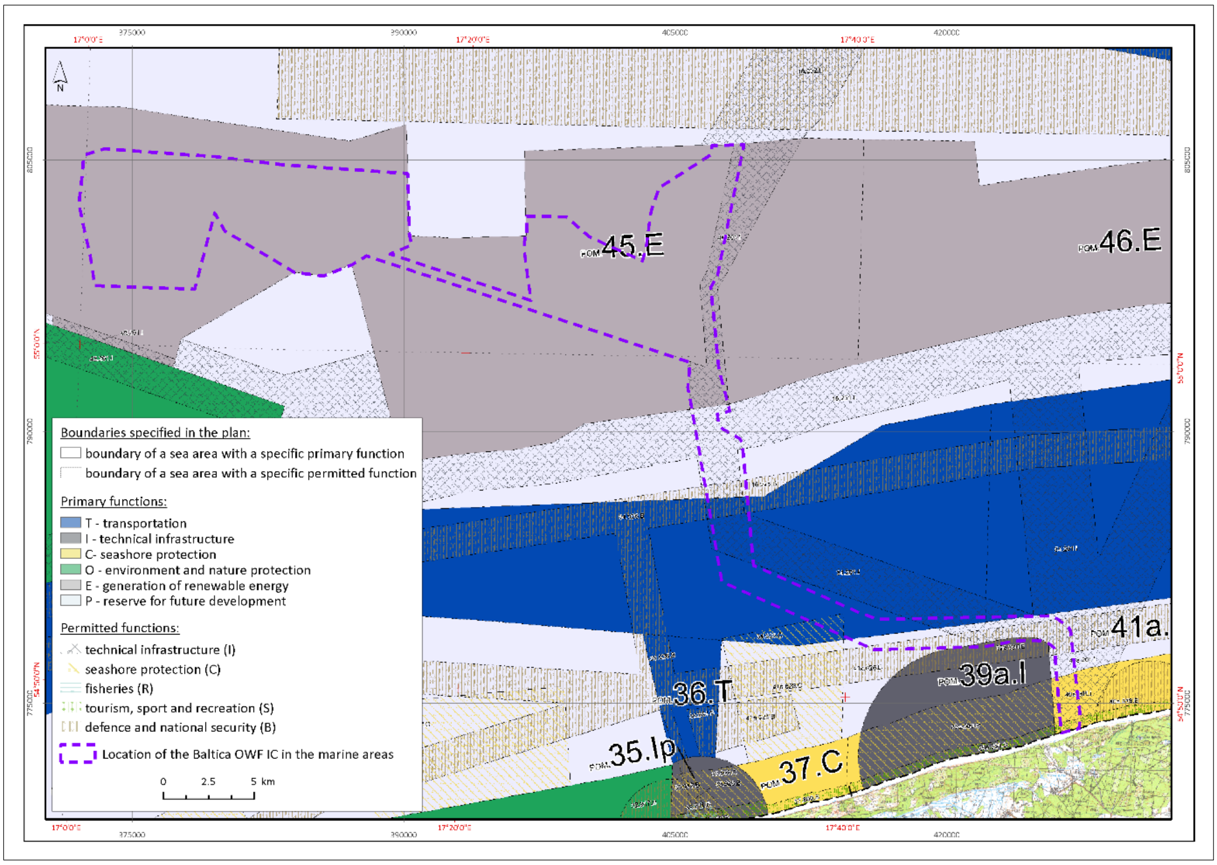



*Figure 3.17. Location of the Baltica OWF CI in relation to the sea areas and sub-areas designated in the Maritime Spatial Plan of the Polish Maritime Areas [Source: internal materials based on the drawing of MSPPMA]*

Pursuant to the MSPPMA, the Baltica OWF CI is classified as "technical infrastructure", i.e.

*"function: technical infrastructure – means:*

*a) the possibility of locating telecommunications cables, substation infrastructure as well as laying and maintaining power cables, including internal and external connection infrastructure for offshore wind farms, [...]"*

The following is a characterisation of the sea areas and sub-areas in the context of allowing the construction and operation of connection infrastructure within their boundaries.

**POM.45.E sea area**

**Primary function**: generation of renewable energy.

**Permitted functions:** aquaculture; scientific research; cultural heritage; <u>technical infrastructure</u>; exploration, prospecting and extraction of minerals from deposits; fisheries; artificial islands and structures; transport; tourism, sport and recreation.

Provisions pertaining to the location of technical infrastructure within the sea area:

*Within the entire sea area:*

*− the implementation of the function is restricted to:*

- *the infrastructure essential for the implementation of the function of energy acquisition;*

- *methods which do not endanger the ecological function of spawning grounds and the survival of the early development stages (eggs and larvae) of commercial fish species;*

*– linear elements of the technical infrastructure are required to be laid in a space-efficient manner, below the surface of the seabed, and if this is impossible due to environmental or technological constraints, other permanent safeguards should be applied to allow the safe use of anchored set nets.*

**Public purpose projects:** *sub-area **45.201.I** is designated for laying and maintenance of the linear elements of technical infrastructure – including external connection infrastructure for offshore wind farms and the planned DC connection between Poland and Lithuania;*

**POM.16.Pw sea area**

**Primary function:** reserve for future development with permission for extraction.

**Permitted functions:** aquaculture; scientific research; cultural heritage; technical infrastructure; defence and national security; exploration, prospecting and extraction of minerals from deposits; fisheries; artificial islands and structures; transport, tourism, sport and recreation.

Provisions pertaining to the location of technical infrastructure within the sea area:

*− the implementation of the function is restricted to the following methods which do not endanger navigational safety;*

*− the new linear elements of technical infrastructure are required to be laid under the seabed surface, and if this is impossible due to environmental or technological constraints, other permanent safeguards should be used to ensure navigational safety.*

*1) the sub-area **16.201.I** is designated for laying and maintenance of the linear elements of technical infrastructure – external connection infrastructure for offshore wind farms, including the planned DC connection between Poland and Lithuania;*

*Sub-area 16.923.B is designated as the training grounds (P-15, P-16, P-18, P-19, P-22, P-23) and sub-area **16.926.B** – as the fairways of the Polish Navy.*

**POM.34.T sea area**

**Primary function:** transport.

**Permitted functions:** scientific research; cultural heritage; technical infrastructure; seashore protection, defence and national security; exploration, prospecting and extraction of minerals from deposits; fisheries; tourism, sport and recreation.

Provisions pertaining to the location of technical infrastructure within the sea area:

*Within the entire sea area:*

*– the implementation of the function is restricted to methods which do not endanger the ecological function of spawning grounds and the survival of the early development stages (eggs and larvae) of commercial fish species;*

*– the new linear elements of technical infrastructure are required to be laid under the seabed surface, and if this is impossible due to environmental or technological constraints, other permanent safeguards should be used to ensure navigational safety.*

*In sub-area **34.628.C**, the implementation of the function is restricted to methods which do not disturb sand accumulation for artificial shore nourishment.*

*Sub-area **34.201.I** is designated for laying and maintenance of linear elements of technical infrastructure – external connection infrastructure for offshore wind farms.*

*Sub-area **34.628.C** is designated for seashore protection, intended for sand accumulation for artificial shore nourishment. Within the sub-area, except in emergency situations, the implementation of the function is restricted to methods which do not endanger the ecological function of spawning grounds and the survival of the early development stages (eggs and larvae) of commercial fish species;*

*a) the sub-area 34.923.B is designated as the training grounds P-22 and P-23 and the sub-area **34.926.B** – as the fairways of the Polish Navy (0023, 0024, 0026, 0304, 0305).*

**POM.54.T sea area**

**Primary function:** transport.

**Permitted functions:** scientific research; cultural heritage; technical infrastructure; defence and national security; exploration, seashore protection; prospecting and extraction of minerals from deposits; fisheries; tourism, sport and recreation.

Provisions pertaining to the location of technical infrastructure within the sea area:

*Within the entire sea area:*

*− the implementation of the function is limited to the following methods which:*

- *do not endanger the ecological function of spawning grounds and the survival of the early development stages (eggs and larvae) of commercial fish species;*

*– the new linear elements of technical infrastructure are required to be laid under the seabed surface, and if it is impossible due to environmental or technological constraints, other permanent safeguards should be used to ensure navigational safety;*

*– it is forbidden to lay the linear elements of the technical infrastructure referred to in Annex 1, § 5 section 2 (i.e. Unless detailed decisions provide otherwise, the implementation of the remaining linear elements, other than those mentioned in section 1, is required to be carried out in the infrastructural corridors referred to in § 11 section 1 items 1–3, 5–7 and 9, with the exception of the situations where it is impossible for environmental, technological, economic or national security reasons), outside the designated sub-areas **54.201.I,** 54.202.I and 54.203.I, with the exception of the DC connection between Poland and Lithuania.*

*The sub-area **54.201.I** is designated for laying and maintenance of the linear elements of technical infrastructure – including external connection infrastructure for offshore wind farms and the planned DC connection between Poland and Lithuania;*

**POM.41a.P sea area**

**Primary function**: reserve for future development.

**Permitted functions:** scientific research; cultural heritage; technical infrastructure; defence and national security; seashore protection; exploration, prospecting and extraction of minerals from deposits; fisheries; transport; tourism, sport and recreation.

Provisions pertaining to the location of technical infrastructure within the sea area:

*Within the entire sea area:*

*− the implementation of the function is restricted to the following methods which:*

- *do not endanger navigational safety;*
- *do not endanger the ecological function of spawning grounds and the survival of the early development stages (eggs and larvae) of commercial fish species;*
- *do not have a significant negative influence on the welfare of birds wintering and resting during migration or in the period of their numerous occurrence from the beginning of November to the end of April;*

*– the new linear elements of technical infrastructure are required to be laid under the seabed surface, and if it is impossible due to environmental or technological constraints, other permanent safeguards should be used to ensure navigational safety;*

*The sub-area **41a.201.I** is designated for laying and maintenance of the linear elements of technical infrastructure – external connection infrastructure for offshore wind farms and the planned DC connection between Poland and Lithuania;*

*The sub-area 41a.923.B is designated as the training ground P-15, while the sub area 41a.924.B is designated as the anchorages K-6 and K-7 and the sub-area **41a.926.B** – as the fairways of the Polish Navy (0205, 0206). The change of their existing state of development must be agreed with the minister responsible for national defence. During the activities carried out by the Polish Armed Forces, the implementation of other functions in the sub-areas may be precluded;*

**POM.40a.C sea area**

**Primary function:** seashore protection.

**Permitted functions:** scientific research; cultural heritage; a port or harbour operation; technical infrastructure; defence and national security; exploration, prospecting and extraction of minerals from deposits; fisheries; artificial islands and structures; transport, tourism, sport and recreation.

Provisions pertaining to the location of technical infrastructure within the sea area:

*within the entire sea area:*

*− the implementation of the function is restricted to the following methods which:*

- *do not endanger the ecological function of spawning grounds and the survival of the early development stages (eggs and larvae) of commercial fish species;*
- *do not have a significant negative influence on the welfare of birds wintering and resting during migration or in the period of their numerous occurrence from the beginning of November to the end of April;*

*– the new linear elements of technical infrastructure are required to be laid:*

- *perpendicularly to the shoreline if possible;*
- *under the seabed surface, and if it is impossible due to environmental or technological constraints, other permanent safeguards should be used to ensure navigational safety;*
- *minimum 3 m below the mean depth of the bottom of depressions between the sandbanks;*

*– it is forbidden to cross the linear elements of technical infrastructure, unless it is impossible due to technological constraints;*

*In sub-area **40a.800.S**, the implementation of functions is restricted to measures meeting the safety requirements of areas used as bathing and recreation sites and for practicing water sports.*

*Sub-area **40a.201.I** is designated for laying and maintenance of the linear elements of technical infrastructure – external connection infrastructure for offshore wind farms and the planned DC connection between Poland and Lithuania.*

*For tourism, sport and recreation – sub-area **40a.800.S** is designated for the development of tourist functions. Within the sub-area:*

*a) the creation of bathing sites and places occasionally used for bathing and recreation as well as water sports is restricted to areas not endangering the safety of human life,*

*b) the introduction of new elements of tourism infrastructure (piers, jetties) is restricted to places meeting the requirements of maintaining the proper condition of the seashore protection system, with the exception of those agreed upon by the territorially competent director of the maritime office prior to the adoption of this plan (including in applicable local spatial development plans);*

The provisions of the MSPPMA indicate that the Baltica OWF CI project can be carried out with the technology assumed within the boundaries of the above-described sea areas and subareas. Sea area POM.54.T is an exception, in which the laying of the technical infrastructure was restricted to the subareas established for that particular purpose. Exceptions can only be made for environmental, technological, economic or national security reasons. The Baltica OWF CI with its scope covers only a small part of the area POM.54.T outside subarea 54.202.I.

As regards the offshore area outside the OWF Area, the route of the project does not reach beyond the area indicated in the location decisions issued by the Minister of Maritime Economy and Inland Navigation and the Director of the Maritime Office in Gdynia. The decisions were not invalidated by the entry of MSPPMA into force on 22 May 2021.

The most important forms of the use of the maritime space in the Baltica OWF CI area are described in Sections 3.10.1–3.10.4.

### 3.10.1 Maritime transport

The Baltica OWF CI area is located in the offshore area, which is intensively used for shipping. In the section from the boundary of the territorial sea up to a distance of about 10 km from the shore, it crosses one of the most important in the Baltic Sea, the customary transport route, leading, among other, to the seaports in Gdynia and Gdańsk. The MSPPMA takes into account the importance of this route, designating for it the sea areas with T category, in which the main function is transport (part of the Baltica OWF CI is located in the areas marked as POM.34.T and POM.54.T). The traffic of vessels in the sea area analysed is supervised by the Traffic Separation Scheme TSS Słupska Bank. The Baltica OWF CI area intersects the eastern part of that system [Figure 3.18]. In addition to transport vessels travelling to and from sea ports, also other vessels such as fishing vessels which conduct catches in this sea area or sail to other fisheries, and small recreational vessels (e.g. sailing yachts) appear in the Baltica OWF CI area.

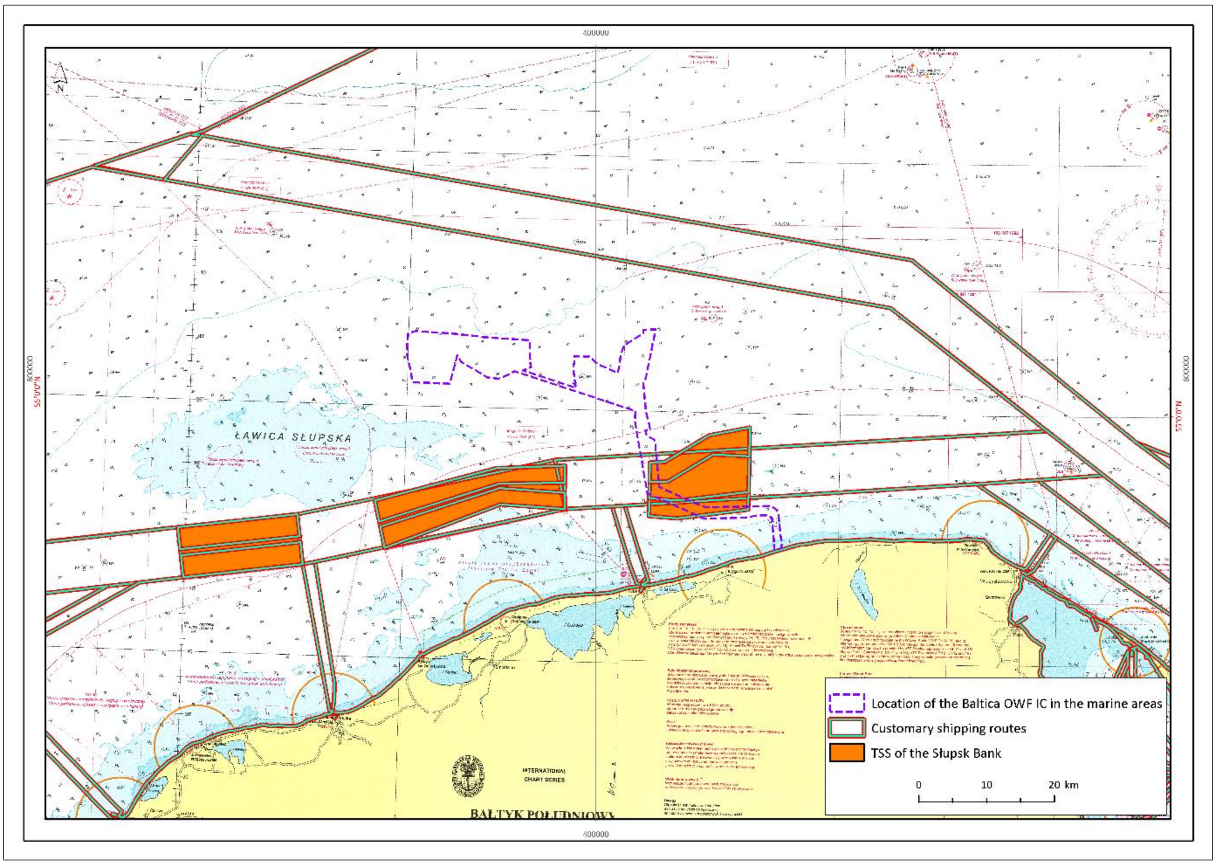



*Figure 3.18. Location of the Baltica OWF CI construction area against the background of shipping routes, projected on the navigational chart [Source: internal materials based on SIPAM]*

#### 3.10.1.1 Navigation

The impact of the project on shipping activity was assessed on the basis of AIS data recorded by the Polish maritime administration in 2018–2019. Data on vessel traffic intensity are presented in Figure 3.19.

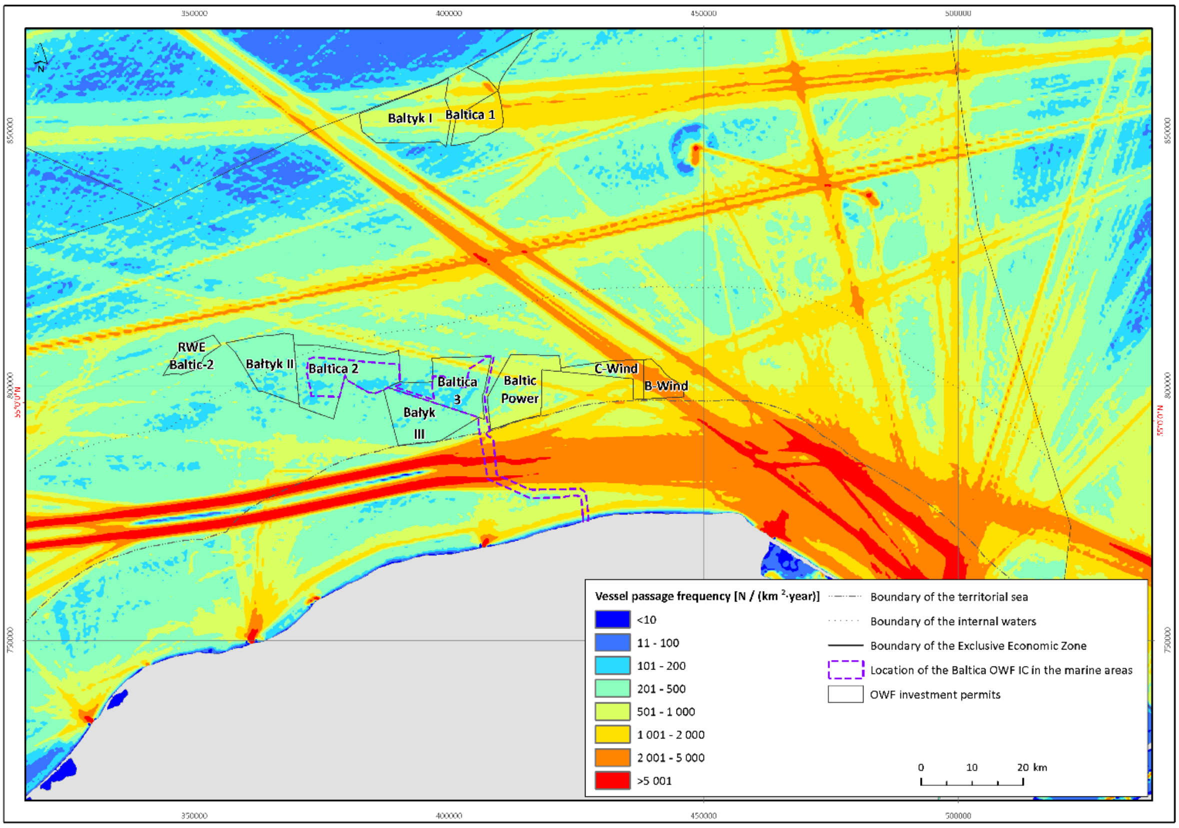



*Figure 3.19. Distribution of vessel traffic in the central part of Polish maritime areas in 2018–2019 [Source: internal materials based on AIS data]*

Based on the data illustrated in Figure 3.19, the axes of the main shipping routes were identified. The analysis of these routes enables the identification of conflicts and risks related to the simultaneous functioning of shipping and activities related to the construction and operation of the Baltica OWF CI and, in a broader sense, all activities related to offshore wind energy, in accordance with the MSPPMA.

Figure 3.20 and Figure 3.21 illustrate diagrams of the present and planned main shipping routes. The map includes both the conditions resulting from the MSPPMA and the modified area of the traffic separation scheme TSS Słupska Bank, which covers its eastern part, i.e. the separation zone, traffic lanes and inshore traffic zone.

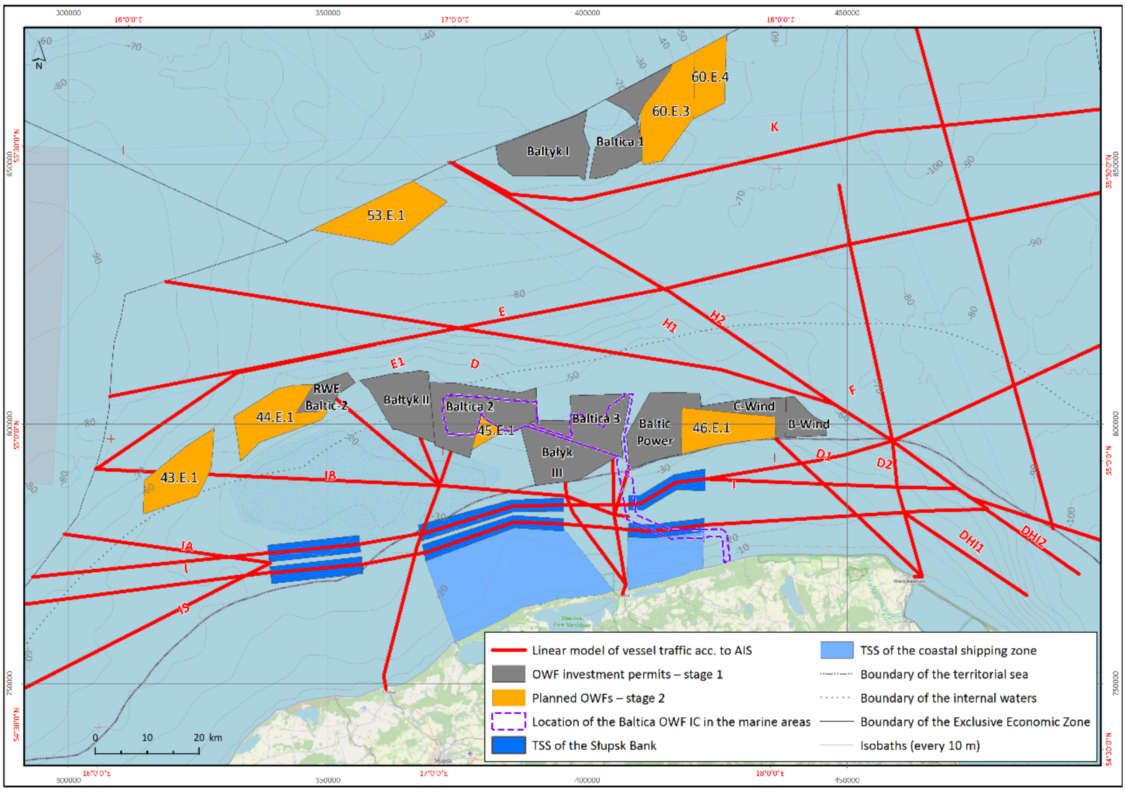



*Figure 3.20. Location of the offshore part of the Baltica OWF CI against the background of shipping routes [Source: internal materials based on AIS data, 2018–2020]*

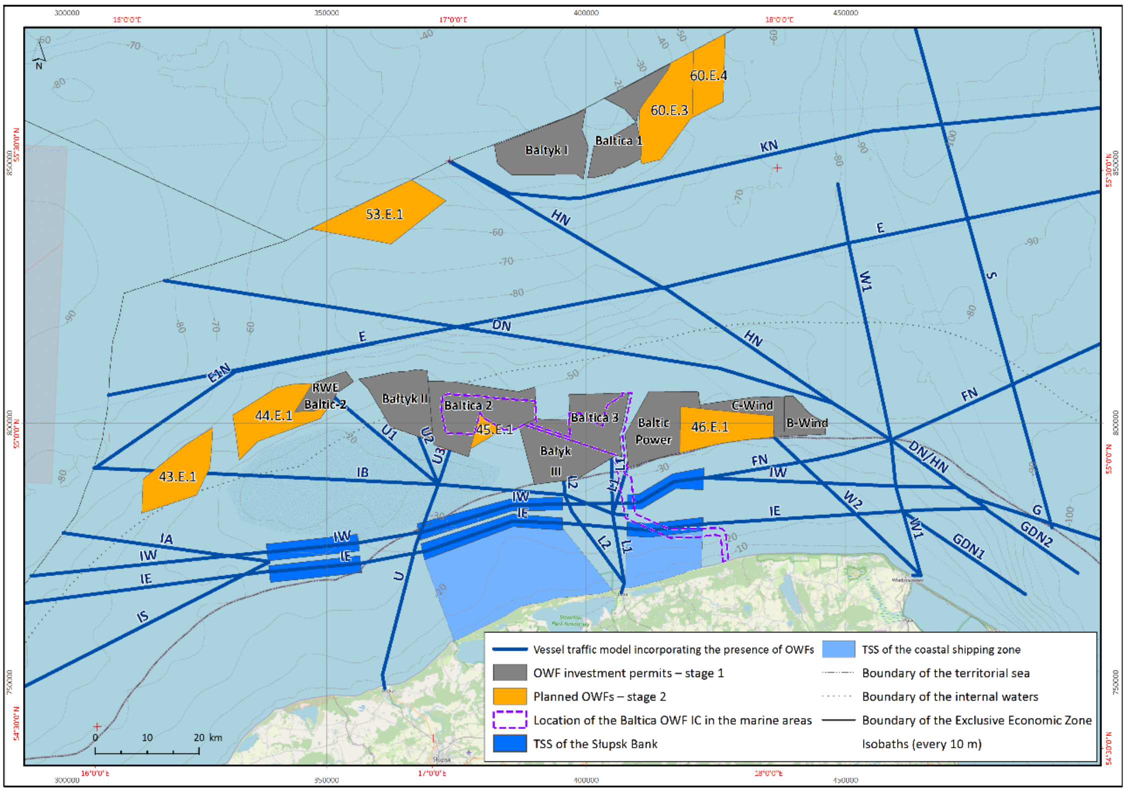



*Figure 3.21. Location of the offshore part of the Baltica OWF CI against the background of planned shipping routes [Source: internal materials]*

### 3.10.1.2 Fisheries in the context of fishing vessel traffic

Figure 3.22 illustrates the movement of fishing vessels in the central part of Polish maritime areas regardless of their speed, while Figure 3.23 illustrates the movement of vessels at speeds below 5 knots based on the assumption that this is the upper speed limit at which fishing can be carried out. Speeds above 5 knots represent a fishing vessel's transfer to the fishing area or return from the fishing area to port.

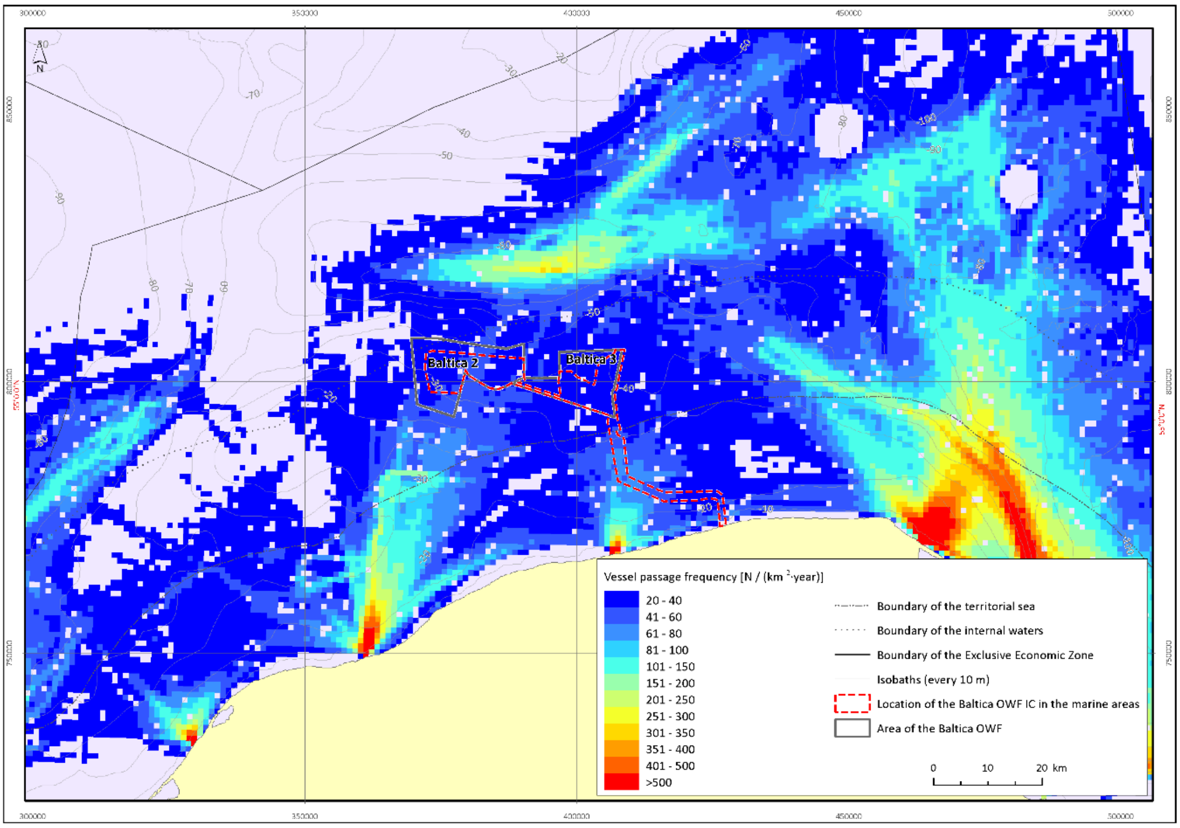



*Figure 3.22. Location of the offshore part of the Baltica OWF CI against the background of the fishing vessel traffic in the central part of Polish maritime areas [Source: internal materials based on AIS data, 2018–2020]*

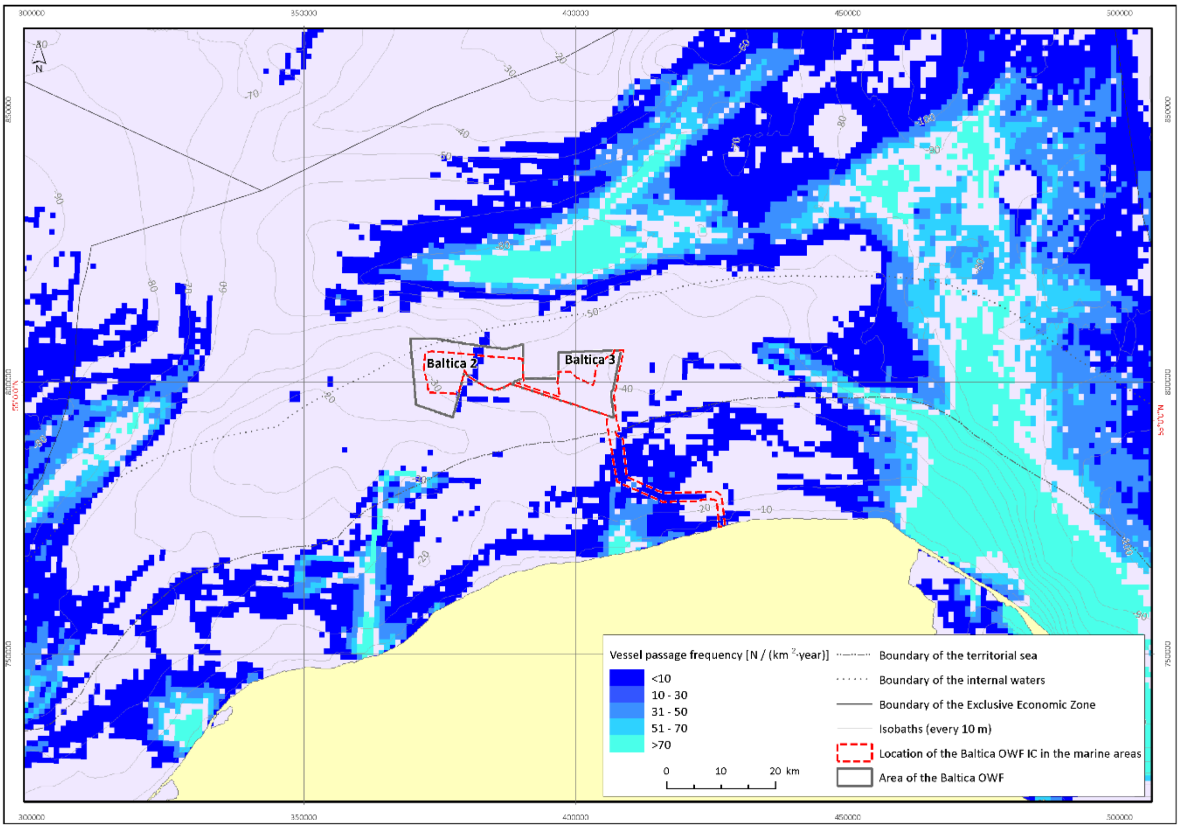



*Figure 3.23. Location of the offshore part of the Baltica OWF CI against the background of the fishing vessel traffic at speeds below 5 knots in the central part of Polish maritime areas [Source: internal materials based on AIS data, 2018–2020]*

### 3.10.2 Fisheries

The Baltica OWF CI is situated in the area of 6 statistical rectangles: O6, N7, O7, L8, M8 and N8 [Figure 3.24].

Activities related to the fishing industry are carried out in the Baltica OWF CI area. These activities were characterised on the basis of the data collected as part of the National Fisheries Data Collection Programme, based on the source data derived from the catch reports of fishing boats taking into account the location of catches (statistical rectangle or geographical position), fish species, month of catches and type of vessel (vessels with a length of up to 12 m and exceeding 12 m).

For fishing vessels exceeding 12 m in length, equipped with a Vessel Monitoring System (VMS), the daily catch volume was assigned to a particular statistical rectangle or the Baltica OWF CI area on the basis of the proportion of the number of vessel position reports provided within a particular statistical rectangle or within the area of the Baltica OWF CI itself to the general number of VMS reports within a day.

For fishing boats up to 12 m in length, for which VMS data are not available, information on the catches in the area of the Baltic rectangle were used, while the estimation of the catch volume in the Baltica OWF CI area was carried out taking into consideration the relative share of the area that will be covered by the project, compared to the total surface area of the statistical rectangle. With this simplification, the possible diversification of the catch volumes within a particular statistical rectangle (for example, due to the differences in depth or the type of seabed) is omitted; however, it is the only possible simplification enabling more precise reference to the location of the fish caught.

The analysis is based on the data from catch reports, which may differ from the landing (final) data; however, adopting them as a basis was necessary for the purpose of demonstrating the geographical distribution of fishing activities. Possible differences should not affect the conclusions reached.

The analysis was based on the catch data for 2016–2020. The value of catches was estimated on the basis of the average annual prices of the first sale of individual species of fish and the volume of catches.

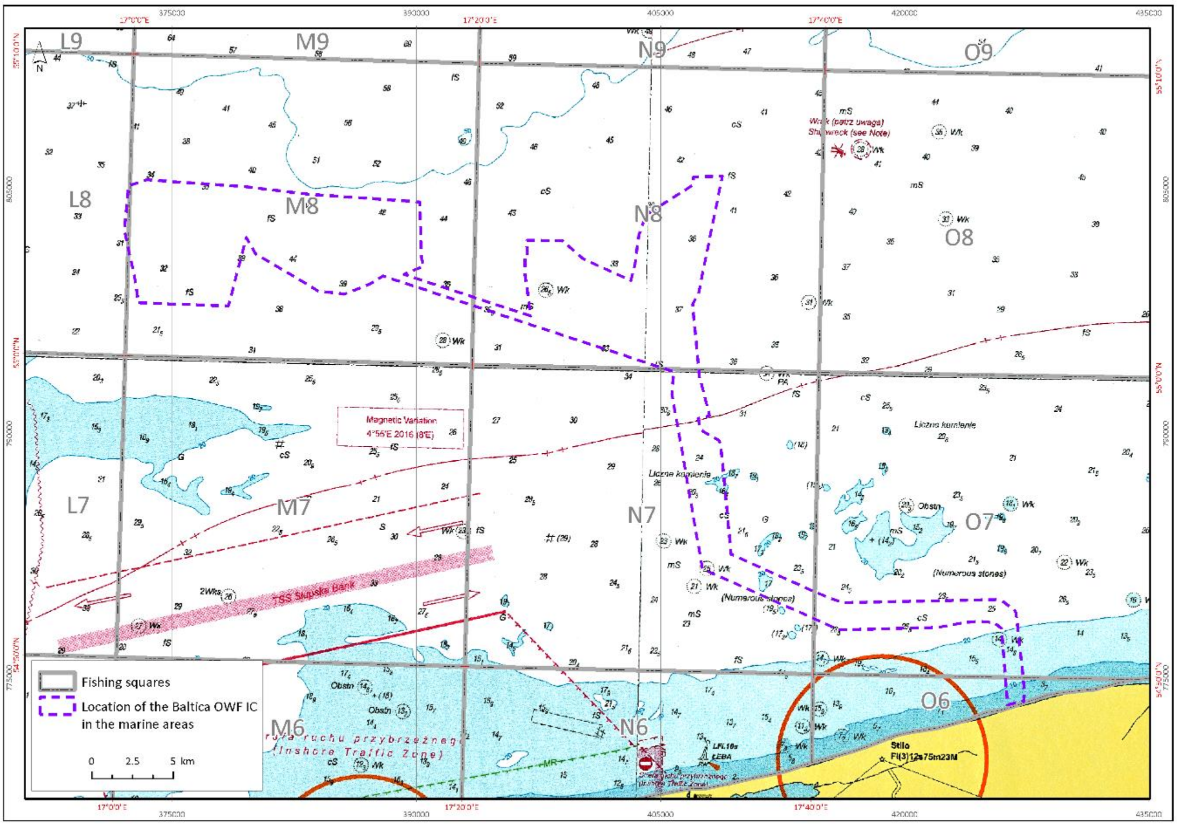



*Figure 3.24. Location of the offshore area of the Baltica OWF CI against the background of statistical rectangles [Source: internal materials]*

*Table 3.6. Surface area occupied by the Baltica OWF CI in individual statistical rectangles [Source: internal materials]*

| Statistical rectangle | Area occupied [%] |
|---|---|
| O6 | 3.06 |
| N7 | 8.59 |
| O7 | 5.73 |
| L8 | 0.16 |
| M8 | 27.09 |
| N8 | 20.24 |
| Total | 12.1 |

### 3.10.2.1 Volume and value of fish catches

In 2020, the total volume of fish catches in the 6 statistical rectangles analysed amounted to approx. 70 t, which constituted 0.1% of the total volume of Polish Baltic catches carried out by the Polish

Baltic fishery sector that year. The value of catches amounted to approx. PLN 300 000, which accounted for 0.2% of the total value of landings from Polish catches in the Baltic Sea [Table 3.7]. The average multi annual share of catches from the area of the 6 rectangles in the general Baltic catches (in terms of volume and value) in the years 2016–2020 was 0.2% and 0.6%, respectively.

*Table 3.7. Volume and value of Polish catches in statistical rectangles O6, N7, O7, L8, M8 and N8 as well as a total for the Baltic Sea, in 2016–2020 [Source: internal materials]*

| Area | Catch parameter | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Rectangles | Volume [t] | 507.1 | 463.2 | 316.0 | 209.9 | 72.5 |
| | Value [PLN thousand] | 2197.3 | 1893.3 | 1427.2 | 630.6 | 303.8 |
| Baltic Sea | Volume [thousand t] | 138.9 | 137.6 | 154.8 | 146.0 | 130.0 |
| | Value [PLN million] | 223.6 | 205.5 | 206.3 | 188.6 | 151.4 |

The significance of the Baltica OWF CI area for fisheries varies depending on the place of fishing vessel registration. Naturally, vessels registered in the ports nearest to the area analysed have the highest share of volume and value of catches conducted in the area of the six statistical rectangles analysed in relation to the total catches in the Baltic Sea. These include ships registered in Ustka and Łeba. In the years 2016–2020, the average share of fish caught in the area of the rectangles located in the area of the planned project in relation to the total catches of vessels registered in the two ports mentioned was 0.9 and 2.7%, respectively, in terms of quantity, and 3.0 and 67% in terms of value (Table 3.8, Table 3.9).

*Table 3.8. Average volume of catches [t] in statistical rectangles O6, N7, O7, L8, M8 and N8, and in the Baltica OWF CI area in 2016–2020 in relation to the total Polish catches in the Baltic Sea, divided by registration ports and vessel sizes [Source: internal materials]*

| Port | Statistical rectangles | | | Baltica OWF CI | | | Baltic Sea total | In the statistical rectangles [%] | In the Baltica OWF CI area [%] |
|---|---|---|---|---|---|---|---|---|---|
| | <12 m | >12 m | Total | <12 m | >12 m | Total | | | |
| Ustka | 87.9 | 69.0 | 156.9 | 11.9 | 9.4 | 21.4 | 16 531.6 | 0.9 | 0.1 |
| Łeba | 31.8 | 43.9 | 75.7 | 1.8 | 6.4 | 8.1 | 2837.4 | 2.7 | 0.3 |
| Władysławowo | 0.0 | 31.5 | 31.5 | 0.0 | 3.8 | 3.8 | 41 398.7 | 0.1 | 0.0 |
| Darłowo | 5.9 | 17.0 | 22.9 | 0.9 | 0.1 | 1.1 | 561.0 | 4.1 | 0.2 |
| Dziwnów | 16.9 | 0.0 | 16.9 | 1.4 | 0.0 | 1.4 | 6086.2 | 0.3 | 0.0 |
| Kołobrzeg | 3.3 | 1.4 | 4.8 | 0.3 | 0.2 | 0.5 | 39 590.7 | 0.0 | 0.0 |
| Jarosławiec | 2.9 | 0.0 | 2.9 | 0.2 | 0.0 | 0.2 | 116.6 | 2.5 | 0.2 |
| Other | 1.0 | 1.1 | 2.1 | 0.0 | 0.0 | 0.0 | 34 282.6 | 0.0 | 0.0 |
| **Total** | **149.6** | **164.1** | **313.7** | **16.6** | **20.0** | **36.6** | **142 470.6** | **0.2** | **0.03** |

*Table 3.9. Average value of catches [PLN thousand] in statistical rectangles O6, N7, O7, L8, M8 and N8, and in the Baltica OWF CI area in 2016–2020 in relation to the total Polish catches in the Baltic Sea, divided by registration ports and vessel sizes [Source: internal materials]*

| Port | Statistical rectangles | | | Baltica OWF CI | | | Baltic Sea total | In the statistical rectangles [%] | In the Baltica OWF CI area [%] |
|---|---|---|---|---|---|---|---|---|---|
| | <12 m | >12 m | Total | <12 m | >12 m | Total | | | |
| Ustka | 458.5 | 278.9 | 737.4 | 57.9 | 32.5 | 90.3 | 24 965.9 | 3.0 | 0.4 |
| Łeba | 124.0 | 170.9 | 294.9 | 5.7 | 24.2 | 29.9 | 4423.9 | 6.7 | 0.7 |

| **Port** | **Statistical rectangles** | | | **Baltica OWF CI** | | | **Baltic Sea total** | **In the statistical rectangles [%]** | **In the Baltica OWF CI area [%]** |
|---|---|---|---|---|---|---|---|---|---|
| | **<12 m** | **>12 m** | **Total** | **<12 m** | **>12 m** | **Total** | | | |
| Władysławowo | 0.0 | 45.4 | 45.4 | 0.0 | 5.0 | 5.0 | 43 654.4 | 0.1 | 0.0 |
| Darłowo | 30.8 | 83.2 | 114.0 | 4.9 | 0.9 | 5.8 | 2372.6 | 4.8 | 0.2 |
| Dziwnów | 62.8 | 0.0 | 62.8 | 5.3 | 0.0 | 5.3 | 9213.7 | 0.7 | 0.1 |
| Kołobrzeg | 8.4 | 5.1 | 13.5 | 0.7 | 0.8 | 1.6 | 49 865.3 | 0.0 | 0.0 |
| Jarosławiec | 14.3 | 0.0 | 14.3 | 1.0 | 0.0 | 1.0 | 521.6 | 2.7 | 0.2 |
| Other | 6.3 | 1.9 | 8.2 | 0.3 | 0.0 | 0.3 | 60 043.9 | 0.0 | 0.0 |
| **Total** | **705.1** | **585.3** | **1290.4** | **75.8** | **63.4** | **139.2** | **205 340.3** | **0.6** | **0.07** |

The volume and value of fish catches in the individual statistical rectangles in which the Baltica OWF CI is to be situated varies considerably. As illustrated in Figure 3.25, rectangles M8 and L8, i.e. the two most northwest rectangles of the six analysed, are by far the most important for fisheries. This is due to the higher cod catches in the deeper waters compared to the other rectangles. At this point, it is necessary to note the very small surface area to be occupied by the Baltica OWF CI (0.16%) in rectangle L8; therefore, the catches in this rectangle could be practically omitted altogether in the impact analysis. What is also noticeable is the clear downward trend in the volume and value of catches – in all rectangles. This is mainly due to the crisis in cod stocks and the consequent decrease in cod fishing quotas.

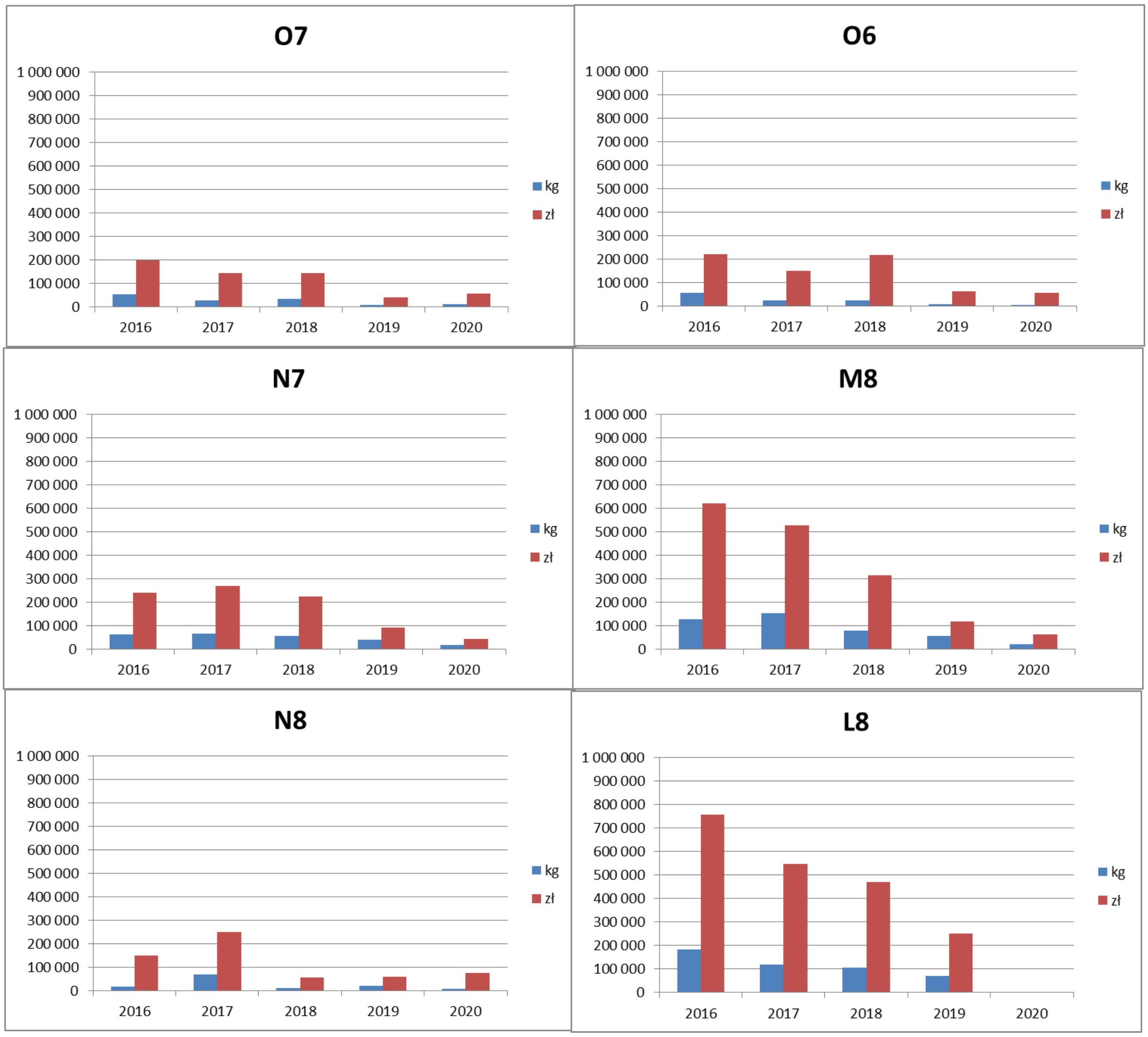



*Figure 3.25. The volume and value of catches in the individual statistical rectangles in the Baltica OWF CI area [Source: internal materials]*

The main fish species caught in the area of the 6 rectangles analysed in 2016–2020 were cod and flounder [Table 3.10], corresponding to 59% and 19% of the total catches volume, and 67 and 9% in terms of the catch value [Figure 3.26]. The remaining part of the catches was herring with 19% and 6% share in the volume and value of catches, respectively.

*Table 3.10. Volume [t] and value [PLN thousand] of fish catches in statistical rectangles O6, N7, O7, L8, M8 and N8 in 2016–2020, by major species [Source: internal materials]*

| Species | Catch parameter | Year | | | | |
|---|---|---|---|---|---|---|
| | | 2016 | 2017 | 2018 | 2019 | 2020 |
| Cod | Volume [t] | 357.1 | 250.0 | 185.2 | 73.5 | 6.7 |
| | Value [PLN thousand] | 1716.1 | 1243.8 | 936.6 | 380.0 | 46.3 |
| Herring | Volume [t] | 82.0 | 70.9 | 74.1 | 47.3 | 31.6 |
| | Value [PLN thousand] | 109.7 | 115.8 | 120.1 | 69.9 | 43.0 |
| Flounder | Volume [t] | 41.0 | 128.0 | 40.8 | 74.4 | 22.2 |
| | Value [PLN thousand] | 57.3 | 177.8 | 45.3 | 91.8 | 28.0 |
| Sprat | Volume [t] | 9.5 | 0.4 | 2.4 | 10.3 | 2.8 |

| Species | Catch parameter | Year | | | | |
|---|---|---|---|---|---|---|
| | | 2016 | 2017 | 2018 | 2019 | 2020 |
| | Value [PLN thousand] | 8.9 | 0.4 | 1.8 | 9.9 | 2.7 |
| Other | Volume [t] | 17.4 | 13.8 | 13.5 | 4.4 | 9.2 |
| | Value [PLN thousand] | 305.3 | 355.5 | 323.3 | 78.9 | 183.7 |
| **Total volume [t]** | | **507.1** | **463.2** | **316.0** | **209.9** | **72.5** |
| **Total value [PLN thousand]** | | **2197.3** | **1893.3** | **1427.2** | **630.6** | **303.8** |

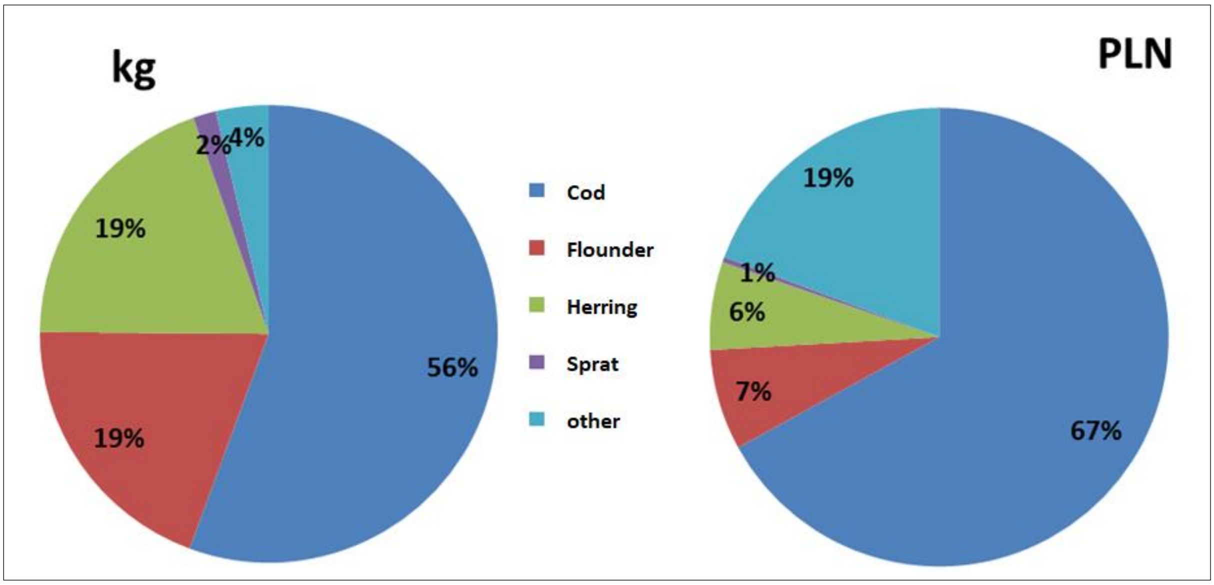



*Figure 3.26. Species structure in the catches in statistical rectangles O6, N7, O7, L8, M8 and N8 in 2016–2020, [Source: internal materials]*

In the period under analysis, a slightly higher volume of catches made in the area of the 6 rectangles analysed was by vessels larger than 12 metres in total length [Table 3.11]; the share in the volume and value of catches of this vessel group was 52% and 45%, respectively.

*Table 3.11. Volume [t] and value [PLN] of catches in statistical rectangles O6, N7, O7, L8, M8 and N8 in 2016–2020, by vessel length [Source: internal materials]*

| Catch parameter | Vessel length [m] | Year | | | | |
|---|---|---|---|---|---|---|
| | | 2016 | 2017 | 2018 | 2019 | 2020 |
| Tonnes | up to 12 | 237.7 | 223.5 | 179.6 | 93.2 | 14.2 |
| | 12 and more | 269.4 | 239.6 | 136.4 | 116.8 | 58.3 |
| PLN | up to 12 | 1063.5 | 1057.3 | 948.1 | 386.9 | 69.9 |
| | 12 and more | 1133.8 | 836.0 | 479.1 | 243.7 | 233.9 |
| **Total volume [t]** | | **507.1** | **463.2** | **316.0** | **209.9** | **72.5** |
| **Total value [PLN]** | | **2197.3** | **1893.3** | **1427.2** | **630.6** | **303.8** |

Table 3.12 presents the estimated value of catches in individual statistical rectangles and the estimated value of catches conducted in the Baltica OWF CI area under analysis. As presented in the introduction, for vessels under 12 meters in length, the value of catches for the Baltica OWF CI area was calculated in proportion to the surface area to be occupied by the project in a given statistical

rectangle. For vessels over 12 meters, data on the exact location of the fishing grounds (based on VMS) was used in the analysis. In 2020, the estimated value of fish caught in the Baltica OWF CI area amounted to PLN 42 thousand (PLN 4.4 thousand for vessels up to 12 m and PLN 37.2 thousand for vessels over 12 m), so it was as much as 80% lower than the value of catches in 2016 (PLN 230 thousand). As mentioned above, this decrease was a result of the drop in cod catches, particularly visible in the nearshore zone (due to the poor individual condition of these fish). The mean multi-annual value of catches estimated for the area to be occupied by the Baltica OWF CI was PLN 139.2 thousand per year.

*Table 3.12. Monthly value of catches [in PLN thousand] in statistical rectangles O6, N7, O7, L8, M8 and N8, as well as estimated value of catches in the Baltica OWF CI area [Source: internal materials]*

| Vessel length [m] | Year | Within the rectangle area [PLN thousand] | | | | | | Within the project area [PLN thousand] | | | | | | Rectangle area | Project area |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | L8 | N7 | N8 | O6 | M8 | O7 | L8 | N7 | N8 | O6 | M8 | O7 | | |
| up to 12 | 2016 | 358.7 | 104.5 | 36.5 | 187.7 | 369.7 | 6.4 | 0.6 | 9.0 | 7.4 | 5.7 | 100.2 | 0.4 | 1063.5 | 123.2 |
| | 2017 | 321.8 | 158.1 | 76.5 | 133.3 | 360.6 | 7.0 | 0.5 | 13.6 | 15.5 | 4.1 | 97.7 | 0.4 | 1057.3 | 131.7 |
| | 2018 | 283.4 | 150.2 | 44.4 | 198.5 | 218.6 | 53.0 | 0.5 | 12.9 | 9.0 | 6.1 | 59.2 | 3.0 | 948.1 | 90.7 |
| | 2019 | 152.7 | 73.4 | 34.4 | 60.9 | 47.0 | 18.5 | 0.2 | 6.3 | 7.0 | 1.9 | 12.7 | 1.1 | 386.9 | 29.2 |
| | 2020 | 0.3 | 20.5 | 3.2 | 42.7 | 2.2 | 1.0 | 0.0 | 1.8 | 0.6 | 1.3 | 0.6 | 0.1 | 69.9 | 4.4 |
| **up to 12 avg.** | | **223.4** | **101.3** | **39.0** | **124.6** | **199.6** | **17.2** | **0.4** | **8.7** | **7.9** | **3.8** | **54.1** | **1.0** | **705.1** | **75.8** |
| 12 and more | 2016 | 399.9 | 136.1 | 115.4 | 35.5 | 252.5 | 194.4 | 1.6 | 12.7 | 37.9 | 1.7 | 35.0 | 17.8 | 1133.8 | 106.7 |
| | 2017 | 227.1 | 113.0 | 173.5 | 18.0 | 166.7 | 137.8 | 0.0 | 19.0 | 17.9 | 2.8 | 40.2 | 26.0 | 836.0 | 105.9 |
| | 2018 | 185.4 | 76.2 | 12.2 | 18.6 | 95.6 | 91.2 | 0.0 | 1.0 | 2.7 | 6.7 | 18.4 | 5.2 | 479.1 | 34.0 |
| | 2019 | 99.0 | 20.2 | 25.5 | 3.8 | 71.0 | 24.1 | 0.0 | 1.0 | 1.4 | 0.6 | 22.9 | 7.3 | 243.7 | 33.1 |
| | 2020 | 3.4 | 23.9 | 72.5 | 16.1 | 61.6 | 56.3 | 0.0 | 3.3 | 5.9 | 0.9 | 18.3 | 8.8 | 233.9 | 37.2 |
| **12 and more avg.** | | **182.9** | **73.9** | **79.8** | **18.4** | **129.5** | **100.7** | **0.3** | **7.4** | **13.2** | **2.5** | **27.0** | **13.0** | **585.3** | **63.4** |
| **Average** | | **406.3** | **175.2** | **118.8** | **143.0** | **329.1** | **117.9** | **0.7** | **16.1** | **21.1** | **6.3** | **81.0** | **14.0** | **1290.4** | **139.2** |

The analysis of fish catch variability in the area of the planned Baltica OWF indicates the concentration of fishing fleet activity in two seasons: summer (May–June) and autumn (September–November) [Figure 3.27]. The average catch volume over these 5 months between 2016 and 2020 was 712 tonnes, representing 55% of the total catch obtained in the area of the six statistical rectangles.

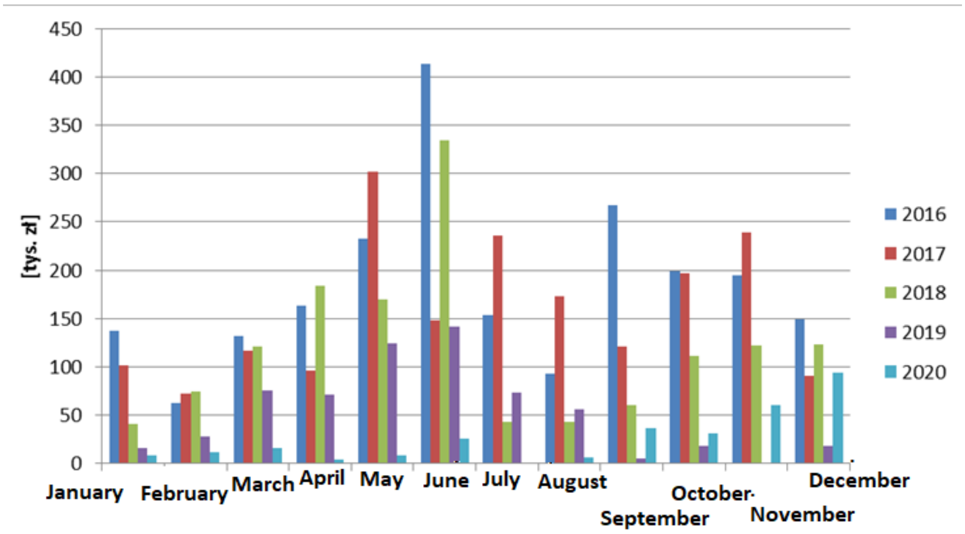



*Figure 3.27. Monthly value of fish catches in the area of O6, N7, O7, L8, M8 and N8 rectangles in 2016–2020 [Source: internal materials]*

In the fishing activities conducted in the area of the Baltica OWF CI analysed in 2016–2020, set gear (gillnets and longlines) were used predominantly, followed by demersal trawls and pelagic trawls. The set gear (mainly cod gillnets) accounted for approx. 85% of the total catches in 2016 and 51% in 2020, within the 6 rectangles analysed. By contrast, the share of demersal trawl catches in 2020 was 6% [Figure 3.28].

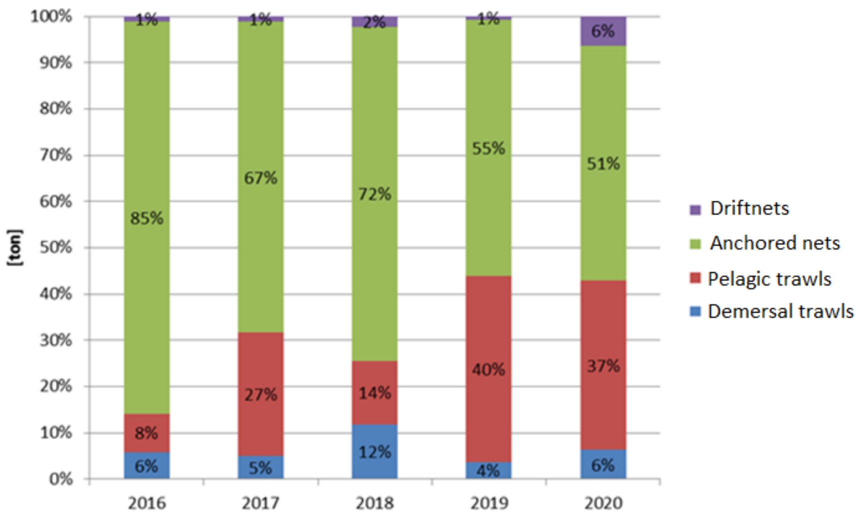



*Figure 3.28. The volume of catches conducted with the respective gear in statistical rectangles O6, N7, O7, L8, M8 and N8, in 2016–2020 [Source: internal materials]*

The analysis of the seasonality of catches in different groups of fishing vessel length shows a characteristic differentiation of monthly catch volumes. Smaller vessels show higher activity in the first half of the year, while vessels >12 m catch the highest volumes in autumn and winter months [Figure 3.29].

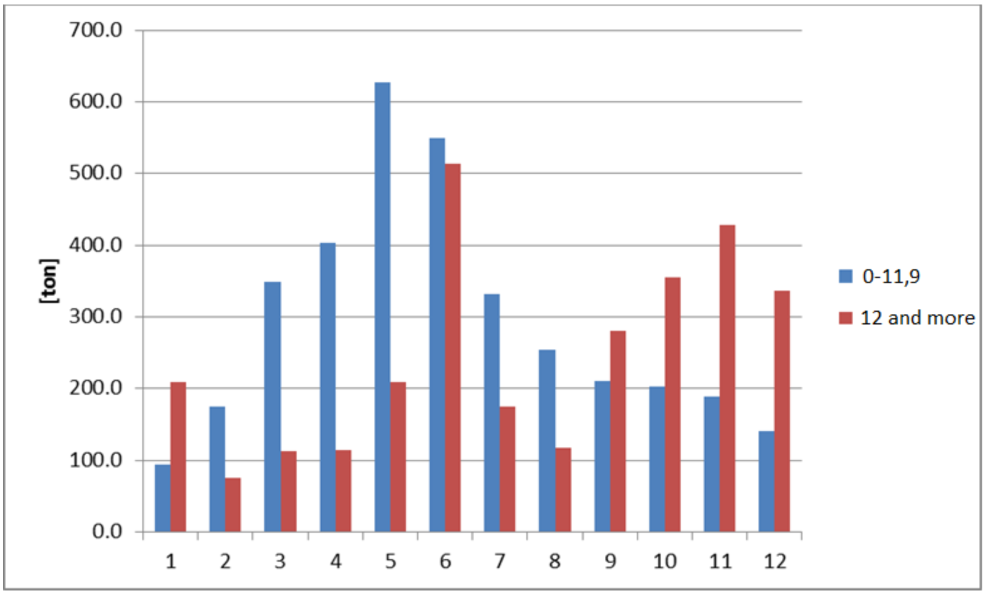



*Figure 3.29. The volume of catches conducted in statistical rectangles O6, N7, O7, L8, M8 and N8, in 2016–2020, divided by the vessel type (length groups) [Source: internal materials]*

### 3.10.2.2 Fishing effort

In 2016–2020, in the area of statistical rectangles O6, N7, O7, L8, M8 and N8, between 41 and 74 fishing vessels were engaged in fishing [Table 3.13]. In 2020, the number of fishing vessels operating in the area analysed was notably smaller, compared to the previous years. This applied to small fishing vessels to a greater extent than vessels over 12 m in length. The reason for this, as in the case of the decline in catch volumes, was a reduction in cod fishing efficiency, observed particularly in shallow waters. The proportion of the number of vessels operating in the area analysed, in relation to the total number of active vessels in 2020, was 5% and decreased in comparison to 2016 by 4 percentage points.

*Table 3.13. The number of fishing vessels engaged in fishing activities in statistical rectangles O6, N7, O7, L8, M8 and N8, in 2016–2020 [Source: internal materials]*

| Year | Number of fishing vessels | | | Baltic Sea total | Proportion Baltica OWF CI/Baltic Sea [%] |
|---|---|---|---|---|---|
| | Up to 12 m | 12 m and more | Total | | |
| 2016 | 31 | 43 | 74 | 812 | 9 |
| 2017 | 36 | 43 | 79 | 797 | 10 |
| 2018 | 34 | 36 | 70 | 777 | 9 |
| 2019 | 30 | 31 | 61 | 786 | 8 |
| 2020 | 14 | 27 | 41 | 806 | 5 |

The total fishing effort (measured by the number of fishing days) during the period analysed within the six rectangles, decreased by as much as 78%, from 1088 days in 2016 to 234 days in 2020. The proportion of the fishing effort within the Baltica OWF CI area, compared with the total effort of the Polish Baltic fleet, decreased from 1.6% in 2016 to 0.6% in 2020 [Figure 3.30].

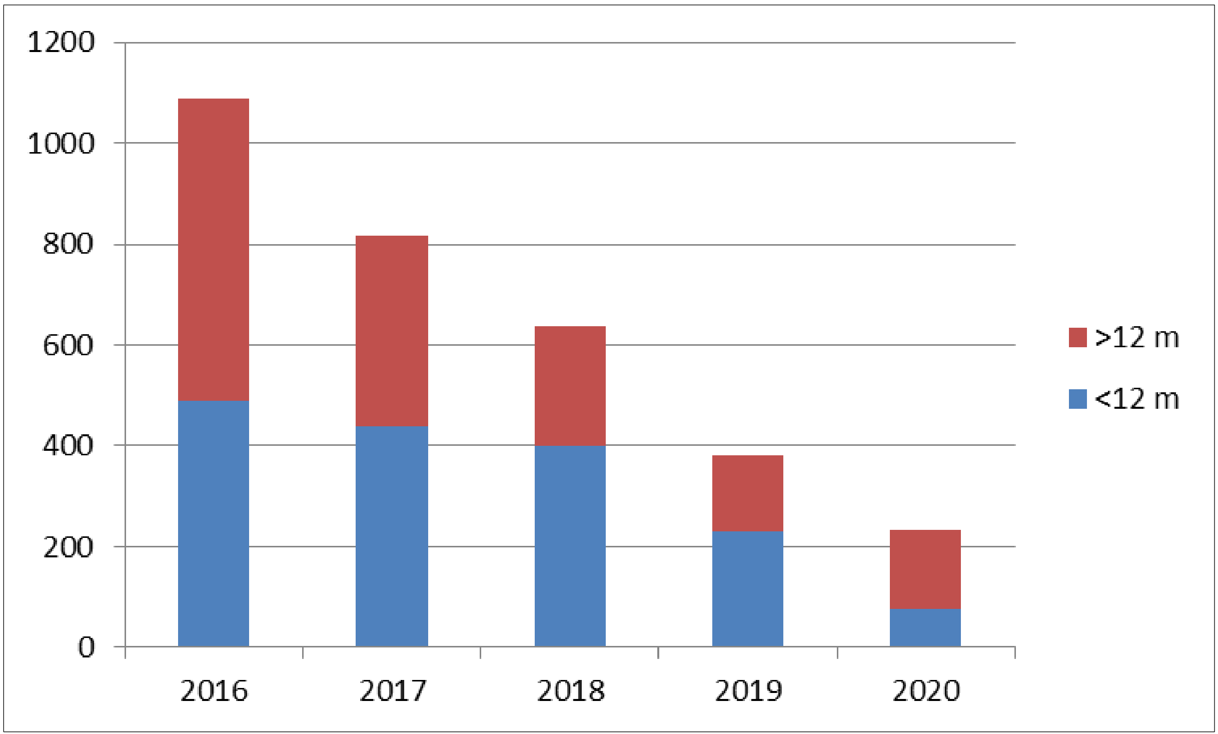



*Figure 3.30. Changes in the fishing effort of vessels fishing in the Baltica OWF CI area between 2016 and 2020 [Source: internal materials]*

### 3.10.3 National defence

The Baltica OWF CI area is located partially within the following sea areas: 16.926.B, 34.926.B and 41a.926.B, which were delineated for the fairways of the Polish Navy. Pursuant to the MSPPMA provisions, these sub-areas were made available for the installation of technical infrastructure, including power cables. The Baltica OWF CI area is not located in zones permanently or periodically closed for navigation and fishing activities, as established by the Minister of National Defence by way of a regulation, in accordance with the Act of 21 March 1991 *on the marine areas of the Republic of Poland and maritime administration* (consolidated text: Journal of Laws of 2020, item 2135, as amended).

### 3.10.4 Natural resource deposits, exploration and drilling concessions

The Baltica OWF CI construction area within the territorial sea intersects the areas of prospective occurrence of sands for artificial shore nourishment at Łeba 1. This area was identified in the MSPPMA as sub-area 34.628.C, in which the implementation of technical infrastructure is restricted to methods which do not disturb sand accumulation for artificial shore nourishment. This condition was also taken into account in decisions (1/DS/2020 and 2/DS/2020) of the Director of Maritime Office in Gdynia, in the form obliging the Applicant to account for the passage of cables through the area of perspective occurrence of sands intended for artificial shore nourishment at Łeba 1, by designing appropriate depth of cable burial in the seabed and applying possible additional protective measures to enable sand excavation to the depth of 2.5 m in case the deposit is not used.

## 3.11 Landscape, including the cultural landscape

The construction area of the Baltica OWF CI is situated within PMA, in the Exclusive Economic Zone and the territorial sea and stretches from the shore up to the distance of approximately 29 km away from the shore. In the natural marine landscape of the sea area, commercial ships moving along the customary shipping route to and from the ports of Gdynia and Gdańsk, as well as other smaller vessels, e.g. recreational and fishing boats constitute the permanent structural element of anthropogenic origin. In the future, wind turbines of the Baltica-2 and Batica-3 OWFs will be built in the northern part of the sea area. Also, there will be other OWFs in its region. The seashore in the cable landfall area is made of a sandy beach, several dozen meters wide.

## 3.12 Population and living conditions of people

The presence of people in the Baltica OWF CI offshore construction area is only temporary, resulting from the existing use of the sea area (shipping and fishery). The construction area of the Baltica OWF CI intersects the customary shipping route to and from the ports of Gdynia and Gdańsk at a distance of 10 km from the shore (see subsection 3.10.1). It is also located within the boundaries of 6 statistical rectangles: O6, N7, O7, L8, M8 and N8, where fishing activities are conducted (see subsection 3.10.1.1)

## ONSHORE AREA

## 3.13 Location, topography of the area

The onshore area of the project is located entirely within the boundaries of a rural commune of Choczewo, in its north-eastern part, in the Wejherowo district, Pomorskie Voivodeship. The customer substations and the busbar systems connecting the customer substations with the Choczewo Substation will be located in the western part of plot no. 17/129 (Kierzkowo precinct) which is currently covered by arable land. Almost the entire cable line (with the exception of the technical belt managed by the Maritime Office in Gdynia) is routed across land areas managed by the Choczewo Forest District Inspectorate, Szklana Huta Forestry.

From the geophysical perspective, the project area is situated at the boundary between two mesoregions – the *Słowińskie* Coast to the north, where an approx. 4 km section of the connection runs, and the Żarnowiecka Upland to the south, where an approx. 2 km section of the connection and onshore substations are located. Both mesoregions are part of the Koszalin Coastland, which is a part of the Southern Baltic Coastland subprovince.

The differences between the said mesoregions are quite clear and are reflected in the vegetation, soil cover, hydrographic network, and above all, in the relief and altitudes. The *Słowińskie* Coast covers a strip of land stretching along the shore of the Baltic Sea with a length of approx. 200 km and an area of approx. 1120 $km^2$, from the Parsęta estuary in the west (near Kołobrzeg), up to the *Kępa Swarzewska* in the east (near Władysławowo), and thus an area going far beyond the boundaries of the survey area. The landscape of the mesoregion is dominated by beaches, coastal dunes, coastal lakes, marshes and peat bogs surrounding them, as well as elements of post-glacial relief represented by moraine hills.

In the *Słowińskie* Coast, the planned project area covers only 0.421 $km^2$ in the eastern part of the region. The landscape there is shaped mainly by a fragment of a coastal pine forest in the south and a stretch of a coastal dune strip with a terrain culmination in the form of the *Wydma Lubiatowska* dune in the north. The altitudes within the boundaries of the project area in the *Słowińskie* Coast reach from 0 MASL near the shoreline up to 33 MASL in the forest area in the southern part of the region. The width of the beach within the project area is approx. 70–80 m, while, the strip of coastal dunes in the *Słowińskie* Coast reaches approx. 1 km inland at the maximum. Further from the shoreline, there is a pine forest, which covers most of the *Słowińskie* Coast within the boundaries of the project area. In the vicinity of the project, the settlement network of the *Słowińskie* Coast is formed by the town of Lubiatowo with the village of Szklana Huta.

The *Żarnowiecka* Upland, which is a morainic plateau, covers an area of 800 km$^2$ between the *Słowińskie* Coast in the north and north-west, the Kashubian Coastland in the east and the Reda-Łeba ice marginal valley in the south and south-west, out of which only 0.425 km$^2$ of the region in its norther part is covered by the planned project. This region is distinctly separated from the surroundings due to its elevation at a height of at least several dozen, and in many places, above 100 MASL. Within the boundaries of the project area, it reaches altitudes from 33 MASL in the area of pine forests up to 46 MASL near the OnSS. In general, the Żarnowiecka Upland is highly fragmented into many moraine mounds separated by land depressions in the form of river valleys and erosion hollows, including tunnel valleys partially filled with lakes. The largest one in the region, Lake Żarnowieckie, is located approx. 7.5 km to the east of the OnSS site. Nearby, a pumped-storage power station using a 100 m difference between the levels of the lake water table and the upland was constructed in 1983. On the opposite side of the lake, approx. 12 km from the project area, there are the remains of a nuclear power plant which was supposed to be built in the 1980’s but its construction was eventually discontinued. Within the Upland, the project area itself is covered by a strip of pine forest with a width of approx. 2 km, located along the boundary with the *Słowińskie* Coast, and by an arable land situated in the location of the planned OnSSs.

The only settlements located on the *Żarnowiecka* Upland in the vicinity of the project are Osieki Lęborskie and Kierzkowo.

## 3.14 Geological structure, coastal zone, soils, and marine aggregates and deposits

### 3.14.1 Geological structure, geotechnical conditions

In a broad geological sense, the project area is situated at the edge of the East-European platform within the so-called Łeba Elevation covering the eastern part of the *Koszalin* Coastland. The sedimentary cover there is composed of rocks of wide lithological diversity and stratigraphic range from the Eocambrian to the Quaternary, with a total thickness of up to approx. 3000 m.

Within the project area, the Cenozoic cover, i.e. the upper part of the sediments from Paleogene to Tertiary periods, usually reaches a thickness of from approx. 120 to approx. 240 m. Its floor usually consists of Paleogene sediments formed in the marine environment – Eocene silts, mudstones, clays, and Oligocene sands, silts and clays overlaying them, with a total thickness ranging from several dozen to 130 m. The Paleogene sediments usually occur down to a depth of approx. 150 MBGL. The Neogene is represented by Miocene sediments formed in the terrestrial environment (mainly sands, clays and silts); however, their proportion in the geological profile within the project is small – they occur locally and are up to several metres thick. Above this stratum, the Quaternary sediments of various lithology and origin are deposited. Those are mainly Pleistocene glacial and fluvioglacial sediments which formed during subsequent glaciations. The surface cover usually consists of Holocene sediments of fluvial and aeolian origin with a thickness of up to 10 m.

The Pleistocene formations formed during subsequent glaciations predominate in the stratigraphic profiles of Quaternary sediments. They consist of:

- sediments of the South Polish Glaciation – tills and fluvioglacial sands and gravels, occurring only in extensive erosion valleys in the inland upland area, at depths of over 100 MBGL (down to 200 m in the area of Szklana Huta);
- sediments of the Middle Polish Glaciation – silts and clays of ice-marginal origin, fluvioglacial sands and tills interbedded with loamy sands with a thickness between several metres in the coastal belt up to 80 m inland;
- sediments of the North Polish Glaciation – fluvioglacial sands and gravels, silts and clays of ice-marginal origin and tills with a thickness between 20 to 80 m, occurring in the upland area.

As far as the upper sedimentary cover is concerned (Detailed Geological Map of Poland at a scale of 1:50 000, sheet 4 – Choczewo), which is relevant for conducting any type of earthworks and construction works, alluvial sands of floodplains, covering 28% of the surface, till residuum on fluvioglacial sands and gravels representing 25% of the surface and aeolian sands on alluvial sands of valley bottoms and terraces representing 18% of the surface are most common in the Baltica OWF CI area [Table 3.17]. A distinctive feature of the near-surface strata is their clear diversity within the boundaries of the project area, which roughly corresponds to the physiographic division into two mesoregions – the *Słowińskie* Coast in the north and the *Żarnowiecka* Upland in the south – and the differences in topographic conditions, plant cover as well as geological processes related among others to the action of the sea resulting thereof. This diversity results in the dominance of aeolian sands, mainly dune sands, in the *Słowińskie* Coast area, i.e. within a strip of up to approx. 1000–1500 m from the shoreline, and in the occurrence of sediments mostly such as alluvial sands of floodplains and till residuum on sands or gravels within the *Żarnowiecka* Upland. In addition, alluvial sands of valley bottoms, humic sands, muds of valley bottoms and endorheic depressions, tills (in the vicinity of Szklana Huta), as well as eolian sands in dunes (north of Osieki Lęborskie), are present locally and in lesser amounts on the Upland.

Table 3.14 presents lithological divisions along the route of the onshore section of the Baltica OWF CI broken down by geographical location (from the shoreline towards inland), whereas Table 3.15 presents the percentage represented by different lithological divisions in the land occupied by the planned project area (starting from the divisions with the highest percentage).

*Table 3.16. Lithological divisions along the route of the onshore section of the Baltica OWF CI [Source: internal materials based on the Detailed Geological Map of Poland at a scale of 1:50 000]*

| Geophysical region | Section of the project area from the shoreline [km] | Section length [km] | Lithological divisions according to the Detailed Geological Map of Poland at a scale of 1:50 000 |
|---|---|---|---|
| Słowińskie Coast | 0.000–0.150 | 150 | Aeolian sands on dunes |
| | 0.150–0.550 | 400 | Alluvial sands of valley bottoms |
| | 0.550–1.060 | 510 | Aeolian sands on alluvial sands of valley bottoms and terraces |
| | 1.060–1.180 | 120 | Aeolian sands on dunes |
| | 1.180–1.450 | 270 | Alluvial sands of valley bottoms on tills |
| | 1.450–1.490 | 40 | Aeolian sands on alluvial sands of valley bottoms and terraces |
| | 1.490–1.560 | 70 | Aeolian sands on dunes |
| | 1.560–1.680 | 120 | Aeolian sands on alluvial sands of valley bottoms and terraces |
| | 1.680–2.330 | 650 | Till residuum on fluvioglacial sands or gravels |
| | 2.330–2.570 | 240 | Humic sands and alluvial muds of valley bottoms and endorheic depressions on alluvial sands of valley bottoms and lake or |

| Geophysical region | Section of the project area from the shoreline [km] | Section length [km] | Lithological divisions according to the Detailed Geological Map of Poland at a scale of 1:50 000 |
|---|---|---|---|
| | | | endorheic terraces |
| | 2.570–3.450 | 880 | Till residuum on fluvioglacial sands or gravels |
| | 3.450–3.740 | 290 | Alluvial sands of floodplains |
| | 3.740–3.850 | 110 | Aeolian sands on alluvial sands of valley bottoms and terraces |
| | 3.850–3.960 | 110 | Alluvial sands of floodplains |
| Żarnowiecka Upland | 3.960 –4.450 | 490 | Alluvial sands of floodplains |
| | 4.450–4.490 | 40 | Aeolian sands on alluvial sands of valley bottoms and terraces |
| | 4.490–4.950 | 460 | Alluvial sands of floodplains |
| | 4.950–5.170 | 220 | Aeolian sands on dunes |
| | 5.170–5.460 | 290 | Aeolian sands on alluvial sands of valley bottoms and terraces |
| | 5.460–5.820 | 360 | Alluvial sands of floodplains |
| | 5.820–5.870 | 50 | Tills on fluvioglacial sands, locally gravels |
| | 5.870–6.070 | 200 | Sand and silt eluvial deposits of tills on tills |

*Table 3.17. Lithological divisions broken down by size of the area along the route of the onshore section of the Baltica OWF CI [Source: internal materials based on the Detailed Geological Map of Poland at a scale of 1:50 000]*

| Lithological divisions according to the Detailed Geological Map of Poland at a scale of 1:50 000 | Total length of the sections within the boundaries of the project area | |
|---|---|---|
| | [m] | [%] |
| Alluvial sands of floodplains | 1710 | 28 |
| Till residuum on fluvioglacial sands or gravels | 1530 | 25 |
| Aeolian sands on alluvial sands of valley bottoms and terraces | 1110 | 18 |
| Aeolian sands on dunes | 560 | 9 |
| Alluvial sands of valley bottoms | 400 | 7 |
| Alluvial sands of valley bottoms on tills | 270 | 5 |
| Humic sands and alluvial muds of valley bottoms and endorheic depressions on alluvial sands of valley bottoms and lake or endorheic terraces | 240 | 4 |
| Sand and silt eluvial deposits of tills on tills | 200 | 3 |
| Tills on fluvioglacial sands, locally gravels | 50 | 1 |

The lithology of the near surface strata considerably affects the geotechnical properties in the context of the project implementation due to the presence of low-bearing and cohesive soils. The presence of low-bearing soils such as dune sands and muds of valley bottoms creates more difficult conditions for earthworks using heavy construction equipment. They represent around 13% of the onshore connection area, mainly in its northern section. The areas of low-bearing soils (aeolian sands on dunes, humic sands and alluvial muds of valley bottoms) within the boundaries of the project area are presented in Figure 3.31.

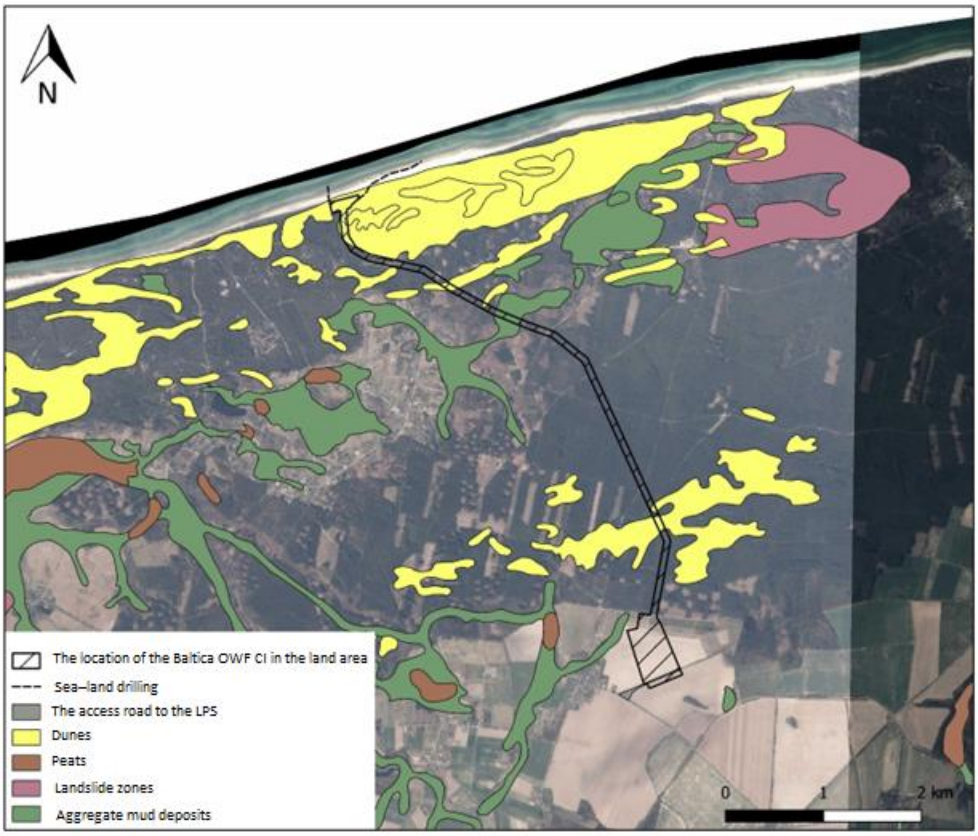



*Figure 3.31. Areas of low-bearing soils within the onshore section of the Baltica OWF CI [Source: internal materials based on Gawlikowska et al., 2009]*

## 3.14.2 Topography and dynamics of the coastal zone

### 3.14.2.1 Beach

The coastal zone is the most seaward protruding piece of land covering the shoreline and the land-sea interface, where mass sediment transport may occur. The zone is divided into the shoreface, i.e. the area extending from the shoreline to a sea depth of approx. 10 m, and the backshore – the area extending from the shoreline to the dune/cliff crest. The beach, which is part of the coastal zone, is a zone where the sea directly impacts the land through accumulation and erosion processes. These processes are a complex phenomenon. Their intensity depends mainly on natural factors such as winds and wave motion, sea currents, the shape of the wave-cut platform or the type of shoreline, but also on anthropogenic factors related to the coastal zone development (e.g. building breakers, seawalls or harbour facilities). Besides the phenomena observed within the sea itself, landform creation is also dependent on the conditions (direction and speed) of winds causing the detritus movement in the beach area (so-called aeolian transport). The intensity of the said accumulation and erosion processes, in turn, has an effect on the physical parameters of the beach, i.e. its width, shape in the transversal cross-section as well as the thickness of the sand layer.

The beach is generally a flat or slightly undulating surface sloping down towards the sea at a small angle. Along almost the entire length of the Polish sea coast, the beaches are sandy. They are composed of sands accumulated by sea water, mainly fine sands with a dominant fraction of grains with a diameter smaller than 0.25 mm, a smaller proportion of medium and coarse sands and an admixture of pebbles. Within the area of sandy beaches, depending on the conditions of the wave motion and the wind regime, many accumulation microforms may occur, such as micro cliffs, ripple marks (so-called wrinkles or wave bars), deflation pavements (rock detritus uncovered from under the sand layer), shore embankments with inflow slope or micro lagoons. Such features are common across the southern Baltic Sea beaches, including the planned project area. The upper beach zone is the area of accumulation of sand blown from the middle beach zone. The accumulation occurs there due to the fact that aeolian accumulation processes prevail over abrasion processes, i.e. the erosive action of seawater (Rotnicka, 2013). In the upper zone of the beach, the succession of the European beachgrass *Ammophila arenaria* takes place, which initiates the formation of the foredune ridge. The shore abrasion which leads to the disturbance and shifting of the dune foot may occur only during the storm season. During the autumn/winter seasons, when the greatest number of storm surges is recorded, an exchange of the material forming the beach as well as a significant remodelling of the beach surface takes place very often.

Beach widths as well as sand cover thickness vary depending on the coast region and the resultant conditions of sand transport and deposition. The dynamics of geological processes in the zone affected by seawater generate changes in the beach parameters over time (systematic shifting of the so-called accumulation and abrasion zones). These parameters also vary, although to a much lesser degree, on an annual basis, depending on the seasonal intensity of marine accumulation and erosion processes (during the winter, the erosion processes prevail, whereas during the summer – the accumulation processes). Another factor related to the ongoing climate change is an anticipated significant decrease in the frequency of the ridged ice on beaches in winter, which will expose beaches to further erosion.

An additional factor, besides those described above, which may affect the topography of the coastal zone, including the beach, are the commonly observed fluctuations in average sea and ocean levels. This phenomenon results from eustatic sea level changes resulting from climate change and the global water balance as well as from isostatic changes caused by lithospheric plate movements affecting the shape and volume of ocean basins. According to the European Environmental Agency (EEA), the mean Southern Baltic Sea level increased over the period 1993–2019 by approx. 3 to 4 mm per year.

Against the most common natural processes occurring within the beach, tides, i.e. daily changes in sea level resulting from the interaction of the gravitational pulls of the Earth, the Sun and the Moon, whose amplitude reaches only 1 cm in the Southern part of the Baltic Sea, are a negligible phenomenon, especially in the context of executing construction projects.

On the basis of LiDAR data and orthophotomaps obtained since 2004, it was established that the beach width in the area of the Baltica OWF CI route was from approx. 20 to approx. 60 m, periodically up to more than 100 m (the maximum value recorded in 2020 in the area of KM 160.0–160.1 and in the area of KM 161.3 to 161.9). The beach smallest width, around 35 m was recorded near KM 160.5 (2018) and 20−25 m near KM 160.1 (2017, 2018 and 2020). On the basis of the data analysis, it was determined that in the period 2008–2020, the average erosion of the shore along the section KM 160.0–163.5 was about 5 m/year.

The thickness of the beach and spit sand layer in the beach zone is from 3 m to approx. 5 m. It is underlain by non-calcareous Holocene sediments of diversified land environments, fine-grained sands with organic matter, peats as well as calcareous gyttja. They occur within the dune and beach zone as well as within the shoreface up to the elevation of 7–8 MBSL and lie directly under modern sea sands and, on land, under aeolian sediments.

#### 3.14.2.2 Shore dynamics

The development of the sandy cover which forms the beach is of a dynamic character, which is the result of the continuous action of the sea and wind. The main manifestation of that process is the continuous exchange of detritus within the beach area. Both the beach sections where accumulation processes of sea sands prevail over erosion process (accumulation zones) and the sections where erosion predominates over accumulation (abrasion zones) can be found in the project area.

According to data from literature (Zawadzka-Kahlau 1999; 2013), the project area is located within the shore section described as stable. On the basis of the interpretation of cartographic data for the period 1875–1979, changes in the position of the shoreline were small; for the section between KM 158.0 and KM 161.5 of the shore, they were on average +0.4 m per year (movement of the shoreline towards the sea). According to the morphodynamic classification of dune shores based on the speed of the dune baseline movement (Zawadzka-Kahlau 1999; 2013), the section analysed should be considered to be in equilibrium, with small changes being possible. For the adjacent sections of the shore, there is no reliable data in literature on their dynamics before 2005.

For the purposes of the feasibility study for this project, high resolution LiDAR data and orthophotomaps from 2005−2020 were analysed. The analysis covered the section of the shore between KM 160.0 and KM 163.5. This is a section of dune coast which may generally be considered to be stable. However, the analyses conducted show that the section of the coast between KM 160.4−161.1 is an abrasive section. The analyses demonstrated that the average rate at which the dune baseline moves towards land at this section is 1.0 to 1.5 m per year. Taking into consideration the variable circulation in the Southern Baltic region as well as the projections of greater frequency and intensity of the storms, this rate is expected to change. This does not mean that the changes projected would accelerate the process. However, it should be noted that the probability of the current rate of abrasion being maintained is higher than the probability that it will be reduced.

The coastal stability depends on numerous factors, among others, on storm surges. These are rare events, but strongly affect the morphology of the dunes and the beach. Recent observations reveal that storm events are irregular and last longer as a result of climate change. The frequency of storm surges recorded (exceeding the sea level by 1 m in relation to the mean level) more than doubled over the last twenty years. These multiannual changes result in impediments to natural regeneration of shores, leading to shore erosion and retreat of dune scarps. Violent storms and hurricanes (extreme events) are mainly characterised by a high average wind velocity, which reaches up to 24–26 $m \cdot s^{-1}$, with gusts over 35 $m \cdot s^{-1}$, in the Southern Baltic region. Strong winds induce an increase in the water level in the coastal zone, which often leads to flooding of the coastal zone and shore erosion. The dune is undercut by waves reaching the dune foot, and the sediment is washed out from the beach and deposited within the shoreface. Sandbanks are also reconstructed and destroyed. On the other hand, during weak and moderate wave motion, the seashore reconstruction takes place, provided that within the shoreface, there is a sufficient amount of sandy sediments. Nowadays all strong autumn and winter storms cause washout and displacement of the coast southward at an average speed of 0.1 $m \cdot r^{-1}$ over the last 100 years (0.5 $m \cdot r^{-1}$ for the period 1960–1983; Zawadzka-Kahlau, 1999). The seashore resistance to extreme waves is usually proved by the presence and number of sandbanks (in the case of the planned drilling site, there are 3 to 5 sandbanks). In general, multi-sandbank seashores are characterised by strong resistance to destruction caused by strong waves, whereas no sandbank or one-sandbank seashores are not resistant to extreme wave motion.

For the purposes of the feasibility study for this project, an analysis of the seashore resistance to extreme wave motion conditions in the planned drilling site was performed using XBeach software.

For the purposes of calculations, the bathymetric profiles were applied; they were measured every 500 m in 2020 as part of the Polish coastal zone monitoring activities conducted by the Maritime Office in Gdynia. The calculations adopted the extreme wave motion with the return period of 20 and 50 years and with the significant wave height equal to 6.08 m and 6.38 m respectively. Since a dune is destroyed most when the wave radius is perpendicular to the shore (the largest amount of wave energy reaches the shore), the worst-case scenario was adopted in the calculations. The analysis of the shore resistance performed along the section from KM 160 to KM 163.5 revealed that the shore is resistant to extreme wave motion conditions. During the expected service life of the OWF CI (30 years), storms with return periods of 20 and 50 years will occur with a probability of approximately 70% and 45%, respectively, during the operation of the infrastructure.

The dynamics of the coastal zone development is also affected by global sea and ocean level changes. The changes in the Southern Baltic waters at the Polish central coast, on a geological scale, were primarily caused by climatic factors, impacting both directly, through changes in the atmospheric and ocean temperature, and indirectly, through ice sheet mass balance, as well as a glacioisostatic factor – through the movements of the Earth's crust under the influence of ice sheet activity (Rotnicki, 2005). According to scientific estimates, the systematic sea level rise from the mid-19th century, which is presently intensified by global climate change induced by the anthropogenic interference with the chemical composition of the Earth's atmosphere, will reach the level of approx. 0.5 m over the next 100 years (on average − 5 mm per year).

In conclusion, the analysis conducted revealed that within the next 30 years, the seashore in the project area will remain in dynamic equilibrium. This means that erosion and accumulation processes will alternate seasonally. No significant shore erosion is therefore expected. Moreover, the calculations of the coastal zone erosion in case of extreme conditions showed that the seashore at the section from KM 160 to KM 163.5 is resistant to extreme wave motion conditions. However, according to scientific studies and international standards, it is recommended that the Baltica OWF CI should be located underneath the shoreface, the beach and the dune, due to the intensification of storm processes observed in the Baltic Sea as a result of climate change.

#### 3.14.2.3 Areas of active aeolian processes

The beach as well as the strip of coastal dunes are areas of continuous intensive aeolian processes. Those processes are facilitated by the morphology of the coast and the material forming the beach and dunes. The beaches in the *Słowińskie* Coast have been shaped by deflation, which means that their morphology is mainly the result of the wind influence. The tiniest fractions of the sandy material are subject to almost constant blowing. As a result, the beaches have a flat shape and their surface is compact and hard. Fine sands (less than 0.25 mm) and also medium sands (0.25–0.50 mm) are heavily predominant. The pattern of strong winds in this part of the Polish coast is conducive to deflation.

The second area, counting from the shoreline, of the most intensive aeolian processes is the strip of coastal dunes. Their development depends on the shore dynamics, but also on the beach width, material thickness, and the shore exposure to the prevailing wind directions, thanks to which the sediment is transported and subsequently accumulated in the form of sandbars. The shape of the dunes formed depends on the strength and directions of the most common winds (wind efficiency) as well as the topographic features and land development, which are decisive in terms of the sand retention efficiency. On the other hand, the main factor causing dune shore erosion is the storm wave motion – surges flooding the beach and destroying dunes.

In the area analysed, there are several areas with no vegetation or with scarce vegetation, within which the character of the relief changes as a result of aeolian processes. The area with the highest intensity of active aeolian processes are series of longitudinal dunes parallel to the shore. At their backs, series of arched, parabolic dunes covered with pine forest and peat accumulations in the dune depressions have developed. The top parts of the dunes reach a height of 20–25 MASL, while the areas of dune slacks are at a height of 3–5 MASL. Within this area, there is the *Wydmy Lubiatowskie* dune complex covering almost 300 ha. This complex is made up of four large dune forms with a height of several to approx. 35 MASL at the highest point (north-east of Kierzkowo), forming a 450–750 m wide stretch of dunes located between KM 158.7 and KM 162.6 (according to the shoreline chainage of the Maritime Office in Gdynia).

Most part of the dunes is covered by vegetation, mostly mountain pine. The area of the *Wydmy Lubiatowskie* dunes uncovered by vegetation has gradually decreased between 2005 and 2019 as a result of natural succession of dune vegetation. In 2005, the area of the land uncovered by vegetation within the *Wydmy Lubiatowskie* dune boundaries was 21.5 ha, and 12.0 ha in 2019. At present, this range is estimated at approx. 10 ha. Within these boundaries, the maximum average displacements of slip faces were recorded in the period 2008−2020 and these were 1 m/year. These changes occur within small areas and short sections of the slip faces in the eastern part of the area analysed. At the remaining sites, the average rate of the change in dune position was less than 0.5 m/year. These changes were more related to the nature of the stoss slopes than the dune displacement itself. The scale of these processes is relatively small and only affects small areas of the *Wydmy Lubiatowskie* dunes. To protect the dune shores, the biological structure is applied there; fascines and foredune reinforcement with the sea lyme grass. Within the area of the village of Lubiatowo, the abrasively undercut dunes form the "dune cliff" of significant heights up to 8−15 m (Łabuz 2005). The back of this spit section is an area of the upland foreland with heights from 8 to 10–15 MASL, slightly rising to the south, with relict parabolic dune forms and peat bog areas. The planned Baltica OWF CI passes by the *Wydmy Lubiatowskie* dune complex, neighbouring them from the west and south-west along the section with a length of approx. 1.2 km.

### 3.14.3 Soils

Data on the soils along the route of the Baltica OWF CI were obtained from two different sources due to different land uses of the area analysed [Table 3.18]. The route of the Baltica OWF CI runs mainly through forest areas, and the OnSSs planned in the southern part of the project will be located on arable land. The information on the types of forest soils was derived from the Forest Data Bank for the Choczewo Forest District. The information on the types of soils on lands used for agricultural purposes (arable land and grassland) comes from the database of the Institute of Soil Science and Plant Cultivation in Puławy – National Research Institute (ISSPC–NRI).

*Table 3.19. Land use in the onshore area of the Baltica OWF CI [Source: internal materials based on soil-agricultural maps made available by the ISSPC–NRI]*

| Type of land use | Area [m$^2$] | Percentage [%] |
|---|---|---|
| Arable land | 258 387 | 36.45 |
| Permanent grassland | 7523 | 1.06 |
| Forests | 412 704 | 58.22 |
| Wasteland | 30 248 | 4.27 |
| **Total** | **708 862** | **100** |

According to the ISSPC–NRI data, the coastal strip located at the northern margin of the planned project was identified as wasteland, for which soil types were not determined.

The southern part of project area, where OnSSs are planned to be built, is located in the area managed as arable land (36.45% of the entire onshore area of the project). Table 3.20 presents the area and percentage of different agricultural suitability complexes of soils present within the planned project area – the statistics refer to lands used for agricultural purposes (arable land, grassland).

*Table 3.20. Area and percentage of different agricultural suitability complexes in the onshore area of the Baltica OWF CI [Source: internal materials based on soil-agricultural maps made available by the ISSPC–NRI]*

| Agricultural suitability complex | Area [m$^2$] | Percentage [%] |
|---|---|---|
| 2 – medium quality grassland | 7523 | 2.83 |
| 4 – very good rye complex | 161 208 | 60.62 |
| 5 – good rye complex | 65 018 | 24.45 |
| 6 – poor rye complex | 32 165 | 12.10 |
| **Total** | **265 915** | **100** |

The largest percentage of the entire area of arable soils is represented by complex 4 – very good rye, followed by complex 5 – good rye, complex 6 – poor rye and medium quality grassland. According to the information included in the Study of Conditions and Directions of Spatial Development of the Choczewo Commune, the soils of the good and very good rye complexes are composed of sands overlying a more compact substratum at a medium or greater depth, they are drought sensitive and less nutrient-rich. They should be considered as typical rye-potato soils.

In terms of soil quality, there are arable land soils of class IIIa and IIIb, IVa, IVb and V. Higher-class soils (IIIa and IIIb) are encountered in the southern part of the Baltica OWF CI area, at the location intended for the construction of the OnSS (south-western part of the OnSS site) near the village of Osieki Lęborskie. Poorer soils, i.e. arable land soils of class IVa, IVb and V, are encountered in the northern and north-eastern part of the planned OnSS.

In terms of the grain size of the substratum in the area concerned, soils formed on strong loamy sands and light loamy sands predominate. At depths of 0.5–1 MBGL, light loam is often encountered; loose sand occurs less frequently. Given the soil pH, acid soils with a pH value of 4.6–5.6 predominate (according to the Atlas of the Republic of Poland, 1993–1997, "Soil properties" map at a scale of 1:3 000 000).

The location of different soil complexes is presented in Figure 3.32. Figure 3.33 presents soil types in lands used for agricultural purposes and in forest lands within the planned project area.

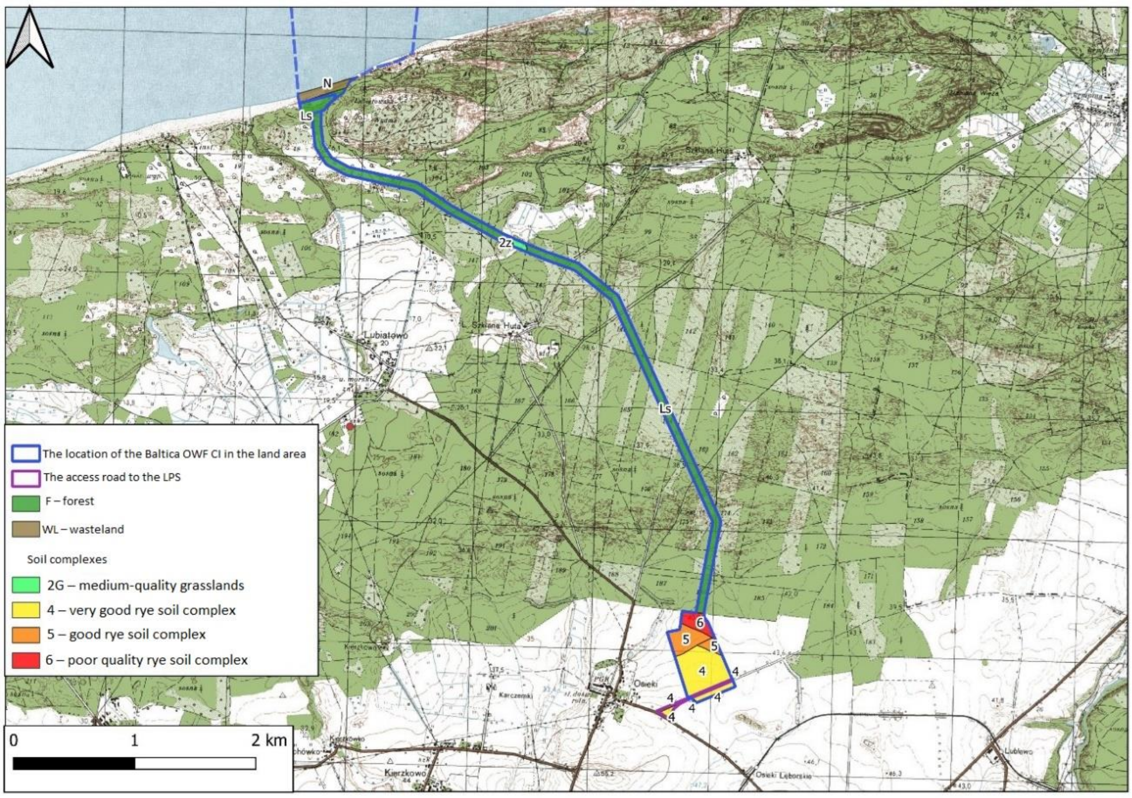



*Figure 3.32. Agricultural suitability complexes of soils within the boundaries of the onshore area of the Baltica OWF CI [Source: internal materials based on a soil-agricultural map of the ISSPC–NRI]*

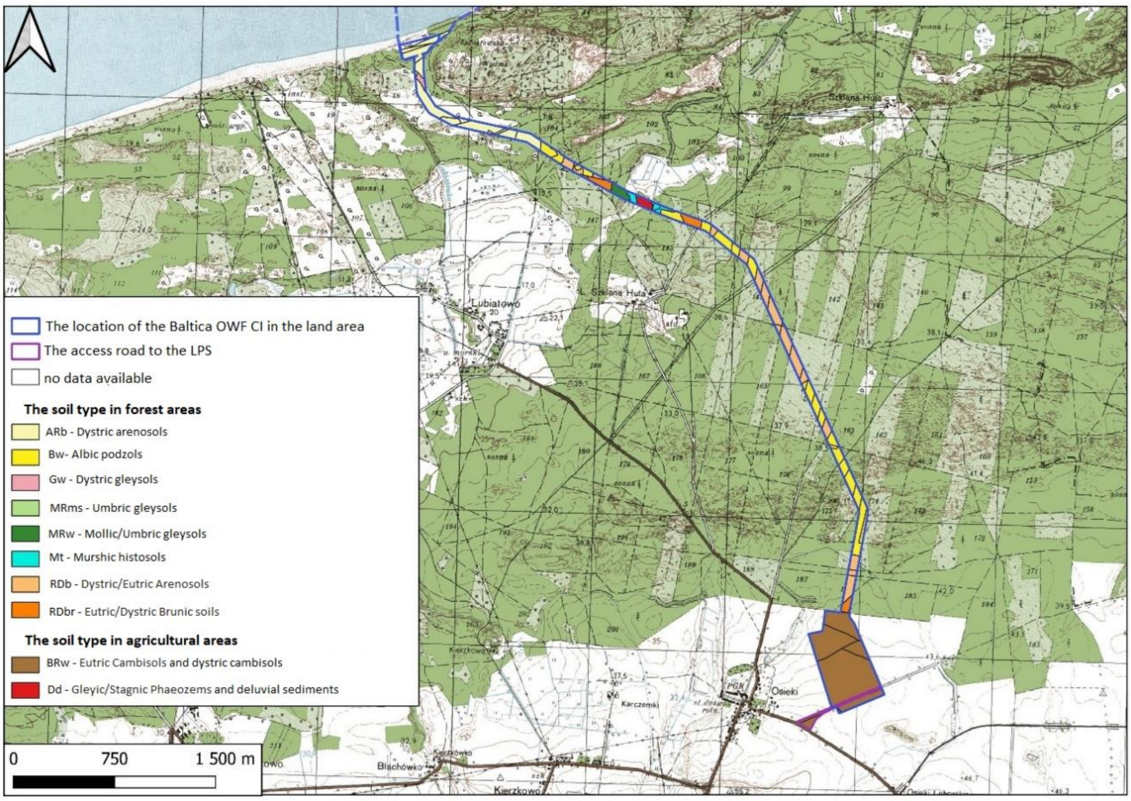



*Figure 3.33. Soil types within the boundaries of the onshore area of the Baltica OWF CI [Source: internal materials based on a soil-agricultural map of the ISSPC–NRI and data from the Forest Data Bank]*

Table 3.21 shows the percentage of different soil types encountered within the Baltica OWF CI boundaries – the statistics refer to the lands used for agricultural purposes and to forest lands.

*Table 3.21. Area and percentage of different types of soils encountered within the boundaries of the onshore area of the Baltica OWF CI [Source: internal materials based on soil-agricultural maps made available by the ISSPC–NRI and data from the Forest Data Bank]*

| Type | Description | Area [m$^2$] | Percentage [%] |
|---|---|---|---|
| **Arable land** | | | |
| BRw | Eutric Cambisols and dystric cambisols | 258 387 | 38.95 |
| Dd | Gleyic/Stagnic Phaeozems and deluvial sediments | 7501 | 1.13 |
| **Forest land** | | | |
| ARb | Dystric arenosols | 107 527 | 16.21 |
| Bw | Albic podzols | 136 329 | 20.55 |
| Gw | Dystric gleysols | 4130 | 0.62 |
| MRms | Umbric gleysols | 451 | 0.07 |
| MRw | Mollic/Umbric gleysols | 9355 | 1.41 |
| Mt | Murshic histosols | 9803 | 1.48 |
| RDb | Dystric/Eutric Arenosols | 104 308 | 15.72 |
| RDbr | Eutric/Dystric Brunic soils | 25 620 | 3.86 |
| **Total** | | **663 411** | **100** |

On lands used for the agricultural purposes in the southern part of the planned project, within the limits of the village of Osieki Lęborskie (the planned OnSS site), eutric cambisols and dystric cambisols (accounting for nearly 40% of all soil types in the entire project area). In the central part of the Baltica OWF CI route in the onshore area, in the forest areas, opposite the village of Lubiatowo, according to the agricultural suitability complex map, there is a small area of permanent grasslands, where soils were classified as gleyic/stagnic phaeozems and deluvial sediments (1.13%).

In the forest lands, which represent a considerable part of the onshore section of the planned project area (nearly 60%), three soil types clearly predominate: in the northern part, these are dystric arenosols (over 16%), while the central part id dominated by albic podzols (over 20%) and dystric/eutric arenosols (over 20%). A relatively small proportion is represented by eutric/dystric brunic soils (nearly 4%), mollic/umbric gleysols (nearly 1.5%) and murshic histosols (nearly 1.5%). The other soil types account for a small proportion of the entire planned project area (less than 1%).

The soil contamination level was assessed on the basis of the data obtained from the Arable Soil Chemistry Monitoring in Poland, which is part of the State Environmental Monitoring activities conducted by the ISSPC–NRI. The aim of the surveys is to assess the soil contamination level and to determine the changes in the soil properties in terms of time and space. The surveys are conducted in 5-year cycles as part of the network comprising monitoring and control points located on soils used for the agricultural purposes across Poland. In the area of the Baltica OWF CI, there is one monitoring point (no. 13) located in the village of Starzyno (the Puck commune), about 22 km east of the planned project. Acid brown soil of the good wheat complex (2) and of soil quality class IIIb, overlying a substratum of sandy loam, was identified at the monitoring point. According to the data from 2020, obtained for this monitoring point from CIEP, the sand fraction (1–0.1 mm) represented the highest percentage, namely as much as 51%, of all fractions; this was followed by 34%

represented by the silt fraction (0.1–0.02 mm) and 15% represented by the FG02 fraction of floatable particles (<0.02 mm). The results of the analysis are presented in Table 3.22.

*Table 3.22.* Soil parameters in 1995, 2000, 2005, 2010, 2015 and 2020 at point 13 [Source: CIEP data*]*

| **Parameter analysed** | **Parameter value** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Limit values for concentrations in soil or earth [mg·kg$^{-1}$ DW] for soil subgroup II-1*** | **1995** | **2000** | **2005** | **2010** | **2015** | **2020** |
| pH in $H_2O$ solution | - | 5.7 | 6.0 | 5.5 | 6.3 | 5.0 | 6.8 |
| pH in KCl solution | | 4.8 | 4.7 | 4.6 | 4.9 | 4.0 | 6.5 |
| Humus [%] | - | 2.12 | 2.09 | 1.92 | 1.9 | 2.04 | 3.89 |
| Organic carbon [%] | | 1.23 | 1.21 | 1.11 | 1.1 | 1.18 | 2.25 |
| Total nitrogen [%] | | 0.079 | 0.069 | 0.08 | 0.125 | 0.14 | 0.135 |
| Phosphorus [%] | - | 0.032 | 0.04 | 0.058 | 0.064 | 0.06 | 0.021 |
| Calcium [%] | | 0.16 | 0.15 | 0.15 | 0.14 | 0.09 | 0.19 |
| Magnesium [%] | | 0.19 | 0.17 | 0.17 | 0.15 | 0.11 | 0.26 |
| Potassium [%] | | 0.19 | 0.16 | 0.2 | 0.13 | 0.09 | 0.16 |
| Sodium [%] | | 0.008 | 0.007 | 0.009 | 0.004 | 0.005 | 0.010 |
| Sulphur [%] | | 0.017 | 0.021 | 0.022 | 0.019 | 0.017 | 0.021 |
| Aluminium [%] | | 1.18 | 0.99 | 0.88 | 0.66 | 0.48 | 1.16 |
| Iron [%] | | 1.27 | 1.24 | 1.1 | 1.24 | 0.93 | 1.56 |
| Manganese [Mn mg·kg$^{-1}$] | - | 522 | 533 | 527 | 531 | 520 | 503 |
| Cadmium [Cd mg·kg$^{-1}$] | 4 | 0.17 | 0.21 | 0.14 | 0.13 | 0.12 | - |
| Copper [Mn mg·kg$^{-1}$] | 150 | 6.7 | 6.3 | 6.0 | 5.8 | 5.4 | 5.03 |
| Chromium [Cr mg·kg$^{-1}$] | 150 | 13.8 | 12.3 | 12.4 | 11.7 | 10.3 | 12.4 |
| Nickel [Ni mg·kg$^{-1}$] | 100 | 8.3 | 7.2 | 6.0 | 7.3 | 5.9 | 6.15 |
| Lead [Pb mg·kg$^{-1}$] | 100 | 9.5 | 11.7 | 13.0 | 13.0 | 11.1 | 11.2 |
| Zinc [Zn mg·kg$^{-1}$] | 300 | 38.3 | 43.0 | 43.0 | 51.2 | 38.0 | 32.3 |
| Cobalt [Co mg·kg$^{-1}$] | 20 | 2.49 | 3.08 | 3.23 | 3.99 | 3.71 | 3.73 |
| Vanadium [V mg·kg$^{-1}$] | - | 26.7 | 26.7 | 20.8 | 15.6 | 13.8 | 16 |
| Lithium [Li mg·kg$^{-1}$] | | 8.8 | 7.6 | 5.9 | 6.5 | 5.0 | - |
| Beryllium [Be mg·kg$^{-1}$] | | 0.37 | 0.37 | 0.34 | 0.34 | 0.25 | - |
| Barium [Ba mg·kg$^{-1}$] | 200 | 44.0 | 40.0 | 36.3 | 38.6 | 33.1 | 29.2 |
| Strontium [Sr mg·kg$^{-1}$] | - | 11.0 | 8.6 | 8.0 | 6.5 | 5.7 | - |
| Lanthanum [La mg·kg$^{-1}$] | | 10.2 | 8.4 | 7.9 | 9.2 | 6.7 | 8.98 |
| Mercury [Hg mg·kg$^{-1}$] | 2 | ND | ND | ND | ND | 0.02 | - |
| Arsenic [As mg·kg$^{-1}$] | 20 | ND | ND | ND | ND | 3.29 | 3.45 |
| Total polycyclic aromatic hydrocarbons 13 PAHs [μg·kg$^{-1}$] | - | 704.0 | 797.0 | 628.0 | 678.7 | 471.8 | 906 |

**In accordance with the Regulation of the Minister of the Environment of 1 September 2016 on the method of assessment of ground surface contamination (Journal of Laws of 2016, item 1395)*

The results of these observations illustrate the changes in the soil contamination parameters taking place between 1995 and 2020 in the planned project area. In most cases, the soil parameters in the project area have not undergone any significant changes during the analysis period (in a 5-year cycle). However, in the case of zinc and barium, their content in 2020 was lower than the average in the remaining years, whereas the soil content of: pH in $H_2O$ solution and in KCl solution, humus, organic carbon, magnesium and PAHs in 2020 was higher than the average content in the previous years.

The soil contamination was assessed in reference to the limit values for the concentration of metals set out in the Regulation of the Minister of the Environment of 1 September 2016 *on the method of assessment of ground surface contamination* (Journal of Laws of 2016, item 1395). The limit values for concentration of elements in soil subgroup II-1, which in the present case is represented by agricultural lands with light mineral soils (with FG02 fraction content of 10–20% and with a $pH_{KCl}$ value ≤6.5 according to 2020 data), are listed in Table 3.22. At the control and monitoring point no. 13, the concentration limit values for metals meet the classifying conditions for this subgroup.

In conclusion, the Baltica OWF CI area is developed and managed mainly as forest land (cable bed) and agricultural land (OnSS). The agriculturally developed areas are dominated by eutric cambisols and dystric cambisols, while, in the forest areas, mainly albic podzols, dystric/eutric arenosols and dystric arenosols are encountered. In the area concerned, the soils formed on strong loamy sands and light loamy sands, below which mainly light till is present. In terms of quality class of the lands used for agricultural purposes, both higher-class soils (IIIa and IIIb) and lower-class soils (IVa, IVb and V) are encountered there. The soils of complex 4 represent the largest proportion in the total area of arable soils – very good rye complex. The analysis of the monitoring data obtained from the monitoring and control point located in the planned project area shows that the concentration limit values for metals for the areas of subgroup II-1 are not exceeded, in accordance with the Regulation of the Minister of the Environment of 1 September 2016 *on the method of assessment of ground surface contamination* (Journal of Laws of 2016, item 1395).

### 3.14.4 Raw materials and deposits

The analysis of the data available in the Central Geological Database of the Polish Geological Institute revealed that within the boundaries of the planned project area and in its immediate vicinity, there are no mineral deposits or mining district and mining impact areas. The nearest deposit is located 5.65 km south-west of the Baltica OWF CI – the unexploited common mineral deposit site “Żelazno” (deposit no. KN 18058). The nearest existing mining district and mining impact area are located 10.65 km south-east of the planned project. This is the mining district at which gravel aggregate is actively extracted from the deposits “Jęczewo” (deposit no. KN 16615) and “Jęczewo I” (deposit no. KN 18038) pursuant to the decisions issued in 2014 (no. OS-277/2014) and 2016 (no. 17/2016).

The planned project used to be located within the licence area “Lębork”, covered by licence no. 16/2007/p granted to Lane Energy Poland Sp. z o.o. for prospecting and exploration of natural gas and crude oil deposits from shale beds. The licence expired at the end of 2015. The entire area of the planned project is currently located within the active licence area “Żarnowiec” covered by applicable licence no. 5/2019.Ł granted on 13 June 2019 for prospecting and exploration of hydrocarbons: crude oil and natural gas in the Cambrian, Ordovician, and Silurian formation and for extraction of crude oil and natural gas from deposits. The “Żarnowiec” area was designated by the geologists from the Polish Geological Institute – National Research Institute (PGI NRI) and the Department of Geology and Geological Licences (DGGC) at the Ministry of Climate and Environment on the basis of data collected in the National Geological Archives and scientific publications. The tender for granting a licence for a 10-year period (including a 5-year phase of prospecting and exploration of deposits followed by a 5-year extraction phase) held in 2018–2019 was won for the "Żarnowiec" area by ShaleTech Energy Sp. z o.o. (currently Baltic Shale Sp. z o.o.). The scope of geological works of the prospecting phase will include, among others, drilling 2 boreholes up to a maximum depth of 5000 m within the entire area covered by the concession. According to the information obtained from the Ministry of Climate and Environment by letter no. DIŚ-IV.431.301.2021.JM of 3 September 2021 and the information provided by Baltic Shale Sp. z o.o. (the licensee represented by Rychłowski & Urbański Law Office) by letter of 6 December 2021, no exact drilling site locations are known at this stage. Pursuant to the Article 80 of the Act of 9 June 2011 – Geological and Mining Law (consolidated text: Journal of Laws of 2021, item 1420) drilling site locations shall be specified in a geological works plan submitted to the licensing authority. Figure 3.34 illustrates the location of the planned project within the licence area "Żarnowiec" as well as the location of mineral deposits, or mining district and mining impact areas.

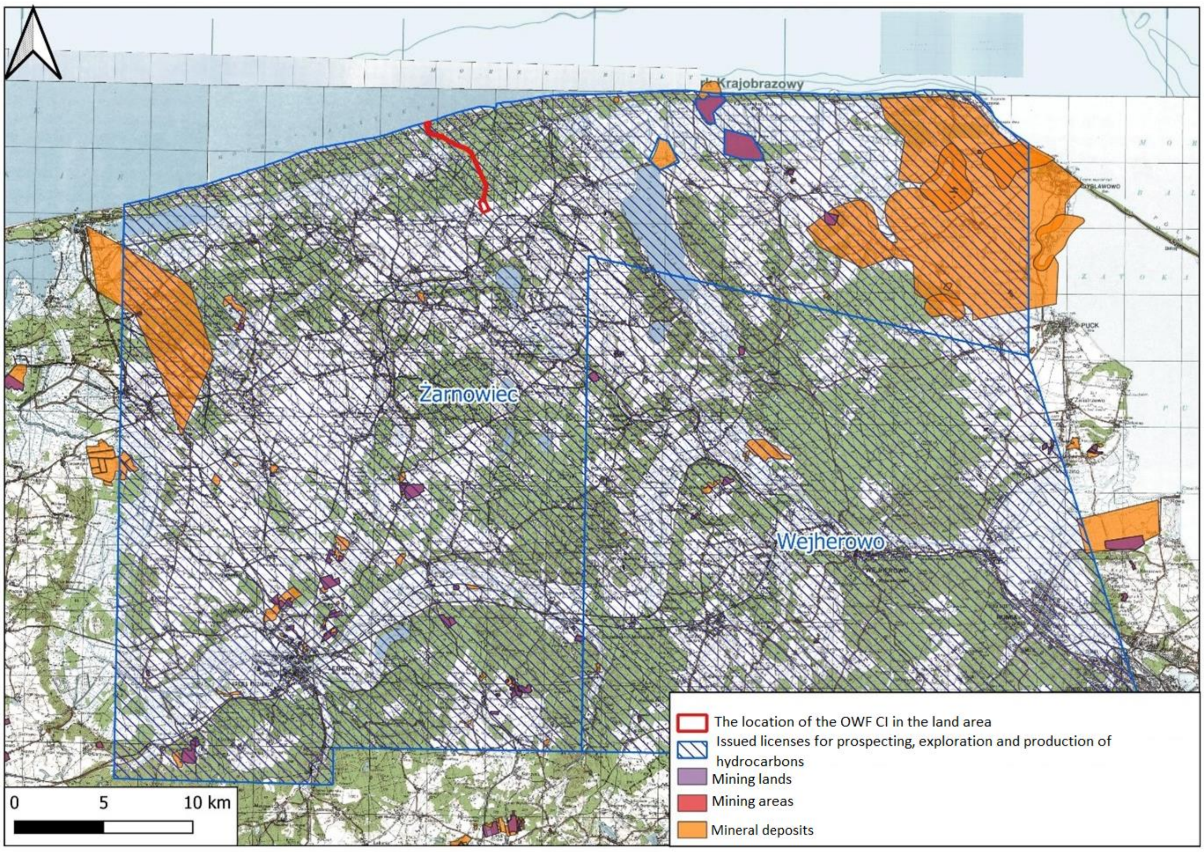



*Figure 3.34. Location of the Baltica OWF CI in relation to licence areas, mining district and mining impact areas as well as mineral deposit sites [Source: internal materials based on the CBDG data]*

## 3.15 Surface waters and their quality

The Baltica OWF CI site is located in the Vistula River basin, in the water region of the Lower Vistula, within the Baltic Coastland catchment area. Within the area of the planned project, there are two drainage ditches which dry out during the summer.

The first ditch with a width of 1 m is located at KM 2.360 of the cable bed route and enters the Bezimienna Stream approx. 1 km east of the project boundaries. The Bezimienna Stream with its wetlands (coastal rivers) is a small, mid-forest watercourse with a length of approx. 4 km flowing into the Baltic Sea west of Białogóra. It crosses a strip of coastal dunes covered with pine forest. It is located approx. 813 m of the planned project. As a result of a deliberate action aimed at water retention in the forest, the upper part of the watercourse is impounded by wooden weirs and forms a system of forested wetlands or takes the form of a regulated channel.

In the southern part of the cable bed route, at KM 5.600, the project area intersects a 1-m wide drainage ditch entering the tributary flowing from the village of Kierzkowo at a distance of approx. 850 m from the OnSS site. The tributary flowing from the village of Kierzkowo is a natural watercourse with a length of 5.73 km. The bed width is, on average, between 0.5 and 3 m, the bed depth is between 0.05 to 0.3 m and the height of banks is between 0.5 to 1.5 m. The flow velocity is approx. 0.5 m·s$^{-1}$. The watercourse bed is visible – sandy, covered with mud deposits in the upper course, sandy and gravelly at the estuary. The watercourse for almost its entire length flows through forest areas, and there are 3 bridges along its course.

The watercourses within the planned project area and in its vicinity are presented in Figure 3.35.

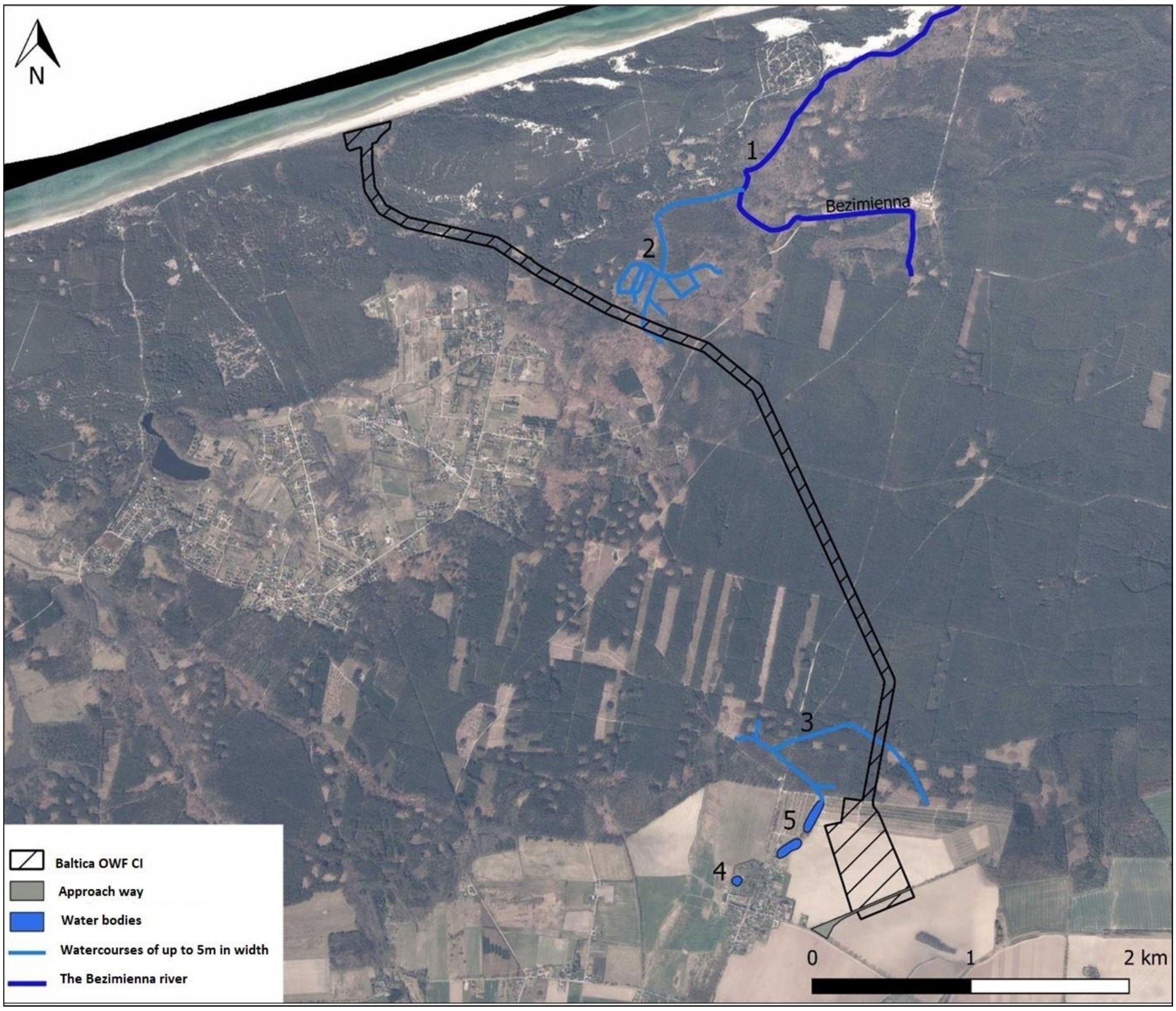



*Figure 3.35. Waters flowing within the area and in the vicinity of the Baltica OWF CI [Source: internal materials]*

The Choczewo commune is characterised by a low lake density. The largest lake, Lake Choczewskie, located over 3 km to the south of the planned project area covers 177.8 ha and its greatest depth is 12.9 m. It is a flow-through lake, mainly used for tourist and recreation purposes. The second largest lake, Kopalińskie Lake, is located about 2 km west of the Baltica OWF CI route. The lake covering

8.4 ha and with a greatest depth of approx. 3 m lies within the Biebrowski Canal catchment. It is used for angling and recreational purposes.

Within the Baltica OWF CI area, there is a system of mid-forest depressions periodically filled with water, which is connected to the Bezimienna Stream valley. They are severely overdried during the summer. In addition, there is one water body within the manor in Osieki Lęborskie (approx. 600 m west of the planned project), while at the Christmas tree farm near Osieki Lęborskie (approx. 72 and 172 m west of the planned project), there are two small water bodies.

**Surface Water Bodies (SWBs)**

Ina accordance with the Vistula River Basin Management Plan approved by the Regulation of the Council of Ministers of 18 October 2016 on the Vistula River Basin Management Plan (Journal of Laws of 2016, item 1911), the area in which the planned project is located covers two SWBs.

- immediate catchment of the sea CWDW1801;
- river SWBs: the Chełst River to its outlet into Lake Sarbsko RW200017476925.

According to the data from the National Water Management Authority, no status was determined for the SWBs of immediate catchments of the sea (including CWDW1801) due to the fact that no assessments of the ecological status/potential have been conducted within their areas. The environmental objectives for them should be set as for the "adjacent" surface water bodies, which receive the waters of surface runoff from these areas. In this context, these will be the following SWBs: the Chełst River to its outlet into Lake Sarbsko RW200017476925 and the Piaśnica River from its outflow from Lake Żarnowieckie to where it is joined by the Białogórska Struga Stream RW200023477289.

The Chełst River to its outlet into Lake Sarbsko RW200017476925 is a heavily modified water body; it covers the entire OnSS site and the southern section of the cable connection. It is part of the combined water body DW1704. The Piaśnica River from its outflow from Lake Żarnowieckie to where it is joined by the Białogórska Struga RW200023477289 is also a heavily modified water body, located approx. 1 km east of the boundaries of the planned project. It is a part of the combined water body DW1801. The project location in relation to the SWBs is presented in Figure 3.36.

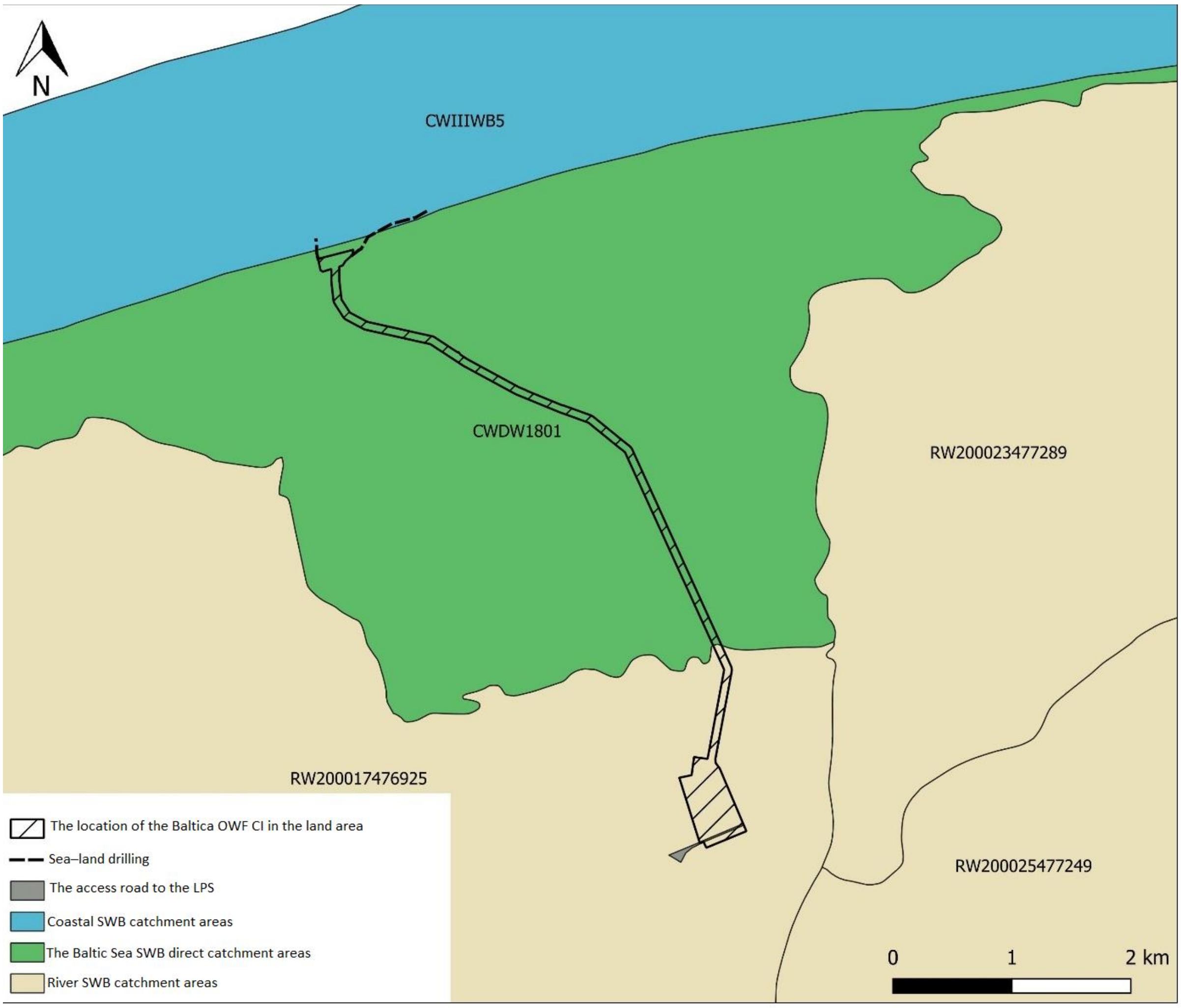



*Figure 3.36. Location of the project in relation to the SWBs [Source: internal materials]*

In accordance with the status assessment of the river surface and impounding reservoir water bodies carried out as part of the surface water monitoring activities by the VIEP in Gdańsk between 2014 and 2019, the Chełst River SWB to its outlet into Lake Sarbsko RW200017476925 was classified as having a 'bad' water status. On the basis of the biological indicators obtained during the operational monitoring of the flowing surface waters conducted in 2019, the biological elements for the Chełst River to its outlet into Lake Sarbsko were classified as class II – 'good' status. The analyses of the physical properties, oxygen concentrations, salinity, acidification and nutrient level of the water performed in 2019, in terms of physico-chemical elements, allowed classifying the SWB as class II – 'good' status. The last analyses performed in 2016 did not identify any significant irregularities in terms of particularly harmful substances, thus, the SWB was also classified into the category of class II – 'good' status. The ecological potential of the water bodies was rated as 'good' (class II, 2019 surveys). As far as the analyses of chemical substances are concerned, exceedances of the limit values for the content of benzopyrene and mercury compounds were observed, which resulted in classifying the chemical status as below 'good.'

Based on the status assessment of the river surface and impounding reservoir water bodies carried out using a transferability method by the VIEP in Gdańsk, the general status of the SWB of the Piaśnica River from its outflow from Lake Żarnowieckie to where it is joined by the Białogórska Struga Stream RW200023477289 was classified as 'bad.' The ecological potential of the SWB was rated as moderate, whereas the chemical status of the water bodies – as below 'good.' The achievement of environmental objectives was found to be unthreatened. The source SWB for which the classification and the assessment of the chemical status of the water bodies were transferred was the SWB Czarna Woda Stream to the Struga Stream (inclusively) RW200023477342.

Pursuant to the Article 57 of the Water Law Act of 20 July 2017 (consolidated text: Journal of Laws of 2021, item 624, as amended), the environmental objective for artificial and heavily modified water bodies is the protection and improvement of the ecological potential and chemical status in order to achieve good ecological potential and good chemical status of the surface water bodies, as well as the prevention of deterioration of their ecological potential and chemical status.

The main threat to the quality of surface waters within the Baltica OWF CI area are untreated or insufficiently treated municipal sewage. A source of pollution are the pollutants discharged from the touristically developed areas, especially during the summer by "wildly developed" recreational plots and informal camping sites. Another source of the water pollution are non-point source pollutants from agricultural and forest areas as well as from traffic route areas.

In accordance with the flood hazard map, the planned project is located outside the area with a probability of flooding once every 10, 100 and 500 years, however, the construction site will be located within a technical belt within the meaning of Article 36, section 2, point 1 of the Act of 21 March 1991 *on the marine areas of the Republic of Poland and maritime administration* (consolidated text: Journal of Laws of 2020, item 2135 as amended), which, in accordance with Article 16, point 34 of the Water Law Act of 20 July 2017 (consolidated text: Journal of Laws of 2021, item 624 as amended), is an area at particular risk of coastal flooding.

## 3.16 Hydrogeological conditions and groundwater

According to the systematics of the hydrogeological units presented in the study entitled "Hydrogeologia regionalna Polski" [literally: "Regional Hydrogeology of Poland"] (Paczyński and Sadurski ed., 2007), the Baltica OWF CI is to be located in the north-eastern part of the Eastern Pomerania Region (part of the Baltic Sea coast and coastland province), where the presence of groundwater is related to the presence of Quaternary and Tertiary formations. According to the Hydrological Map of Poland at a scale of 1:50 000, Choczewo sheet (Lidzbarski, 2000), two usable multi-aquifer formations were distinguished within the planned project area: the Quaternary and Tertiary.

The Quaternary multi-aquifer formation consists of two aquifers: intermoraine and sub-till. The intermoraine aquifer is encountered in fluvioglacial sediments of the Middle Polish Glaciation and North Polish Glaciation, most often combined into a single aquifer complex. The total thickness of the aquifer horizon is usually 15–30 m, 40 m at maximum. This aquifer stretches between depths greater than 1 m in the northern part of the planned project, and 20–50 m in its southern part. The groundwater discharge occurs mainly towards the Baltic Sea, it is related to the Chełst River only locally.

The second, Quaternary aquifer – sub-till, is limited to the presence of fluvioglacial deposits of the South Polish Glaciation, mostly within the fossil structures. It lies at depths between 120 and 200 m. This aquifer is not exploited within the area concerned and represents a secondary aquifer horizon.

The Tertiary multi-aquifer formation is composed of sandy Oligocene deposits, and its thickness reaches up to 20 m. Heading northwards, it loses its significance as a usable multi-aquifer formation due to the decreasing thickness and a higher content of the clayey fraction in sands. This multi-aquifer formation is usually encountered at depths greater than 100 m, only locally at smaller depths

– up to 50 m. The Żarnowiecka Upland serves as the main recharge zone of this multi-aquifer formation, whereas the bed of the Baltic Sea forms its drainage base. The Oligocene aquifer plays a secondary role in water supply, and only in the areas where no shallower aquifers exist, it is regarded as the primary aquifer.

The location of the planned project plotted on the Hydrogeological Map of Poland and the depth of the water-table of the First Aquifer were presented in Figure 3.37 and Figure 3.38.

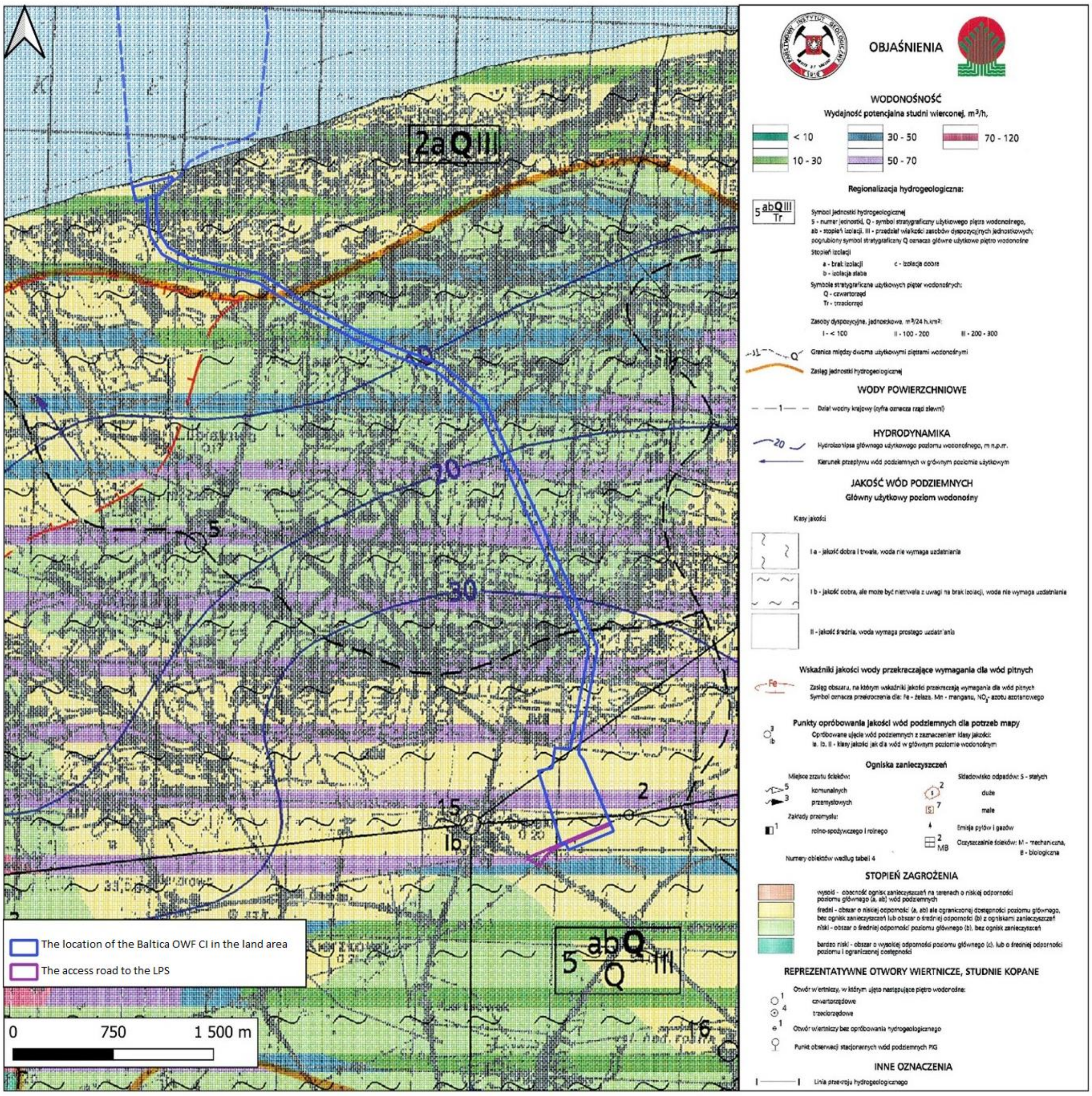



*Figure 3.37. Baltica OWF CI plotted on the Hydrogeological Map of Poland [Source: internal materials based on the Hydrological Map of Poland]*

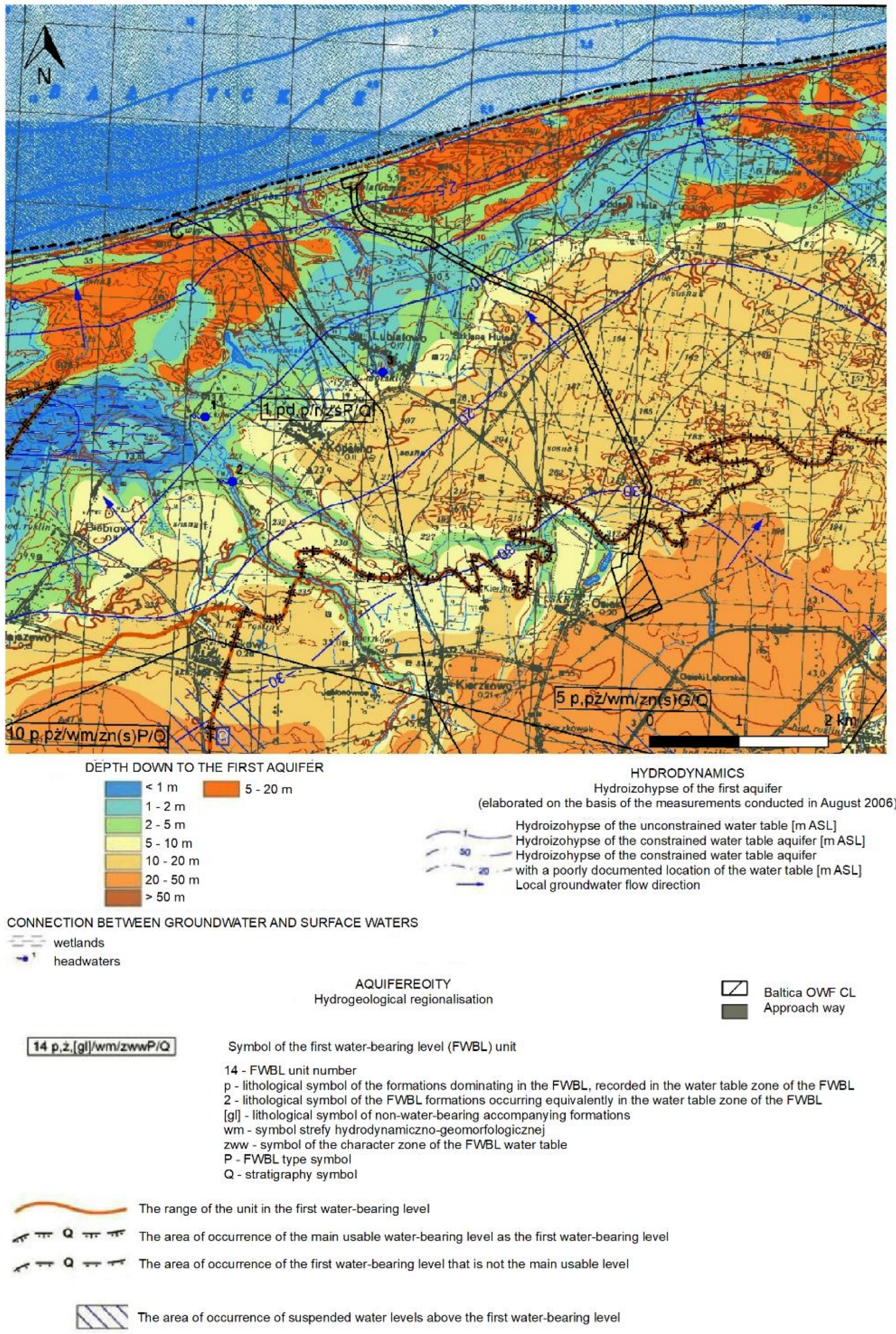



*Figure 3.38. Baltica OWF CI plotted on the Map of the First Aquifer [Source: internal materials based on the Hydrological Map of Poland]*

In relation to the current division into groundwater bodies (GWBs), the planned project lies within the boundaries of two units:

- GWB 13 (PLGW240013) in the northern and central part of the project;
- GWB 11 (PLGW240011) in the southern part of the project.

The total area of the GWB 13 is 2856.1 km$^2$. The aquifer system of the unit consists of three multiaquifer formations: Quaternary, Paleogene–Neogene (Tertiary) and Cretaceous. Seven aquifers were distinguished, including four belonging to the Quaternary multiaquifer formation (groundwater aquifer – Holocene–Pleistocene and three intermoraine aquifers Pleistocene), and also the Miocene, Oligocene and Cretaceous aquifers. The groundwater aquifer is mostly composed of alluvial deposits of river valleys, ice marginal valleys and outwash plains. The intermoraine aquifers consist of sand and gravel Pleistocene sediments forming horizons with thicknesses between 10 and 40 m. The Miocene aquifer consists of the horizons made of fine-grained sands with a thickness of up to 40 m. The Oligocene aquifer is composed of glauconite fine-grained sands in the horizons with thicknesses between 10 and 25 m. The Cretaceous aquifer, which is also composed mainly of glauconite fine-grained sands, is characterised by considerable thicknesses within the limits of 100–150 m. Within the area of the planned project, the dominant role of the main useful aquifer is played by Quaternary aquifers.

The total area of the GWB 11 is 3969.1 km$^2$. This unit includes the catchments of the Łeba, Łupawa and Słupia Rivers as well as smaller coastal rivers. The aquifer system comprises four multi-aquifer formations – Quaternary, Neogene, Paleogene and Cretaceous, whereby within the boundaries of the planned project, Quaternary and Oligocene aquifers are usable.

The status assessment for 2012 for both GWBs indicated good chemical, quantitative and general statuses. This has been confirmed by the 2015 results of the monitoring activities published by the VIEP in Gdańsk and by the results from the previous years. As part of the operational monitoring activities, in 2015, the VIEP in Gdańsk tested the groundwater at three sites in the GWB 11 and three sites in the GWB 13, including the water intake in the village of Czymanowo in the Gniewino commune. All the tests indicated that water bodies have a good chemical status (quality class II standard is not exceeded).

Neither of the GWBs is at risk of the environmental objectives not being met. For both GWBs, “maintaining good chemical status, maintaining good quantitative status” were set as environmental objectives. The location of the planned project area in relation to the GWBs is presented in Figure 3.39.

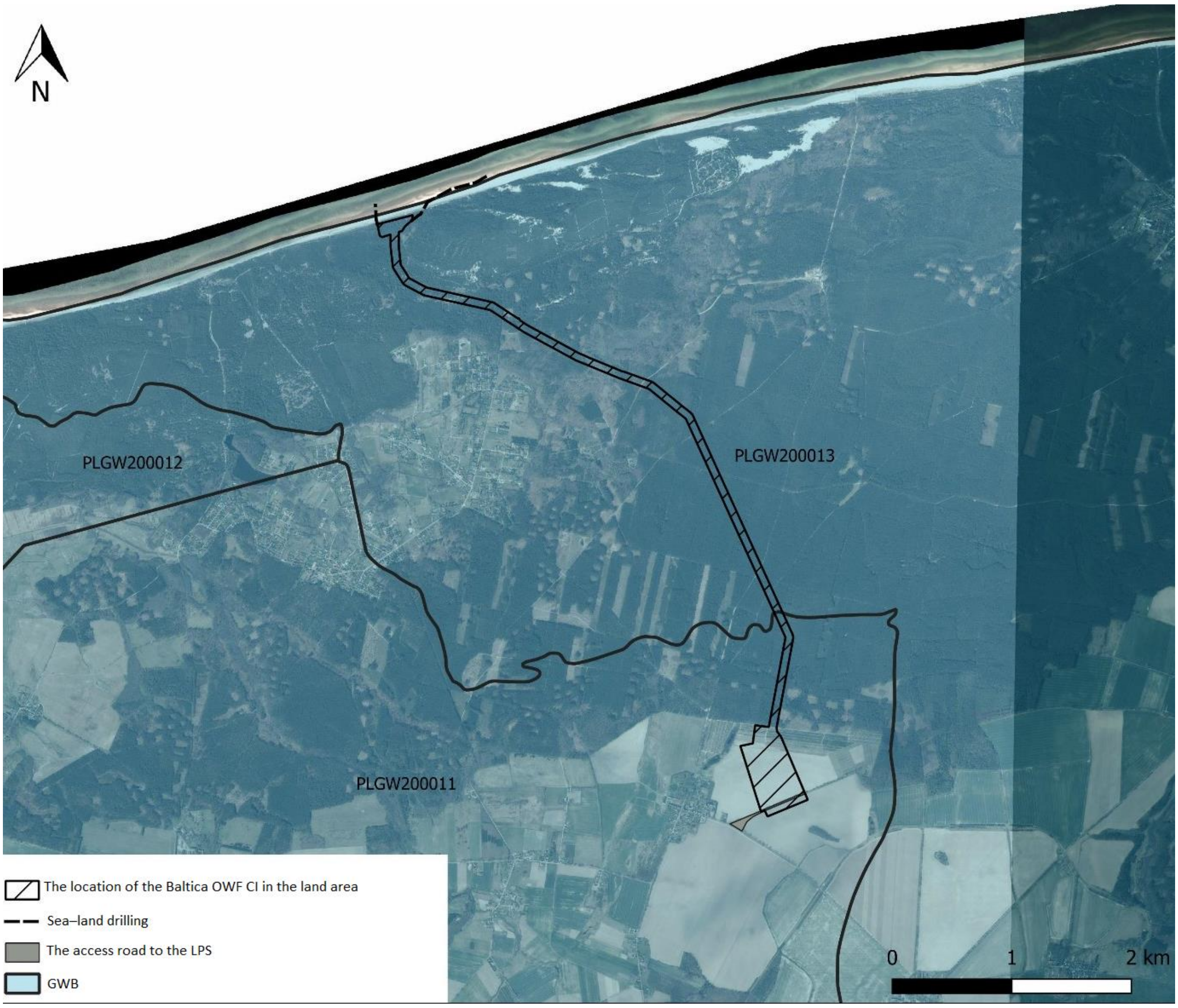



*Figure 3.39. Baltica OWF CI against the Groundwater Bodies [Source: internal materials based on the Hydrological Map of Poland]*

The area within which the project is planned, is not located at any Main Groundwater Basin, nor within the protection zones of such basins. Therefore, no restrictions connected to the protection of groundwater resources apply there.

The nearest municipal groundwater intake is located in Lubiatowo, approx. 2 km west of the connection route. The intake supplies water to the villages of Lubiatowo, Kopalino and Jackowo. It has two operating wells with yields of 58 $m^3 \cdot h^{-1}$ and 114 $m^3 \cdot h^{-1}$. The intake is situated in the immediate protection zone; however, no intermediate protection zone has been established for it.

## 3.17 Climatic conditions and air quality

### 3.17.1 Climate and the risk related to climate change

The Baltica OWF CI is located within the Baltic Coastland zone, which forms a strip with a width from several to a few dozen kilometres along the southern Baltic Sea coasts. Apart from coastal landscapes with estuaries, it covers moraine plains dissected by a network of small ice marginal valleys, situated at an elevation below 100 MASL, with a few hills exceeding that height,. This is a climatic region shaped by the strong influence of the Baltic Sea and Atlantic air masses. Mild winters and relatively cool summers are characteristic of that region. In addition, transitional periods between summer and winter are relatively long there and spring is distinctly colder than autumn. The impact range of the sea depends on the topography of the areas adjacent to the coast and decreases with the distance from the shoreline. If in the vicinity of the shoreline there are moraine elevations, the impact of the Baltic Sea is smaller, and the range of its direct impact can be limited to a few kilometres from the shoreline (Woś, 1993).

Due to the fact that the economic analyses of the impact of climate change point to its most distinct relationship with the power generation industry, this section also discusses the risks related to climate change.

As part of the "KLIMAT" and "KLIMADA" projects, climate scenarios were developed for selected meteorological elements (air temperature, precipitation, cloud cover, air humidity) in Poland. They describe trends and range of climate variability which should be taken into account when planning economic activities in selected locations within the next few decades. Climate change and its effects on the natural environment were estimated and their economic effects were determined. Detailed trends of the change were estimated on the basis of the results obtained from two types of numerical models: numerical models using statistical and empirical scaling and regional numerical models using statistical methods for parameterisation understood as description of meteorological processes on a small scale (Wibig and Jakusik ed., 2012).

Since the second half of the previous century, the climate of Poland has undergone significant changes. They involved an increase in the average air temperature, increase in cloud cover in summer and decrease in winter, spring and autumn, increase in water vapour content in the air with a decrease in relative humidity. The amount of precipitation has remained at a similar level. The scenarios of climate change indicate that the average annual air temperature in Poland in the period until 2030 will not change significantly with reference to the value from the reference period. However, the maximum temperatures will increase, especially in the winter periods. An increase in the amount of precipitation should also be expected, which will be related to the intensification of cyclonic circulation in the region of the Baltic Sea basin and/or over the eastern part of the continent. Climate change increases the probability of the sea levels rising systematically. At the same time, the frequency of storm surges will increase, which may reinforce the shoreline erosion. Global warming will lead to a shorter duration of ice-cover, deterioration in the water quality in combination with environmental eutrophication, and increase in the mean Baltic Sea level and its extremes. The scenarios do not predict changes in the wave climate.

In general, the climate change scenarios point to further warming over the next 20 years, while precipitation remains unchanged, which follows the trend observed since the middle of the 20$^{th}$ century. The climate change in Poland is in line with the climate change observed in other European countries. Climate change will particularly affect the power generation industry, having a substantial impact on demand. The problems may include water scarcity and recurring low water conditions.

It should be noted, however, that the uncertainty of the findings from scientific research justifies the need of monitoring the changes in the climate system. At this stage, it is not possible to undoubtedly specify to what extent climate change is caused by energetic processes resulting from human activities, and to what extent it is caused by natural factors. The models used for estimating climate change, both in short term and in long term, have several limitations. The analysis of the models reveals, among other things, that they tend to suggest oceanic nature of the climate in more cases than it actually is in reality.

The connection infrastructure must be prepared for climate change, especially for extreme weather conditions, including strong winds, tornados or storms. To this end, adaptation measures are undertaken, which are adjusted both to the infrastructure type and the region they concern.

The guidelines for climate change adaptation measures dedicated to the Pomorskie Voivodeship area, especially to the Baltic Coastland, which are recommended by the KLIMADA project will be taken into account when implementing the planned project. These include:

- protection of the coastline and harbour areas;
- flood protection of the areas identified in a preliminary flood risk assessment and of the areas designated on the flood hazard maps;
- implementation of the systems for protecting agricultural and forest areas from drought through protecting soils from drying out and small-scale water retention.

## 3.17.2 Meteorological conditions

### 3.17.2.1 Wind velocity and direction

Continental polar and marine polar air masses reach the area of the planned project. The wind caused by continental polar air masses usually reaches lower velocities, while the wind caused by maritime polar air masses (from the North Atlantic) is usually strong.

For the purpose of producing the Environmental Impact Assessment Report, the IMWM-NRI was commissioned to develop detailed characteristics of the frequency of wind events and atmospheric stability states in the location of the project. Along a 6-km section of the planned project area, a point located 2 km from the shoreline (approximately opposite the geometric centre of the village of Lubiatowo) was selected as an indication point. The data calculated by the IMWM-NRI was depicted by selected characteristics, which are presented in Figure 3.40 and in Table 3.23.

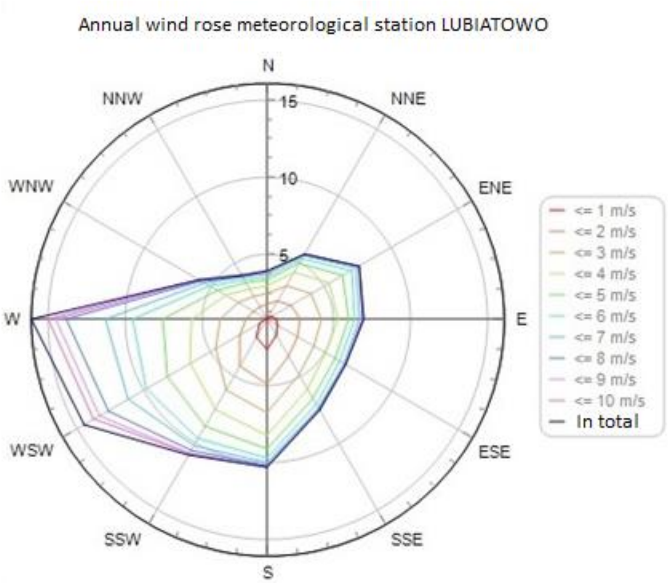



*Figure 3.40. Depiction of the wind rose for the project location [Source: internal materials based on the IMWM-NRI data]*

*Table 3.23. Percentage of wind directions [Source: internal materials based on the IMWM-NRI data]*

| **Windsector number** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direction | NNE | ENE | E | ESE | SSE | S | SSW | WSW | W | WNW | NNW | N |
| Percentage of observations | 5.65 | 7.70 | 7.00 | 6.65 | 7.54 | 10.37 | 10.88 | 14.43 | 16.05 | 5.89 | 4.02 | 3.82 |

The data presented above indicates the following meteorological conditions for substance dispersion in the air:

- the wind rose in the planned project area is strongly dominated by westerly and southerly winds (as much as 65% of the wind events clearly prevent the inflow of substances which could be emitted from the planned project to Lubiatowo);
- the NNW wind direction (along the line: the coastal zone drilling station – Lubiatowo) is observed throughout the year only in 4% of cases, which corresponds to nearly 15 days (in fact even less, as the total frequencies of the directions indicated in Table 3.23 correspond to 100%; this means that they do not include calm periods, which, due to a distance of over 1000 m between the location of drilling through the coastal zone and Lubiatowo, also prevents effective migration of substances);
- the directions which would be conducive to effective migration of substances (over a short distance) from the area designated for the planned cable lines to Lubiatowo (NNE, ENE and E) are observed throughout the year only in 20% of cases, which, considering the high rate of the construction work site movement (approx. 100 m·2 $d^{-1}$), makes the impact very unlikely to occur;
- the frequency of wind events along the stretch between the OnSS and Osieki Lęborskie (ENE, E directions) is only 15%, which results in a low probability of occurrence of emission-related impacts from the planned OnSS on the atmospheric air in the development area of Osieki Lęborskie.

The area located directly in the near-shore zone, in which the sea–land connection site is planned, is characterised by dynamic wind conditions. This zone is dominated by WSW winds, reaching speeds of over 20 m·$s^{-1}$. During the autumn/winter seasons, stronger winds are recorded than during the remaining part of the year. The majority of storms at sea are observed during that period. In other periods, the wind is weaker, moderate. Strong winds occur sporadically during those periods, usually accompanying the weather phenomena such as storms. The wind velocity and direction are similar both in the offshore and onshore areas within the coastal zone of the area concerned. The average wind velocity is 7 m·$s^{-1}$.

#### 3.17.2.2 Air temperature

The average annual air temperature in the region is 7–8°C. The annual temperature pattern is regular over the entire area. The average annual air temperature amplitude over the entire area is less than 19°C. The lowest average annual air temperature amplitude occurs in the narrow coastal zone, where its values reach approx. 17.5°C. The coldest month is January with an average air temperature varying between 0°C and -2°C. July is the hottest month with average air temperature of 17–18°C. The number of frosty days, with a minimum temperature of below 0°C, is less than 30 and is the lowest in Poland.

The average number of cloudless days, i.e. with cloud cover less than 20%, is 30 days. The number of days with daily mean total cloud cover equal to or greater than 80% is from 120 to 140 days per year. The annual totals of sunshine duration within that area are between 1500–1600 hours. In June and July, the average sunshine duration can be up to 9 hours per day. The average duration of thermal summer is 60–70 days, whereas, the average duration of thermal winter is 50–80 days. Within the site region, one of the lowest pressure readings in Poland are recorded, which is the result of the location near the tracks of barometric depressions which are very active in winter.

#### 3.17.2.3 Precipitation

The Choczewo commune is characterised by the highest total annual precipitation within the Łeba River catchment. The average annual precipitation in this area is between 650 to 700 mm and is higher than the average annual precipitation in Poland. Most of the precipitation falls in the warm half of the year and amounts to 350–500 mm, whereas, the smallest amount of precipitation is recorded in the winter half of the year and amounts to 200–250 mm. The snow cover duration is from 40 to 70 days (Lorenc ed., 2005).

### 3.17.3 Air quality

The current data on the level of air pollution in the planned project area was provided by the CIEP – the Regional Department of Environmental Monitoring in Gdańsk (data updated on the basis of the letter of 15.10.2021). The annual average pollutant concentration compared with air quality criteria was presented in Table 3.24.

*Table 3.24. Comparison of the current levels of air pollution and air quality criteria [Source: internal materials based on the CIEP data in Gdańsk]*

| **Substance** | **Atmospheric concentration of substance** | | | |
|---|---|---|---|---|
| | **Unit** | **Air pollution background** | **Air quality criterion $D_a$** | **Limit value percentage [%]** |
| **Compounds for which air quality standards were set** | | | | |
| Nitrogen dioxide | $\mu g \cdot m^{-3}$ | 5 | 40 | 13 |
| Sulphur dioxide | $\mu g \cdot m^{-3}$ | 1 | 20 | 5 |
| Particulate matter PM10 | $\mu g \cdot m^{-3}$ | 11 | 40 | 28 |
| Particulate matter PM2.5 | $\mu g \cdot m^{-3}$ | 6 | 20 | 30 |
| Benzene | $\mu g \cdot m^{-3}$ | 0,5 | 5 | 10 |
| Lead in suspended particulate matter PM10 | $\mu g \cdot m^{-3}$ | 0,01 | 0,5 | 2 |
| **Compounds for which the target levels were used as a quality criterion** | | | | |
| Cadmium in suspended particulate matter PM10 | $ng \cdot m^{-3}$ | 0,2 | 5 | 4 |
| Arsenic in suspended particulate matter PM10 | $ng \cdot m^{-3}$ | 0,6 | 6 | 10 |
| Carbon monoxide | $\mu g \cdot m^{-3}$ | 190 | - | - |
| Nickel in suspended particulate matter PM10 | $ng \cdot m^{-3}$ | 0,8 | 20 | 4 |
| Benzo(a)pyrene in suspended particulate matter PM10 | $ng \cdot m^{-3}$ | 0,49 | 1 | 49 |

The above values clearly indicate that within the planned project area, the air quality is very good, with no risk of exceeding the limit values, in particular for the air quality standards.

The main sources of pollutants emitted into the air (mainly of anthropogenic origin) in the planned project area are as follows:

- commercial and housing industry (point emission) – emissions are generated by local heating plants and domestic fires emitting particulate matter, sulphur dioxide, nitrogen oxides, carbon monoxides, heavy metals and hydrocarbons; these sources are also responsible for elevated suspended particulate matter and benzopyrene concentrations (mainly in the winter season);

- transportation (linear emission) – the emission from this source affects the year-round values of NOx, carbon monoxide, heavy metal, hydrocarbon, particulate matter and benzopyrene concentrations. The excessive emissions from transportation are caused by poor technical condition of vehicles, their improper operation, an increase in traffic density and the lack of free flow of traffic.

There are no large industrial plants or roads with heavy traffic which could emit significant amounts of particulate and gas pollutants in the area of the planned project, which positively impacts the air quality.

## 3.18 Ambient noise

The impact of the planned project in terms of the effect of noise pollution on the human environment depends on the following factors: noise level, frequency, continuity or discontinuity of noise, duration, separate assessment of the factor. Noise is considered a high-nuisance factor, which affects human mental and physical health, as well as hinders relaxation and reduces work productivity.

Permissible levels for the noise emitted to the environment are not established for the forest, industrial or agricultural areas, whereas, they shall be specified for the protected areas, the function of which involves the presence of humans, as set forth in the Annex to the Regulation of the Minister of the Environment of 14 June 2007 *on permissible noise levels in the environment* (consolidated text: Journal of Laws of 2014, item 112) [Table 3.25]. The noise levels permissible in the environment are expressed in terms of $L_{Aeq\ D}$ and $L_{Aeq\ N}$ indicators, which are used to establish and monitor the conditions regulating the environmental use, for a single day.

*Table 3.25. Noise levels permissible in the environment*

| **Type of area** | **Permissible noise level [dB]** | | | |
|---|---|---|---|---|
| | **Roads or railways[1)]** | | **Other noise-emitting facilities and activities** | |
| | **$L_{Aeq\ D}$ reference time interval equal to 16 hours** | **$L_{Aeq\ N}$ reference time interval equal to 8 hours** | **$L_{Aeq\ D}$ reference time interval equal to 8 consecutive least favourable daytime hours** | **$L_{Aeq\ N}$ reference time interval equal to 1 least favourable night-time hour** |
| Health resort protection zone "A"<br>Hospital areas outside the city | 50 | 45 | 45 | 40 |
| Single family housing areas<br>Development areas with buildings related to permanent or temporary stay of children and adolescents[2)]<br>Nursing home areas<br>Hospital areas in cities | 61 | 56 | 50 | 40 |
| Multi-family housing and collective housing areas<br>Homestead housing areas<br>Recreational and leisure areas[2)]<br>Residential and commercial areas | 65 | 56 | 55 | 45 |
| Inner city zones of cities with more than 100 000 inhabitants[3)] | 68 | 60 | 55 | 45 |

*[1)]The values specified for roads and railway lines shall also apply for tramway tracks outside the roadway and cable cars.*

*2)In the case these areas are not used according to their function, during the night-time, the permissible noise levels do not apply there.*
*3)The city centre zone in cities with more than 100 000 inhabitants is an area of compact residential development with a concentration of administrative, commercial and service facilities. In the case of cities with districts of more than 100 000 inhabitants, city centres zones may be delimited within such districts if they are characterised by compact residential development with a concentration of administrative, commercial and service facilities.*

The matter of protecting areas against noise pollution is regulated by the provisions of spatial development plans or, if no such plan exists, the area will be classified into an appropriate noise-level category pursuant to Article 113 and Article 115 of the Act of 27 April 2001 – *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973, as amended) on the basis of the actual land development.

The provisions of the local spatial development plan "Wiatraki w Osiekach" [Wind Turbines in Osieki] approved by the Choczewo Commune City Council Resolution no. XIV/145/2008 of 19 March 2008 apply in the area designated for the construction of the OnSS.

For the remaining areas surrounding the planned OnSS, no local spatial development plan has been adopted which would specify the use of land in the vicinity of the substation, thus, indicating areas which should be protected from noise pollution. The nearest areas surrounding the station are:

- from the south, east and west – agricultural areas;
- from the north – forest areas;
- from the west, at a distance of approx. 280 m, there are the nearest existing residential buildings of the village of Osieki Lęborskie.

The Choczewo Commune Office was requested to classify the areas adjacent to the OnSS into an appropriate noise-level category. As no response had been received, the decisions on land development conditions issued so far and the geodetic subdivision in the vicinity of the planned project were studied. At a distance of approx. 100 m from the OnSS, decisions on land development conditions have been issued for the development of mainly residential buildings [Figure 3.41]. Also, the subdivision of plots west of the OnSS, suggest that the agricultural land is designated for residential development.

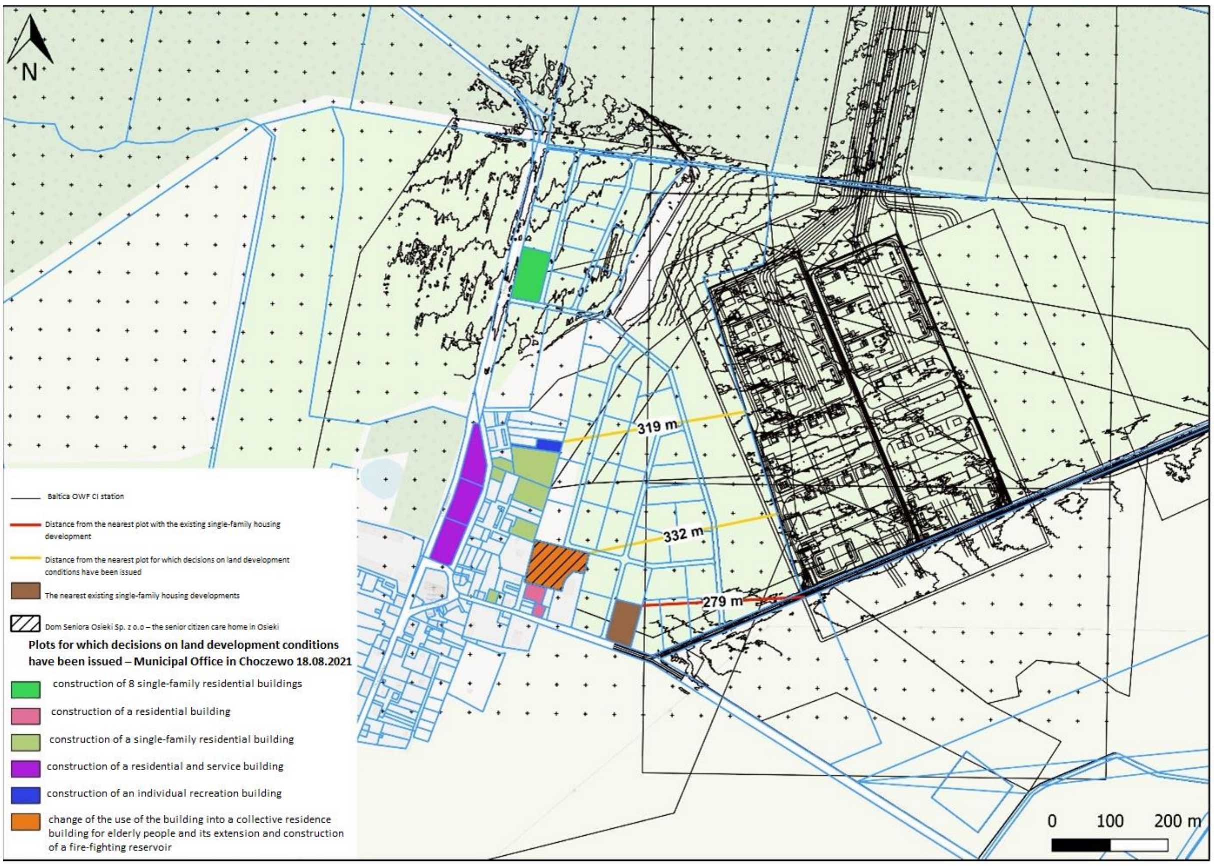



*Figure 3.41. Location of the existing and potential developments in the vicinity of the Baltica OWF CI [Source: internal materials]*

Those plots are currently undeveloped; however, it was acknowledged that in the near future this could change. As a result, the decision was made that the areas located west of the planned OnSS, divided into small plots, would be treated as prospective residential development areas, thus, as an area subject to noise protection. For those areas, the following normative (permissible) noise levels have been adopted:

- 50 dB – during daytim (6:00–22:00);
- 40 dB – during night-time (22:00–6:00).

## 3.19 Electromagnetic field emission (EMF)

Artificial sources of non-ionising electromagnetic fields include electrically powered devices. The main sources of non-ionising radiation are as follows: electrical installations for power generation and transmission (power stations, cogeneration plants, substations and power lines), radio communication facilities (radio and television transmitters, base transceiver stations) as well as electric installations and devices (industrial, medical and common-use devices).

The Choczewo commune area is supplied by the NPS from the transformer station MPSS Jackowo 110/15 kV. The MPSS transformer station is supplied by two HV overhead power lines 110 kV, i.e.:

- HV 110 kV line Opalino;
- HV 110 kV line Wojciechowo.

Back-up supply for the MV lines is provided by 110/15 kV MPSS Opalino and Bożepole stations.

The commune power supply infrastructure system includes:

- MPSS 110/15 kV Jackowo station (main power supply station);
- the transmitted 15 kV power supplying individual settlement units – 8 overhead lines;
- a series of 15/04 kV transformer stations supplying the end customers.

In accordance with the Low-Emission Plan for the Choczewo Commune (2015), the majority of 15 kV stations were constructed in the 1970s and 1980s. They have been renovated or replaced and their technical condition is assessed as good. The existing low-voltage network is well-developed and assessed as good. The street lighting network is a 0.4 kV separated network and should be partially modernised. Local customers are supplied from the medium to low-voltage transformer stations, which are the source of power for the low-voltage customer and lighting networks. Transformer substations are usually constructed with overhead lines, on towers, with transformers with a power of up to 600 kVa. The number of transformer devices and the MV and LV network lengths satisfy the demand of individual customers as well as of small and medium enterprises.

In the vicinity of the planned project, the route of the 110 kV single-circuit power line no. 1502 runs between the Opalino switching station and Jackowo switching station. The planned cable bed area is crossed by an overhead medium-voltage line.

Over the last few years, we can observe a dynamic development of the digital cellular network technology – GSM (Global System for Mobile Communications), which results in a rapid increase in the number of base transceiver stations (BTS). The location data and the number of physically existing and operating stations are presented and updated on the *btsearch.pl* search engine website. According to the *btsearch.pl* data, the following 5 base stations are located closest to the planned project area: Kierzkowo (the fire lookout tower of the Choczewo Forest District), Białogóra, Lubiatowo (the observation tower of the Choczewo Forest District) and 2 stations in Choczewo. In accordance with the Report on the State of the Environment in the Pomorskie Voivodeship, in the Choczewo commune, which was identified as a rural area, the EMF intensity measurements were carried out in 2017 and 2018. For all the rural areas inspected, the average intensity values of the EMF in 2017 were 0.22 $V \cdot m^{-1}$ and in 2018 – 0.42 $V \cdot m^{-1}$.

## 3.20 Description of natural elements and protected areas

### 3.20.1 Biotic elements in the onshore area

#### 3.20.1.1 Spatial range of the biotic element characteristics

The description of the biotic environment in the onshore area of the project is presented with reference to:

1) the direct impact zone (1): an area with a width of 62–68 m covering the cable bed area (excluding the land-sea borehole zone), an area with a width of 12–13 m within the boundaries of the modernisation area of the access road to the OnSS and the OnSS area, in which the construction works will be carried out, as a direct impact zone of the planned project on individual resources of the biotic environment;
2) the indirect impact zone (2) of the planned project as a zone in which the impact of the construction works conducted in zone (1) on individual resources of the biotic environment will be felt, diversified for individual resources:
    a) in the case of natural habitats, moss and liverwort, vascular plants, as well as lichens and fungi species – 100 m from the external boundaries of the Baltica OWF CI (in the vicinity of the coastal zone, the entire area between the construction site and the seashore was taken into consideration) as well as 50 m from the external boundaries of the modernisation area of the access road to the OnSS – this is the zone in which a change in

habitats should be expected, thus, in the abundance of species as a result of forest and woodlot clearance, the effect of which will be a change in illumination conditions (side illumination) and humidity in the direct vicinity of the project,

b) in the case of invertebrates – 300 m from the external boundaries of the cable bed area and 300 m deep into the forest and 500 m towards fields from the external boundaries of the OnSS; the potential impact area of the modernisation of the access road to the OnSS is located within this area – in this zone, the following should be expected:
   - change of habitats, thus, a change in species abundance and composition due to forest and woodlot clearance, the effect of which will be a change in illumination conditions (side illumination) and humidity in the direct vicinity of the project,
   - change in the species composition of invertebrate groups as a result of light emission from the OnSS (smaller impact range in forest areas, larger in field areas),

c) in the case of herpetofauna – 300 m from the external boundaries of the Baltica OWF CI; the potential impact area of the modernisation of the access road to the OnSS is located within this area – in this zone, the impact on herpetofauna should be expected as a result of standard route lengths of the movements of individuals,

d) in the case of breeding birds – 300 m from the external boundaries of the Baltica OWF CI; the potential impact area of the modernisation of the access road to the OnSS is located within this area – in this zone, the following should be expected:
   - change of habitats, thus, a change in species abundance and composition due to forest and woodlot clearance, the effect of which will be a change in illumination conditions (side illumination) and humidity in the direct vicinity of the project,
   - change in the species composition and abundance as a result of bird scaring, especially at the construction stage,
   - change in the species composition of bird groups as a result of light emission from the OnSS,

e) in the case of non-breeding birds – the area of fields used by birds in the vicinity of the planned OnSSs – within the entire area, a change in the species and quantitative compositions of bird groups using the area during the migration and resting periods should be expected,

f) in the case of mammals – 50 m from the external boundaries of the modernisation area of the access road to the OnSS, 300 m from the external boundaries of the cable bed area, 500 m deep into the forest and 100 m towards fields from the external boundaries of the OnSS – in this zone, the following should be expected:
   - change of habitats, thus, a change in species abundance and composition in favour of species from open areas due to forest and woodlot clearance, the effect of which will be a change in illumination conditions (side illumination) and humidity in the direct vicinity of the project,
   - change in species composition or bat activity as a result of light emission from construction sites,
   - change in the species composition and activity of bat groups as a result of light emission from the OnSS (larger impact range in forest areas, smaller in field areas).

#### 3.20.1.2 Methods of evaluation of the biotic environment resources identified and their habitats

For each of the groups studied, a resource evaluation was carried out, which took into account, on the one hand, the conservation status and threat category on an international, national, and local scale and, on the other hand, the frequency of occurrence in the country and Gdansk Pomerania. In the case of some organism groups, due to the lack of detailed information on the occurrence of many taxa, the list of species under legal protection did not include those which are actually rare and/or endangered in Poland. As a result, for the purposes of the Baltica OWF CI impact area evaluation, also rare and/or endangered species were included, regardless of their conservation status.

For individual patches of natural habitats, the following was specified:

- representativeness of the habitat in accordance with the guidelines for filling SDF for the Natura 2000 site;
- habitat conservation status as a result of the assessment of indicators selected by an expert for the assessment of the parameter “structure and functions” described in the CIEP methodological guides within the framework of the State Environmental Monitoring and perspectives for habitat conservation.

For individual sites of “natural” plant and animal species, the following was specified:

- size of population and size of species resource (abundance or abundance category), if possible;
- species conservation status as a result of the assessment of indicators selected by an expert for the assessment of the parameter “habitat status” described in the CIEP methodological guides within the framework of the State Environmental Monitoring and perspectives for site conservation.

For individual sites of “other” plant, animal, and fungi species, the following was specified:

- size of population and size of species resource (abundance, abundance category), if possible;
- expert assessment of the species conservation status as a result of the assessment of species habitat features and perspectives for site conservation selected by an expert.

On the basis of the evaluation of resources as well as the habitat status assessment and the assessment of site conservation perspectives, the Final assessment of resource site (= site evaluation) was introduced, with the following algorithm applied:

*Site evaluation (= Final assessment) = Resource evaluation + Assessment of natural habitat or species habitat conservation status + Assessment of natural habitat or species site conservation perspectives*

$$(FA = Rv + As + Ap)$$

The following scoring system was applied for the resource evaluation:

- resources of exceptional value 5 points,
- resources of high value 4 points,
- resources of medium value 3 points,
- resources of low value 2 points,
- resources of no significant value 1 point.

The following scoring system was applied for the assessment of resource habitat conservation status:

- FV (favourable) 3 points,
- U1 (inadequate) 2 points,
- U2 (bad) 1 point.

The following scoring system was applied for the assessment of resource site conservation perspectives:

- FV (favourable) 3 points,
- U1 (unfavourable) 2 points,
- U2 (bad) 1 point.

Hence, the resources assessed as part of the final assessment could have received from 3 to 11 points – in the minimum version 3 points: insignificant resource (1 point) + Habitat conservation status assessment U2 (1 point) + Site conservation perspective assessment U2 (1 point); in the maximum version 11 points: exceptional resource (5 point) + Habitat conservation status assessment FV (3 point) + Site conservation perspective assessment FV (3 point).

#### 3.20.1.3 Forests

In the onshore area, the Baltica OWF CI will be located in the State Forests National Forest Holding (hereafter: SFN FH) in the Szklana Huta Forestry (Choczewo Forest Inspectorate). The planned project is located within the following units: 47, 116, 115, 114, 169, 168, 167, 166, 165, 164, 187, 186, 185, 200, 199 and 211 (numbering compliant with the route of the Baltica OWF CI) [Figure 3.42].

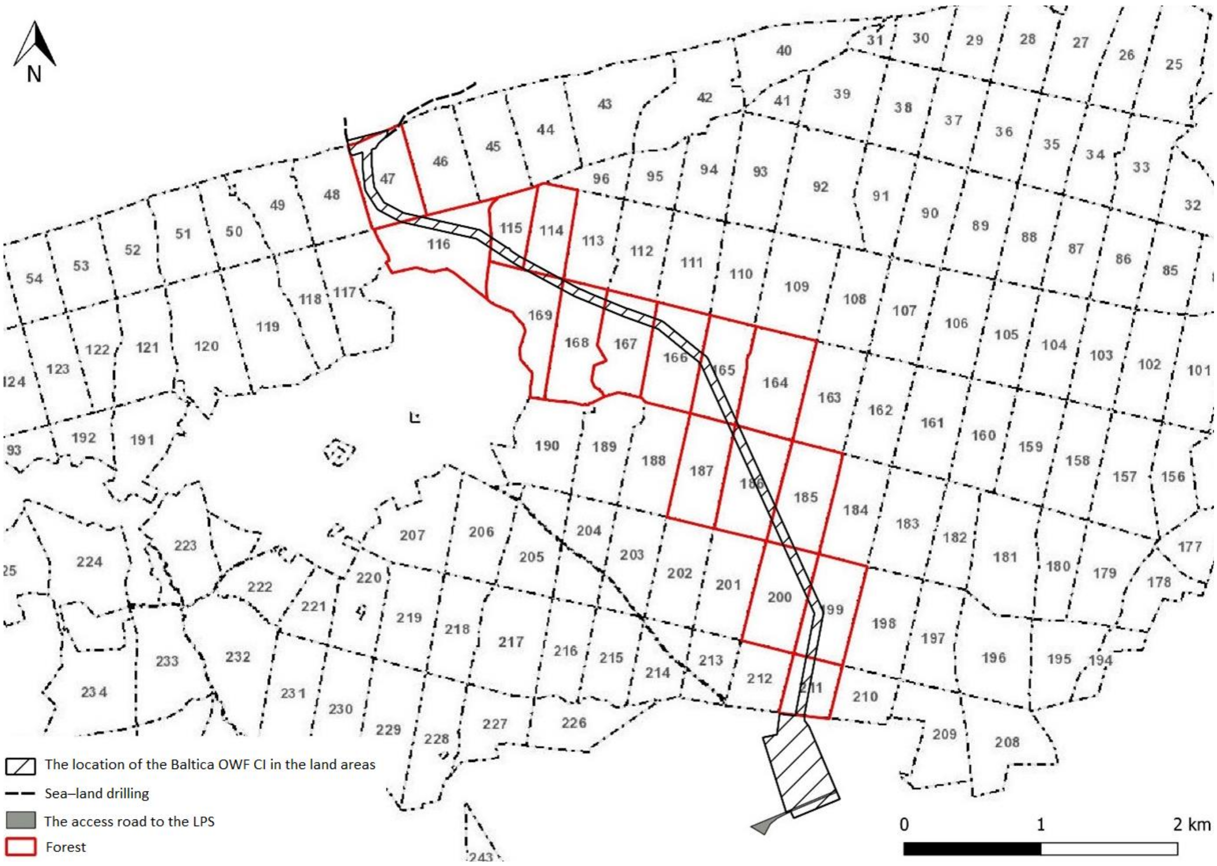



*Figure 3.42. Location of the Baltica OWF CI within the boundaries of the Choczewo Forest District [Source: internal materials based on data from the Forest Data Bank, www.bdl.lasy.gov.pl]*

Forest management is conducted on the basis of the Forest Management Plan for the period 2014–2023. In the area of the planned Baltica OWF CI, the habitat of fresh mixed coniferous forest and moist mixed coniferous forest are dominant, covering more than 84% of the project surface area [Figure 3.43].

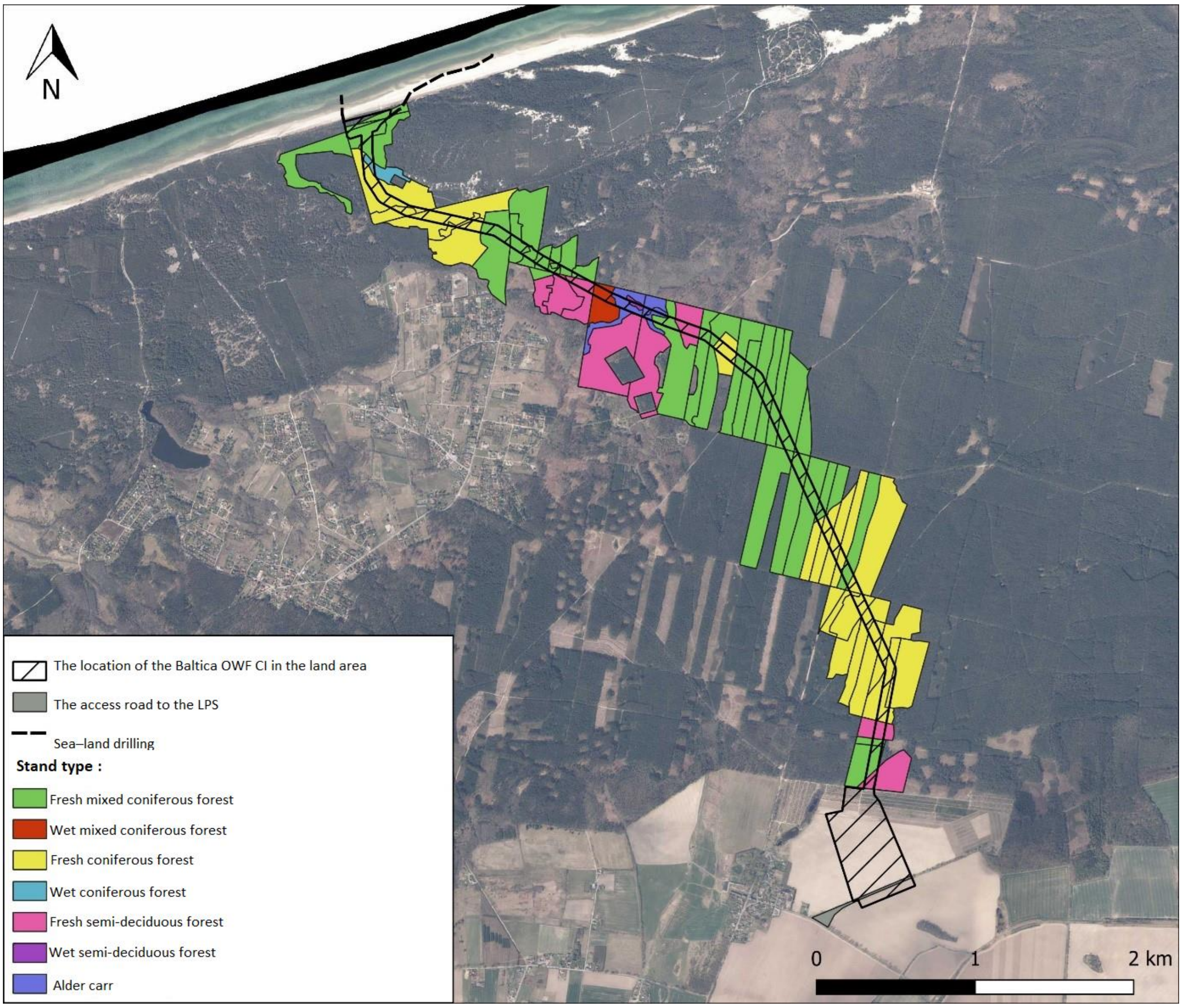



*Figure 3.43. Forest habitat types along the Baltica OWF CI route within the boundaries of the Choczewo Forest District [Source: internal materials based on data from the Forest Data Bank, www.bdl.lasy.gov.pl]*

The dominant species along 95.57% of the planned project route is Scots pine. The remaining area is overgrown with alder (2.43%), beech (1.21%) and spruce (0.79%) [Figure 3.44].

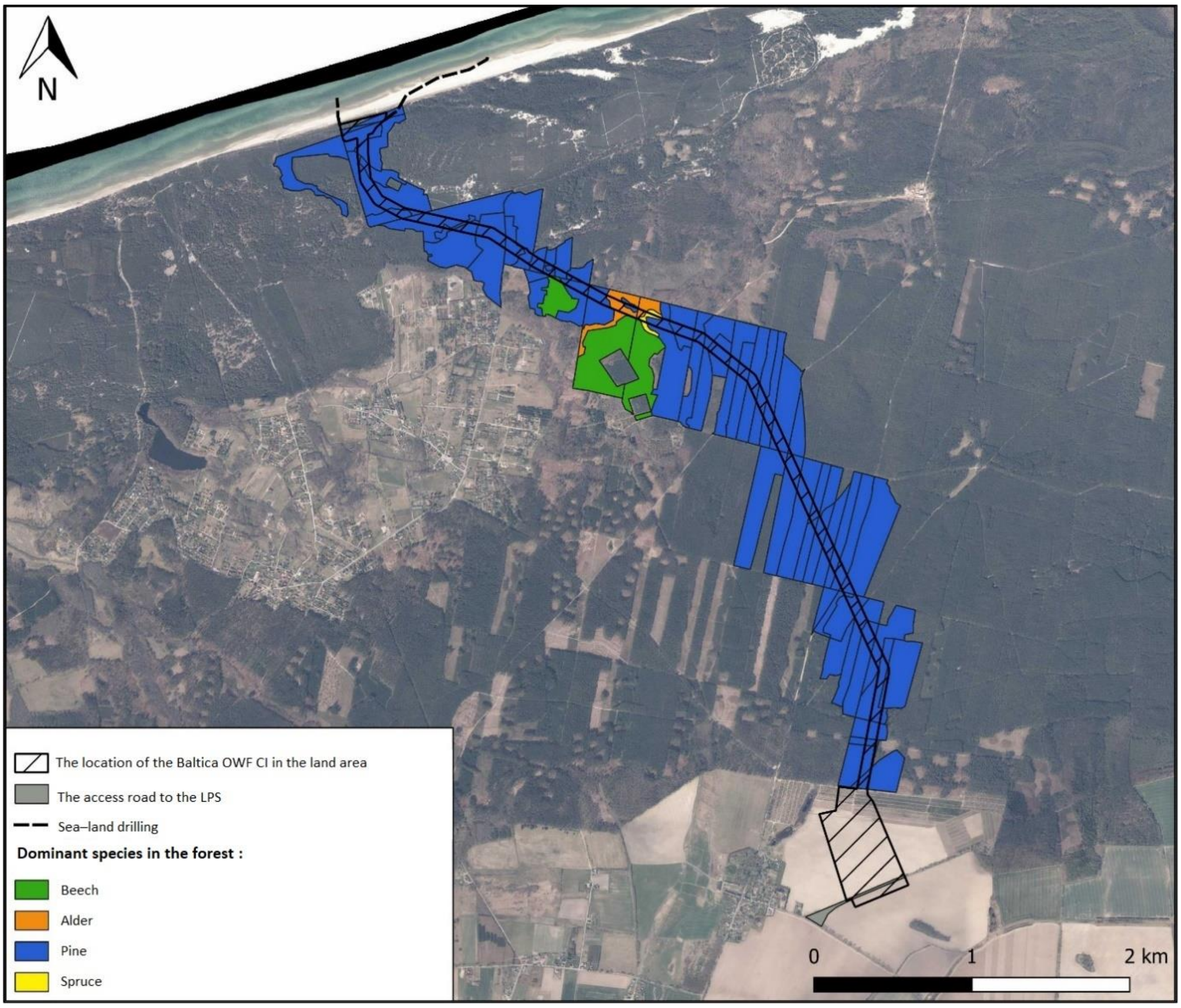



*Figure 3.44. Dominant tree species along the Baltica OWF CI within the boundaries of the Choczewo Forest District [Source: internal materials based on data from the Forest Data Bank www.bdl.lasy.gov.pl]*

Forests of lower age class (up to 60 years) occupy approx. half of the surface area of the planned project and are used commercially. A significant share (approx. 27%) is of tree stands older than 100 years located mainly in the northern part of the planned project [Figure 3.45]. They play protective functions, soil-protective and water-protective to a lesser extent [Figure 3.46]. A small fragment of the forest has a research function.

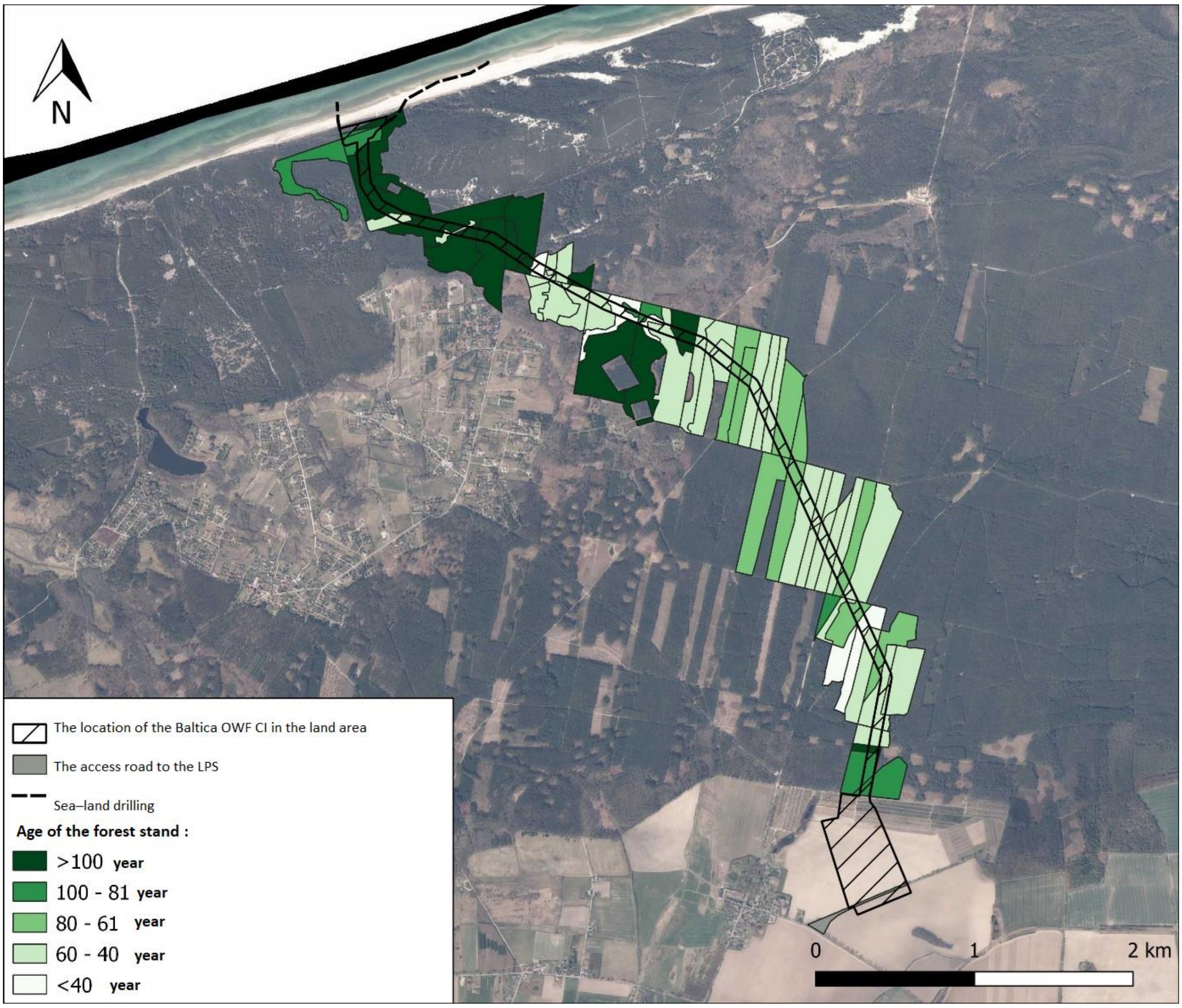



*Figure 3.45. Forest stand age along the route of the Baltica OWF CI within the boundaries of the Choczewo Forest District [Source: internal materials based on data from the Forest Data Bank, www.bdl.lasy.gov.pl]*

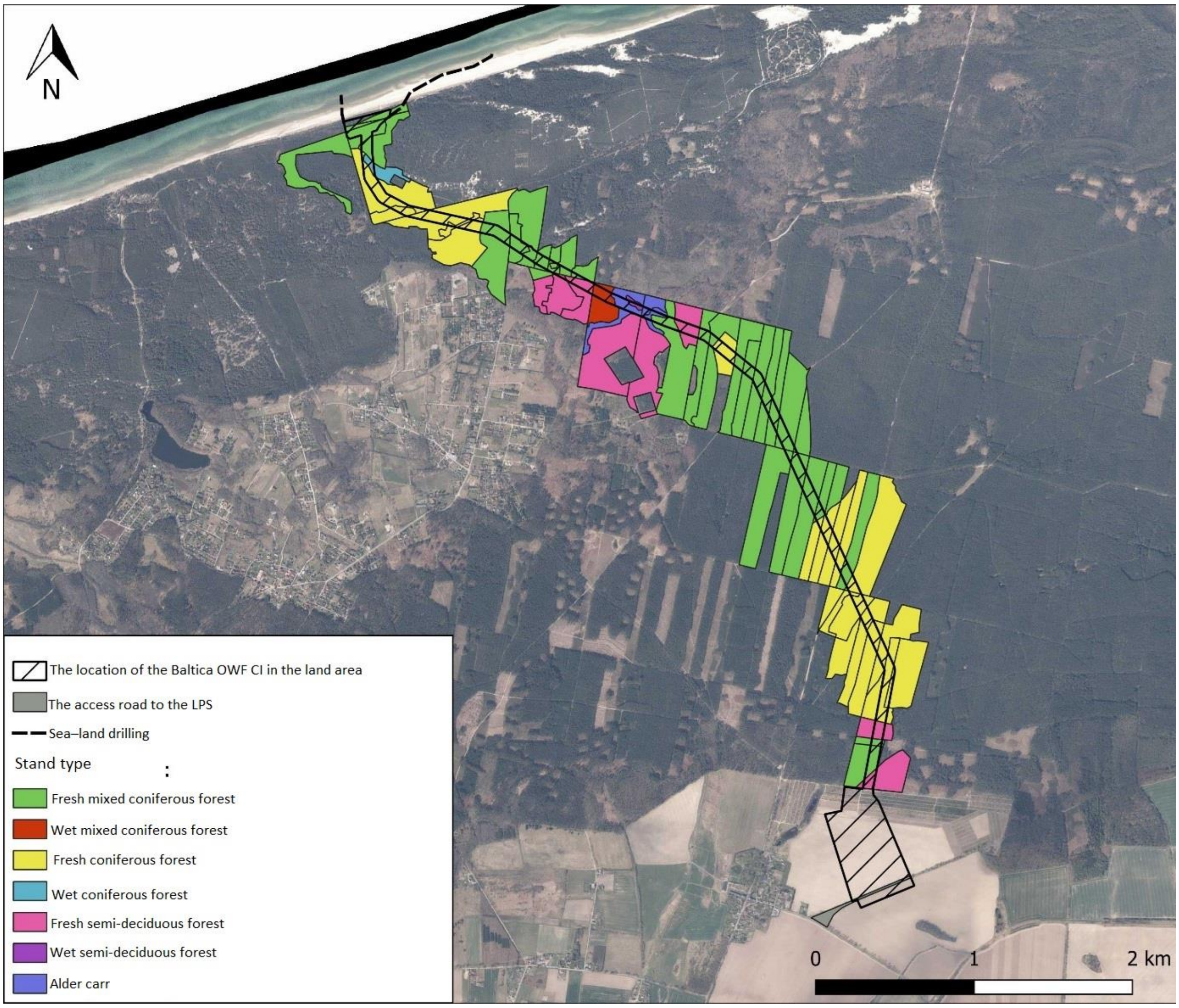



*Figure 3.46. Forest functions along the Baltica OWF CI route within the boundaries of the Choczewo Forest District [Source: internal materials based on data from the Forest Data Bank, www.bdl.lasy.gov.pl]*

The route of the Baltica OWF CI location within the boundaries of the Choczewo Forest District was agreed with the Forest District authorities. The route of cable lines was designed to minimise their negative impact on the environment (see: Subsection 2.1.2).

#### 3.20.1.4 Fungi

##### 3.20.1.4.1 Characteristics of the species identified

Within the Baltica OWF CI impact area, the presence of 14 protected, endangered, and rare species of macroscopic fungi was confirmed [Table 3.26, Figure 3.47], including:

- 1 species under partial protection;
- 13 species included in the Red List of Fungi (Wojewoda and Ławrynowicz, 2006):
  - 1 species classified as extinct or lost (cat. Ex),
  - 6 species classified as endangered (cat. E),
  - 1 species classified as vulnerable (cat. V),
  - 4 species classified as rare (cat. R),
  - 1 species of indeterminate status (cat. I);
- 1 species not covered by legal protection in Poland and not included in the Red List of plants and fungi of Poland (Wojewoda and Ławrynowicz, 2006).

A single object (tree, fragment of deadwood, etc.) or a group of neighbouring objects of similar mycobiota were considered a survey plot. Within the Baltica OWF CI impact area, the presence of 16 plots of protected, endangered, and rare species of macroscopic fungi was inventoried.

3 plots from this group are located in the cable bed direct impact zone, 12 in the cable bed indirect impact zone, 2 of which in the land-sea drilling zone. There are no plots in the OnSS direct and indirect impact area as well as the direct impact zone of the access road to the OnSS, whereas, in the indirect impact zone of the access road to the OnSS, 1 plot was found.

*Table 3.26. Plots of protected, endangered, and rare species of macroscopic fungi found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category[2] | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | |
| 5 | Scaly hedgehog/scaly tooth | *Sarcodon imbricatus* | None | V | 1 fruiting body | Moderate value | 9 |
| 6 | – | *Diplomitoporus flavescens* | None | R | 4 fruiting bodies | Insignificant | 7 |
| 7 | – | *Lentinus cyathiformis* | None | E | 1 fruiting body | High value | 10 |
| **Cable bed indirect impact area** | | | | | | | |
| 1 | Jellied bolete | *Suillus flavidus* | PP | E | 8 fruiting bodies | Moderate value | 8 |
| 2 | Drab tooth | *Bankera fuligineoalba* | None | E | 6 fruiting bodies | Moderate value | 9 |
| 5 | Scaly hedgehog/scaly tooth | *Sarcodon imbricatus* | None | V | 1 fruiting body | Moderate value | 9 |
| 6 | – | *Diplomitoporus flavescens* | None | R | 1 fruiting body | Insignificant | 7 |
| 8 | – | *Coltricia cinnamomea* | None | I | 2 fruiting bodies | Low value | 8 |
| 9 | Slimy spike-cap | *Gomphidius glutinosus* | None | R | 1 fruiting body | Insignificant | 7 |
| 10 | - | *Panaeolus dunensis* | None | No data from Poland | 1 fruiting body | Low value | 8 |
| 11 | Fused cork hydnum | *Phellodon confluens* | None | Ex | 1 fruiting body | Moderate value | 9 |
| 12 | Grey tooth | *Phellodon connatus* | None | E | 1 fruiting body | Moderate value | 9 |
| 13 | Woolly tooth | *Phellodon tomentosus* | None | E | 5 fruiting bodies | Moderate value | 9 |
| **Land-sea drilling zone** | | | | | | | |
| 3 | Dune brittlestem | *Psathyrella ammophila* | none | E | 26 fruiting bodies | High value | 10 |
| 4 | Sand tulips | *Peziza ammophila* | none | R | 1 fruiting body | Moderate value | 9 |

| Species no. | Species | | Conservation status[1] | Threat category[2] | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|
| | **Species name** | **Binomial nomenclature** | | | | **Descriptive** | **Points** |
| **OnSS direct and indirect impact area** | | | | | | | |
| None | | | | | | | |
| **Area of the direct impact of the access road to the OnSS** | | | | | | | |
| 14 | Silky rosegill | *Volvariella bombycina* | None | R | 1 fruiting body | Moderate value | 9 |
| **Area of the indirect impact of the access road to the OnSS** | | | | | | | |
| None | | | | | | | |

*[1]Pursuant to the Regulation of the Minister of the Environment of 9 October 2014 on the protection of fungi species (Journal of Laws of 2014, item 1408): SP – species under strict protection, PP – species under partial protection*

*[2]According to the Red List of Fungi (Wojewoda and Ławrynowicz, 2006): E – endangered species; V – vulnerable species; R – rare species; I – species of unidentified threat – species with inadequate data available to assign them to a particular category*

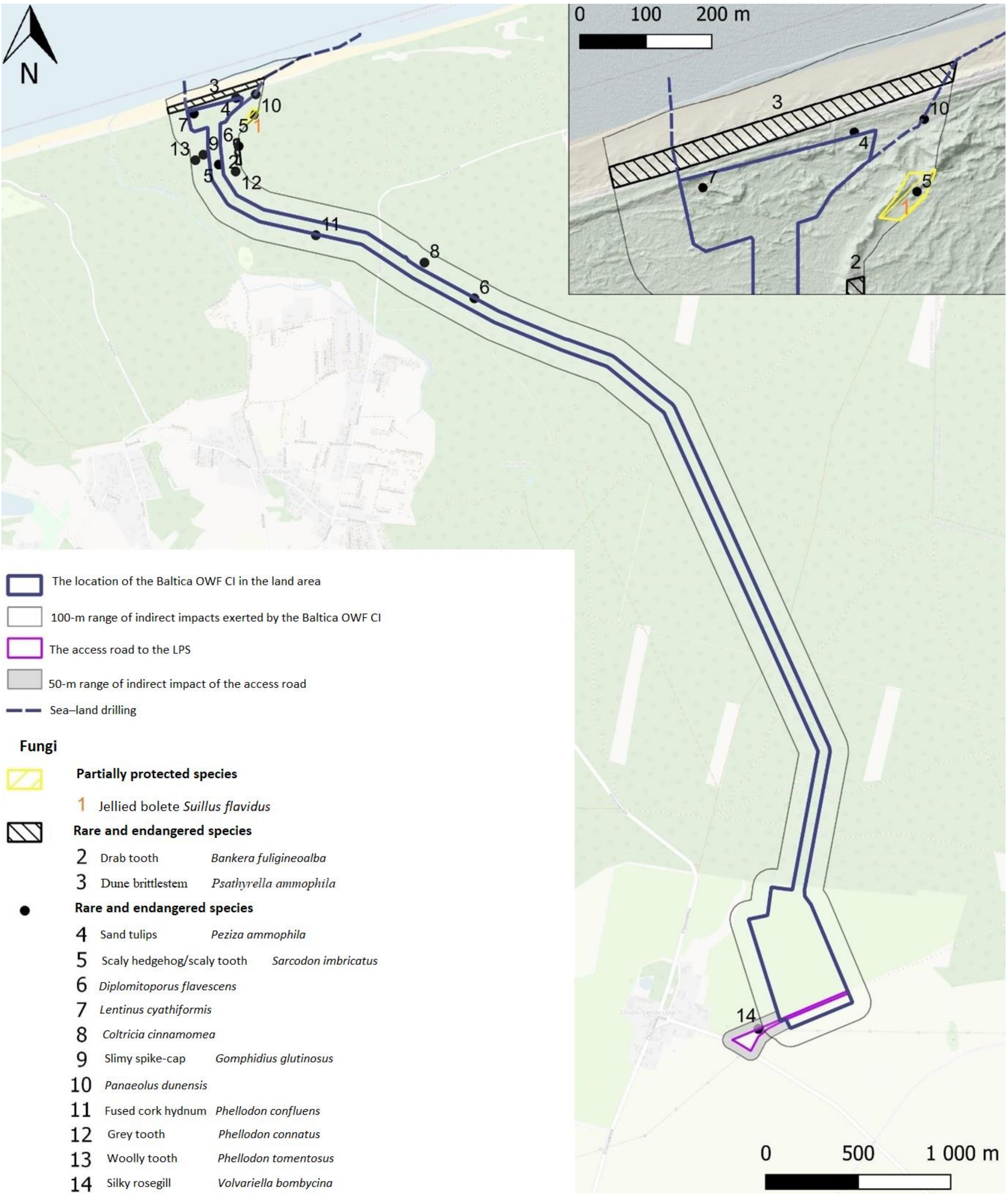



*Figure 3.47. Plots of protected, endangered and rare species of macroscopic fungi found within the Baltica OWF CI impact area [Source: internal materials]*

Within the scope of the Baltica OWF CI direct impact, a single plot of *Lentinus cyathiformis* is located, which was classified as a resource of high value. Another plot classified as a resource of high value is a lot of dune brittlestem *Psathyrella ammophila* located within the land-sea drilling zone. Both species are not under protection, probably due to the lack of detailed knowledge on their occurrence. They should be classified as species of high nature value, endangered at a national scale and scarce in Poland and with their occurrence limited to Pomerania. They were included in the Red

List of Fungi (Wojewoda and Ławrynowicz, 2006) and assigned category E (endangered species). Dune brittlestem is connected to dune habitats (it grows on sands). In Poland, it is only known from single plots on the coast. It finds favourable conditions on the entire *Wydma Lubiatowska* dune, and the number of fruiting bodies is large. *Lentinus cyathiformis* grows on wood, mainly deciduous, in parks and at forest edges. In Poland, it is known from only 5 plots, however, none of them is located in Pomerania.

The only species found under partial protection – jellied bolete *Suillus flavidus* – is quite rare both nationally and in the area analysed. In the Red List of Fungi (Wojewoda and Ławrynowicz, 2006) it is classified as endangered species (cat. E). This species grows on acidic peat bogs, usually near pines. Its nearest plots can be found on the Vistula Spit and in the *Słowiński* National Park (Wojewoda, 2003). Wojewoda provides 19 historical plots in total. According to the GREJ database, only 8 new plots of that species are known in Poland, and 3 of them are in fact located in Pomerania. This is due to the fact that in this region of the country, there are well-preserved and suitable habitats for the species. Therefore, the coastal strip should be classified as a location of particular value for the conservation of that rare species. As part of the inventory survey described, jellied bolete was found in the depressions between dunes. However, it is known to be more common in the region and sometimes can be found growing in rather large groups. Therefore, the peat bogs running along the shore behind the grey dune should be especially protected due to the occurrence of that fungi.

Woolly tooth *Phellodon tomentosus* and grey tooth *Ph. connatus* grow on the ground among berries in pine forests. Both species were commonly recorded as part of the surveys conducted on the *Wydma Lubiatowska* dune. Those fungi grow in patches and the areas larger than the plots of that fungi should be covered by protection. Fruiting bodies were recorded especially often on poor pine fall litter, in places without the vegetation cover or accompanied by *Cladonia* spp. Although they are quite rare nationally, in Pomerania they are encountered much more often.

Although the fused cork hydnum is classified in the Polish Red List of Fungi as an extinct and lost species (cat. Ex), it was classified as a resource of moderate value. This is motivated by the recent reports on the plots of this fungus from the GREJ database. In the Checklist of Polish Larger Basidiomycetes (Wojewoda, 2003) this fungus has only a single plot near Olsztyn, whereas, in the GREJ database, there are currently more than 20 present-day reports on its occurrence. This is a mycorrhizal fungus encountered both in coniferous and deciduous forests. During the inventory survey described, it was encountered less often than the woolly tooth, sometimes on slightly moister substratum, however, usually in quite large groups. It seems that the *Wydma Lubiatowska* dune is a place particularly suited to its habitat requirements, in particular as regards sustained high humidity.

Other fungi species, which were evaluated as resources of insignificant value, are species widely spread in Poland, with numerous populations both nationally and regionally. This means that they find numerous, favourable habitats for growth and reproduction, and their plots show no symptoms of natural or human threats.

The plot of silky sheath *Volvariella bombycina* was found on a tree near a road, within the scope of indirect impact zone of the access road to the OnSS. In general, most trees along this road constitute a favourable habitat for the development of that fungus, which only occasionally produces fruiting bodies that could be inventoried and probably in the following seasons, the fruiting bodies could appear on other trees.

##### 3.20.1.4.2 Evaluation of the species identified and their habitats

The inventoried species were organised in a matrix, taking into consideration, on the one hand, the conservation status and threat category on an international, national and local scale and, on the other hand, the frequency of occurrence in the country and Gdansk Pomerania [Table 3.27]. In the case of fungi, due to the lack of detailed information on the occurrence of many taxa, the list of species under legal protection did not include those which are actually rare and/or endangered in Poland. As a result, for the purposes of the Baltica OWF CI impact area evaluation, also rare and/or endangered fungi species were included, regardless of their conservation status [Table 3.28].

*Table 3.27. Evaluation of protected macroscopic fungi found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally excluding the categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally excluding the category I[2] | Resources of high value | Resources of moderate value<br>Jellied bolete *Suillus flavidus* | Resources of low value | Resources of low value |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania[3] | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Species subject to protection under the national law and not endangered nationally in Poland nor in Gdańsk Pomerania | Resources of low value | Resources of insignificant value | Resources of insignificant value | Resources of insignificant value |

*[1]According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

*[2]According to the Red List of Fungi (Wojewoda and Ławrynowicz, 2006): I – species of unidentified threat – species with inadequate data available to assign them to a particular category*

*[3]No Regional Red List developed for Gdańsk Pomerania*

*Table 3.28. Evaluation of macroscopic fungi species which are not under legal protection, however, included in the Polish Red List of Fungi (Wojewoda and Ławrynowicz, 2006) found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species endangered internationally excluding the categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species endangered nationally excluding the category I[2] | Resources of high value<br>Dune brittlestem *Psathyrella ammophila*;<br>*Lentinus cyathiformis* | Resources of moderate value<br>Fused cork hydnum *Phellodon confluens*<br>Grey tooth *Phellodon connatus*<br>Woolly tooth *Phellodon tomentosus*;<br>Drab tooth *Bankera fuligineoalba*<br>Sand tulip *Peziza ammophila*<br>Scaly hedgehog/scaly tooth *Sarcodon imbricatus*<br>Silky rosegill *Volvariella bombycina* | Resources of low value | Resources of insignificant value<br>*Diplomitoporus flavescens*<br>Slimy spike-cap *Gomphidius glutinosus* |
| | Species endangered in Gdańsk Pomerania[3] | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Other species inventoried | Resources of low value<br>*Coltricia cinnamomea*<br>*Panaeolus dunensis* | Resources of insignificant value | Resources of insignificant value | Resources of insignificant value |

*[1]According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*
*[2]According to the Red List of Fungi (Wojewoda and Ławrynowicz, 2006): I – species of unidentified threat – species with inadequate data available to assign them to a particular category*
*[3]No Regional Red List developed for Gdańsk Pomerania*

The status of all habitats influenced by the Baltica OWF CI was determined as appropriate. Also, the conservation prospects for most plots are not endangered, with the exception of the jellied bolete endangered by trampling and silky sheath endangered by the felling of hosts (trees).

As a result of the final assessment, the plots assessed at 9 points dominate (50%); only 2 plots (12.5%) were assessed at 10 points, whereas, 3 plots (18.75% each) were assessed at 7 and 8 points [Figure 3.48]. The plot of dune brittlestem located within the land-sea drilling zone and the plot of *Lentinus cyathiformis* located within the Baltica OWF CI direct impact zone at the boundary between the beach and dune strip were assigned the highest rating.

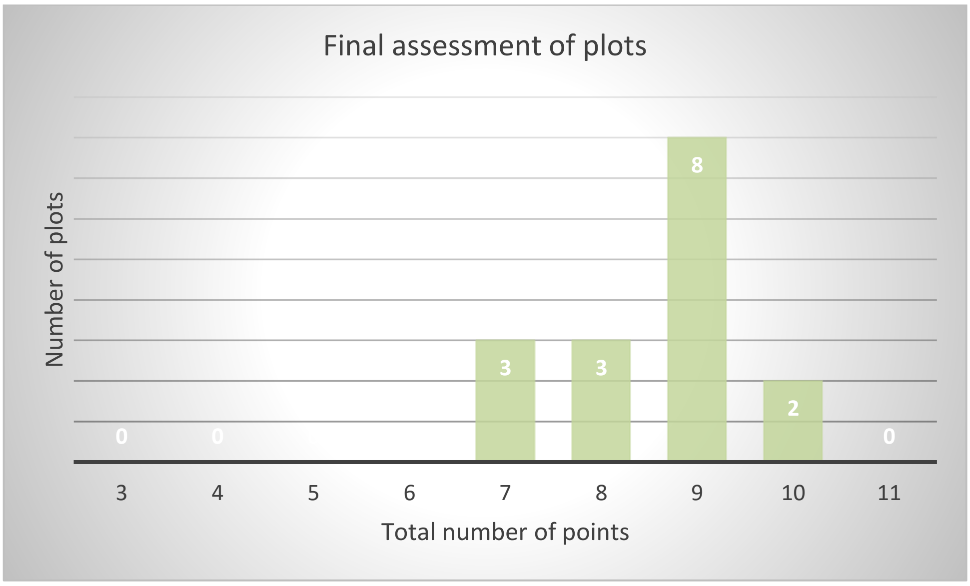



*Figure 3.48. Final assessment of the plots of fungi [Source: internal materials]*

#### 3.20.1.5 Lichens

##### 3.20.1.5.1 Characteristics of the species identified

Within the Baltica OWF CI impact area, the presence of 24 protected, endangered and rare species of lichens was confirmed [Table 3.29, Figure 3.49], including:

- 3 species under strict protection,
- 9 species under partial protection,
- 19 species included in the Red List of Lichens in Poland (Cieśliński *et al.*, 2006):
  - 2 species classified as critically endangered (cat. CR),
  - 8 species classified as endangered (cat. EN),
  - 5 species classified as vulnerable (cat. VU),
  - 4 species classified as near-threatened (cat. NT);
- 9 species included in the Red List of threatened lichens in Gdańsk Pomerania (Fałtynowicz and Kukwa, 2003):
  - 1 species classified as critically endangered (cat. CR),
  - 7 species classified as vulnerable (cat. VU),
  - 1 species classified as least concern (cat. LC).

A single object (tree, boulder, fragment of deadwood, fragment of soil, etc.) or a group of neighbouring objects of similar lichen biota (e.g. a tree alley) were considered a survey plot. Within the Baltica OWF CI impact area, the presence of 97 plots of protected, endangered and rare species of lichens was inventoried.

31 plots from this group are located in the cable bed direct impact zone, 65 in the cable bed indirect impact zone, including one in the land-sea drilling zone. There are no plots in the OnSS direct nor indirect impact area nor in the direct impact zone of the access road to the OnSS, whereas, in the indirect impact zone of the access road to the OnSS, 8 plots were found.

*Table 3.29. Plots of protected, endangered and rare species of lichens found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category[2] | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PL[2] | PG[3] | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | | |
| 6 | Oakmoss | *Evernia prunastri* | None | NT | None | 1–5 ind. | Insignificant | 7 |
| 6 | Oakmoss | *Evernia prunastri* | None | NT | None | 1–5 ind. | Insignificant | 7 |
| 6 | Oakmoss | *Evernia prunastri* | None | NT | None | 11–50 ind. | Insignificant | 7 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 11–50 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 10 | Tree reindeer lichen | *Cladonia arbuscula* | PP | None | None | 11–50 ind. | Insignificant | 7 |
| 10 | Tree reindeer lichen | *Cladonia arbuscula* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 11–50 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 13 | Farinose cartilage lichen | *Ramalina farinacea* | PP | VU | None | 1–5 ind. | Low value | 8 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category[2] | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PL[2] | PG[3] | | Descriptive | Points |
| | lichen | | | | | | | |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 15 | Tube lichen | *Hypogymnia tubulosa* | PP | NT | None | 1–5 ind. | Insignificant | 7 |
| 15 | Tube lichen | *Hypogymnia tubulosa* | PP | NT | None | 1–5 ind. | Insignificant | 7 |
| 15 | Tube lichen | *Hypogymnia tubulosa* | PP | NT | None | 1–5 ind. | Insignificant | 7 |
| 16 | Ostrich hide lichen | *Pertusaria leioplaca* | None | NT | None | 1–5 ind. | Insignificant | 7 |
| 17 | - | *Zwackhia viridis* | None | VU | VU | 1–5 ind. | Moderate value | 9 |
| 20 | Pierced lichen | *Pertusaria pertusa* | None | VU | | 6–10 ind. | Insignificant | 7 |
| 21 | Covered lichen | *Pertusaria hymenea* | None | CR | CR | 11–50 ind. | High value | 10 |
| 22 | - | *Arthonia spadicea* | None | None | LC | 6–10 ind. | Insignificant | 7 |
| 23 | Script lichen | *Graphis scripta* | None | NT | None | 6–10 ind. | Insignificant | 7 |
| 24 | - | *Varicellaria hemisphaerica* | None | EN | None | 1–5 ind. | Moderate value | 9 |
| **Indirect impact area of the access road to the OnSS** | | | | | | | | |
| 6 | Oakmoss | *Evernia prunastri* | None | NT | None | 6–10 ind. | Insignificant | 7 |
| 6 | Oakmoss | *Evernia prunastri* | None | NT | None | 6–10 ind. | Insignificant | 7 |
| 6 | Oakmoss | *Evernia prunastri* | None | NT | None | 101–250 ind. | Insignificant | 7 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 11–50 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 11–50 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 11–50 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate | 9 |

| Species no. | Species | | Conservation status[1] | Threat category[2] | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PL[2] | PG[3] | | Descriptive | Points |
| | | | | | | | value | |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 6–10 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 9 | Bristly beard lichen | *Usnea hirta* | PP | VU | None | 1–5 ind. | Moderate value | 9 |
| 10 | Tree reindeer lichen | *Cladonia arbuscula* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 10 | Tree reindeer lichen | *Cladonia arbuscula* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 10 | Tree reindeer lichen | *Cladonia arbuscula* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 10 | Tree reindeer lichen | *Cladonia arbuscula* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 11–50 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 11 | Reindeer lichen | *Cladonia portentosa* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 12 | Grey reindeer lichen | *Cladonia rangiferina* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 12 | Grey reindeer lichen | *Cladonia rangiferina* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 13 | Farinose cartilage lichen | *Ramalina farinacea* | PP | VU | None | 1–5 ind. | Low value | 8 |
| 13 | Farinose cartilage lichen | *Ramalina farinacea* | PP | VU | None | 1–5 ind. | Low value | 8 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category[2] | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PL[2] | PG[3] | | Descriptive | Points |
| | lichen | | | | | | | |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 6–10 ind. | Insignificant | 7 |
| 14 | Salted starburst lichen | *Imshaugia aleurites* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| 15 | Powder-headed tube lichen | *Hypogymnia tubulosa* | PP | NT | None | 1–5 ind. | Insignificant | 7 |
| 16 | Ostrich hide lichen | *Pertusaria leioplaca* | None | NT | None | 1–5 ind. | Insignificant | 7 |
| 17 | - | *Zwackhia viridis* | None | VU | VU | 11–50 ind. | Moderate value | 9 |
| 17 | - | *Zwackhia viridis* | None | VU | VU | 11–50 ind. | Moderate value | 9 |
| 18 | Sulphured crimson dot lichen | *Pyrrhospora quernea* | None | CR | EN | 6–10 ind. | High value | 10 |
| 19 | Rim lichen | *Lecanora intumescens* | None | EN | VU | 1–5 ind. | Moderate value | 9 |
| 19 | Rim lichen | *Lecanora intumescens* | None | EN | VU | 1–5 ind. | Moderate value | 9 |
| 20 | Pierced lichen | *Pertusaria pertusa* | None | VU | None | 1–5 ind. | Insignificant | 7 |
| 20 | Pierced lichen | *Pertusaria pertusa* | None | VU | None | 6–10 ind. | Insignificant | 7 |
| 21 | Covered lichen | *Pertusaria hymenea* | None | CR | CR | 11–50 ind. | High value | 10 |
| 21 | Covered lichen | *Pertusaria* | None | CR | CR | 6–10 ind. | High value | 10 |

| Species no. | Species | | Conservation status[1] | Threat category[2] | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | **Species name** | **Binomial nomenclature** | | **PL[2]** | **PG[3]** | | **Descriptive** | **Points** |
| | | *hymenea* | | | | | | |
| 22 | - | *Arthonia spadicea* | None | None | LC | 6–10 ind. | Insignificant | 7 |
| 22 | Scribble lichen | *Alyxoria varia* | None | NT | None | 1–5 ind. | Insignificant | 7 |
| 23 | Script lichen | *Graphis scripta* | None | NT | None | 1–5 ind. | Insignificant | 7 |
| 24 | - | *Varicellaria hemisphaerica* | None | EN | None | 1–5 ind. | Moderate value | 9 |
| **Land-sea drilling zone (cable bed indirect impact area)** | | | | | | | | |
| 12 | Grey reindeer lichen | *Cladonia rangiferina* | PP | None | None | 1–5 ind. | Insignificant | 7 |
| **OnSS direct and indirect impact area** | | | | | | | | |
| None | | | | | | | | |
| **Direct impact area of the access road to the OnSS** | | | | | | | | |
| None | | | | | | | | |
| **Indirect impact area of the access road to the OnSS** | | | | | | | | |
| 1 | Eagle's claws lichen | *Anaptychia ciliaris* | OŚ | EN | VU | 6–10 ind. | High value | 10 |
| 2 | Dotted ribbon lichen | *Ramalina fastigiata* | OŚ | EN | VU | 101–250 ind. | Moderate value | 9 |
| 3 | Cartilage lichen | *Ramalina fraxinea* | OŚ | EN | VU | 101–250 ind. | Moderate value | 9 |
| 4 | - | *Pleurosticta acetabulum* | PP | EN | VU | 11–50 ind. | Moderate value | 9 |
| 5 | Farinose cartilage lichen | *Ramalina farinacea* | PP | VU | None | 101–250 ind. | Low value | 8 |
| 6 | Oakmoss | *Evernia prunastri* | None | NT | None | 51–100 ind. | Insignificant | 7 |
| 7 | | | None | EN | VU | 1–5 ind. | High value | 10 |
| 8 | - | *Pertusaria flavida* | None | EN | None | 11–50 ind. | High value | 9 |

[1]*Pursuant to the Regulation of the Minister of the Environment of 9 October 2014 on the protection of fungi species (Journal of Laws of 2014, item 1408): SP – species under strict protection, PP – species under partial protection; PZP – species that require a protection zone for their sanctuaries or plots to be established*

[2]*PL – Red List of Lichens in Poland (Cieśliński et al., 2006): CR – critically endangered species; EN – species considered endangered; VU – species considered vulnerable; NT – species considered near-threatened*

[3]*PG – Red List of threatened lichens in Gdańsk Pomerania (Fałtynowicz and Kukwa, 2003): CR – critically endangered species; EN – species considered endangered; VU – species considered vulnerable; LC – least concern species*

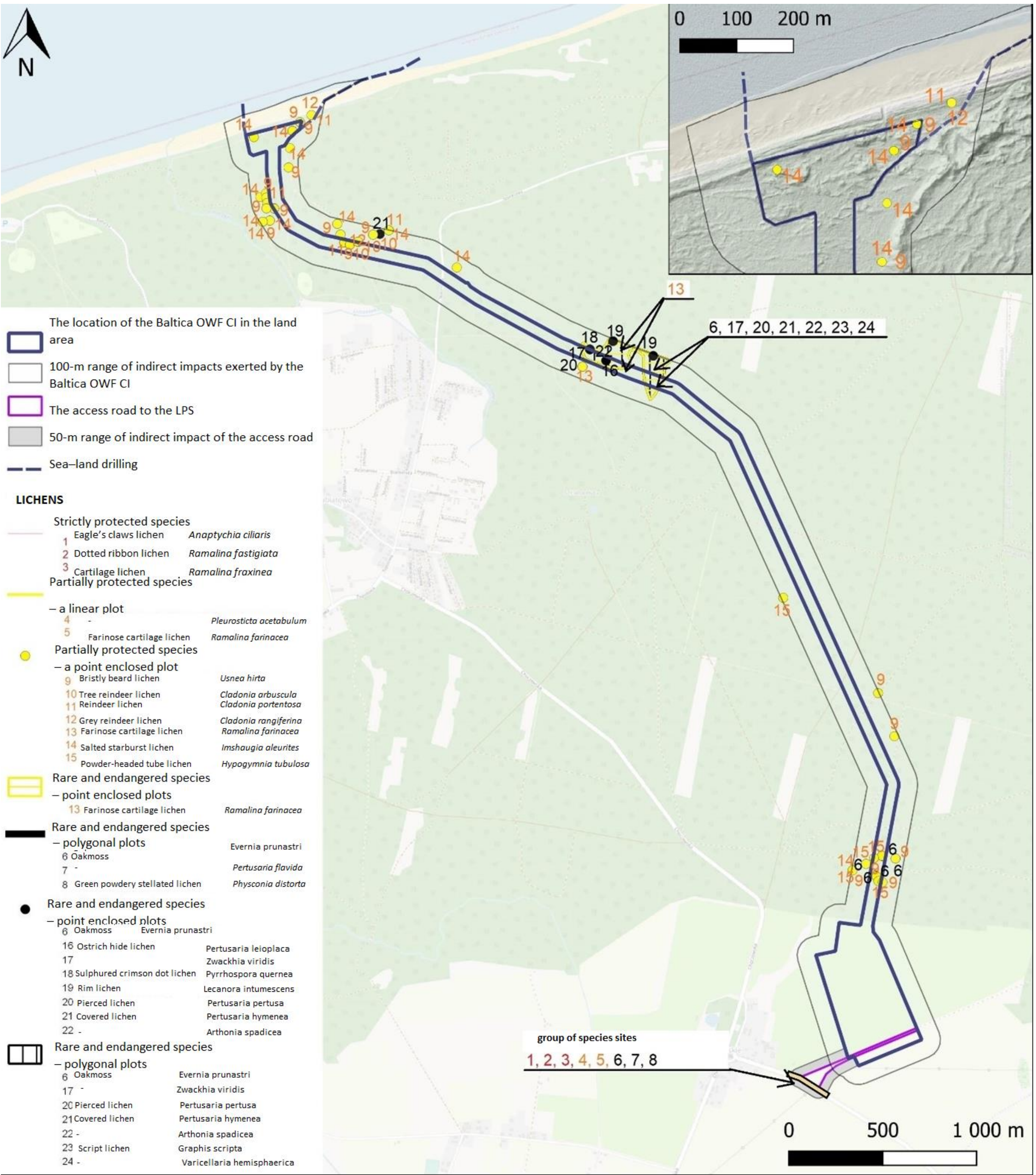



*Figure 3.49. Plots of protected, endangered and rare species of lichens found within the Baltica OWF CI impact area [Source: internal materials]*

The plots of three species, which were classified as resources of high value, are located within the range of the project direct impact (sulphured crimson dot lichen *Pyrrhospora quernea, Pertusaria flavida* and covered lichen *Pertusaria hymenea*). Those species are not subject to species protection, however, they belong to rare or quite rare species that are endangered in Poland and in Gdańsk Pomerania. Two of them (sulphured crimson dot lichen and covered lichen) were assigned to critically endangered species (cat. CR) in Poland. The covered lichen is additionally considered to be a critically endangered (cat. CR) taxon in Gdańsk Pomerania. Within the cable bed direct impact area, all those species were recorded in single plots in low abundance (up to 5 specimens), and only the sulphured crimson dot lichen and covered lichen occurred in slightly higher abundances. Resources of high value were found in 5 plots in total.

The plots of several species under strict protection (eagle's claws lichen *Anaptychia ciliaris,* dotted ribbon lichen *Ramalina fastigiata* and cartilage lichen *Ramalina fraxinea*) as well as partial protection (farinose cartilage lichen *Ramalina farincea* and *Pleurosticta acetabulum*) are located within the indirect impact area of the access road to the OnSS. All the *Ramalina* species were found in several plots, however, most trees growing along this road are a favourable habitat for the development of both those and other species.

##### 3.20.1.5.2 Evaluation of the species identified and their habitats

The inventoried species were organised in a matrix, taking into consideration, on the one hand, the conservation status and threat category on an international, national and local scale and, on the other hand, the frequency of occurrence in the country and Gdansk Pomerania [Table 3.30]. In the case of lichen, due to the lack of detailed information on the occurrence of many taxa, the list of species under legal protection did not include those which are actually rare and/or endangered in Poland. As a result, for the purposes of the Baltica OWF CI impact area evaluation, also rare and/or endangered lichen species were included, regardless of their conservation status [Table 3.31].

*Table 3.30. Evaluation of the protected lichen species found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare and quite rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally excluding the categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally the excluding NT, LC and DD categories[2] | Resources of high value<br>Eagle's claws lichen *Anaptychia ciliaris* | Resources of moderate value<br>Bristly beard lichen *Usnea hirta*<br>Cartilage lichen *Ramalina fraxinea*<br>Dotted ribbon lichen *Ramalina fastigiata*<br>*Pleurosticta acetabulum* | Resources of low value | Resources of low value<br>Farinose cartilage lichen *Ramalina farincea* |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania, excluding the NT, LC and DD categories[3] | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare and quite rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| | Species subject to protection under the national law and not endangered nationally in Poland nor in Gdańsk Pomerania | Resources of low value | Resources of insignificant value | Resources of insignificant value | Resources of insignificant value<br>Tree reindeer lichen *Cladonia arbuscula*<br>Reindeer lichen *Cladonia portentosa*<br>Grey reindeer lichen *Cladonia rangiferina*<br>Salted starburst lichen *Imshaugia aleurites*<br>Powder-headed tube lichen *Hypogymnia tubulosa* |

*[1]According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

*[2]According to the Red List of Lichens in Poland (Cieśliński et al., 2006): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

*[3]According to the Red List of threatened lichens in Gdańsk Pomerania (Fałtynowicz and Kukwa, 2003): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

*Table 3.31. Evaluation of rare and/or endangered lichen species found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare and quite rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Gatunki zagrożone w ujęciu międzynarodowym z wyłączeniem kategorii NT, LC, DD i NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Gatunki zagrożone w ujęciu krajowym z wyłączeniem kategorii NT, LC i DD[2] | Resources of high value<br>Sulphured crimson dot lichen *Pyrrhospora quernea*<br>Covered lichen *Pertusaria hymenea*<br>*Pertusaria flavida* | Resources of moderate value<br>*Zwackhia viridis*<br>Rim lichen *Lecanora intumescens*<br>*Varicellaria hemisphaerica*<br>Green powdery stellated lichen *Physconia distorta* | Resources of low value | Resources of insignificant value<br>*Pierced lichen* Pertusaria pertusa |
| | Species not endangered nationally in Poland, however, endangered in Gdańsk Pomerania, excluding the NT, LC and DD categories[3] | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Other species inventoried | Resources of low value | Resources of insignificant value | Resources of insignificant value<br>*Scribble lichen* Alyxoria varia | Resources of insignificant value<br>*Script lichen* Graphis scripta<br>*Oakmoss* Evernia prunastri<br>*Ostrich hide lichen* Pertusaria leioplaca<br>Arthonia spadicea |

*[1]According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

*[2]According to the Red List of Lichens in Poland (Cieśliński et al., 2006): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

*[3]According to the Red List of threatened lichens in Gdańsk Pomerania (Fałtynowicz and Kukwa, 2003): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

The status of habitats and conservation prospects of the plots of all species influenced by the Baltica OWF CI was determined as appropriate.

As a result of the final assessment, the plots rated at 9 points dominate (57%). A large percentage are plots with high rating of 9 points (31%) and 10 points (8%). 4% of plots were rated at 8 points [Figure 3.50].

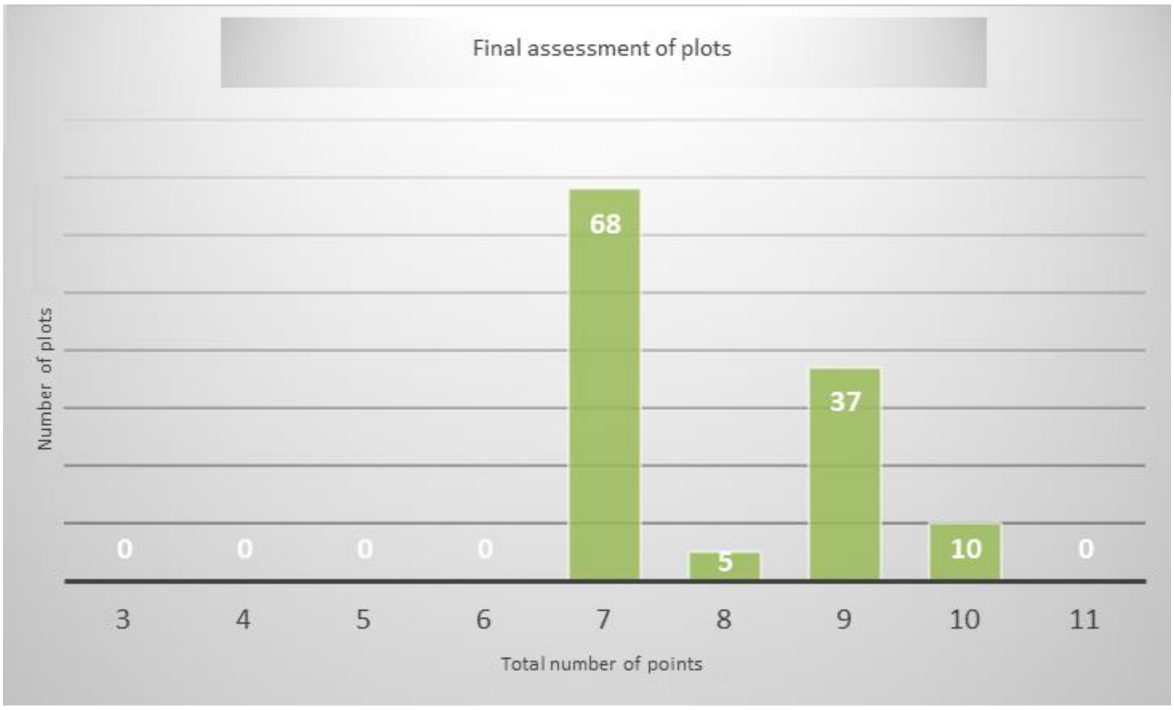



*Figure 3.50. Final assessment of lichen plots [Source: internal materials]*

#### 3.20.1.6 Mosses and liverworts

##### 3.20.1.6.1 Characteristics of the species identified

Within the Baltica OWF CI impact area, the presence of 12 protected, endangered and rare species of mosses and liverworts was confirmed [Table 3.32, Figure 3.51], including:

- 12 species under partial protection;
- 2 species included in the Polish Red List of Plants (Żarnowiec *et al.*, 2004; Klama, 2006) as vulnerable species (cat. V).

The boundary of a particular phytocoenosis, within which a particular species was found, was classified as the plot of a species. In the case of species of exceptional nature value (selected by an expert), each occurrence located 100 m from another occurrence of the same species was treated as a separate plot. Within the Baltica OWF CI impact area,13 protected, endangered and rare species of mosses and liverworts were inventoried.

Out of this group, 7 plots are located in the cable bed direct impact area, and 13 in the cable bed indirect impact area, and 7 of them are located in the land-sea drilling zone. There are no plots in the OnSS direct and indirect impact area nor in the direct and indirect impact zone of the access road to the OnSS.

*Table 3.32. Plots of protected, endangered and rare species of mosses and liverworts found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category[2] | Abundance class[3] | Resource assessment | |
|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | |
| 1 | Broom forkmoss | *Dicranum scoparium* | PP | None | 4 | Insignificant | 7 |
| 2 | Wavy broom moss | *Dicranum polysetum* | PP | None | 4 | Insignificant | 7 |
| 3 | Red-stemmed feathermoss | *Pleurozium schreberi* | PP | None | 5 | Insignificant | 7 |
| 4 | Neat feather-moss | *Pseudoscleropodium purum* | PP | None | 4 | Insignificant | 7 |
| 5 | Mountain fern moss | *Hylocomium splendens* | PP | None | 4 | Insignificant | 7 |
| 6 | Ostrich-plume feather-moss | *Ptilium crista-castrensis* | PP | None | 3 | Insignificant | 7 |
| 7 | White pincushion-moss | *Leucobryum glaucum* | PP | None | 2 | Insignificant | 7 |
| **Cable bed indirect impact area** | | | | | | | |
| 1 | Broom forkmoss | *Dicranum scoparium* | PP | None | 4 | Insignificant | 7 |
| 2 | Wavy broom moss | *Dicranum polysetum* | PP | None | 4 | Insignificant | 7 |
| 3 | Red-stemmed feathermoss | *Pleurozium schreberi* | PP | None | 5 | Insignificant | 7 |
| 4 | Neat feather-moss | *Pseudoscleropodium purum* | PP | None | 4 | Insignificant | 7 |
| 5 | Mountain fern moss | *Hylocomium splendens* | PP | None | 4 | Insignificant | 7 |
| 6 | Ostrich-plume feather-moss | *Ptilium crista-castrensis* | PP | None | 3 | Insignificant | 7 |
| 7 | White pincushion-moss | *Leucobryum glaucum* | PP | None | 2 | Insignificant | 7 |
| 8 | - | *Eurhynchium angustirete* | PP | None | 2 | Insignificant | 7 |
| 9 | Dilated scalewort | *Frullania dilatata* | PP | None | 1 | Insignificant | 7 |
| 10 | Common tamarisk-moss | *Thuidium tamariscinum* | PP | None | 2 | Insignificant | 7 |
| 11 | Bruch's pincushion | *Ulota bruchii* | PP | V | 1 | Low value | 8 |
| 12 | Crisped pincushion moss | *Ulota crispa* | PP | V | 1 | Low value | 8 |
| 12 | Crisped pincushion moss | *Ulota crispa* | PP | V | 2 | Low value | 8 |
| **Land-sea drilling zone (cable bed indirect impact area)** | | | | | | | |
| 1 | Broom forkmoss | *Dicranum scoparium* | PP | None | 4 | Insignificant | 7 |
| 2 | Wavy broom moss | *Dicranum polysetum* | PP | None | 4 | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category[2] | Abundance class[3] | Resource assessment | |
|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | | | Descriptive | Points |
| 3 | Red-stemmed feathermoss | *Pleurozium schreberi* | PP | None | 5 | Insignificant | 7 |
| 4 | Neat feather-moss | *Pseudoscleropodium purum* | PP | None | 4 | Insignificant | 7 |
| 5 | Mountain fern moss | *Hylocomium splendens* | PP | None | 4 | Insignificant | 7 |
| 6 | Ostrich-plume feather-moss | *Ptilium crista-castrensis* | PP | None | 3 | Insignificant | 7 |
| 7 | White pincushion-moss | *Leucobryum glaucum* | PP | None | 2 | Insignificant | 7 |
| **OnSS direct and indirect impact area** | | | | | | | |
| None | | | | | | | |
| **Direct impact area of the access road to the OnSS** | | | | | | | |
| None | | | | | | | |
| **Indirect impact area of the access road to the OnSS** | | | | | | | |
| None | | | | | | | |

*[1]Pursuant to the Regulation of the Minister of the Environment of 9 October 2014 on the protection of plant species (Journal of Laws of 2014, item 1409): PP – species under partial protection;*
*[2]Polish Red List of Plants (Żarnowiec et al., 2004; Klama, 2006): V – vulnerable species*
*[3]1 – 1–10 spec., 2 – 11–50 spec., 3 – 51–100 spec., 4 – 101–1000 spec., 5 – >1000 spec.*

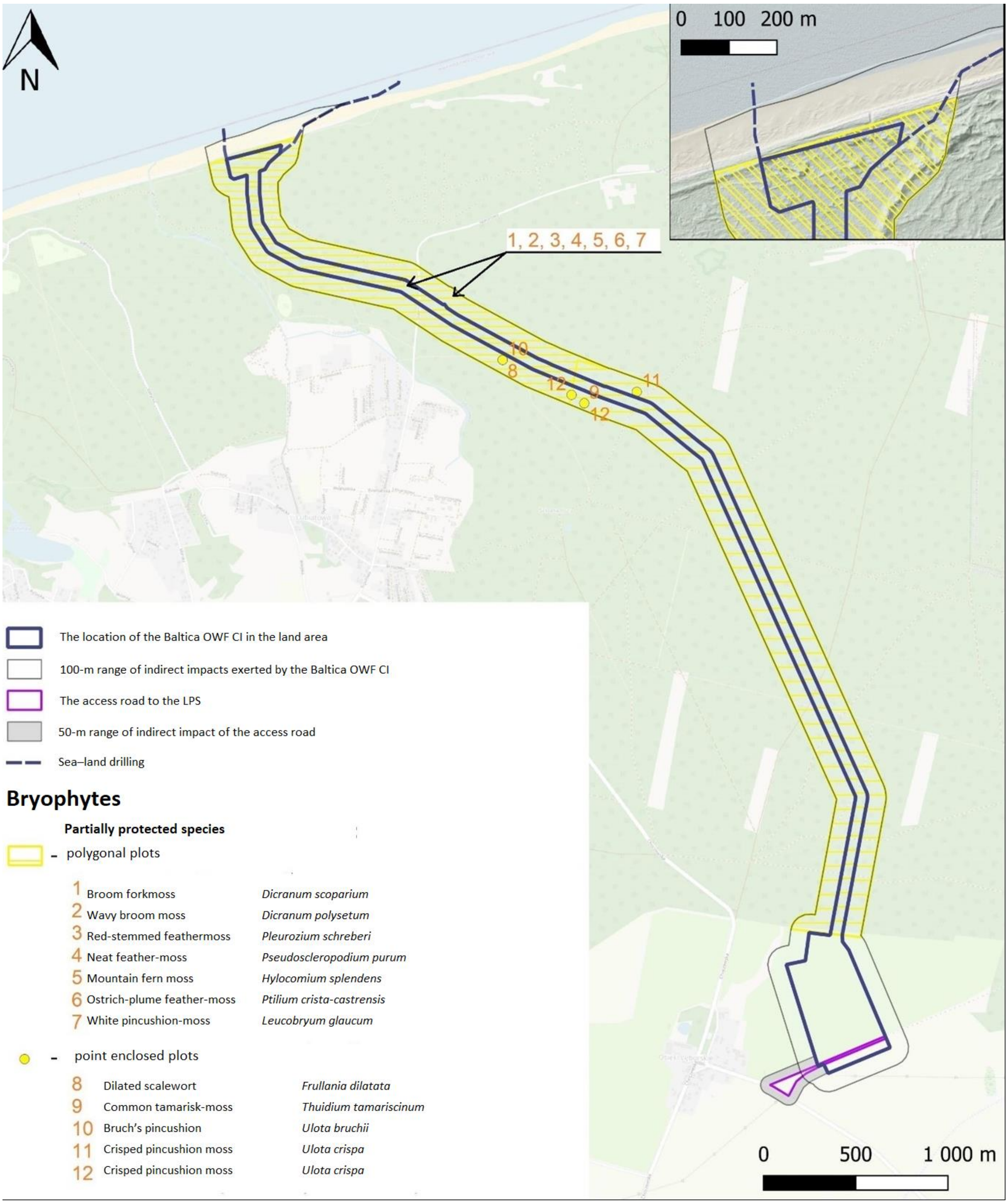



*Figure 3.51. Plots of protected, endangered and rare species of mosses and liverworts found within the Baltica OWF CI impact area [Source: internal materials]*

Among the species found that are under partial protection, there are common mosses typical of the groundcover of coniferous forests and acidophilous deciduous forests, such as broom forkmoss *Dicranum scoparium*, wavy broom moss *Dicranum polysetum*, red-stemmed feathermoss *Pleurozium schreberi*, neat feathermoss *Pseudoscleropodium purum*, mountain fern moss *Hylocomium splendens*, ostrich-plume feather-moss *Ptilium crista-castrensis*. A large group includes common mosses of the deciduous forest ground cover: white pincushion-moss *Leucobryum glaucum* (found also in coniferous forests), *Eurhynchium angustirete* and common tamarisk-moss *Thuidium* *tamariscinum*. Deciduous and coniferous forest mosses along the course of and in the vicinity of the project were encountered commonly, the populations in the plots surveyed were usually rich and very rich.

All the species recorded are widely spread in Poland and Gdańsk Pomerania and do not belong to plants endangered nationally and regionally. Only two species were classified as resources of low value, whereas, the remaining as insignificant.

##### 3.20.1.6.2 Evaluation of the species identified and their habitats

The inventoried species were organised in a matrix, taking into consideration, on the one hand, the conservation status and threat category on an international, national and local scale and, on the other hand, the frequency of occurrence in the country and Gdansk Pomerania [Table 3.33].

*Table 3.33. Evaluation of protected moss and liverwort species found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally excluding categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally excluding category I[2] | Resources of high value | Resources of moderate value | Resources of low value | Resources of low value<br>Bruch's pincushion *Ulota bruchii*<br>Crisped pincushion moss *Ulota crispa* |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania[3] | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| | Species subject to protection under the national law and not endangered nationally in Poland and in Gdańsk Pomerania | Resources of low value | Resources of insignificant value | Resources of insignificant value | Resources of insignificant value<br>Large white-moss *Leucobryum glaucum*<br>*Eurhynchium angustirete*<br>Mountain fern moss *Hylocomium splendens*<br>Dilated scalewort *Frullania dilatata*<br>Neat feather-moss *Pseudoscleropodium purum*<br>Ostrich-plume feather-moss *Ptilium crista-castrensis*<br>Red-stemmed feathermoss *Pleurozium schreberi*<br>Common tamarisk-moss *Thuidium tamariscinum*<br>Wavy broom moss *Dicranum polysetum*<br>Broom forkmoss *Dicranum scoparium* |

[1]*According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

[2]*According to the Polish Red List of Plants (Żarnowiec et al., 2004; Klama, 2006): I – species of unidentified threat – species with inadequate data available to assign them to a particular category*

[3]*No Regional Red List developed for Gdańsk Pomerania*

The status of habitats and conservation prospects of the plots of all species influenced by the project was determined as appropriate.

As a result of the final assessment, the plots rated at 7 points definitely dominate (77%), and the remaining plots (23%) were rated at 8 points [Figure 3.52].

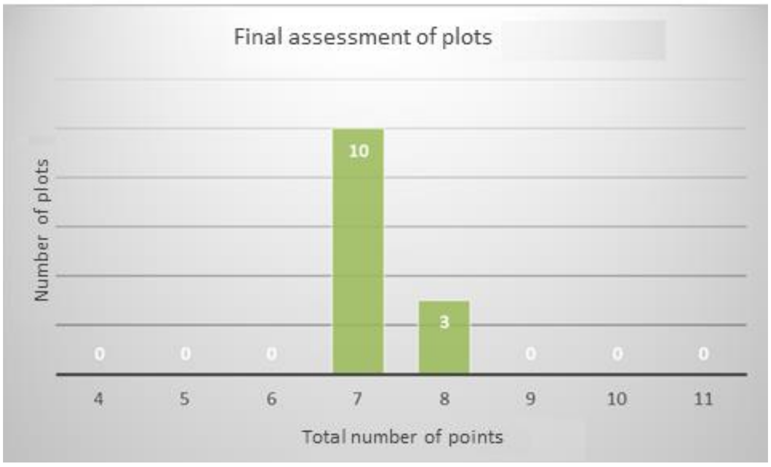



*Figure 3.52. Final assessment of the plots of moss and liverwort species [Source: internal materials]*

### 3.20.1.7 Vascular plants

#### 3.20.1.7.1 Characteristics of the species identified

Within the Baltica OWF CI impact area, the presence of 7 protected, endangered and rare species of vascular plants was confirmed [Table 3.34, Figure 3.53], including:

- 3 species under strict protection;
- 4 species under partial protection;
- 3 species included in the Polish Red List of Pteridophytes and Flowering Plants (Kaźmierczakowa *et al.*, 2016):
  - 2 species classified as vulnerable (moderately threatened) (cat. VU),
  - 1 species classified as near-threatened (cat. NT);
- 4 threatened and endangered vascular plant species of Gdańsk Pomerania (Markowski and Buliński, 2004):
  - 3 species classified as vulnerable (cat. VU),
  - 1 species classified as near-threatened (cat. NT).

The boundary of a particular phytocoenosis, within which a particular species was found, was classified as the plot of a species. Within the Baltica OWF CI impact area, the presence of 9 plots of protected, endangered and rare species of vascular plants was inventoried.

Out of this group, 8 plots are located in the cable bed direct impact area, and 9 in the cable bed indirect impact area, and one of them is located in the land-sea drilling zone. There are no plots in the OnSS direct and indirect impact area nor in the direct and indirect impact zone of the access road to the OnSS.

*Table 3.34. Plots of protected, endangered and rare species of vascular plants found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PL[2] | PG[3] | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | | |
| 1 | Cross-leaved heath | *Erica tetralix* | SP | VU | VU | More than one thousand specimens | Moderate value | 9 |
| 2 | Creeping lady's-tresses | *Goodyera repens* | SP | NT | NT | Several hundred specimens | Moderate value | 9 |
| 3 | Sweetgale | *Myrica gale* | SP | VU | VU | More than one thousand specimens | Moderate value | 9 |
| 4 | Sand sedge | *Carex arenaria* | PP | None | None | Several hundred specimens | Low value | 6 |
| 4 | Sand sedge | *Carex arenaria* | PP | None | None | More than one thousand specimens | Low value | 8 |
| 5 | Black crowberry | *Empetrum nigrum* | PP | None | None | Several hundred specimens | Insignificant | 7 |
| 5 | Black crowberry | *Empetrum nigrum* | PP | None | None | More than one thousand specimens | Insignificant | 7 |
| 6 | Marsh Labrador tea | *Ledum palustre* | PP | None | None | More than one thousand specimens | Low value | 8 |
| **Cable bed indirect impact area** | | | | | | | | |
| 1 | Cross-leaved heath | *Erica tetralix* | SP | VU | VU | More than one thousand specimens | Moderate value | 9 |
| 2 | Creeping lady's-tresses | *Goodyera repens* | SP | NT | NT | Several hundred specimens | Moderate value | 9 |
| 3 | Sweetgale | *Myrica gale* | SP | VU | VU | More than one thousand specimens | Moderate value | 9 |
| 4 | Sand sedge | *Carex arenaria* | PP | None | None | Several hundred specimens | Low value | 6 |
| 4 | Sand sedge | *Carex arenaria* | PP | None | None | More than one thousand specimens | Low value | 8 |
| 5 | Black crowberry | *Empetrum nigrum* | PP | None | None | Several hundred specimens | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | **Species name** | **Binomial nomenclature** | | **PL[2]** | **PG[3]** | | **Descriptive** | **Points** |
| 5 | Black crowberry | *Empetrum nigrum* | PP | None | None | More than one thousand specimens | Insignificant | 7 |
| 6 | Marsh Labrador tea | *Ledum palustre* | PP | None | None | More than one thousand specimens | Low value | 8 |
| **Land-sea drilling zone (cable bed indirect impact area)** | | | | | | | | |
| 1 | Cross-leaved heath | *Erica tetralix* | SP | VU | VU | More than one thousand specimens | Moderate value | 9 |
| 2 | Creeping lady's-tresses | *Goodyera repens* | SP | NT | NT | Several hundred specimens | Moderate value | 9 |
| 3 | Sweetgale | *Myrica gale* | SP | VU | VU | More than one thousand specimens | Moderate value | 9 |
| 4 | Sand sedge | *Carex arenaria* | PP | None | None | Several hundred specimens | Low value | 6 |
| 4 | Sand sedge | *Carex arenaria* | PP | None | None | More than one thousand specimens | Low value | 8 |
| 5 | Black crowberry | *Empetrum nigrum* | PP | None | None | Several hundred specimens | Insignificant | 7 |
| 5 | Black crowberry | *Empetrum nigrum* | PP | None | None | More than one thousand specimens | Insignificant | 7 |
| 6 | Marsh Labrador tea | *Ledum palustre* | PP | None | None | More than one thousand specimens | Low value | 8 |
| 7 | Beach pea | *Lathyrus japonicus* | none | NT | VU | More than a dozen specimens | Low value | 8 |
| **OnSS direct and indirect impact area** | | | | | | | | |
| None | | | | | | | | |
| **Direct impact area of the access road to the OnSS** | | | | | | | | |
| None | | | | | | | | |
| **Indirect impact area of the access road to the OnSS** | | | | | | | | |
| None | | | | | | | | |

*[1]Pursuant to the Regulation of the Minister of the Environment of 9 October 2014 on the protection of plant species (Journal of Laws of 2014, item 1409): SP – species under strict protection, PP – species under partial protection; HD II – species listed in Annex II of the EU Habitats Directive*

*[2]PL – Polish Red List of Pteridophytes and Flowering Plants (Kaźmierczakowa et al., 2016): VU – vulnerable (moderately threatened), NT – near-threatened*

*[3]GP – Endangered and threatened vascular plants of Gdańskie Pomerania (Markowski and Buliński, 2004): VU – vulnerable (moderately threatened), NT – near-threatened*

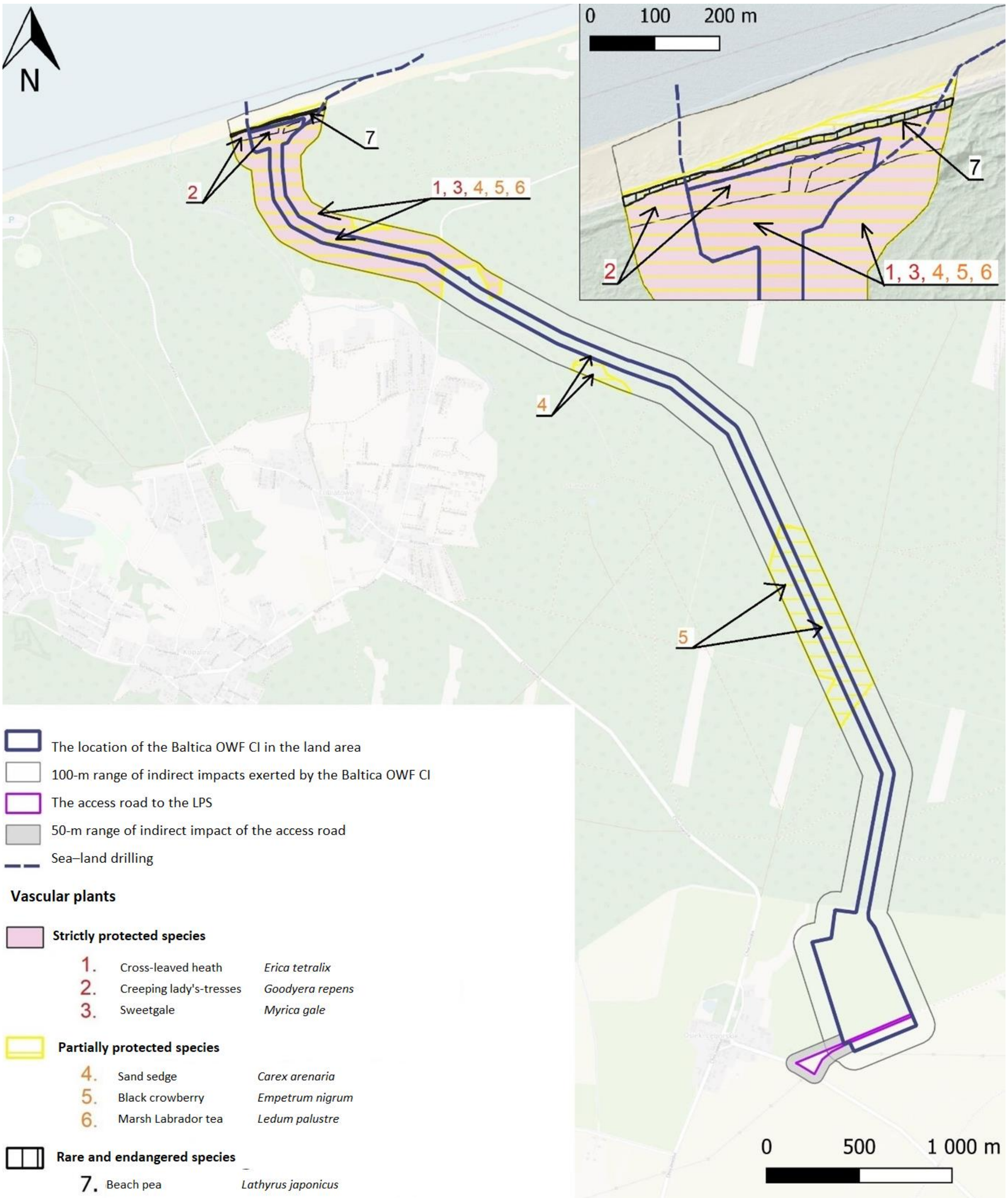



*Figure 3.53. Plots of protected, endangered and rare species of vascular plants found within the Baltica OWF CI impact area [Source: internal materials]*

The flora of protected and endangered vascular plants along the route and in the vicinity of the project includes to a large extent species that are frequent or moderately frequent in the area of Gdansk Pomerania as well as in the whole country.

Due to the location of the planned project in the coastal zone, a crucial element of its flora are species of an Atlantic character, which are quite common in Gdańsk Pomerania, however, across entire Poland are rare or very rare. These are: the black crowberry *Empetrum nigrum*, the cross-leaved heath *Erica tetralix*, the creeping lady's-tresses *Goodyera repens* and the sweetgale *Myrica gale*. The last three species were classified as resources of moderate value and the black crowberry as insignificant.

Along the route and in the vicinity of the project, the black crowberry is common within the patches of the *Empetro nigri-Pinetum* association, as well as heaths. It is relatively abundant also in coniferous forests outside the dune area. The cross-leaved heath occurs rarely in Poland, first of all, along the Baltic Sea coast. Along the route and in the vicinity of the project, it is a common component of the crowberry coniferous forests, bog birch forest and marshy coniferous forests as well as heaths. Another component of the crowberry coniferous forest is the creeping lady's-tresses – a very rare orchid species in Poland, which is classified as near threatened in Gdańsk Pomerania. A nationally rare and vulnerable species both in the area of Gdansk Pomerania and in the whole country is the European waxwing. Along the route and in the vicinity of the project, it occurs as a component of the coastal coniferous forest and heaths, where it is abundant in the form of more or less dense clusters, sometimes consisting of tens or even hundreds of individuals.

The two remaining species form abundant populations within the grey dunes, coastal heaths, crowberry coniferous forest and in sandy habitats beyond the dune area (sand sedge) or as the component of marshy coniferous forests and the coastal coniferous forests (marsh Labrador tea).

Few populations on the grey dune embankments along the sea shore are formed by the beach pea – a vulnerable species in the area of Gdansk Pomerania. Its plot is located within the land-sea drilling zone.

###### 3.20.1.7.2 Evaluation of the species identified and their habitats

The inventoried species were organised in a matrix, taking into consideration, on the one hand, the conservation status and threat category on an international, national and local scale and, on the other hand, the frequency of occurrence in the country and Gdansk Pomerania [Table 3.35]. Additionally, Table 3.36 contains a compilation of the results of valorisation of species not legally protected in Poland, however, classified as rare and included in the Polish and regional Red Lists.

*Table 3.35. Evaluation of protected vascular plants found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally excluding categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally excluding NT, LC and DD categories[2] | Resources of high value | Resources of moderate value<br>Cross-leaved heath *Erica tetralix*<br>Sweetgale *Myrica gale* | Resources of low value | Resources of low value |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania, excluding NT, LC and DD categories[3] | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Species subject to protection under the national law and not endangered nationally in Poland and in Gdańsk Pomerania | Resources of low value<br>Sand sedge *Carex arenaria*<br>Marsh Labrador tea *Ledum palustre* | Resources of insignificant value<br>Black crowberry *Empetrum nigrum*<br>Creeping lady's-tresses *Goodyera repens** | Resources of insignificant value | Resources of insignificant value |

*[1]According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

*[2] Polish Red List of Pteridophytes and Flowering Plants (Kaźmierczakowa et al., 2016): NT – near-threatened species; LC – least concern species*

*[3]Endangered and threatened vascular plants of Gdańskie Pomerania (Markowski and Buliński, 2004): NT – near-threatened species; LC – least concern species*

**As a result of expert assessment, the species was classified as a resource of moderate value*

*Table 3.36. Evaluation of vascular plant species not under legal protection, but listed in the national and regional red lists found in the impact area of the Baltica OWF CI [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species endangered internationally excluding categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species endangered nationally excluding category NT, LC and DD[2] | Resources of high value | Resources of moderate value | Resources of low value | Resources of insignificant value |
| | Species endangered in Gdańsk Pomerania excluding category NT, LC and DD | Resources of moderate value | Resources of low value<br>Beach pea *Lathyrus japonicus ssp. maritimus* | Resources of low value | Resources of insignificant value |
| | Other species inventoried | Resources of low value | Resources of insignificant value | Resources of insignificant value | Resources of insignificant value |

*[1]According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

*[2] Polish Red List of Pteridophytes and Flowering Plants (Kaźmierczakowa et al., 2016): NT – near-threatened species; LC – least concern species*

*[3]Endangered and threatened vascular plants of Gdańskie Pomerania (Markowski and Buliński, 2004): NT – near-threatened species; LC – least concern species*

The status of habitats and conservation prospects of the plots of almost all species influenced by the project was determined as appropriate. With the exception of one plot of sand sedge located in sections 167, 168, 169 – due to the conducted planting of beech, the species will probably yield from that plot in the future.

As a result of the final assessment, 3 plots (33% each) were rated at 8 and 9 points, 2 plots (22%) were rated at 7 points, and 1 plot at 6 points [Figure 3.54].

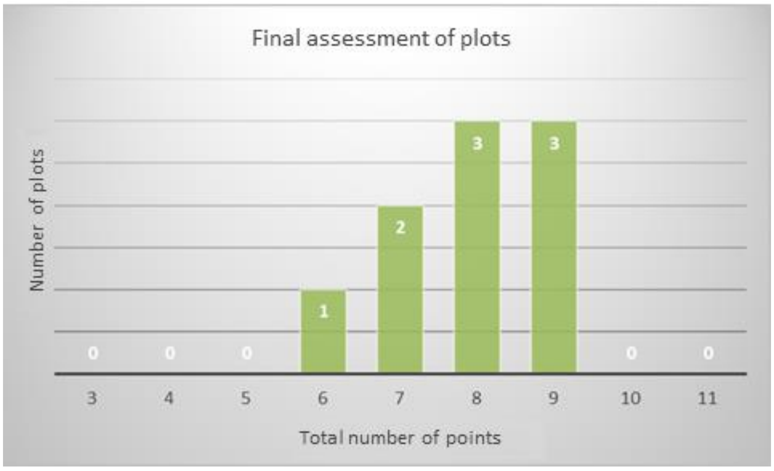



*Figure 3.54. Final assessment of vascular plant plots [Source: internal materials]*

#### 3.20.1.8 Natural habitats

##### 3.20.1.8.1 Characteristics of the natural habitats found

Within the Baltica OWF CI impact area, the presence of 4 types of natural habitats was confirmed, including one priority habitat – *2130 Fixed coastal dunes with herbaceous vegetation ("grey dunes") [Table 3.37, Figure 3.55].

The natural habitats were identified on the basis of the data included in the Interpretation Manual of European Union Habitats. The boundaries of habitat patches were determined on the basis of the dominant type of phytocoenoses and the representativeness and conservation status of the habitat. Within the Baltica OWF CI impact area, 8 plots of natural habitats were inventoried.

Three patches of natural habitats (2180 and 9110) are located in the direct impact area, whereas 8 patches (2120, *2130, 2180 and 9110) in the indirect impact area of the cable bed, 3 of which (2120 and *2130) in the land-sea drilling zone. There are no natural habitat patches in the OnSS direct and indirect impact area nor in the direct and indirect impact zone of the access road to the OnSS.

*Table 3.37. Plots of natural habitats found within the Baltica OWF CI impact area [Source: internal materials]*

| Code | Name of habitat | Priority | Representativeness | Surface area [ha] | Resource assessment | |
|---|---|---|---|---|---|---|
| | | | | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | |
| 2180 | Wooded dunes of the Atlantic, Continental and Boreal region | None | A/B | 11.62 | Low value | 8 |
| 9110 | Beech forests (*Luzulo-Fagetum*) | None | B | 0.66 | Insignificant | 6 |

| Code | Name of habitat | Priority | Representativeness | Surface area [ha] | Resource assessment | |
|---|---|---|---|---|---|---|
| | | | | | Descriptive | Points |
| 9110 | Beech forests (*Luzulo-Fagetum*) | None | A | 0.012 | Insignificant | 6 |
| **Cable bed indirect impact area** | | | | | | |
| 2180 | Wooded dunes of the Atlantic, Continental and Boreal region | None | A/B | 31.46 | Low value | 8 |
| 2180 | Wooded dunes of the Atlantic, Continental and Boreal region | None | C | 0.79 | Low value | 6 |
| 9110 | Beech forests (*Luzulo-Fagetum*) | None | B | 1.83 | Insignificant | 6 |
| 9110 | Beech forests (*Luzulo-Fagetum*) | None | A | 2.12 | Insignificant | 6 |
| 9110 | Beech forests (*Luzulo-Fagetum*) | None | B | 1.39 | Insignificant | 6 |
| **Land-sea drilling zone (cable bed indirect impact area)** | | | | | | |
| 2120 | Acidophilous beech forests (*Elymo-Ammophiletum*) | None | A | 0.73 | Low value | 8 |
| *2130 | Fixed coastal dunes with herbaceous vegetation ("grey dunes") | Priority | A | 0.064 | High value | 10 |
| *2130 | Fixed coastal dunes with herbaceous vegetation ("grey dunes") | Priority | A/B | 0.46 | High value | 10 |
| **OnSS direct and indirect impact area** | | | | | | |
| None | | | | | | |
| **Direct impact area of the access road to the OnSS** | | | | | | |
| None | | | | | | |
| **Indirect impact area of the access road to the OnSS** | | | | | | |
| None | | | | | | |

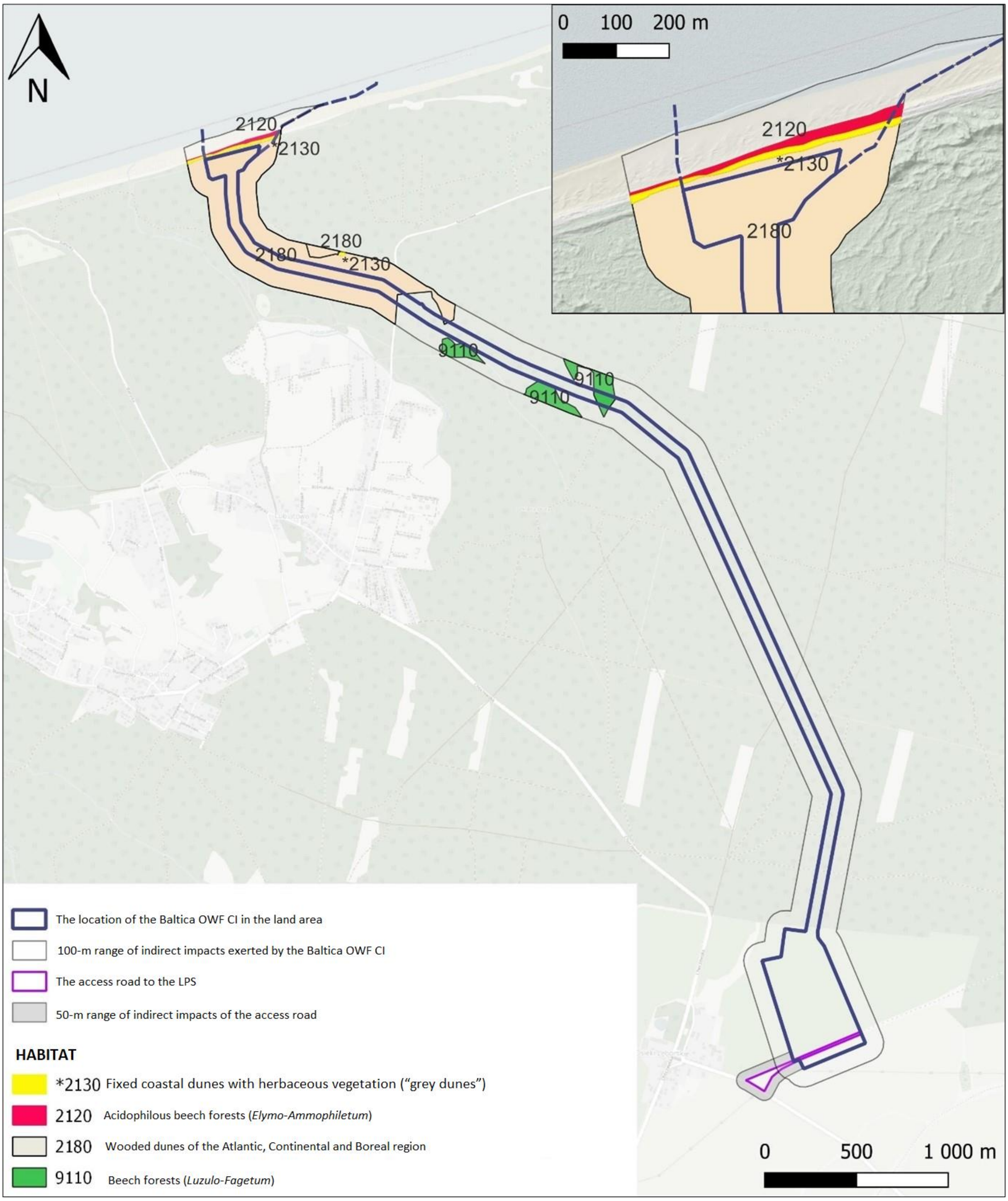



*Figure 3.55. Plots of natural habitats found within the Baltica OWF CI impact area [Source: internal materials]*

The habitat of the highest nature value is the fixed coastal dunes with herbaceous vegetation ("grey dunes") (*2130). Within the area of the planned project and its vicinity, they are adjacent to white dunes (habitat 2120), covering the older dunes along the seashore. They are typically developed in terms of species composition and community structure (representativeness A and A/B). Their conservation status and conservation prospects are satisfactory.

The patches of the natural habitat 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes", *Elymo-Ammophiletum*) grow mainly on the first dune embankment that runs along the sea shore. Their representativeness is high; however, the conservation status was specified as locally unsatisfactory due to the dune embankment stabilisation methods applied (branches scattered across the dune embankments and fascine fences).

Habitat 2180 creates a complex of well-developed patches of coastal coniferous forests (*Empetro nigri-Pinetum* association in *typicum*, *cladonietosum* and *ericetosum* sub-associations). The representativeness of those patches was assessed as high due to the presence of species characteristic for the complex (first of all, a significant share of the black crowberry *Empetrum nigrum*), appropriate structure, and also the natural renewal of typical species. The relatively small surface areas of coastal coniferous forests are transformed, mostly due to human pressure (compaction and trampling of undergrowth, pollution). The patches of the coastal coniferous forest within the boundaries of the Baltica OWF CI are characterised by a proper conservation status and proper conservation prospects.

The patches of acidophilous beech forests (habitat 9110) are within the complex of pine forests between the town of Lubiatowo and the village of Osieki Lęborskie. The patches are well-developed and are characterised by a poor layer of herbaceous plants, but a well-developed moss layer which is typical of the *Luzulo pilosae-Fagetum* association. However, they are characterised by insufficient dead wood resources. The conservation prospects for beech forests were assessed as appropriate.

##### 3.20.1.8.2 Evaluation of the natural habitats found and their conservation status

The habitats were organised in a matrix, taking into consideration, on the one hand, the general assessment of the natural habitat in the biogeographical region on the basis of the report for the years 2013–2018 (http://siedliska.gios.gov.pl/pl/projekt-raportow-do-ke/projekt-raportow) as well as the priority habitats regardless of the general assessment of their status, and on the other hand, the frequency of occurrence nationally and in Pomerania region [Table 3.38].

*Table 3.38. Evaluation of natural habitats found within the Baltica OWF CI impact area [Source: internal materials]*

| **Habitat evaluation** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Habitats rare in Poland and in Pomerania** | **Habitats rare in Poland and common in Pomerania** | **Habitats common in Poland and rare in Pomerania** | **Habitats common in Poland and in Pomerania** |
| Habitat status | Priority natural habitats subject to protection under national and EU law | Resources of exceptional value | Resources of high value<br>*2130 – Fixed dunes with herbaceous vegetation (“grey dunes”) | Resources of moderate value | Resources of low value |
| | Other natural habitats protected under national and EU law with a general assessment of the natural habitat status in the biogeographical region FV or XX or any other status with reference to habitats at the range boundary | Resources of high value | Resources of moderate value | Resources of low value | Resources of low value |
| | Other natural habitats protected under national and EU law with a general assessment of the natural habitat status in the biogeographical region U1 | Resources of moderate value | Resources of low value<br>2180 – Wooded dunes of the Atlantic, Continental and Boreal region | Resources of low value | Resources of insignificant value<br>9110 – Beech forests (*Luzulo-Fagetum*) |
| | Other natural habitats protected under national and EU law with a general assessment of the natural habitat status in the biogeographical region U2 | Resources of low value | Resources of insignificant value<br>2120 – Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”) (*Elymo-Ammophiletum*)** | Resources of insignificant value | Resources of insignificant value |

**Priority habitat*

***As a result of expert assessment, the resource was classified as having low value (see: Table 3.37)*

### 3.20.1.9 Invertebrates

#### 3.20.1.9.1 Characteristics of the species identified

Within the Baltica OWF CI impact area, the plots of only 2 invertebrate species protected, endangered and rare were confirmed [Table 3.39, Figure 3.56], including:

- 1 species under partial protection;
- 2 species included in the Red List of Threatened Animals in Poland (Głowaciński ed., 2002):
    - 1 species classified as near-threatened (cat. NT),
    - 1 least concern species (cat. LC).

Within the Baltica OWF CI impact area, 12 plots of protected, endangered and rare invertebrate species were inventoried.

From this group, no plots located in the cable bed indirect impact zone were identified, whereas, 12 plots are located in the cable bed indirect zone. There are no plots in the OnSS indirect and direct impact areas, the land-sea drilling zone as well as the direct and indirect impact area of the access road to the OnSS.

*Table 3.39. Plots of protected, endangered and rare species of invertebrates found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | PRL[3] | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | | |
| None | | | | | | | | |
| **Cable bed indirect impact area** | | | | | | | | |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica polyctena* | PP | None | NT | 1 anthill | Insignificant | 7 |
| 1 | - | *Formica* | PP | None | NT | 1 anthill | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | PRL[3] | | Descriptive | Points |
| | | *polyctena* | | | | | | |
| 2 | - | *Nemoura dubitans* | none | None | LC | 3 individuals | Insignificant | 7 |
| **OnSS direct and indirect impact area** | | | | | | | | |
| None | | | | | | | | |
| **Land-sea drilling zone (cable bed indirect impact area)** | | | | | | | | |
| None | | | | | | | | |
| **Direct impact area of the access road to the OnSS** | | | | | | | | |
| None | | | | | | | | |
| **Indirect impact area of the access road to the OnSS** | | | | | | | | |
| None | | | | | | | | |

*[1]Pursuant to the Regulation of the Minister of the Environment of 16 December 2016 on the protection of animal species (Journal of Laws of 2016, item 2183): SP – species under strict protection, PP – species under partial protection; HD II – species listed in Annex II of the EU Habitats Directive*

*[2]PRDB – Polish Red Data Book of Animals – invertebrates*

*[3]PRL – Red List of Threatened Animals in Poland (Głowaciński ed., 2002): NT – near threatened species; LC – species of the least concern*

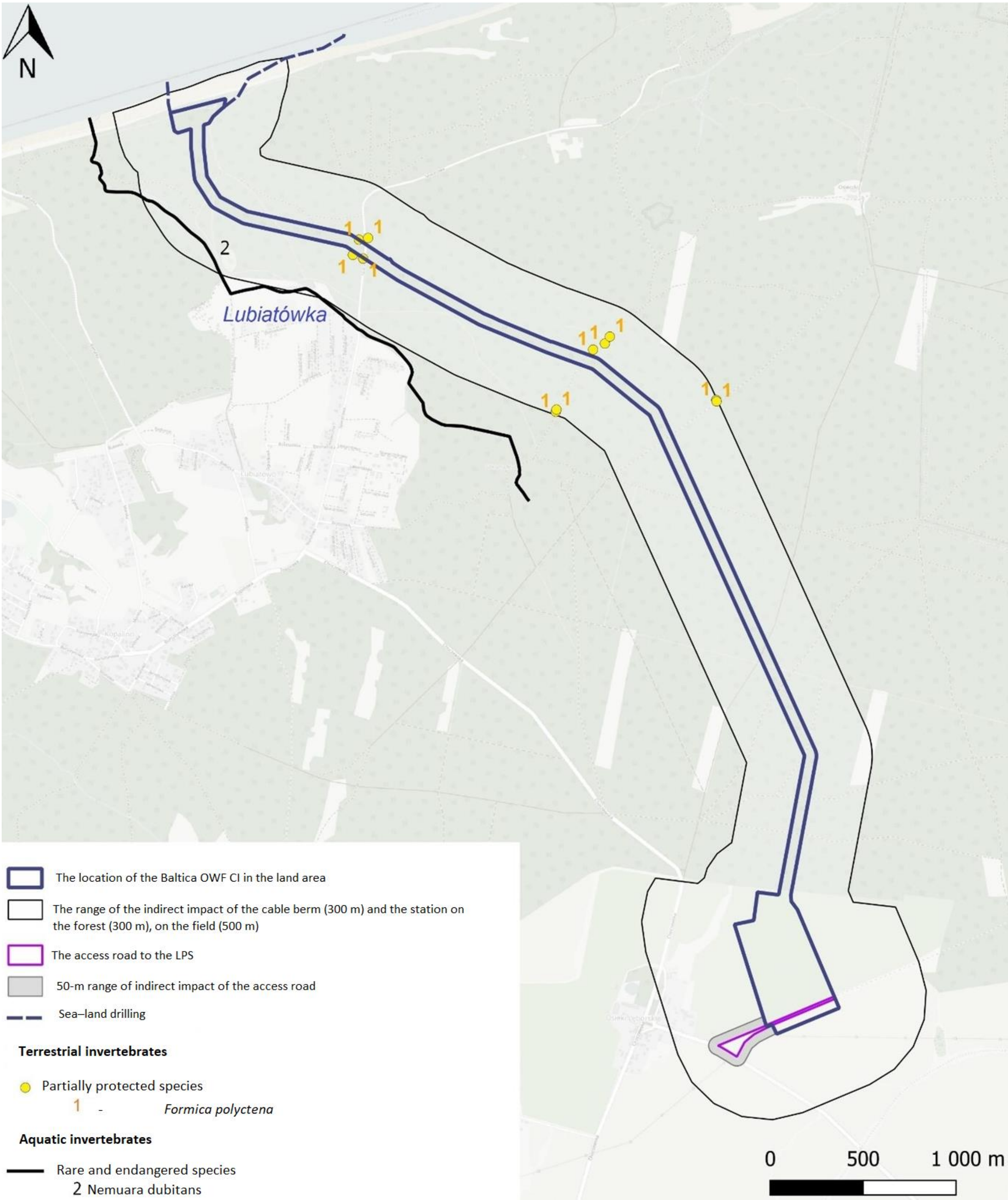



*Figure 3.56. Sites of protected, endangered and rare species of invertebrates found within the Baltica OWF CI impact area [Source: internal materials]*

11 sites of terrestrial invertebrates were identified in the cable bed indirect impact area. All of them are anthills of *Formica polyctena.* This species is common in Poland and in Pomerania, subject to partial protection, which is, among other things, due to its great environmental importance as a regulator of forest insect abundance, favourably influencing the processes of self-regulation and structure of the forest environment.

*Nemora dubitans* was included in the Red List as a least concern species (cat. LC) (Głowaciński ed., 2002). In Poland, the sites of that species are known in lowlands and lower parts of mountains. This species is connected to flowing waters mainly smaller watercourses (streams and creeks). The characteristic elements of the species sites are relatively high shadiness and clean and cold water (Fiałkowski and Kittel, 2002).

The area of the planned project is frequented by mobile invertebrates (flying insects) in search of food supply or inhabited by animals that do not create nests, using this area for temporary hiding and feeding places. All the species found belong to species widely popular both in Pomerania and throughout Poland.

##### 3.20.1.9.2 Evaluation of the species identified and their habitats

The inventoried species were organised in a matrix, taking into consideration, on the one hand, the conservation status and threat category on an international, national and local scale and, on the other hand, the frequency of occurrence in the country and Gdansk Pomerania [Table 3.40].

*Table 3.40. Evaluation of protected invertebrate species found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally excluding categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally excluding NT, LC and DD categories[2] | Resources of high value | Resources of moderate value | Resources of low value | Resources of low value |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania[3] | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Species subject to protection under the national law and not endangered nationally in Poland and in Gdańsk Pomerania | Resources of low value | Resources of insignificant value | Resources of insignificant value | Resources of insignificant value<br>*Formica polyctena* |

*[1]IUCN (the world and Europe) – Red List of Threatened Species Version 2016-3 (http://www.iucnredlist.org): NT – near-threatened species; LC – species of the least concern; DD – data deficient species; NE – non-estimated species*

*[2]Red List of Threatened Animals in Poland (Głowaciński ed., 2002) and the Polish Red Data Book of Animals – invertebrates: NT – near-threatened species; LC – species of the least concern; DD – data deficient species*

*[3]No Regional Red List developed for Gdańsk Pomerania*

*Table 3.41. Evaluation of invertebrate species not under legal protection, but included in the Red List of Threatened Animals in Poland (Głowaciński ed., 2002) found in the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species endangered internationally excluding categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species endangered nationally excluding category NT, LC and DD[2] | Resources of high value | Resources of moderate value | Resources of low value | Resources of low value |
| | Species endangered in Gdańsk Pomerania excluding category NT, LC and DD | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Other species inventoried | Resources of low value | Resources of insignificant value | Resources of insignificant value | Resources of insignificant value<br>*Nemoura dubitans* |

*[1]IUCN (the world and Europe) – Red List of Threatened Species Version 2016-3 (http://www.iucnredlist.org): NT – near-threatened species; LC – species of the least concern; DD – data deficient species; NE – non-estimated species*

*[2]Red List of Threatened Animals in Poland (Głowaciński ed., 2002) and the Polish Red Data Book of Animals – invertebrates: NT – near-threatened species; LC – species of the least concern; DD – data deficient species*

The conservation status of the found *Formica polyctena* sites was assessed as appropriate. The conservation status of the found *Nemora dubitans* site was also assessed as appropriate.

As a result of the final assessment of sites, all of them were rated at 7 points [

Figure 3.57].

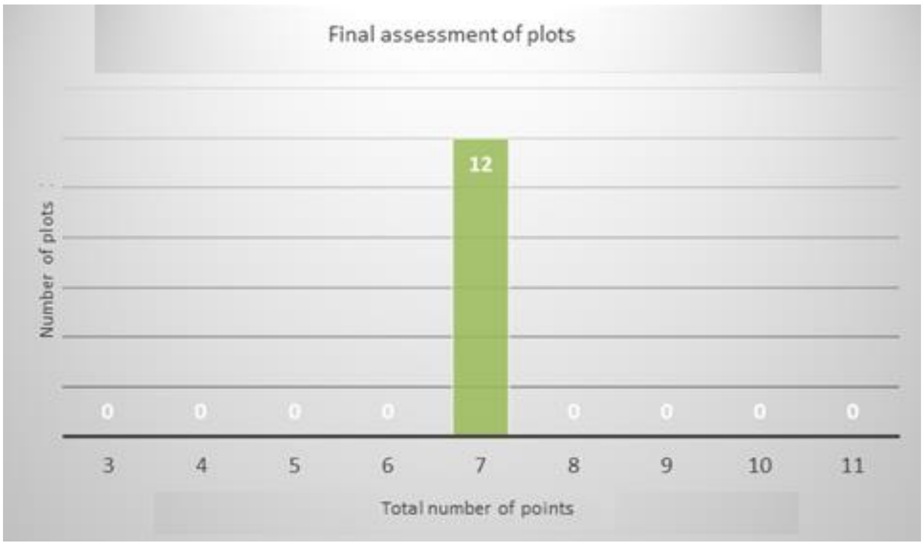



*Figure 3.57. Final assessment of the invertebrate sites [Source: internal materials]*

#### 3.20.1.10 Ichthyofauna

There are no watercourses present in the planned project area nor in its vicinity. In the planned project area and in its vicinity, there is a system of mid-forest depressions connected to the Bezimienna Stream valley, periodically filled with water. They are severely overdried during the summer, with distinct traces of moisture in the part with an alder forest character, however, without an open water table in the parts with a dried carex or reed community character. Drainage ditches near the planned substation also dry out in summer. All watercourses within the boundaries and near the Baltica OWF CI are characterised by conditions unfavourable to the occurrence of ichthyofauna, thus, no representatives of ichtiofauna were found there.

#### 3.20.1.11 Herpetofauna

##### 3.20.1.11.1 Characteristics of the species identified

Within the Baltica OWF CI impact area, the presence of 11 protected, endangered and rare species of amphibians and reptiles was confirmed [Table 3.42, Figure 3.58], including:

- 3 species under strict protection;
- 8 species under partial protection (the green frogs complex was represented within the boundaries of the survey area by 2 taxa, i.e. the pool frog *Pelophylax lessonae* and the edible frog *Pelophylax esculentus*);
- 1 species requiring protection zones to be established for their sanctuaries or plots;
- 1 species listed in Annex II of the EU Habitats Directive;
- 1 species included in the Polish Red List of Animals (Głowaciński ed., 2002) classified as near-threatened (cat. NT).

The following were classified as species sites:

- in the case of amphibians: the breeding site, for example, various types of water reservoirs, drainage/roadside ditches, water channels, river backwater cut off from the river stream, wetlands; in the case of drainage ditches, the entire section of a ditch within the boundaries of the analysis area was classified as a site;
- in the case of reptiles: a uniform habitat patch (e.g. forest and meadow ecotone; ruderal plants on the edges of rural developments, etc.) appropriate for habitat and breeding of reptiles.

Within the Baltica OWF CI impact area, 18 sites of amphibians and reptiles were distinguished.

Out of this group, 7 sites of reptiles are located in the cable bed direct impact area, and 12 in the cable bed indirect impact area, and 7 of them are located in the land-sea drilling zone. One of the reptile sites is located at the boundary of the cable bed and the OnSS indirect impact zone. In the cable bed direct and indirect impact areas, including the land-sea drilling zone, there are no amphibian sites. Two amphibian breeding sites are located within the OnSS direct impact area. There are no herpetofauna sites in the OnSS direct impact area nor in the direct and indirect impact areas of the access road to the OnSS.

*Table 3.42. Sites of protected, endangered and rare species of herpetofauna found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | PRL[3] | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | | |
| **AMPHIBIANS** | | | | | | | | |
| None | | | | | | | | |
| **REPTILES** | | | | | | | | |
| 8 | Slow worm | *Anguis fragilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 8 | Slow worm | *Anguis fragilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 9 | Sand lizard | *Lacerta agilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 9 | Sand lizard | *Lacerta agilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 10 | Common European adder | *Vipera berus* | Partial-1 | None | None | + | Insignificant | 7 |
| 11 | Viviparous lizard | *Zootoca vivipara* | Partial-1 | None | None | + | Insignificant | 7 |
| 11 | Viviparous lizard | *Zootoca vivipara* | Partial-1 | None | None | + | Insignificant | 7 |
| **Cable bed indirect impact area** | | | | | | | | |
| **AMPHIBIANS** | | | | | | | | |
| None | | | | | | | | |
| **REPTILES** | | | | | | | | |
| 3 | Smooth snake | *Coronella austriaca* | SP-1, PZP | None | VU | + | High value | 9 |
| 8 | Slow worm | *Anguis fragilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 8 | Slow worm | *Anguis fragilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 8 | Slow worm | *Anguis fragilis* | Partial-1 | None | None | + | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | PRL[3] | | Descriptive | Points |
| 9 | Sand lizard | *Lacerta agilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 9 | Sand lizard | *Lacerta agilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 9 | Sand lizard | *Lacerta agilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 10 | Common European adder | *Vipera berus* | Partial-1 | None | None | + | Insignificant | 7 |
| 10 | Common European adder | *Vipera berus* | Partial-1 | None | None | + | Insignificant | 7 |
| 11 | Viviparous lizard | *Zootoca vivipara* | Partial-1 | None | None | + | Insignificant | 7 |
| 11 | Viviparous lizard | *Zootoca vivipara* | Partial-1 | None | None | + | Insignificant | 7 |
| 11 | Viviparous lizard | *Zootoca vivipara* | Partial-1 | None | None | + | Insignificant | 7 |
| **Land-sea drilling zone (cable bed indirect impact area** | | | | | | | | |
| **AMPHIBIANS** | | | | | | | | |
| None | | | | | | | | |
| **REPTILES** | | | | | | | | |
| 8 | Slow worm | *Anguis fragilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 8 | Slow worm | *Anguis fragilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 9 | Sand lizard | *Lacerta agilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 9 | Sand lizard | *Lacerta agilis* | Partial-1 | None | None | + | Insignificant | 7 |
| 10 | Common European adder | *Vipera berus* | Partial-1 | None | None | + | Insignificant | 7 |
| 11 | Viviparous lizard | *Zootoca vivipara* | Partial-1 | None | None | + | Insignificant | 7 |
| 11 | Viviparous lizard | *Zootoca vivipara* | Partial-1 | None | None | + | Insignificant | 7 |
| **OnSS direct impact area** | | | | | | | | |
| **AMPHIBIANS** | | | | | | | | |
| None | | | | | | | | |
| **REPTILES** | | | | | | | | |
| None | | | | | | | | |
| **OnSS indirect impact area** | | | | | | | | |
| **AMPHIBIANS** | | | | | | | | |
| 1 | Great crested newt | *Triturus cristatus* | SP-1, HD II | None | NT | Eggs | Moderate value | 9 |
| 2 | Moor frog | *Rana arvalis* | SP-1 | None | None | 4 individuals | Insignificant | 7 |
| 4 | Common toad | *Bufo bufo* | Partial-1 | None | None | 1 individual | Insignificant | 7 |
| 5 | Smooth newt | *Lissotriton vulgaris* | Partial-1 | None | None | Eggs | Insignificant | 7 |
| 6 | The common water frog complex | *Pelophylax esculentus complex* | Partial-1 | None | None | 2 individuals | Insignificant | 7 |
| 7 | Common frog | *Rana temporaria* | Partial-1 | None | None | 3 individuals | Insignificant | 7 |
| **REPTILES** | | | | | | | | |

| Species no. | Species | | Conservation status[1] | Threat category | | Abundance | Resource assessment | |
|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | PRL[3] | | Descriptive | Points |
| None | | | | | | | | |
| **Area of the direct impact of the access road to the OnSS** | | | | | | | | |
| **AMPHIBIANS** | | | | | | | | |
| None | | | | | | | | |
| **REPTILES** | | | | | | | | |
| None | | | | | | | | |
| **Area of the indirect impact of the access road to the OnSS** | | | | | | | | |
| **AMPHIBIANS** | | | | | | | | |
| None | | | | | | | | |
| **REPTILES** | | | | | | | | |
| None | | | | | | | | |

*1Pursuant to the Regulation of the Minister of the Environment of 16 December 2016 on the protection of animal species (Journal of Laws of 2016, item 2183): SP – species under strict protection, PP – species under partial protection; 1 – species that are under additional ban on intentional scaring or disturbing; PZP – species that require a protection zone for their sanctuaries or plots to be established; HD II – species listed in Annex II of the EU Habitats Directive*
*2PRDBA – Polish Red Data Book of Animals – vertebrates*
*3PRL – Red List of Threatened Animals in Poland: NT – near-threatened species, VU – vulnerable species*

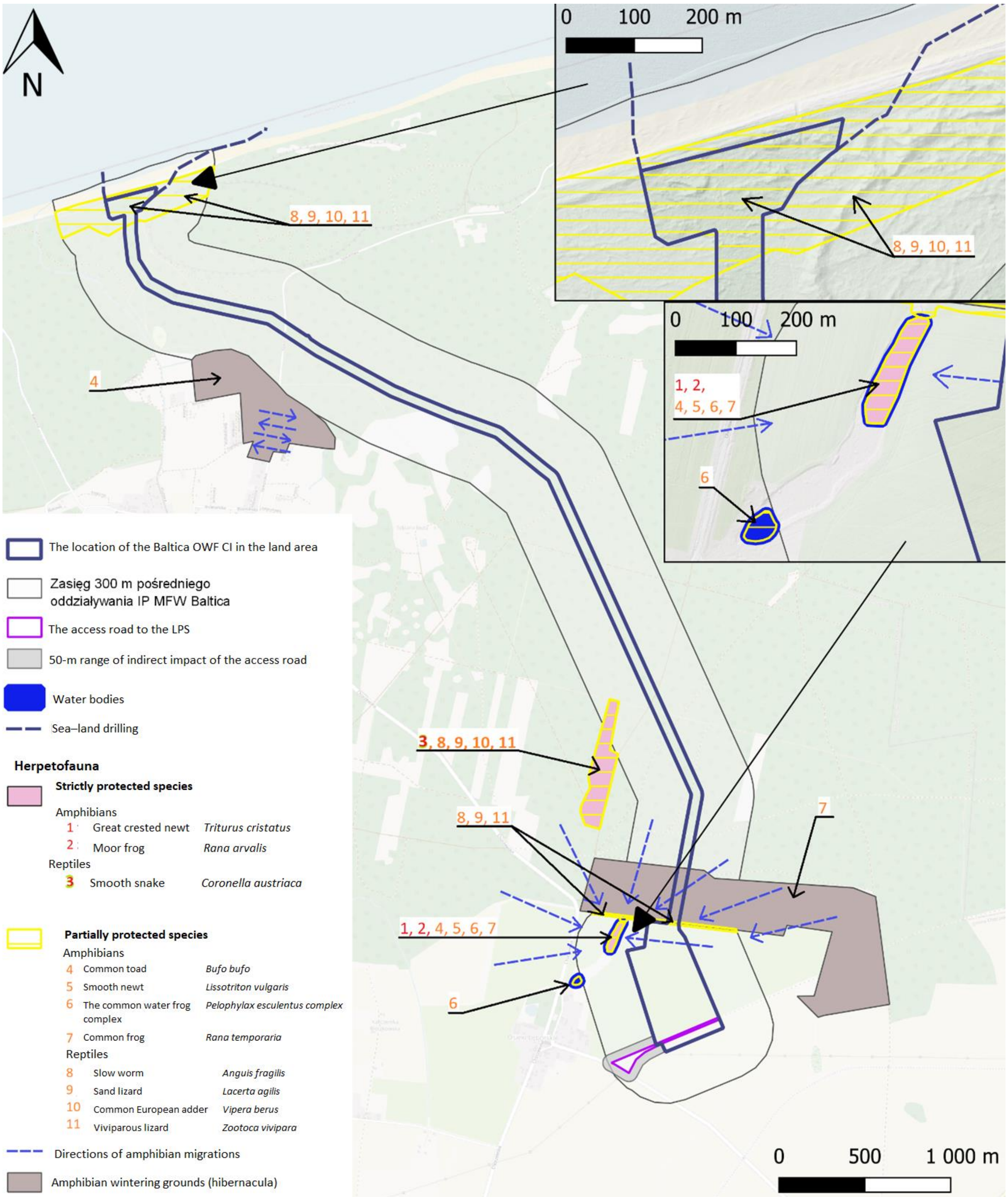



*Figure 3.58. Sites of protected, endangered and rare species of herpetofauna found within the Baltica OWF CI impact area [Source: internal materials]*

The European green frogs complex *Pelophylax esculentus complex* was treated collectively as a group of two taxa found within the boundaries of the survey area, i.e. the pool frog *Pelophylax lessonae* and the edible frog *Pelophylax esculentus*. The collective classification of representatives of the group of green frogs is due to the difficulties associated with identifying these amphibians, especially distinguishing the edible frog from the pool frog. Those amphibians are very similar in terms of morphology, biology and ecology. A significant hindrance is also the fact that both species often inhabit the same reservoirs, forming so-called mixed populations, freely interbreeding with each other (Rybacki, 2012).

Five species of amphibians under partial protection, i.e. the common frog, the pool frog and the edible frog, and also the common toad and the smooth newt are species that are abundant and common both nationally (Juszczyk, 1987; Głowaciński and Rafiński ed., 2003), and in the northern part of the Pomorskie Voivodeship (Mieńko *et al.,* 1995). They inhibit various types of reservoirs with still water, as well as drainage channels and ditches. They have no special preference for breeding and habitat locations. Only the pool frog prefers smaller reservoirs that warm up quickly and are well-sunlit in open areas among fields and meadows.

All amphibian species were found in the two ponds located within the Christmas tree plantation (north-west of the OnSS), where the entire breeding took place. One of the two ponds, located in the northern part, belongs to the most valuable amphibian sites within the entire area subject to analysis for the purposes of the onshore connection. Only there, the reproduction of the great crested newt was confirmed. This species is under strict protection and is listed in Annex II to the Habitats Directive and is included in the Red List of Threatened Animals in Poland as a near-threatened species. Another species inhabiting the same reservoir is the moor frog. This species is still quite common both in Poland and in Gdańsk Pomerania, however, its distribution in Pomerania is still poorly identified. Both species require reservoirs that warm up quickly, thus, are relatively small or shallow, including, first of all, those with very abundant submerged vegetation. The conservation status of both plots was assessed as appropriate.

Two wintering sites of amphibians were found in the project area and its vicinity. They were identified on the basis of observations of migrating individuals and/or dead individuals found on local roads. The migrating amphibian individuals found (the common frog and the common toad) belong to the species which gather most often in greater numbers or even *en masse* in the location of winter numbness.

Three species of Polish lizards are under partial protection in compliance with the Polish law. These are abundant and common species both nationally (Juszczyk, 1987; Głowaciński and Rafiński ed., 2003), and in the northern part of the Pomorskie Voivodeship (Mieńko *et al.*, 1995). They inhibit mostly ecotone sites, i.e. transitory zones between various types of habitats, characterised, among others, by high plant diversity and good sun exposure. In general, such conditions are appropriate for all species of Polish reptiles. The slow worm also prefers sites with well-developed undergrowth, i.e. grassy and mossy sun-lit forests, woodlets and shrubberies, as well as locations that are partially shaded and in damp depressions. Essentially, the slow worm and the viviparous lizard are typical European species, occurring among various forest habitats and in open areas without any preferred, strictly specified conditions concerning their sites. On the other hand, the sand lizard is a more demanding reptile in terms of habitat and thermal conditions; it prefers dry grasslands and sandy locations very well-sunlit.

Apart from lizards, 2 national snake species were also found: the common European adder and the smooth snake. The adder is under partial protection in compliance with the Polish law. It is a quite widely distributed but not necessarily abundant species. This may be due to the very secretive lifestyle and very few requirements concerning its habitat and its exposition to sunlight. In general, similar to all reptiles, it chooses locations at a boundary of various habitats with exposed and well-sunlit sites, where it basks several times a day. However, it may be unnoticed since it occupies spatially unexposed locations. The smooth snake has the greatest thermal requirements for its habitat. This species is threatened with extinction in Poland, which is why it has been included in the Red List of Threatened Animals in Poland (Głowaciński ed., 2002). So far (within the last fifty years), this species has been found mainly in the southern and western part of Poland (Głowaciński and Rafiński ed., 2003). However, so far, its current-day sites in Pomerania have not been known, so it has been commonly considered to be absent in that region (Najbar, 2012). That snake is the only representative of the reptile division within the project area and in its vicinity under strict protection in the Polish law, also requires the establishment of a protection zone in the place of its reproduction and regular stay as well as in the area with a radius of up to 100 m from it, in accordance with the Regulation of 28 December 2016 on *species protection of animals* (Journal of Laws of 2016, item 2183).

Reptile sites were found in three locations in the project area and in its vicinity. Those were well-sunlit ecotone forest zones and a mid-forest glade in a well-sunlit location, among an undulated (hilly) area covered by plantings of pine seedlings, with a large number of hiding places in the form of fatwood left after forest felling and brushwood piles. The site found due to the presence of juvenile individuals, indicative of a breeding population, is of particular value, providing grounds for the assumption that suitable conditions for the permanent occurrence of that species are present in the area.

The presence of the common European adder in the survey area was known on the basis of the reports of the inhabitants of the surrounding villages. The field surveys confirmed the occurrence of that snake on the coastal grey dune opposite Lubiatowo.

###### 3.20.1.11.2 Evaluation of the species identified and their habitats

The species inventoried were organised in a matrix, taking into consideration, on the one hand, the conservation status and threat category on an international, national and local scale and, on the other hand, the frequency of occurrence in the country and Gdańsk Pomerania [Table 3.43].

*Table 3.43. Evaluation of protected amphibian and reptile species found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Pomerania** | **Species abundant or moderately abundant in Poland and rare in Pomerania** | **Species abundant or moderately abundant in Poland and in Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally excluding categories LC and DD | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally excluding categories LC and DD | Resources of high value<br>Smooth snake *Coronella austriaca* | Resources of moderate value | Resources of low value | Resources of low value |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania, excluding categories LC and DD | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Species subject to protection under the national law and not endangered nationally in Poland and in Gdańsk Pomerania | Resources of low value | Resources of insignificant value | Resources of insignificant value<br>Great crested newt *Triturus cristatus* | Resources of insignificant value<br>Smooth newt *Lissotriton vulgaris*<br>Common toad *Bufo bufo*<br>Common frog *Rana temporaria*<br>Moor frog *Rana arvalis*<br>Pool frog *Pelophylax lessonae*<br>Edible frog *Pelophylax esculentus*<br>Sand lizard *Lacerta agilis*<br>Viviparous lizard *Lacerta agilis*<br>Slow worm *Anguis fragilis*<br>Common European adder *Vipera berus* |

**As a result of expert assessment, the species value was increased to a moderate value (see: Table 3.42)*

The conservation status of all sites was assessed as appropriate.

As a result of the final assessment, the plots rated at 7 points dominate (89%). Only 2 sites (one for the great crested newt and the second one for the smooth snake) were rated the highest – at 9 points (11%) [Figure 3.59]

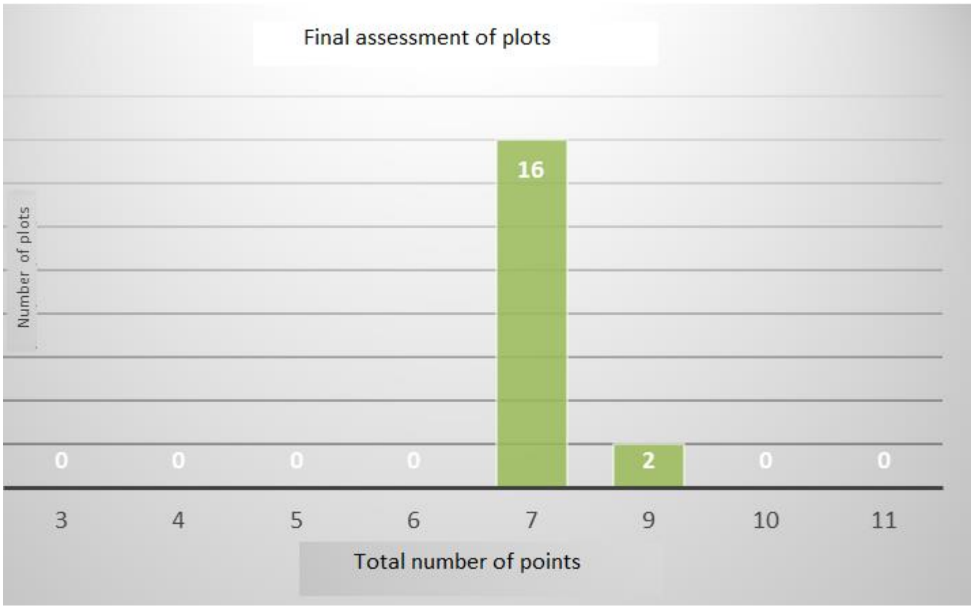



*Figure 3.59. Final assessment of amphibian and reptile sites [Source: internal materials]*

### 3.20.1.12 Birds

#### 3.20.1.12.1 Characteristics of rare and moderately abundant bird species

Within the Baltica OWF CI impact area, the presence of 18 bird species was confirmed [Table 3.44, Figure 3.60], including:

- 17 species under strict protection;
- 1 breeding species (red kite *Milvus milvus*) under zonal protection of breeding locations;
- 1 game species;
- 6 species listed in Annex I of the Birds Directive;
- 5 species listed in the Red Polish Data Book of Animals (Głowaciński ed. 2001):
  - 2 species classified as near-threatened (cat. NT),
  - 3 least concern species (cat. LC);
- 7 species endangered in Europe according to the criteria of BirdLife International (2004).
  - 4 endangered species, the European population of which exceeds 50% of the global population and the conservation status of which was assessed as unfavourable (cat. SPEC 2),
  - 3 endangered species, the European population of which exceeds 50% of the global population and the conservation status of which was assessed as unfavourable (cat. SPEC 3).

Bird nesting locations or locations in which birds were recorded manifesting behaviours indicative of having a brood or occupied a site (for example, birds observed with food for nestlings or with nest materials, singing birds, lekking birds, nuptial flights, birds visiting places appropriate for nesting) were classified as species sites.

From this group, 4 sites are located in the cable bed direct impact area, and 19 in the cable bed indirect impact area, including no sites found in the land-sea drilling zone. Nine sites are located within the OnSS direct impact area, and 12 in the OnSS indirect impact area. Six plots are located in the indirect and direct impact areas of the access road to the OnSS.

*Table 3.44. Sites of protected, endangered and rare species of birds found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category | | Species status[4] | Abundance[5] | Resource assessment | |
|---|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | BL[3] | | | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | | | |
| 1 | Black woodpecker | *Dryocopus martius* | SP, BDI | None | None | B | 1 s | Insignificant | 7 |
| 2 | European nightjar | *Caprimulgus europaeus* | SP, BDI | None | SPEC2 | B, M | 1 s | High value | 10 |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1 s | Insignificant | 7 |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1 s | Insignificant | 7 |
| 5 | Common buzzard | *Buteo buteo* | SP | None | None | B | 1 i | Insignificant | 7 |
| 5 | Common buzzard | *Buteo buteo* | SP | None | None | M | 3 i | Insignificant | 7 |
| 7 | Tawny owl | *Strix aluco* | SP | None | None | B | 1 s | Insignificant | 7 |
| 8 | Stock dove | *Columba oenas* | SP | None | None | B, M | 1 s | Low value | 8 |
| 10 | Northern goshawk | *Accipiter gentilis* | SP | LC | None | M | 1 i | Insignificant | 7 |
| 14 | European golden plover | *Pluvialis apricaria* | SP | LC | None | M | 5 i | Insignificant | 7 |
| 15 | Rough-legged buzzard | *Buteo lagopus* | SP | LC | None | M | 1 i | Insignificant | 7 |
| 16 | Red kite | *Milvus milvus* | SP | NT | SPEC2 | M | 1 i | Insignificant | 7 |
| 17 | Eurasian curlew | *Numenius arquata* | SP | NT | SPEC2 | M | 12 i | Insignificant | 7 |
| **Cable bed indirect impact area** | | | | | | | | | |
| 1 | Black woodpecker | *Dryocopus martius* | SP, BDI | None | None | B | 1 s | Insignificant | 7 |
| 1 | Black woodpecker | *Dryocopus martius* | SP, BDI | None | None | B | 1 s | Insignificant | 7 |
| 2 | European nightjar | *Caprimulgus europaeus* | SP, BDI | None | SPEC2 | B, M | 1 s | High value | 10 |
| 2 | European nightjar | *Caprimulgus europaeus* | SP, BDI | None | SPEC2 | B, M | 1 s | High value | 10 |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1 s | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category | | Species status[4] | Abundance[5] | Resource assessment | |
|---|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | BL[3] | | | Descriptive | Points |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1 s | Insignificant | 7 |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1 s | Insignificant | 7 |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1i | Insignificant | 7 |
| 4 | Red-breasted flycatcher | *Ficedula parva* | SP, BDI | None | None | B, M | 1 s | Insignificant | 7 |
| 4 | Red-breasted flycatcher | *Ficedula parva* | SP, BDI | None | None | B, M | 1 s | Insignificant | 7 |
| 4 | Red-breasted flycatcher | *Ficedula parva* | SP, BDI | None | None | B, M | 1 s | Insignificant | 7 |
| 5 | Common buzzard | *Buteo buteo* | SP | None | None | B | 1 p | Insignificant | 7 |
| 7 | Tawny owl | *Strix aluco* | SP | None | None | B | 1 s | Insignificant | 7 |
| 7 | Tawny owl | *Strix aluco* | SP | None | None | B | 1 s | Insignificant | 7 |
| 7 | Tawny owl | *Strix aluco* | SP | None | None | B | 1 s | Insignificant | 7 |
| 7 | Tawny owl | *Strix aluco* | SP | None | None | B | 1 s | Insignificant | 7 |
| 8 | Stock dove | *Columba oenas* | SP | None | None | B, M | 1 p | Low value | 8 |
| 9 | Common firecrest | *Regulus ignicapillus* | SP | None | None | B, M | 1 s | Insignificant | 7 |
| 10 | Northern goshawk | *Accipiter gentilis* | SP | None | None | B | 1 p | Insignificant | 7 |
| 12 | Long-eared owl | *Asio otus* | SP | None | None | B, M | 1 i | Low value | 8 |
| **Land-sea drilling zone (cable bed indirect impact area)** | | | | | | | | | |
| None | | | | | | | | | |
| **OnSS direct impact area** | | | | | | | | | |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1 s | Insignificant | 7 |
| 6 | Common quail | *Coturnix coturnix* | SP | None | None | B, M | 1 s | Low value | 8 |
| 6 | Common quail | *Coturnix coturnix* | SP | None | None | B, M | 1 s | Low value | 8 |
| 5 | Common buzzard | *Buteo buteo* | SP | None | None | M | 1 i | Insignificant | 7 |
| 10 | Northern goshawk | *Accipiter gentilis* | SP | None | None | M | 1 i | Insignificant | 7 |
| 14 | European golden plover | *Pluvialis apricaria* | SP, BDI | EXP | None | M | 5 i | Insignificant | 7 |
| 15 | Rough-legged buzzard | *Buteo lagopus* | SP | None | None | M | 1 i | Insignificant | 7 |
| 16 | Red kite | *Milvus milvus* | SP, BDI | NT | SPEC2 | M | 1 i | Insignificant | 7 |
| 17 | Eurasian curlew | *Numenius arquata* | SP | VU | SPEC2 | M | 12 i | Insignificant | 7 |
| **OnSS indirect impact area** | | | | | | | | | |
| 3 | Woodlark | *Lullula arborea* | SP, BDI | None | SPEC3 | B, M | 1 s | Insignificant | 7 |
| 5 | Common buzzard | *Buteo buteo* | SP | None | None | M | 1 i | Insignificant | 7 |

| Species no. | Species | | Conservation status[1] | Threat category | | Species status[4] | Abundance[5] | Resource assessment | |
|---|---|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | BL[3] | | | Descriptive | Points |
| 6 | Common quail | *Coturnix coturnix* | SP | None | None | B, M | 1 s | Low value | 8 |
| 6 | Common quail | *Coturnix coturnix* | SP | None | None | B, M | 1 s | Low value | 8 |
| 6 | Common quail | *Coturnix coturnix* | SP | None | None | B, M | 1 s | Low value | 8 |
| 6 | Common quail | *Coturnix coturnix* | SP | None | None | B, M | 1 s | Insignificant | 8 |
| 10 | Northern goshawk | *Accipiter gentilis* | SP | None | None | M | 1 i | Insignificant | 7 |
| 13 | Common crane | *Grus grus* | SP, BDI | None | SPEC2 | B, M | 1 p | Insignificant | 7 |
| 14 | European golden plover | *Pluvialis apricaria* | SP, BDI | EXP | None | M | 5 i | Insignificant | 7 |
| 15 | Rough-legged buzzard | *Buteo lagopus* | SP | None | None | M | 1 i | Insignificant | 7 |
| 16 | Red kite | *Milvus milvus* | SP, BDI | NT | SPEC2 | M | 1 i | Insignificant | 7 |
| 17 | Eurasian curlew | *Numenius arquata* | SP | VU | SPEC2 | M | 12 i | Insignificant | 7 |
| **Area of the direct and indirect impact of the access road to the OnSS** | | | | | | | | | |
| 5 | Common buzzard | *Buteo buteo* | SP | None | None | M | 3 i | Insignificant | 7 |
| 10 | Northern goshawk | *Accipiter gentilis* | SP | None | None | M | 1 i | Insignificant | 7 |
| 14 | European golden plover | *Pluvialis apricaria* | SP, BDI | EXP | None | M | 5 i | Insignificant | 7 |
| 15 | Rough-legged buzzard | *Buteo lagopus* | SP | None | None | M | 1 i | Insignificant | 7 |
| 16 | Red kite | *Milvus milvus* | SP, BDI | NT | SPEC2 | M | 1 i | Insignificant | 7 |
| 17 | Eurasian curlew | *Numenius arquata* | SP | VU | SPEC2 | M | 12 i | Insignificant | 7 |

*[1]Pursuant to the Regulation of the Minister of the Environment of 16 December 2016 on the protection of animal species (Journal of Laws of 2016, item 2183): SP – species under strict protection, PP – species under partial protection; BDI – species listed in Annex I of the EU Birds Directive*
*G – game species pursuant to the Regulation of the Minister of the Environment of 11 March 2005 on establishing the list of game species (Journal of Laws of 2005, no. 45, item 433)*
*[2]PRDBA – Polish Red Data Book of Animals – vertebrates: NT – near threatened species; LC – species of the least concern*
*[3]BirdLife International (2004): SPEC 2 – endangered species, the European population of which exceeds 50% of the global population and their conservation status was assessed as unfavourable; SPEC 3 – endangered species, the European population of which does not exceed 50% of the global population and their conservation status was assessed as unfavourable;*
*[4]B – breeding or probably breeding species; M – birds migrating regularly*
*[5]i – individual, p – pair, m – male*

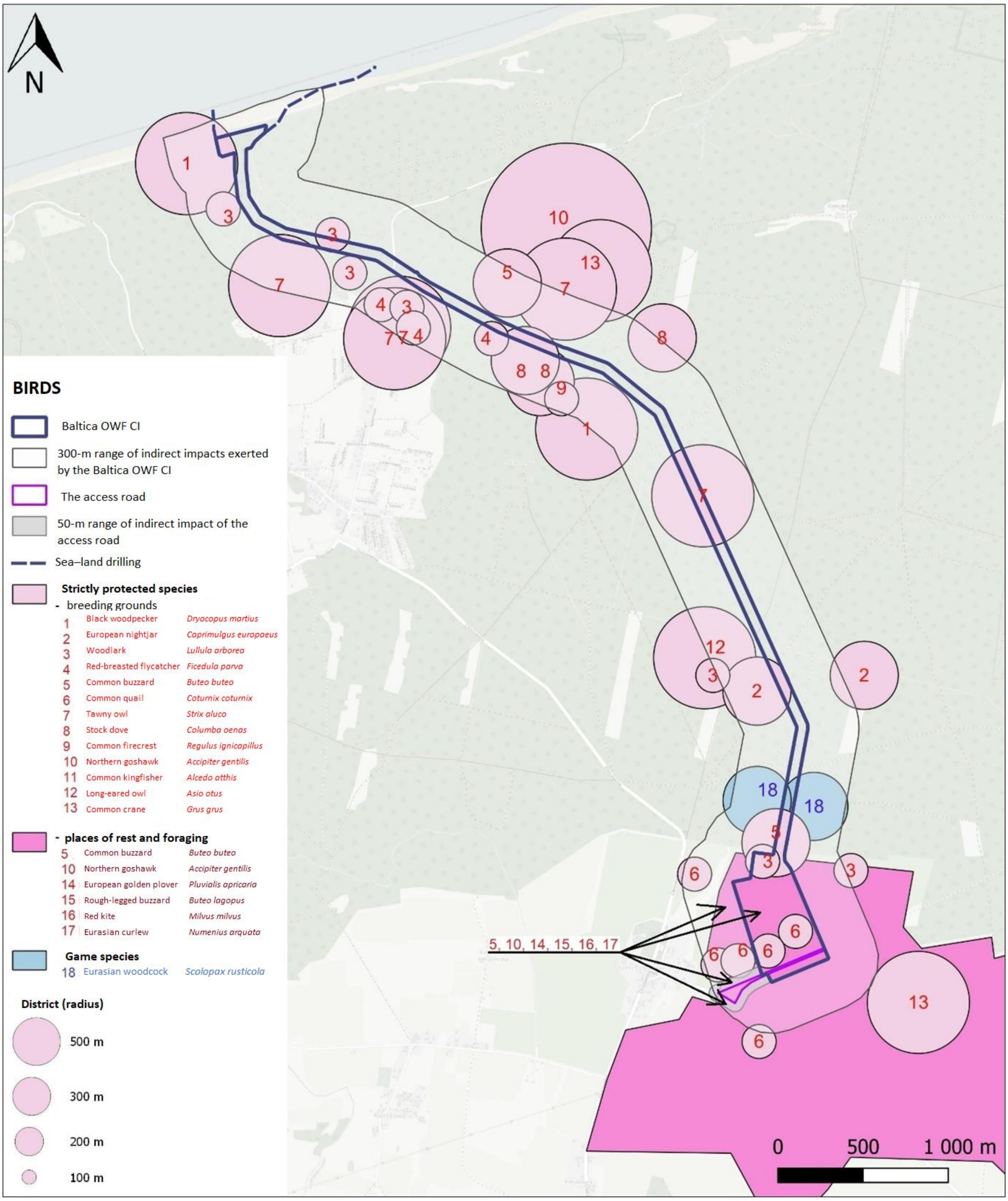



*Figure 3.60. Sites of protected, endangered and rare species of birds found within the Baltica OWF CI impact area [Source: internal materials]*

Within the Baltica OWF CI impact area, 67 breeding sites belonging to 14 rare and moderately abundant bird species were inventoried in total. The woodlark was the most abundant species inventoried. 3 breeding Accipitriformes species were recorded (red kite, common buzzard, northern goshawk). The landscape density of those species found in the survey area was assessed as average or low on a national scale.

Also, in the case of most other species, their abundance and density are average. However, attention is drawn to the density of the common quail (0.8 male per 1 $km^2$ of arable land on average) and the woodlark (2.5 pairs per 1 $km^2$ forest area), which is quite high for Pomerania.

Also, the relatively high abundance of species rare in Poland are worth noting: the red-breasted flycatcher (6 pairs) and the stock dove (5 pairs).

###### 3.20.1.12.2 Characteristics of common breeding bird species

During surveys dedicated mainly to all widespread and abundant species (bird counts in the grid of observation points), a total of 895 individuals belonging to 64 bird species were found. Among the individuals recorded, 30% were the 2 most abundant species in Poland – skylark and common chaffinch [Table 3.45]. The common chaffinch belongs to the most common species – it was recorded at 86% of observation points.

*Table 3.45. Abundance, dominance and frequency of bird species found during the counts at observation and monitoring points [Source: internal materials]*

| No. | Species | | Total number of individuals (sum from 3 counts) | Dominance [%] | Frequency [%] |
|---|---|---|---|---|---|
| | Species name | Species name | | | |
| 1. | Common chaffinch | *Fringilla coelebs* | 151 | 16.9 | 85.7 |
| 2. | Eurasian skylark | *Alauda arvensis* | 123 | 13.7 | 28.6 |
| 3. | Great tit | *Parus major* | 47 | 5.3 | 71.4 |
| 4. | Eurasian wren | *Troglodytes troglodytes* | 31 | 3.5 | 61.9 |
| 5. | Barn swallow | *Hirundo rustica* | 29 | 3.2 | 23.8 |
| 6. | Common starling | *Sturnus vulgaris* | 28 | 3.1 | 19.0 |
| 7. | Common blackbird | *Turdus merula* | 26 | 2.9 | 66.7 |
| 8. | Eurasian blackcap | *Sylvia atricapilla* | 23 | 2.6 | 57.1 |
| 9. | Wood warbler | *Phylloscopus sibilatrix* | 23 | 2.6 | 57.1 |
| 10. | Tree pipit | *Anthus trivialis* | 22 | 2.5 | 28.6 |
| 11. | Common wood pigeon | *Columba palumbus* | 21 | 2.3 | 57.1 |
| 12. | Corn bunting | *Miliaria calandra* | 21 | 2.3 | 28.6 |
| 13. | Willow warbler | *Phylloscopus trochilus* | 20 | 2.2 | 42.9 |
| 14. | Common chiffchaff | *Phylloscopus collybita* | 20 | 2.2 | 47.6 |
| 15. | Meadow pipit | *Anthus pratensis* | 18 | 2.0 | 9.5 |
| 16. | Common cuckoo | *Cuculus canorus* | 17 | 1.9 | 57.1 |
| 17. | Common crane | *Grus grus* | 16 | 1.8 | 23.8 |
| 18. | Song thrush | *Turdus philomelos* | 15 | 1.7 | 52.4 |
| 19. | Great spotted woodpecker | *Dendrocopos major* | 14 | 1.6 | 42.9 |
| 20. | Common raven | *Corvus corax* | 14 | 1.6 | 28.6 |
| 21. | European robin | *Erithacus rubecula* | 14 | 1.6 | 42.9 |
| 22. | Eurasian jay | *Garrulus glandarius* | 13 | 1.5 | 38.1 |
| 23. | Mistle thrush | *Turdus viscivorus* | 12 | 1.3 | 33.3 |
| 24. | Whinchat | *Saxicola rubetra* | 12 | 1.3 | 14.3 |
| 25. | Eurasian collared dove | *Streptopelia decaocto* | 10 | 1.1 | 23.8 |

| No. | Species | | Total number of individuals (sum from 3 counts) | Dominance [%] | Frequency [%] |
|---|---|---|---|---|---|
| | Species name | Species name | | | |
| 26. | Common whitethroat | *Sylvia communis* | 9 | 1.0 | 23.8 |
| 27. | Eurasian nuthatch | *Sitta europaea* | 9 | 1.0 | 33.3 |
| 28. | Woodlark | *Lullula arborea* | 9 | 1.0 | 19.0 |
| 29. | Coal tit | *Periparus ater* | 9 | 1.0 | 33.3 |
| 30. | Yellowhammer | *Emberiza citrinella* | 9 | 1.0 | 28.6 |
| 31. | Greenfinch | *Carduelis chloris* | 8 | 0.9 | 14.3 |
| 32. | Eurasian blue tit | *Cyanistes caeruleus* | 7 | 0.8 | 19.0 |
| 33. | Goldcrest | *Regulus regulus* | 7 | 0.8 | 14.3 |
| 34. | Stock dove | *Columba oenas* | 7 | 0.8 | 19.0 |
| 35. | Common linnet | *Carduelis cannabina* | 6 | 0.7 | 14.3 |
| 36. | Common buzzard | *Buteo buteo* | 6 | 0.7 | 23.8 |
| 37. | House sparrow | *Passer domesticus* | 6 | 0.7 | 4.8 |
| 38. | Eurasian treecreeper | *C. familiaris* | 5 | 0.6 | 19.0 |
| 39. | Eurasian wryneck | *Jynx torquilla* | 4 | 0.4 | 9.5 |
| 40. | Eurasian magpie | *Pica pica* | 4 | 0.4 | 14.3 |
| 41. | Northern lapwing | *Vanellus vanellus* | 3 | 0.3 | 9.5 |
| 42. | European crested tit | *Lophophenes cristatus* | 3 | 0.3 | 14.3 |
| 43. | Black woodpecker | *Dryocopos martius* | 3 | 0.3 | 14.3 |
| 44. | Fieldfare | *Turdus pilaris* | 3 | 0.3 | 9.5 |
| 45. | Common house martin | *Delichon urbicum* | 3 | 0.3 | 4.8 |
| 46. | Lesser whitethroat | *Sylvia curucca* | 3 | 0.3 | 9.5 |
| 47. | Western yellow wagtail | *Motacilla flava* | 3 | 0.3 | 4.8 |
| 48. | Green sandpiper | *Tringa ochropus* | 3 | 0.3 | 4.8 |
| 49. | Goldfinch | *Carduelis carduelis* | 3 | 0.3 | 9.5 |
| 50. | Hooded crow | *Corvu corone cornix* | 3 | 0.3 | 9.5 |
| 51. | European green woodpecker | *Picus viridis* | 2 | 0.2 | 9.5 |
| 52. | Mallard | *Anas platyrhynchos* | 2 | 0.2 | 4.8 |
| 53. | Grey partridge | *Perdix perdix* | 2 | 0.2 | 4.8 |
| 54. | Common redstart | *Phoenicurus phoenicurus* | 2 | 0.2 | 9.5 |
| 55. | Golden oriole | *Oriolus oriolus* | 2 | 0.2 | 9.5 |
| 56. | Icterine warbler | *Hippolais icterina* | 2 | 0.2 | 9.5 |
| 57. | White stork | *Ciconia ciconia* | 1 | 0.1 | 4.8 |
| 58. | Corn crake | *Crex crex* | 1 | 0.1 | 4.8 |
| 59. | Hoopoe | *Uppupa epops* | 1 | 0.1 | 4.8 |
| 60. | Red-backed shrike | *Lanius collurio* | 1 | 0.1 | 4.8 |
| 61. | Common swift | *Apus apus* | 1 | 0.1 | 4.8 |
| 62. | Common stonechat | *Saxicola torquata* | 1 | 0.1 | 4.8 |
| 63. | Great reed warbler | *A. arundinaceus* | 1 | 0.1 | 4.8 |
| 64. | Common firecrest | *Regulus ignicapillus* | 1 | 0.1 | 4.8 |

At individual observation points, from 5 to 27 bird species were recorded, and the total number of individuals was from 17 to 78. Points with 11 to 20 species and 26 to 35 individuals recorded dominated [Figure 3.61].

The points with the lowest number of species and individuals coincide with the area of poor pine forests of young age classes. However, when analysing the bird species abundance map [Figure 3.62], it should be taken into consideration that, despite a relatively small number of species, rare or endangered taxa, which are present exclusively or are most abundant in this type of habitats (e.g. European nightjar) can also occur in the above-mentioned areas.

The greatest number of species was found at point 39 located in the old-growth pine forest with a rich spruce undergrowth and at two points located in the rural landscape rich in striped tree plantings (points 59–60) [Figure 3.62].

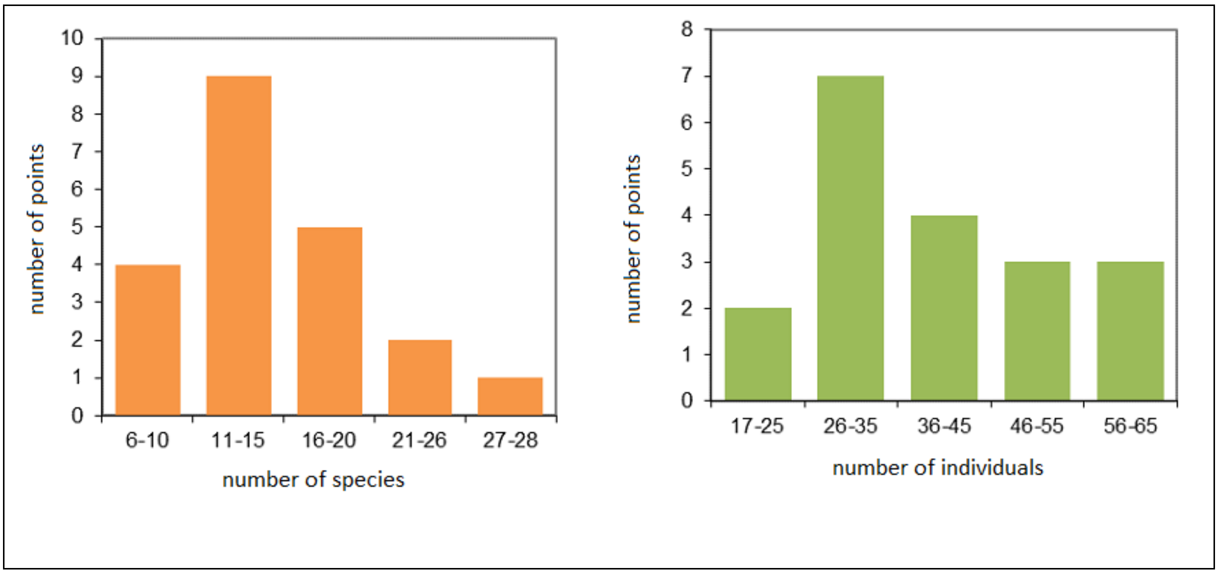



*Figure 3.61. Distribution of the number of species (left panel) and the number of individuals (right panel) found at the observation points [Source: internal materials]*

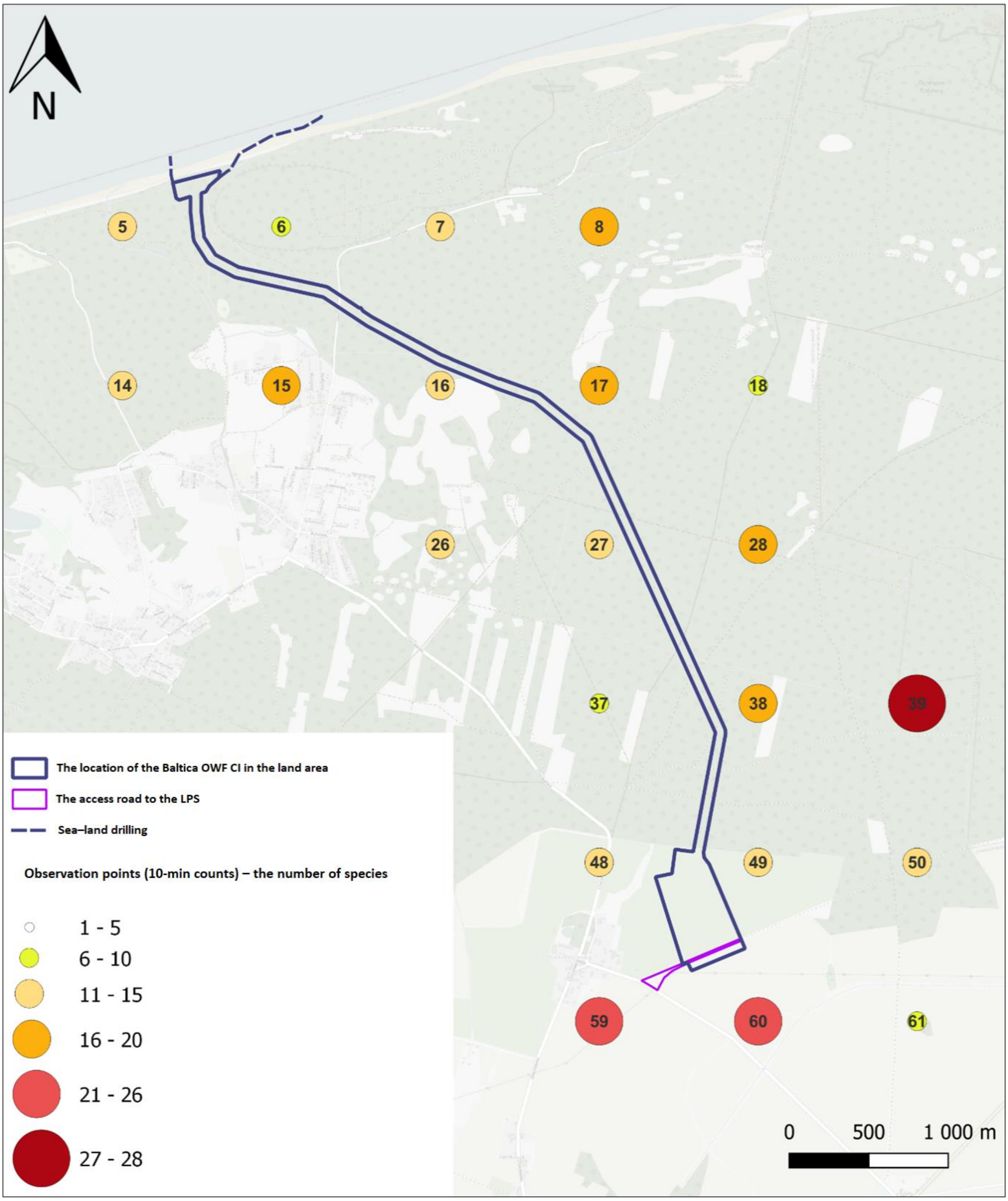



*Figure 3.62. Diversification of the number of common breeding bird species within the Baltica OWF CI impact area (the number in a circle stands for an observation point) [Source: internal materials]*

#### 3.20.1.12.3 Characteristics of bird occurrence in the non-breeding period

The area planned for the location of the onshore substations was surveyed in terms of the location of bird concentration in the migration and wintering periods. During individual controls, from 1 to 14 individuals belonging to 6 species were found there. During all controls, the following abundances for individual species were recorded:

- Eurasian curlew *Numenius arquata* – 12 ind.;
- European golden plover *Pluvialis apricaria* – 5 ind.;
- common buzzard *Buteo buteo* – 3 ind.;
- rough-legged buzzard *Buteo lagopus* – 1 ind.;
- northern goshawk *Accipiter gentilis* – 1 ind.;
- Red kite *Milvus milvus* – 1 ind.

This area was one of the least used by the birds from the areas located within the boundaries of the entire area covered by surveys conducted in the years 2016–2017 for the purposes of the Baltica OWF CI route determination. The data collected do not indicate that the area was of significant importance to migratory birds.

###### 3.20.1.12.4 Evaluation of bird species and their sites

An assessment of value was carried out for all bird species inventoried. For that purpose:

- in the case of breeding bird species – on the one hand, the unambiguous and repeatable criteria resulting from the inclusion of the species in question on the list of species protected under national and/or EU and international legislation [list of species with an unfavourable conservation status in Europe – BirdLife International criterion (Wilk *et al.*, 2010)], and the national or regional red lists of endangered, rare and threatened species, but also, the data on abundance trends obtained as part of the Monitoring of Polish Birds (http://monitoringptakow.gios.gov.pl), and on the other hand, the frequency of its occurrence in Poland (Chodkiewicz *et al.*, 2015) and in Pomerania in accordance with Table 3.46;
- in the case of birds occurring within the boundaries of the Baltica OWF CI beyond the breeding season – on the one hand, the international threat category was taken into consideration [list of species with an unfavourable conservation status in Europe – BirdLife International criterion (Wilk *et al.*, 2010)], and on the other hand, the size of population stopping during migration within the area and in the vicinity of the Baltica OWF CI [Table 3.47].

*Table 3.46. Evaluation of protected, breeding bird species found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally excluding (SPEC 1, SPEC 2, SPEC 3)* | Resources of exceptional value | Resources of high value<br>Red kite *Milvus milvus*<br>Common kingfisher *Alcedo atthis*<br>European nightjar *Caprimulgus europaeus*<br>Eurasian woodcock *Scolopax rusticola*[1]****<br>Common crane *Grus grus*[2] | Resources of moderate value | Resources of low value<br>Woodlark *Lullula arbore*[3] |
| | Species subject to protection under the national and/or EU law and endangered nationally excluding categories NT, LC, DD and NE** | Resources of high value | Resources of moderate value | Resources of low value | Resources of low value |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania*** | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Species subject to protection under the national law and not endangered nationally in Poland and in Gdańsk Pomerania | Resources of low value<br>Northern goshawk *Accipiter gentilis*<br>Long-eared owl *Asio otus*<br>Stock dove *Columba oenas* | Resources of insignificant value | Resources of insignificant value<br>Common stonechat *Saxicola rubicola* | Resources of insignificant value<br>Black woodpecker *Dryocopus martius*<br>Common quail *Coturnix coturnix*[4]<br>Red-breasted flycatcher *Ficedula parva*<br>Common buzzard *Buteo buteo* |

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| | | | | | Tawny owl *Strix aluco*<br>Common firecrest *Regulus ignicapillus* |

**BirdLife International (2004): SPEC 1 - European species of global conservation concern; SPEC 2 – endangered species, the European population of which exceeds 50% of the global population and their conservation status was assessed as unfavourable; SPEC 3 – endangered species, the European population of which does not exceed 50% of the global population and their conservation status was assessed as unfavourable; Non-SPEC – species not endangered in Europe, but the breeding population of which is concentrated in Europe*

***PRDBA – Polish Red Data Book of Animals – vertebrates: NT – near-threatened species; LC – species of the least concern; DD – data deficient species; NE – non-estimated species*

****No regional red data book of birds*

*****The table also contains two game species (the Eurasian woodcock and the greylag goose), because they are rare species and characteristic of habitat types of high nature value (moist mature forests and water reservoirs overgrowing with vegetation and wetlands)*

*[1]As a result of expert assessment, the species was rated as a resource of low value, because this is a moderately abundant species, widespread in the forests in Pomerania*

*[2]Data from the Monitoring of Polish Birds program indicate that the species increases its abundance in Poland and is currently unthreatened, thus, the expert verification of the resource rating was carried out, and the species rating was lowered to low*

*[3]Data from the Monitoring of Polish Birds program indicate that the species increases its abundance in Poland and is widespread in Poland and is currently unthreatened, thus, the expert verification of the resource rating was carried out, and the species rating was lowered to insignificant*

*[4]Data from the Monitoring of Polish Birds program indicate that the species shows a drop in its abundance in Poland, thus, the expert verification of the resource rating was carried out, and the species rating was increased to low*

*Table 3.47. Evaluation of bird species observed outside the breeding season within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of the migrating population** | | **Threat categories in Europe** | |
|---|---|---|---|
| | | **Species endangered in Europe (SPEC 1, SPEC 2, SPEC 3)[1]** | **Species not endangered in Europe (Non-SPEC, Non-SPEC$^E$, Non-SPEC$^E$W)[2]** |
| Size of resources | Population of European importance (>1% of the European migratory population) | Resources of exceptional value | Resources of high value |
| | Population of national importance (>1% of the migratory population stopping over in Poland) | Resources of high value | Resources of moderate value |
| | Population of regional importance (>1% of the migratory population stopping over in Gdańsk Pomerania) | Resources of moderate value | Resources of low value<br>European golden plover *Pluvialis apricaria* |
| | Population regionally insignificant (< 1% of the migratory population stopping over in Gdańsk Pomerania) | Resources of insignificant value<br>Northern goshawk *Accipiter gentilis*<br>Eurasian curlew *Numenius arquata*<br>Common crane *Grus grus* | Resources of insignificant value<br>Red kite *Milvus milvus*<br>Rough-legged buzzard *Buteo lagopus* |

*[1]SPEC1 – species of global conservation concern; SPEC 2 – endangered species, the European population of which exceeds 50% of the global population and their conservation status was assessed as unfavourable; SPEC 3 – endangered species, the European population of which does not exceed 50% of the global population and their conservation status was assessed as unfavourable (according to BirdLife International, 2004)*

*[2]Non-SPEC – species not endangered in Europe, but the breeding population of which is not concentrated in Europe; Non-SPEC$^E$ – species not endangered in Europe, but the breeding population of which is concentrated in Europe; Non-SPEC$^E$W – species not endangered in Europe, but the wintering population of which is concentrated in Europe*

In the case of birds, breeding sites are very often of an unstable character. This stems, among other, from the dynamics (e.g. the structure of vegetation, water conditions) of the available breeding habitats. In the case of that group of animals, it is not the habitat status of an individual bird pair that is assessed, but the conservation status of the species in the area specified (Zawadzka *et al.*, 2013). The conservation status of all breeding species and those occurring in the survey area outside the breeding season was assessed as appropriate.

As a result of the final assessment, the sites rated at 7 points dominate (67%), 13 sites (27%) were rated at 8 points, 3 sites (6%) (2 sites of the European nightjar and 1 site of the common kingfisher) were rated very high – at 10 points [Figure 3.63]. The sites of the European nightjar are limited to the strip of coastal coniferous forests and the mountain pine brushes, whereas, the sites of the common kingfisher were found near the Lubiatówka Stream.

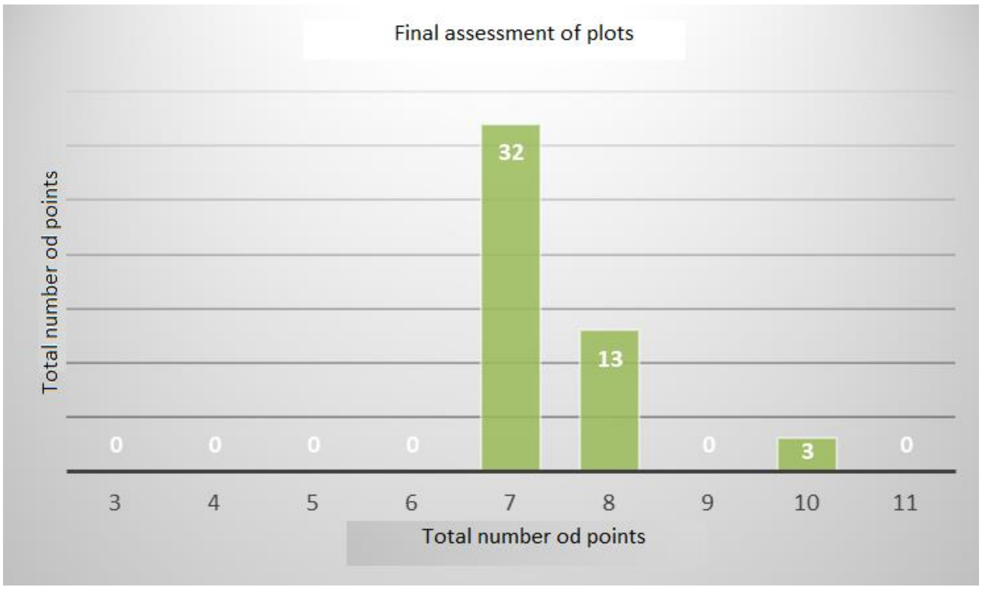



*Figure 3.63. Final assessment of bird sites [Source: internal materials]*

### 3.20.1.13 Mammals

#### 3.20.1.13.1 Characteristics of the mammal species identified excluding bats

Within the Baltica OWF CI impact area, at least 32 mammals species other than bats were found [Table 3.48, Figure 3.64], including:

- 1 species under strict protection;
- 13 species under partial protection;
- 11 game species;
- 3 species included in Annex II of the EU Habitats Directive;
- 1 species included in the Polish Red Book of Animals classified as near-threatened (cat. NT);
- 29 species included in the IUCN global red list;
    - 1 species classified as near-threatened (cat. NT),
    - 29 least concern species (cat. LC);
- 4 not applicable (non-indigenous) species (cat. NA).

In the case of tracks, it is not always possible to identify them to the species, as a result, some determinations are described to the family and genus level.

*Table 3.48. Mammals excluding bats found in the Baltica OWF CI impact area [Source: internal materials]*

| No. | Species | | Conservation status[1] | Threat category[2] | | |
|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB | IUCN (global) | IUCN (Eu) |
| 1. | Roe deer | *Capreolus capreolus* | G | None | LC | LC |
| 2. | European badger | *Meles meles* | G | None | LC | LC |
| 3. | European pine marten | *Martes martes* | G | None | LC | LC |
| 4. | Wild boar | *Sus scrofa* | G | None | LC | LC |
| 5. | Red deer | *Cervus elaphus* | G | None | LC | None |
| 6. | Fallow deer | *Dama dama* | G | NA | LC | LC |
| 7. | Wolf** | *Canis lupus* | SP-1, HD II* | NT | LC | LC |
| 8. | Red fox | *Vulpes vulpes* | G | None | LC | LC |
| 9. | American mink | *Neovison vison* | G | NA | LC | None |
| 10. | Striped field mouse | *Apodemus agrarius* | None | None | LC | LC |
| 11. | Yellow-necked mouse | *Apodemus flavicollis* | None | None | LC | LC |
| 12. | – | *Apodemus sp.* | Not applicable | Not applicable | Not applicable | Not applicable |
| 14. | Wood mouse | *Apodemus sylvaticus* | Partial-1 | None | LC | LC |
| 15. | Bank vole | *Myodes glareolus* | None | None | LC | LC |
| 16/. | Eurasian pygmy shrew | *Sorex minutus* | Partial-1 | None | LC | LC |
| 17. | Common shrew | *Sorex araneus* | Partial-1 | None | LC | LC |
| 18. | Red squirrel | *Sciurus vulgaris* | Partial-1 | None | LC | LC |
| 19. | Mediterranean water shrew | *Neomys fodiens* | Partial-1 | None | LC | LC |
| 19. | Raccoon | *Procyon lotor* | G | NA | LC | None |
| 20. | European pine vole | *Microtus subterraneus* | None | None | LC | LC |
| 21.* | Field vole | *Microtus agrestis* | None | None | LC | LC |
| 22.* | Vole (genus) | *Microtus sp.* | None | None | LC | Not applicable |
| 23. | Raccoon dog | *Nyctereutes procyonoides* | G | NA | LC | None |
| 24. | Shrews | *Soricidae* | Partial-1 | None | Not applicable | Not applicable |
| 25. | European hare | *Lepus europaeus* | G | None | LC | LC |
| 26.* | European beaver | *Castor fiber* | PP-1, HD II | None | LC | LC |
| 27. | Eurasian otter | *Lutra lutra* | PP-1, HD II | None | NT | LC |
| 28. | European mole | *Talpa europaea* | Partial-1 | None | LC | LC |
| 29.* | Harvest mouse | *Micromys minutus* | PP | None | LC | LC |
| 30.* | European water vole | *Arvicola amphibius* | PP | None | LC | LC |
| 31. | European water vole/Brown rat | *Arvicola amphibius/Rattus norvegicus* | PP/none | None | LC/LC | LC/none |
| 32.* | Northern white-breasted hedgehog | *Erinaceus roumanicus* | Partial-1 | None | LC | LC |

| No. | Species | | Conservation status[1] | Threat category[2] | | |
|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB | IUCN (global) | IUCN (Eu) |
| 33.* | Mustelids | *Mustelidae* | Not applicable | Not applicable | Not applicable | Not applicable |

*[1]Pursuant to the Regulation of the Minister of the Environment of 16 December 2016 on the protection of animal species (Journal of Laws of 2016, item 2183): SP – species under strict protection, PP – species under partial protection, 1 – species that are under additional ban on intentional scaring or disturbing; HD II – species listed in Annex II of the EU Habitats Directive; HD II* – priority species listed in Annex II of the EU Habitats Directive; G – game species pursuant to the Regulation of the Minister of the Environment of 11 March 2005 on establishing the list of game species (Journal of Laws of 2005, no. 45, item 433)*
*[2]IUCN (the world and Europe) – Red List of Threatened Species Version 2016-3 (http://www.iucnredlist.org): NT – near threatened species; LC – species of the least concern; PRDBA – Polish Red Data Book of Animals – vertebrates (Głowaciński ed., 2001): NT – near-threatened; NA – not applicable species (that do not belong to the native fauna)*
*+Species observed commonly within the entire Baltica OWF CI area*

The area in which the project is located is relatively homogeneous. Vast forests with local swamps are predominant, while in the area adjacent to the planned substations, there are mainly arable fields. The region of the planned project is one of the less populated areas in the country, which constitutes its great natural value and enables the free occurrence of large groups of herbivores that provide a food supply for the top predator – the wolf. The areas located at unregulated, small watercourses, especially flowing across forest areas, constitute unique areas that provide a favourable location for the development of large mammal populations. The area analysed is used for recreational purposes basically only in summer, since only then, there is an increase in the human presence and there is a risk of disturbance to wildlife.

The mammal groups observed are not unique nationally or regionally. However, their habitats are distinguished by good conservation status, which is evidenced by the presence of predators such as wolfs. This species, which has been re-inhabiting the areas from which it had been displaced, and the conservation of which is currently one of the priorities of the Polish environmental protection; because it is an umbrella species, its conservation entails the conservation of many other species and habitats. The otter is occasionally observed in the coastal watercourses, and in the watercourses located further from the seashore, the beaver can be encountered, which transforms its habitats by water damming, which is favourable for other animal groups and locally enhances biodiversity. Waterlogged areas near the boundary of water reservoirs, wetlands and reed beds constitute areas of exceptional value for small mammal groups both insectivorous as well as rodents.

On the basis of the results of mammal trapping in live traps, registering tracks on discs and recordings of mammals from camera traps for individual mammal survey areas, the Shannon-Wiener diversity index was calculated which enabled the assessment of biodiversity at individual stations [Table 3.49].

*Table 3.49. Results of the Shannon-Wiener index value for individual sites [Source: internal materials]*

| Site | Number of the species identified | Number of observations | Shannon-Wiener index value[1] |
|---|---|---|---|
| 2 | 7 | 19 | 0.760 |
| 5 | 4 | 18 | 0.565 |
| 6 | 9 | 23 | 0.770 |

*[1]Maximum value indicating the highest possible biodiversity is when $H^I = 1$*

Sites 2 and 6, where the biodiversity index exceeded 0.7, can be treated as sites with an average species richness. Site 5 received a very low mammal species diversity index. At all sites, a single species under partial protection was recorded – Eurasian pygmy shrew *Sorex minutus* [Figure 3.64].


*Figure 3.64. Location of the Eurasian pygmy shrew Sorex minutus sightings in the vicinity of the planned Baltica OWF CI [Source: internal materials]*

Apart from the species strongly connected to water (otter and beaver), most species is not connected directly to a single, specified type of land cover or such species occupy areas large enough to make it impossible to precisely demarcate the boundaries of their sites.

From this group, only a single site of the otter and a single site of the beaver are located within the cable bed indirect and direct impact areas, with no sites within the direct and indirect impact areas of the OnSS and the access road to the OnSS [Table 3.50, Figure 3.65].

*Table 3.50. Sites of protected, endangered and rare species of mammals found within the Baltica OWF CI impact area [Source: internal materials]*

| Species no. | Species | | Conservation status[1] | Threat category | | Resource assessment | |
|---|---|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB[2] | IUCN[3] | Descriptive | Points |
| **Cable bed direct impact area** | | | | | | | |
| 1 | Eurasian beaver | *Castor fiber* | PP, HD II | None | LC | Insignificant | 5 |
| 2 | Eurasian otter | *Lutra lutra* | PP, HD II | None | NT | Insignificant | 6 |
| **Cable bed indirect impact area** | | | | | | | |
| 1 | Eurasian beaver | *Castor fiber* | PP, HD II | None | LC | Insignificant | 5 |
| 2 | Eurasian otter | *Lutra lutra* | PP, HD II | None | NT | Insignificant | 6 |
| Land-sea drilling zone (cable bed indirect impact area) | | | | | | | |
| None | | | | | | | |
| **OnSS direct and indirect impact area** | | | | | | | |
| - | None | | - | - | - | - | - |
| **Direct and indirect impact areas of the access road to the OnSS** | | | | | | | |
| - | None | | - | - | - | - | - |

*[1]Pursuant to the Regulation of the Minister of the Environment of 16 December 2016 on the protection of animal species (Journal of Laws of 2016, item 2183): SP – species under strict protection, PP – species under partial protection; HD II – species listed in Annex II of the Habitats Directive; HD II* – priority species listed in Annex II of the EU Habitats Directive*
*[2]PRDBA – Polish Red Data Book of Animals – vertebrates: NT – near threatened species; LC – species of the least concern*
*[3]IUCN (the world and Europe) – Red List of Threatened Species Version 2016-3 (http://www.iucnredlist.org): NT – near threatened species; LC – species of the least concern*

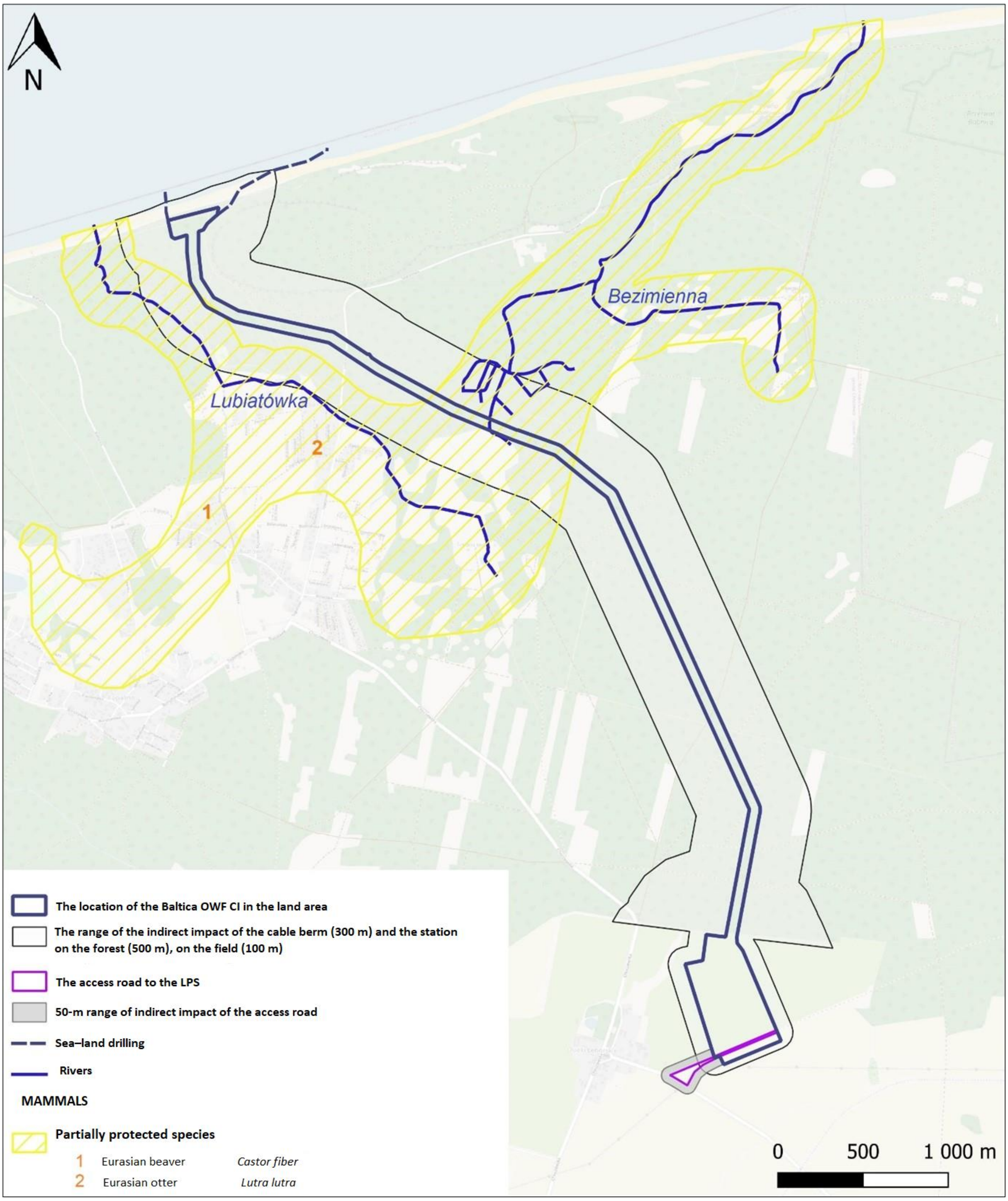



*Figure 3.65. Sites of mammals excluding bats found in the Baltica OWF CI impact area [Source: internal materials]*

### 3.20.1.13.2 Bat species diversity

Within the Baltica OWF CI impact area, at least 8 species and 3 groups of bats were found [Table 3.51], including:

- all species under strict protection;
- 10 species included in the IUCN global red list in the LC category – species of least concern.

*Table 3.51. Bat species found in the Baltica OWF CI impact area [Source: internal materials]*

| No. | Species | | Conservation status[1] | Threat category[2] | |
|---|---|---|---|---|---|
| | Species name | Binomial nomenclature | | PRDB | IUCN |
| 1. | Serotine bat | *Eptesicus serotinus* | SP-1 | None | LC |
| 2. | Common noctule | *Nyctalus noctula* | SP-1 | None | LC |
| 3. | Nathusius' pipistrelle | *Pipistrellus nathusii* | SP-1 | None | LC |
| 4. | Common pipistrelle | *Pipistrellus pipistrellus* | SP-1 | None | LC |
| 5. | Soprano pipistrelle | *Pipistrellus pygmaeus* | SP-1 | None | LC |
| 6. | Brown long-eared bat | *Plecotus auritus* | SP-1 | None | LC |
| 7. | Daubenton's bat | *Myotis daubentoniid* | SP-1 | None | LC |
| 8. | Natterer's bat | *Myotis nattereri* | SP-1 | None | LC |
| 9. | Noctule-Eptesicus-Vespertilio (group) | *Nyctalus-Eptesicus-Vespertilio* | SP-1 | N/A | N/A |
| 10. | Mouse-eared bats (group) | *Myotis sp.* | SP-1 | N/A | N/A |
| 11. | Pipistrelles (group) | *Pipistrellus sp.* | SP-1 | N/A | N/A |

*[1]Pursuant to the Regulation of the Minister of the Environment of 16 December 2016 on the protection of animal species (Journal of Laws of 2016, item 2183): SP – species under strict protection; 1 – species that are under additional ban on intentional scaring or disturbing;*
*[2]PRDBA – Polish Red Data Book of Animals – vertebrates (Głowaciński ed., 2001): VU – vulnerable species, LC – least concern species; IUCN – Global Red List of Animals IUCN (IUCN 2015): LC – least concern species*

The bat species found belong mostly to the species typical and common in the region.

#### 3.20.1.13.3 Spring migrations of bats

To assess the significance of particular fragments of the area within the area and vicinity of the planned project, the density of sighting (flight) points along particular transects was counted. A continuous sequence of echolocation impulses for a single species with fixed intervals between individual sounds was regarded as a single flight. If the interval between a continuous sequence of impulses was four times longer than the interval between individual impulses, they were treated as separate flights. The density was calculated according to the formula $\frac{N}{l}$. where *N* stands for the number of flights along a particular transect, and *l* stands for the length of a transect expressed in kilometres. This made it possible to indicate the transects with the highest bat activity.

The highest bat activity was recorded along transect 8 between the villages of Bychowo and Słuchowo as well as the villages of Osieki Lęborskie and the estuary of the Bezimienna Stream. The increased activity near the Bezimienna Stream and the forests of the coastal strip may be connected to the flights of pipistrelles, which migrate along the Baltic Sea coast (Ciechanowski *et al.*, 2015) [Table 3.52, Figure 3.66].

*Table 3.52. Bat activity in the spring of 2016 at individual transects [Source: internal materials]*

| Transect number | Transect name | Transect length [m] | Number of bat flights | Number of bat flights·km$^{-1}$ of a transect |
|---|---|---|---|---|
| 6 | Osieki–Sluchowo–Lublewko | 6.89 | 14 | 2.03 |
| 7 | Roza_Wiatrow-Osieki | 5.98 | 2 | 0.33 |
| 8 | Osieki–Bezimienna | 6.24 | 67 | 10.74 |
| 9 | Biebrowo–Osieki | 6.77 | 14 | 2.07 |
| 11 | Lubiatowo–Roza_Wiatrow | 6.23 | 37 | 5.94 |
| 12 | Beach–Kierzkowo | 7.73 | 50 | 6.47 |

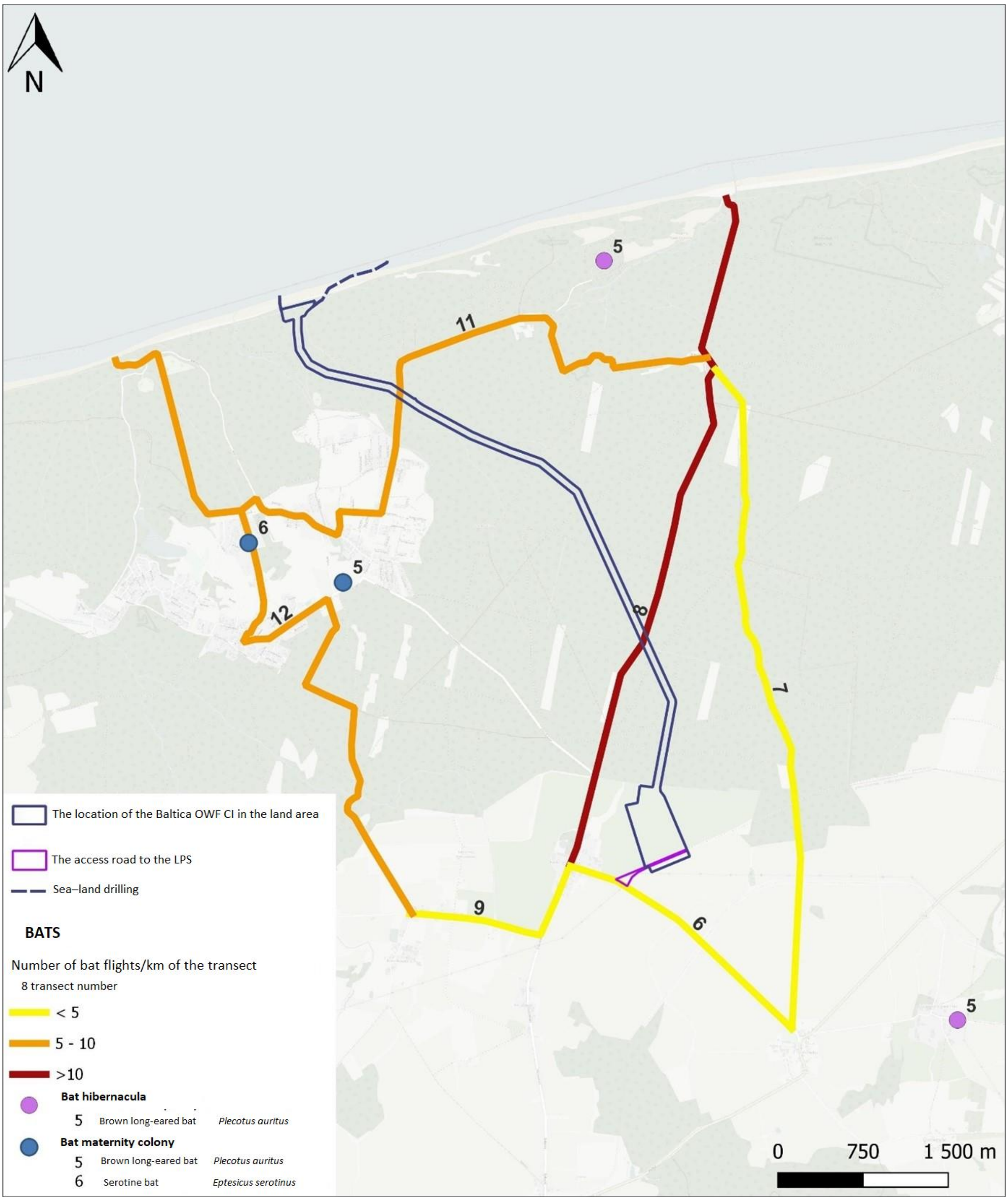



*Figure 3.66. Bat activity in the spring of 2016 at individual transects [Source: internal materials]*

#### 3.20.1.13.4 Breeding period

In summer, the transects were divided into shorter survey sections with a length of approx. 3–5 km due to a shorter night, thus, it was necessary to adjust the transect survey sections to the bat activity in that phenological period.

Worth noting are the transects with the number of flights greater than 10 flights·km$^{-1}$ (transects No.18 and 21) [Table 3.53, Figure 3.67]. Tree alleys and low-rise buildings are mainly located along the transects mentioned. Such locations are characterised by a large number of insects, thus, they constitute attractive feedings grounds.

*Table 3.53. Bat activity in the summer of 2016 at individual transects [Source: internal materials]*

| Transect number | Transect name | Transect length [km] | Number of bat flights | Number of bat flights·km$^{-1}$ of a transect |
|---|---|---|---|---|
| 11 | Lublewo–Osieki Lęborskie | 3.930 | 7 | 1.78 |
| 15 | Lublewko–forest | 4.249 | 35 | 8.24 |
| 16 | Beach–forest | 3.366 | 19 | 5.64 |
| 18 | Kierzkowo–parking | 3.600 | 39 | 10.83 |
| 19 | Szklana Huta–parking | 2.877 | 14 | 4.87 |
| 20 | Lubiatowo–Mimo Wszystko | 3.269 | 14 | 4.28 |
| 21 | Lubiatowo | 2.922 | 33 | 11.29 |
| 22 | Lubiatowo–Kopalino | 3.499 | 4 | 1.14 |
| 23 | Kopalino 1 | 2.179 | 9 | 4.13 |
| 24 | Kopalino 2 | 2.052 | 1 | 0.49 |

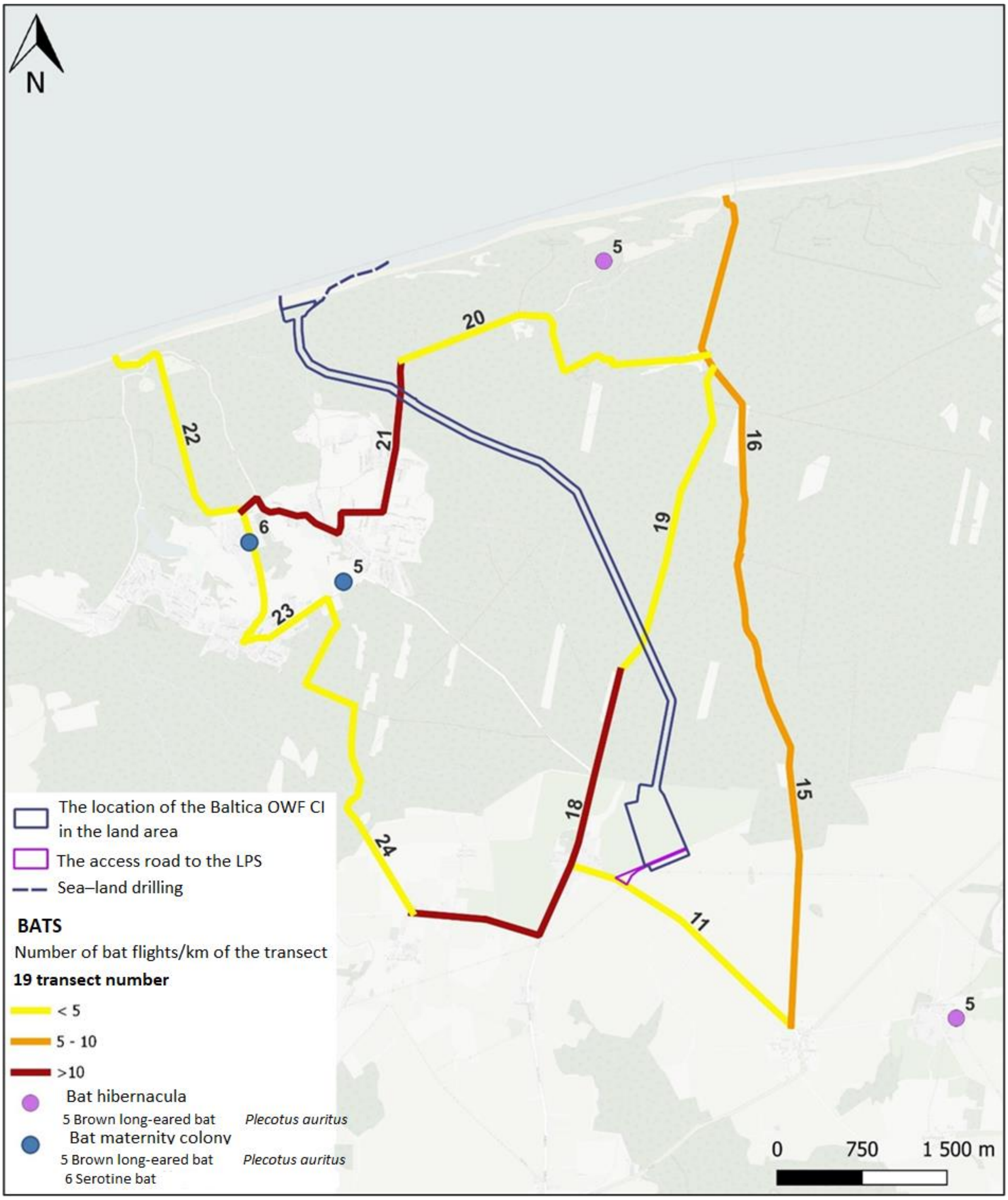



*Figure 3.67. Bat activity in the summer of 2016 at individual transects [Source: internal materials]*

#### 3.20.1.13.5 Bat autumn migrations

In autumn, the activity of bats was very low at all transects crossing the Baltica OWF CI area or in its vicinity. Low activity was recorded in all habitat types: in forests, in the beach area as well as in open areas [Figure 3.68].

*Table 3.54. Bat activity in the autumn of 2016 at individual transects [Source: internal materials]*

| Transect number | Transect name | Transect length [m] | Number of bat flights | Number of bat flights·km$^{-1}$ of a transect |
|---|---|---|---|---|
| 2 | Lubiatowo–Kierzkowo | 7.67 | 24 | 3.13 |
| 3 | Lubiatowo–Bezimienna | 7.77 | 14 | 1.80 |
| 4 | Szklana Huta–Kierzkowo | 6.56 | 17 | 2.59 |
| 5 | Szklana Huta–Osieki | 8.48 | 9 | 1.06 |

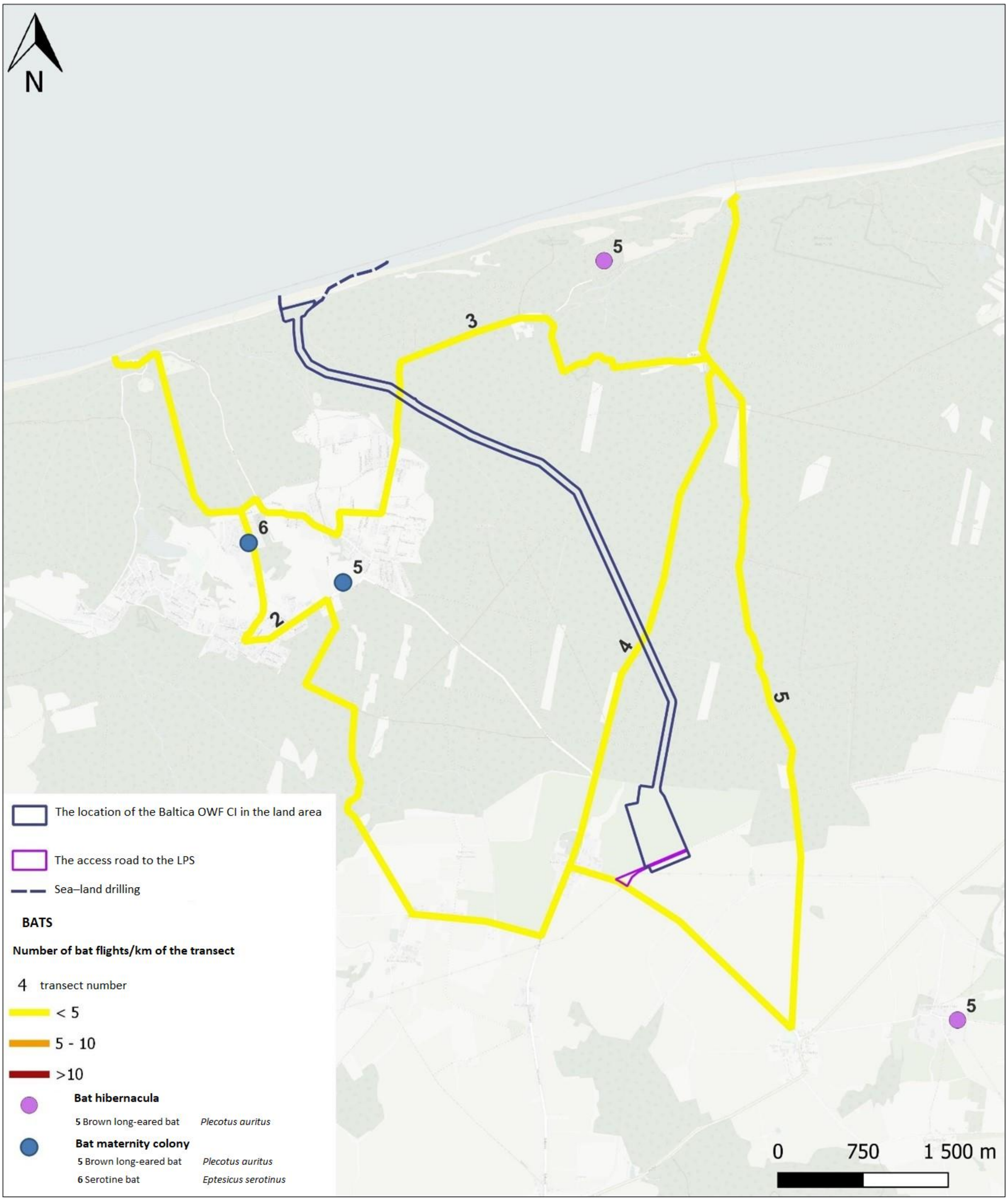



*Figure 3.68. Bat activity in the autumn of 2016 at individual transects [Source: internal materials]*

#### 3.20.1.13.6 Long-distance bat migrations

The planned project is located within the flight zone of bat species migrating along the Baltic Sea coast (Ciechanowski *et al.*, 2015). During surveys, no increased activity of the migratory species was observed, which would enable delineating detailed migratory routes along the coast. This may be related to the diverse times of migration or the failure to capture its peak during surveys.

#### 3.20.1.13.7 Bat occurrence sites

**Bat breeding grounds**

Bats choose dry and warm places, such as tree hollows, bird and bat boxes, attics, cracks in roofs and building walls, as their breeding colony locations. Such locations are inhabited only by females with offspring, while males occupy other hiding places at that time. The number of individuals within a colony is very changeable and depends both on the location occupied as well as the bat species, and may count from several, approx. dozen (most colonies of the serotine bat and the brown long-eared bat) up to several hundred individuals (some pipistrelle colonies). The size of a colony and the type of the hiding place occupied affect its detectability – in the case of small colonies, several to a dozen of individuals take part in the morning swarming before entering the hiding place, which makes it short-lived and less noticeable. Detectability of hiding locations can be also decreased when the entry is located in a building on private property, invisible from the public area.

2 existing breeding colonies were detected in the vicinity of the planned project [Table 3.55]. They are located at a distance of approx. 1.7 km and 1.8 km from the planned project. Bats from the colonies identified belong to bat species with high habitat flexibility, which change their hiding places also during the reproductive period.

*Table 3.55. Bat breeding colonies found within the Baltica OWF CI impact area [Source: internal materials]*

| Site number | Location | Type of structure | Bat species reported | Abundance of bats |
|---|---|---|---|---|
| 1 | Kopalino Site | Summer house, under roof soffit | Serotine bat *Eptesicus serotinus* | 8 |
| 8 | Lubiatowo | Palace (headquarters of the Maritime Office in Gdynia), attic | Brown long-eared bat *Plecotus auritus* | 30 |

**Winter roosts of bats**

No winter roosts were found in the project area nor in its vicinity. Bats, depending on the species, choose underground locations with low, above 0° C, constant temperature and high humidity, tree hollows or overground parts of buildings, as their winter roosts. In the case of tree hollows or overground parts of buildings, detecting such winter roosts is very difficult and often almost impossible.

The bat winter roost nearest to the planned project is the one located inside the remnants of a 46 DOAR command shelter adopted by the Choczewo Forest Inspectorate as a winter roost (approx. 1.9 km away from the planned project). Another winter roost identified was a dugout basement in the village of Lublewo Lęborskie (approx. 3.3 km away from the planned project) [Table 3.56].

*Table 3.56. Bat wintering roosts found in the Baltica OWF CI impact area [Source: internal materials]*

| Site number | Location | Type of structure | Bat species reported | Abundance of bats |
|---|---|---|---|---|
| 11 | *Wydma* | Remnants of a 46 DOAR command shelter adopted by the Choczewo Forest | Brown long-eared bat | 4 |

| Site number | Location | Type of structure | Bat species reported | Abundance of bats |
|---|---|---|---|---|
| | *Lubiatowska* dune | Inspectorate as a bat winter roost | *Plecotus auritus* | |
| 13 | Lublewo Lęborskie | Secured dugout basement used as intended | Brown long-eared bat *Plecotus auritus* | 1 |

#### 3.20.1.14 Evaluation of mammals species and their sites

The inventoried species were organised in a matrix, taking into consideration, on the one hand, the conservation status and threat category on an international, national and local scale and, on the other hand, the frequency of occurrence in the country and Gdansk Pomerania [Table 3.57].

*Table 3.57. Evaluation of protected mammal species found within the Baltica OWF CI impact area [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Pomerania** | **Species abundant or moderately abundant in Poland and rare in Pomerania** | **Species abundant or moderately abundant in Poland and in Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally, excluding categories NT, LC, DD and NE[1] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally, excluding NT, LC and DD categories[2] | Resources of high value | Resources of moderate value | Resources of low value | Resources of low value |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania, excluding categories NT, LC and DD | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |
| | Species subject to protection under the national law and not endangered nationally in Poland nor in Gdańsk Pomerania | Resources of low value<br>Wolf *Canis lupus** | Resources of insignificant value | Resources of insignificant value<br>Mediterranean water shrew *Neomys fodiens*<br>Harvest mouse *Micromys minutus* | Resources of insignificant value<br>Eurasian otter *Lutra lutra*<br>Soprano pipistrelle *Pipistrellus pygmaeus*<br>Nathusius' pipistrelle *Pipistrellus nathusii*<br>Common pipistrelle *Pipistrellus pipistrellus*<br>Serotine bat *Eptesicus serotinus*<br>Common noctule *Nyctalus noctula*<br>Brown long-eared bat *Plecotus auritus*<br>Red squirrel *Sciurus vulgaris*<br>Wood mouse *Apodemus sylvaticus*<br>Eurasian pygmy shrew *Sorex minutus*<br>Common shrew *Sorex araneus* |

| Evaluation of species | | Prevalence | | | |
|---|---|---|---|---|---|
| | | Species rare both in Poland and in Gdańsk Pomerania | Species rare in Poland and abundant or moderately abundant in Pomerania | Species abundant or moderately abundant in Poland and rare in Pomerania | Species abundant or moderately abundant in Poland and in Pomerania |
| | | | | | European mole *Talpa europaea*<br>European beaver *Castor fiber*<br>European water vole *Arvicola amphibius*<br>Northern white-breasted hedgehog *Erinaceus roumanicus* |

*[1]IUCN (the world and Europe) – Red List of Threatened Species Version 2016-3 (http://www.iucnredlist.org): NT – near-threatened species; LC – species of the least concern; DD – data deficient species; NE – non-estimated species*

*[2]PRDBA – Polish Red Data Book of Animals – vertebrates (Głowaciński ed., 2001): NT – near-threatened species; LC – species of the least concern; DD – data deficient species*

**As a result of expert assessment, the species value was increased to a moderate value (see: Table 3.50)*

## 3.20.2 Protected areas, including Natura 2000 sites

### 3.20.2.1 Protected areas other than Natura 2000 sites

The onshore area of the planned project runs across areas of varying nature values. The most valuable areas are under legal protection [Figure 3.69].

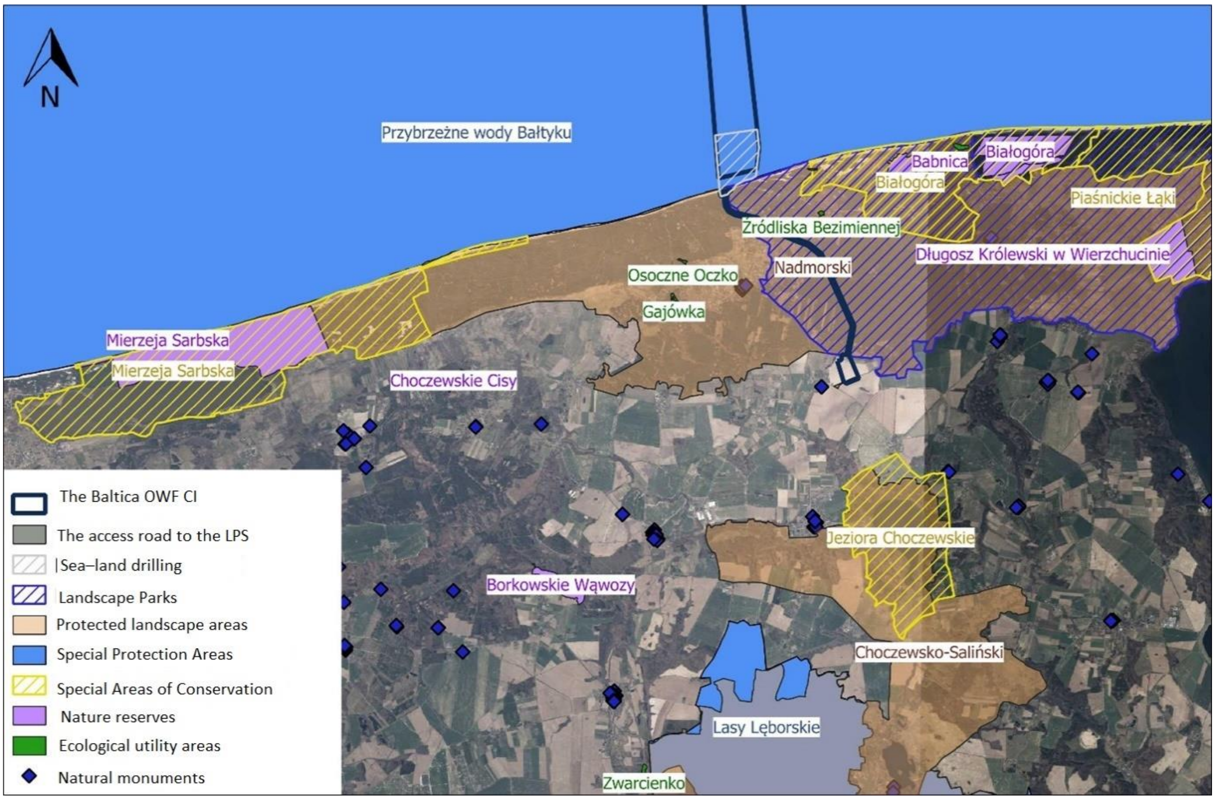



*Figure 3.69. Forms of environmental protection within the onshore area of the Baltica OWF CI [Source: internal materials]*

**Coastal Protected Landscape Area**

Almost the entire onshore area of the planned project with the exception of the extreme southern part, where the construction of the substations and busbar systems with a length of 6.1 km to connect to the NPS is planned, is located within the boundaries of the Coastal Protected Landscape Area established under the Regulation No. 5/94 of the Gdańsk Voivodeship Governor of 8 November 1994 (Official Journal of the Gdańsk Voivodeship No. 27, item 139). The main value of this area is the characteristic of the coastal zone, a strip-like arrangement of natural environment types, including fragments of morainic plateau, peaty, waterlogged plain with meadows and pasture lands as well as a dune spit with a coastal pine forest.

In accordance with the Resolution No. 259/XXIV/16 of the Pomorskie Regional Assembly of 25 July 2016 on the protected landscape areas in the Pomorskie Voivodeship (Official Journal of the Pomorskie Voivodeship, item 2942), the following is prohibited within the boundaries of the area:

1) killing wild animals, destroying their burrows, lairs, other shelters as well as breeding and spawning grounds, spawned eggs, with the exception of amateur fishing and activities related to rational agricultural, forest, fishery and hunting management;

2) implementing undertakings that could significantly affect the environment within the meaning of the provisions of Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessments* (Journal of Laws of 2021, item 247, as amended);
3) eliminating and destroying mid-forest, roadside, and near-water woodlots, if this does not result from the need to provide protection against flooding and to ensure the safety of road or waterway traffic or to construct, reconstruct, maintain, repair, or renovate water facilities;
4) extracting rocks, including peat and fossils, including fossilised plant and animal remains as well as minerals and amber, for commercial purposes;
5) conducting earthworks permanently distorting the topographical relief, with the exception of works connected to anti-storm, flood or landslide protection or the maintenance, construction, reconstruction, repair, or renovation of water facilities;
6) implementing changes in water relations, if they are applied for purposes other than environmental protection or sustainable use of arable and forest lands and rational water or fisheries management;
7) eliminating natural water reservoirs, oxbow lakes, and swampy wetlands;
8) constructing new building structures within a belt with a width of 100 m from:
   a) river, lake, and other natural water reservoir shorelines,
   b) the edge of water table of artificial water reservoirs located at flowing waters at a normal damming level specified in the water permit mentioned in Article 122 section 1 point 1 of the Water Law Act of 20 July 2017 with the exception of water facilities and objects intended for the purpose of rational agricultural, forest, and fishery management.

Pursuant to Article 24 section 2(c), the above-mentioned prohibitions do not apply to public purpose investments, which, in compliance with Article 6 point 4(a) of the Act of 21 August 1997 *on real estate management* (Journal of Laws of 2021, item 1990, as amended), include the construction and maintenance of OWFs.

**The Polish Coastal Landscape Park**

The OnSS area is located in the immediate vicinity of the Coastal Landscape Park established under the Resolution No. IX/49/78 of the Voivodeship National Council in Gdańsk on 5 January 1978.

**Nature reserves**

No nature reserves are located along the onshore route of the Baltica OWF CI. The following nature reserves are located nearest to the planned project:

- Babnica – at a distance of approx. 2.75 km south-east of the Baltica OWF CI;
- Białogóra – at a distance of approx. 4.53 km south-east of the Baltica OWF CI.

**Ecological areas**

No ecological areas are located along the onshore route of the Baltica OWF CI. The *Źródliska Bezimiennej* [the Bezimienna springs] ecological area is located the nearest to the planned project, at a distance of approx. 0.76 km.

**Natural monuments**

No natural monuments are located along the onshore route of the Baltica OWF CI. The natural monument in the form of a small-leaved lime tree *Tilia cordata* is located the nearest to the planned project in Osieki Lęborskie, at a distance of approx. 0.59 km. A group of approx. 14 natural monuments, including common yew *Taxus baccata*, common beech *Fagus sylvatica*, common oak *Quercus robur*, and small-leaved lime *Tilia cordata*, is located at a distance of approx. 2 km in Lubiatowo.

#### 3.20.2.2 Natura 2000 sites

No Natura 2000 sites are located along the onshore route of the Baltica OWF CI. The following Natura 2000 sites are located the nearest to the planned project:

- *Białogóra* PLH220003 – at a distance of approx. 1.3 km;
- *Jeziora Choczewskie* PLH220096 – at a distance of approx. 2.55 km;
- *Mierzeja Sarbska* PLH220018 – at a distance of approx. 4.5 km.

**Białogóra PLH220003**

One of two places on the Gdańsk Pomerania coast, where the processes of paludification of the mineral substrate take place at present. The habitats listed in Annex I to the Council Directive 92/43/EEC – 10 types – occupy almost 40% of the area. In the area, there is a complex of peatlands and forests unique to the southern shores of the Baltic Sea which create a natural series of ecological succession. Also, plant communities of Atlantic character such as *Eleocharitetum multicaulis* association, *Rhynchosporetum fuscae* association, *Ericetum tetralicis* association, *Myricetum gale* association, which are very rare on a national scale, were found there in dense patches and covering relatively large surfaces, as well as a coastal form of marshy coniferous forest with the cross-leaved heath *Erica tetralix* and sweetgale *Myrica gale*, a humid, rare on a regional scale, form of crowberry coniferous forest, fragments of well-preserved bog birch forest and birch and oak as well as beech and oak forests (the latter only at the forehead of a parabolic dune). The flora of vascular plants and spore plants including lichen flora, with many species of Atlantic range type is unique. A number of those species are present there with populations of several hundred and thousand representatives, e.g. spoonleaf sundew *Drosera intermedia*, brown beak-sedge *Rhynchospora fusca*, sweetgale *Myrica gale*, and cross-leaved heath *Erica tetralix*. One of the 5 plots of *Eleocharis multicaulis* in Poland, and the only one in Gdańsk Pomerania is located there. This area has an exceptional landscape value.

In compliance with the binding SDF, no plant or animal species is subject to protection in the area, no species with motivation D was mentioned, as well.

**Jeziora Choczewskie PLH220096**

This area includes two northernmost lobelia lakes of Poland (Lake Choczewskie and Lake Czarne) together with a part of their catchment areas. They are located in a forest (Lake Czarne) or forest-agricultural landscape (Lake Choczewskie), with acidophilous oak forests and alder carrs dominant in the catchment areas. Those lakes have significant, as for lobelia lakes, surface areas; Lake Czarne is also quite deep (max. 21 m).

Lake Choczewskie is a shallow, mesotrophic lake and a reservoir relatively rich in calcium. The characteristic feature of this lake's vegetation is the co-existence of plant communities from the class Littorelletea (*Isoëto-Lobelietum littorelletosum*, small patches of *Isoëto-Lobelietum lobelietosum*), Charetea (mainly *Charetum asperae*) and from the Potamion association (e.g. *Potametum lucentis*).

Lake Czarne is an oligotrophic reservoir with acidic water (pH 5.25) and low in calcium and carbonates (content of Ca 6.7 mg/dm$^3$), with law electrical conductivity (28 S/cm). That lake has been strongly transformed as a result of being included into the drainage network and the constant flow of drainage water. As a result, the lake water is rich in humic substances and is heavily coloured (240 mg Pt/dm$^3$). Submerged vegetation is scarce, poorly-developed and limited to the depths of

0.5 m. Patches of *Isoëto-Lobelietum typicum* and *Isoëtetum echinosporae* can be found in the littoral zone. The only species reported in the SDF, in compliance with the literature, is the floating water-plantain *Luronium natans* (Lake Choczewskie).

**Mierzeja Sarbska PLH220018**

The area covers a narrow strip between the Baltic Sea and a crypto-depressive Lake Sarbsko, and moreover, the lake itself. This lake is one of the 11 salt water coastal lakes in Poland. The sanctuary constitutes a unique complex of embankment and parabolic dunes (partially shifting) with vegetation that constitutes a complex of white dune, grey dune and crowberry heathland communities as well as crowberry forests of diversified humidity. Dune slacks are filled with shallow peat. Unique plant communities of moist depressions form on them, for example, bog-myrtle bushes, beak-rush bushes, wet willow and erica heathlands, with vanishing, rare plots in Poland. Apart from the predominant crowberry coniferous forests, bog woodlands, alder and bog birch forests can be found here. A significant part of the area (approx. 30% of its surface area) is protected as a nature reserve Sarbska Spit. The SDF lists three species included in Annex II of the EU Habitats Directive: lesser ramshorn snail *Anisus vorticulus*, grey seal *Halichoerus grypus* and *Linaria loeselii*.

### 3.20.3 Wildlife corridors

The location area of the planned project intersects longitudinally the wildlife corridor KPn-20C *Pobrzeże Kaszubskie* [Kashubian Coast]. This is an element of the Northern Corridor (KPn) – one of the 7 main corridors, which constitute the sections of the Pan-European corridors, and their role is to ensure ecological connectivity nationally and continentally [Figure 3.70]. **The Northern Corridor (KPn)** connects the Augustów Primeval Forest, the Knyszyn Forest and the Białowieża Forest with the Biebrza River Valley, the Pisz Forest, the Napiwodzko-Ramucka forests and the Iława Lake District. It runs across the Vistula River Valley to the Tuchola Forest, the Kashubian Lake District, the Koszalin, Goleniów and Wkrza Forests. Running across the Wałeńskie and Krajeńskie Forests it connects also with the Drawsko Forest, and further reaches the Cedynia Landscape Park via the Gorzów Wielkopolski Forest (https://korytarze.pl/mapa/mapa-korytarzy-ekologicznych-w-polsce).

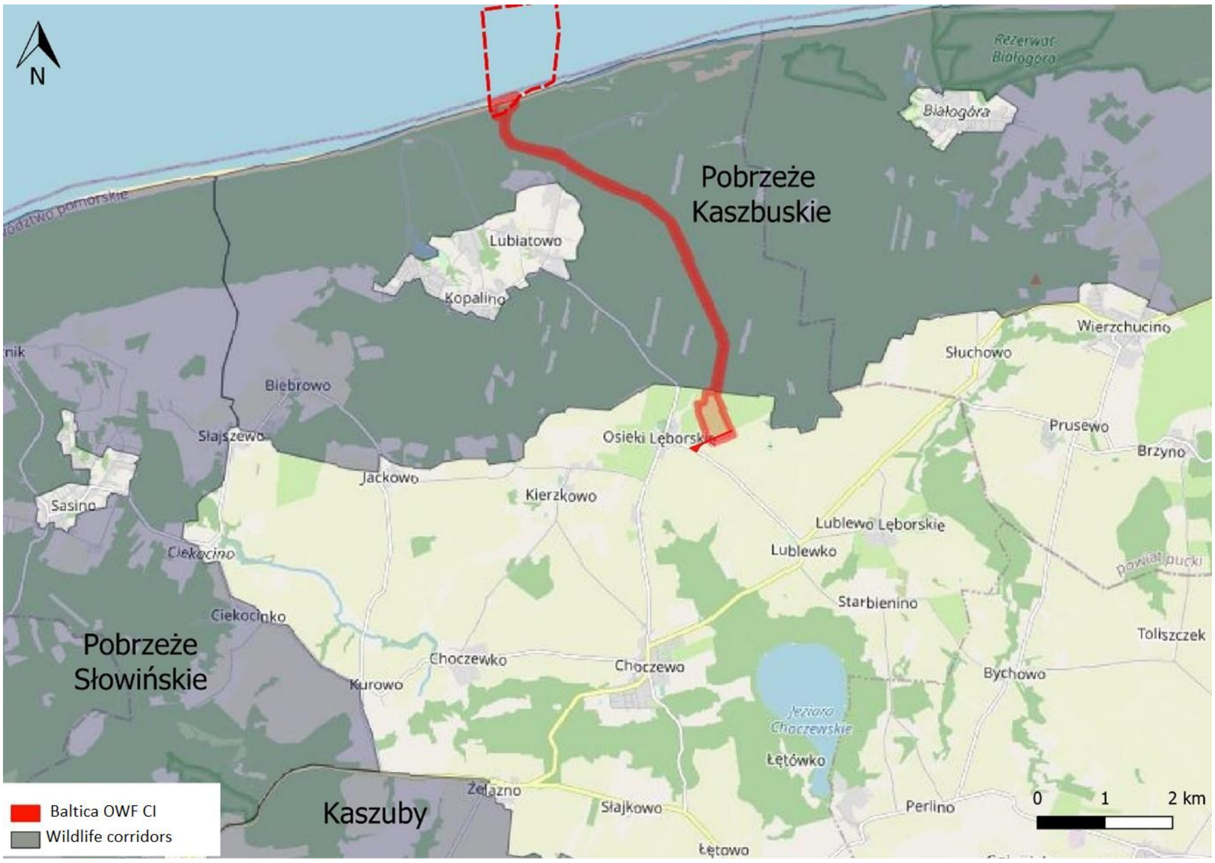



*Figure 3.70. Location of the Baltica OWF CI within the Northern Corridor fragment (KPn) [Source: internal materials based on https://korytarze.pl/mapa/mapa-korytarzy-ekologicznych-w-polsce]*

The routes of corridors delineated in Poland are specified in detail in the Pomorskie Voivodeship Spatial Development Plan (Resolution No. 318/XXX/16). The location area of the planned project intersects longitudinally the Coastal Wildlife Corridor of supra-regional importance running along the Hel Peninsula and the Baltic Sea coast within the boundaries of the Puck, Wejherowo, Lębork and Słupsk districts [Figure 3.71].


*Figure 3.71. Location of the Baltica OWF CI within the ecological structure of the Pomorskie Voivodeship [Source: internal materials based on the Pomeranian Voivodeship Spatial Development Plan; https://pbpr.pomorskie.pl/plan-zagospodarowania-wojewodztwa/]*

### 3.20.4 Biodiversity

One of the indicators of a good environmental status is its biodiversity. In accordance with Article 2 of the Convention on biodiversity, biodiversity should be understood as a diversification of all living organism forms, for example, terrestrial, marine and other aquatic ecosystems and the ecological complexes, which they are a part of. It refers to diversity within species (genetic diversity), between species and between ecosystems.

The occupation of areas of high nature value for investment purposes, particularly in areas touristically attractive, is undoubtedly associated with the loss of biodiversity, causing fragmentation of habitats and the introduction of further barriers that constitute an obstacle to the migration of species and the maintenance of the ecological continuity of many populations and ecosystems. In the case of the planned project, we have a touristically attractive area, and additionally, an area of increased nature values due to its location within the boundaries of a forest, which is usually characterised by higher biodiversity, as well as the Coastal Protected Landscape Area. The Baltica OWF CI runs across areas of high diversity of habitats and the associated plant, fungi and animal species. The area is also valuable in terms of biodiversity because the planned project is located in the coastal zone; thus, there are many species of Atlantic character, which are encountered in the Gdańsk Pomerania quite commonly, however, in the scale of the entire country they are rare or very rare. Also, some of the natural habitats (2120, *2130 and 2180) are encountered only in this part of the country. They are typically developed in terms of species composition and community structure.

### 3.20.5 Environmental valorisation of the area

With reference to all natural habitats and plant, fungi and animal species inventoried, an assessment of their value was carried out. For that purpose, unambiguous and repeatable criteria were taken into consideration, resulting from:

- in the case of plant and animal species – inclusion of the species discussed in the list of protected species under national and/or EU law and/or in international, national or regional red lists of threatened, rare and endangered species;
- in the case of natural habitats – general assessment of the natural habitat status within the bio-geographical region on the basis of the report for the years 2013–2018 (http://siedliska.gios.gov.pl/pl/projekt-raportow-do-ke/projekt-raportow/) and the acknowledgement of the habitat as a priority regardless of the general assessment of their status.

*Table 3.58. Assessment of the value of the protected plant, fungi and animal species identified [Source: internal materials]*

| Evaluation of species | | Prevalence | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species subject to protection under the national and/or EU law and endangered internationally, excluding the following categories:<br>a) for fungi, lichens, mosses and liverworts, vascular plants, terrestrial invertebrates, water invertebrates, herpetofauna and mammals: NT, LC, DD and NE[1];<br>b) for birds: SPEC 1, SPEC 2, SPEC 3[11] | Resources of exceptional value | Resources of high value<br>Red kite *Milvus milvus*<br>Common kingfisher *Alcedo atthis*<br>European nightjar *Caprimulgus europaeus*<br>Eurasian woodcock *Scolopax rusticola*[1]*****<br>Common crane *Grus grus*[2] | Resources of moderate value | Resources of low value<br>Woodlark *Lullula arbore*[3] |
| | Species subject to protection under the national and/or EU law and endangered nationally excluding the following categories:<br>a) for fungi: I[2];<br>b) for lichen: NT, LC and DD[4];<br>c) for mosses and liverworts: I[6];<br>d) for vascular plants: NT, LC and DD[7];<br>e) for terrestrial and water invertebrates: NT, LC and DD[9];<br>f) for herpetofauna, birds and mammals: NT, LC and DD[10] | Resources of high value<br>Eagle's claws lichen *Anaptychia ciliaris*<br>Smooth snake *Coronella austriaca* | Resources of moderate value<br>Jellied bolete *Suillus flavidus*<br>Bristly beard lichen *Usnea hirta*<br>Dotted ribbon lichen *Ramalina fastigiata*<br>Cartilage lichen *Romalina fraxinea*<br>*Pleurosticta acetabulum*<br>Cross-leaved heath *Erica tetralix*<br>Sweetgale *Myrica gale* | Resources of low value | *Resources of low value*<br>Farinose cartilage lichen *Ramalina farinacea*<br>Bruch's pincushion *Ulota bruchii*<br>Crisped pincushion moss *Ulota crispa* |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania, excluding the following categories: | Resources of moderate value | Resources of low value | Resources of low value | Resources of insignificant value |

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| | a) for fungi, mosses and liverworts, terrestrial invertebrates, water invertebrates, herpetofauna, birds and mammals: [3];<br>b) for lichen: NT, LC and DD[5];<br>c) for vascular plants: NT, LC and DD[8] | | | | |
| | Species subject to protection under the national law and not endangered nationally in Poland and in Gdańsk Pomerania | Resources of low value<br>Sand sedge *Carex arenaria*<br>Marsh Labrador tea *Ledum palustre*<br>Northern goshawk *Accipiter gentilis*<br>Long-eared owl *Asio otus*<br>Stock dove *Columba oenas*<br>Wolf *Canis lupus* | Resources of insignificant value<br>Black crowberry *Empetrum nigrum*<br>Creeping lady's-tresses *Goodyera repens** | Resources of insignificant value<br>Great crested newt *Triturus cristatus*<br>Common stonechat *Saxicola rubicola*<br>Mediterranean water shrew *Neomys fodiens*<br>Harvest mouse *Micromys minutus* | Resources of insignificant value<br>Tree reindeer lichen *Cladonia arbuscula*<br>Reindeer lichen *Cladonia portentosa*<br>Grey reindeer lichen *Cladonia rangiferina*<br>Salted starburst lichen *Imshaugia aleurites*<br>Powder-headed tube lichen *Hypogymnia tubulosa*<br>Large white-moss *Leucobryum glaucum*<br>*Eurhynchium angustirete*<br>Mountain fern moss *Hylocomium splendens*<br>Dilated scalewort *Frullania dilatata*<br>Neat feather-moss *Pseudoscleropodium purum*<br>Ostrich-plume feather-moss *Ptilium crista-castrensis*<br>Red-stemmed feathermoss *Pleurozium schreberi* |

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| | | | | | Common tamarisk-moss *Thuidium tamariscinum*<br>Wavy broom moss *Dicranum polysetum*<br>Broom forkmoss *Dicranum scoparium*<br>*Formica polyctena*<br>Smooth newt *Lissotriton vulgaris*<br>Common toad *Bufo bufo*<br>Common frog *Rana temporaria*<br>Moor frog *Rana arvalis*<br>Pool frog *Pelophylax lessonae*<br>Edible frog *Pelophylax esculentus*<br>Sand lizard *Lacerta agilis*<br>Viviparous lizard *Lacerta agilis Zootoca vivipara*<br>Slow worm *Anguis fragilis*<br>Common European adder *Vipera berus*<br>Black woodpecker *Dryocopus martius*<br>Common quail *Coturnix coturnix* [4]<br>Red-breasted flycatcher *Ficedula parva*<br>Common buzzard *Buteo buteo*<br>Tawny owl *Strix aluco*<br>Common firecrest *Regulus ignicapillus*<br>Eurasian otter *Lutra lutra* |

| Evaluation of species | | Prevalence | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| | | | | | Soprano pipistrelle *Pipistrellus pygmaeus*<br>Nathusius' pipistrelle *Pipistrellus nathusii*<br>Common pipistrelle *Pipistrellus pipistrellus*<br>Serotine bat *Eptesicus serotinus*<br>Common noctule *Nyctalus noctula*<br>Brown long-eared bat *Plecotus auritus*<br>Red squirrel *Sciurus vulgaris*<br>Wood mouse *Apodemus sylvaticus*<br>Eurasian pygmy shrew *Sorex minutus*<br>Common shrew *Sorex araneus*<br>European mole *Talpa europaea*<br>European beaver *Castor fiber*<br>European water vole *Arvicola amphibius*<br>Northern white-breasted hedgehog *Erinaceus roumanicus* |

*[1]According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

*[2]According to the Red List of Fungi (Wojewoda and Ławrynowicz, 2006): I – species of unidentified threat – species with inadequate data available to assign them to a particular category*

*[3]No Regional Red List developed for Gdańsk Pomerania*

*[4]According to the Red List of Lichens in Poland (Cieśliński et al., 2006): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

*[5]According to the Red List of threatened lichens in Gdańsk Pomerania (Fałtynowicz and Kukwa, 2003): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

*[6]According to the Polish Red List of Plants (Żarnowiec et al., 2004; Klama, 2006): I – species of unidentified threat – species with inadequate data available to assign them to a particular category*

*[7]Polish Red List of Pteridophytes and Flowering Plants (Kaźmierczakowa et al., 2016): NT – near-threatened species; LC – least concern species*

*[8]Endangered and threatened vascular plants of Gdańskie Pomerania (Markowski and Buliński, 2004): NT – near-threatened species; LC – least concern species*

*[9]Red List of Threatened Animals in Poland (Głowaciński ed., 2002) and the Polish Red Data Book of Animals – invertebrates: NT – near-threatened species; LC – species of the least concern; DD – data deficient species*

*[10]Red List of Threatened Animals in Poland (Głowaciński ed., 2002) and the Polish Red Data Book of Animals – vertebrates: NT – near-threatened species; LC – species of the least concern; DD – data deficient species*

*[11]BirdLife International (2004): SPEC 1 – European species of global conservation concern; SPEC 2 – endangered species, the European population of which exceeds 50% of the global population and their conservation status was assessed as unfavourable; SPEC 3 – endangered species, the European population of which does not exceed 50% of the global population and their conservation status was assessed as unfavourable; Non-SPEC – species not endangered in Europe, but the breeding population of which is concentrated in Europe*

*Table 3.59. Assessment of the value of the plant, fungi and animal species identified which are not under legal protection, however, are included in the national and regional red lists [Source: internal materials]*

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| Species status | Species endangered internationally excluding the following categories:<br>a) for fungi, lichens, mosses and liverworts, vascular plants, terrestrial invertebrates, water invertebrates, herpetofauna and mammals: NT, LC, DD and NE[1];<br>b) for birds: SPEC 1, SPEC 2, SPEC 3[11] | Resources of exceptional value | Resources of high value | Resources of moderate value | Resources of low value |
| | Species subject to protection under the national and/or EU law and endangered nationally, excluding the following categories:<br>a) for fungi: I[2];<br>b) for lichen: NT, LC and DD[4];<br>c) for mosses and liverworts: I[6];<br>d) for vascular plants: NT, LC and DD[7];<br>e) for terrestrial and water invertebrates: NT, LC and DD[9];<br>a) for herpetofauna, birds and | Resources of high value<br>Dune brittlestem *Psathyrella ammophila*;<br>*Lentinus cyathiformis*<br>Sulphured crimson dot lichen *Pyrrhospora quernea*<br>Covered lichen *Pertusaria hymenea*<br>*Pertusaria flavida*<br>*Opegrapha vermicellifera*<br>*Gyalecta carneola* | Resources of moderate value<br>Fused cork hydnum *Phellodon confluens*<br>Grey tooth *Phellodon connatus*<br>Woolly tooth *Phellodon tomentosus*;<br>Drab tooth *Bankera fuligineoalba*<br>Sand tulip *Peziza ammophila*<br>Scaly hedgehog/scaly tooth *Sarcodon imbricatus*<br>Silky rosegill *Volvariella bombycina*<br>*Zwackhia viridis*<br>Rim lichen *Lecanora intumescens*<br>*Varicellaria hemisphaerica*<br>Green powdery stellated lichen *Physconia distorta* | Resources of low value | Resources of insignificant value<br>*Diplomitoporus flavescens*<br>Slimy spike-cap *Gomphidius glutinosus*<br>Pierced lichen *Pertusaria pertusa* |

| **Evaluation of species** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Species rare both in Poland and in Gdańsk Pomerania** | **Species rare in Poland and abundant or moderately abundant in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and rare in Gdańsk Pomerania** | **Species abundant or moderately abundant in Poland and in Gdańsk Pomerania** |
| | mammals: NT, LC and DD[10] | | | | |
| | Species subject to protection under the national and/or EU law and not endangered nationally in Poland, however, endangered in Gdańsk Pomerania, excluding the following categories:<br>a) for fungi, mosses and liverworts, terrestrial invertebrates, water invertebrates, herpetofauna, birds and mammals[3];<br>b) for lichen: NT, LC and DD[5];<br>c) for vascular plants: NT, LC and DD[8] | Resources of moderate value | Resources of low value<br>Beach pea *Lathyrus japonicus ssp. maritimus* | Resources of low value | Resources of insignificant value |
| | Other species inventoried | Resources of low value<br>*Coltricia cinnamomea*<br>*Panaeolus dunensis* | Resources of insignificant value | Resources of insignificant value<br>Scribble lichen *Alyxoria varia* | Resources of insignificant value<br>Script lichen *Graphis scripta*<br>Oakmoss *Evernia prunastri*<br>Ostrich hide lichen *Pertusaria leioplaca*<br>*Arthonia spadicea*<br>*Nemoura dubitans* |

[1]*According to the international IUCN Red List (http://www.iucnredlist.org): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category; NE – not estimated species*

[2]*According to the Red List of Fungi (Wojewoda and Ławrynowicz, 2006): I – species of unidentified threat – species with inadequate data available to assign them to a particular category*

[3]*No Regional Red List developed for Gdańsk Pomerania*

[4]*According to the Red List of Lichens in Poland (Cieśliński et al., 2006): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

*[5]According to the Red List of threatened lichens in Gdańsk Pomerania (Fałtynowicz and Kukwa, 2003): NT – near-threatened species; LC – least concern species; DD – data deficient species with insufficient data regarding threat category*

*[6]According to the Polish Red List of Plants (Żarnowiec et al., 2004; Klama, 2006): I – species of unidentified threat – species with inadequate data available to assign them to a particular category*

*[7] Polish Red List of Pteridophytes and Flowering Plants (Kaźmierczakowa et al., 2016): NT – near-threatened species; LC – least concern species*

*[8]Endangered and threatened vascular plants of Gdańskie Pomerania (Markowski and Buliński, 2004): NT – near-threatened species; LC – least concern species*

*[9]Red List of Threatened Animals in Poland (Głowaciński ed., 2002) and the Polish Red Data Book of Animals – invertebrates: NT – near-threatened species; LC – species of the least concern; DD – data deficient species*

*[10]Red List of Threatened Animals in Poland (Głowaciński ed., 2002) and the Polish Red Data Book of Animals – vertebrates: NT – near-threatened species; LC – species of the least concern; DD – data deficient species*

*[11]BirdLife International (2004): SPEC 1 - European species of global conservation concern; SPEC 2 – endangered species, the European population of which exceeds 50% of the global population and their conservation status was assessed as unfavourable; SPEC 3 – endangered species, the European population of which does not exceed 50% of the global population and their conservation status was assessed as unfavourable; Non-SPEC – species not endangered in Europe, but the breeding population of which is concentrated in Europe*

*Table 3.60. Assessment of the value of natural habitats identified [Source: internal materials]*

| **Habitat evaluation** | | **Prevalence** | | | |
|---|---|---|---|---|---|
| | | **Habitats rare in Poland and in Pomerania** | **Habitats rare in Poland and common in Pomerania** | **Habitats common in Poland and rare in Pomerania** | **Habitats common in Poland and in Pomerania** |
| Habitat status | Priority natural habitats subject to protection under national and EU law | Resources of exceptional value | Resources of high value<br>*2130 – Fixed dunes with herbaceous vegetation ("grey dunes") | Resources of moderate value | Resources of low value |
| | Other natural habitats protected under national and EU law with a general assessment of the natural habitat status in the biogeographical region FV or XX or any other status with reference to habitats at the range boundary | Resources of high value | Resources of moderate value | Resources of low value | Resources of low value |
| | Other natural habitats protected under national and EU law with a general assessment of the natural habitat status in the biogeographical region U1 | Resources of moderate value | Resources of low value<br>2180 – Wooded dunes of the Atlantic, Continental and Boreal region | Resources of low value | Resources of insignificant value<br>9110 – Beech forests (*Luzulo-Fagetum*) |
| | Other natural habitats protected under national and EU law with a general assessment of the natural habitat status in the biogeographical region U2 | Resources of low value | Resources of insignificant value<br>2120 – Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") (*Elymo-Ammophiletum*) | Resources of insignificant value | Resources of insignificant value |

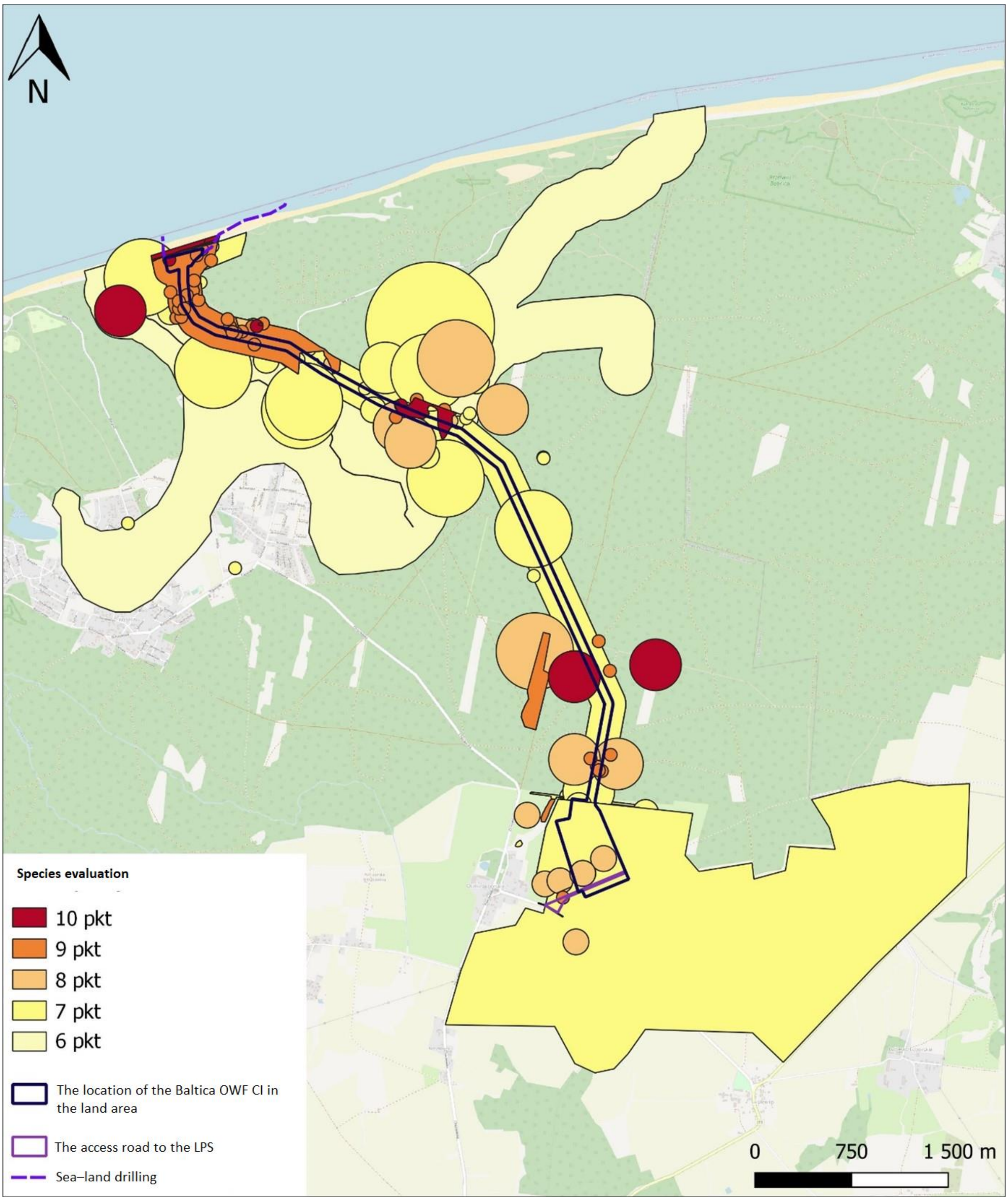



*Figure 3.72. Collective evaluation of the sites of natural habitats and fungi, plant and animal species identified [Source: internal materials]*

None of the protected and endangered plant, fungi, and animal species inventoried were identified as having exceptional value, and 13 species were classified as having high value. Also, a single type of natural habitat (*2130) was classified as a resource of high value. The vast majority of species inventoried were assessed as resources of low or insignificant value. They are widespread both in Gdańsk Pomerania as well as in Poland and are not endangered within the area of its occurrence. The occurrence of the most valuable resources is concentrated in three locations: dune strip, the complex of well-developed patches of coastal coniferous forests *Empetro nigri-Pinetum* association (in sub-associations: *typicum*, *cladonietosum* and *ericetosum*) in the northern part of the cable bed area and within the boundaries of beech forests (*Luzulo pilosae-Fagetum* association) connected to the Bezimienna Stream valley.

## 3.21 Cultural values, monuments and archaeological sites and objects

The legal basis for the implementation of the Baltica OWF CI in terms of its potential impact on the cultural heritage resources is the Act of 23 July 2003 *on the protection and care of monuments* (consolidated text: Journal of Laws of 2021, item 710, as amended).

Pursuant to Article 7 and Article 19 section 1(a) of the above-mentioned Act the forms of protection of monuments are:

- entry into the Register of Monuments;
- entry into the List of Heritage Treasures;
- recognition as a historical monument;
- creation of a cultural park;
- establishment of protection in the local spatial development plan or in a decision on the location of a public purpose investment, a decision on land development conditions, a decision on a permit for the implementation of a road project, a decision on the location of the railway line or a decision on a permit for the implementation of a project such as a public airport.

In order to survey the area regarding the presence of objects and areas recognised as historic monuments within the area and in the vicinity of the planned project, a 500 m wide zone (buffer) around the planned project was established.

**Immovable monuments**

An immovable monument is considered to be a part or all of the real estate with the features of a monument. In addition to buildings and structures, immovable monuments are also places commemorating historical events or the activities of great people or institutions. The Act also mentions cultural landscapes, urban and rural systems, defence constructions, technical facilities, cemeteries and parks.

The inventory of immovable monuments was carried out on the basis of historical monument record sheets obtained from the Choczewo Commune Office (document ref.: RIGKiOŚ.604.20.2021.ZW of 18 August 2021) and the information obtained from the Pomorskie Voivodeship Heritage Conservation Office in Gdańsk (document ref.: ZA.5183.1056.2021 SS of 27 August 2021). On the basis of the information obtained, the immovable monuments included in the register of monuments of the Pomorskie Voivodeship Heritage Conservation Officer (PVHCO) and in the record of monuments (VRM – voivodeship record of monuments, CRM – commune record of monuments) located in a separate survey buffer around the planned project were identified. Moreover, the map and the provisions of the Local Spatial Development Plan were analysed in terms of objects or areas protected due to their historic value. Figure 3.73 shows the location of the planned project in relation to the layout of immovable monuments under conservation protection.

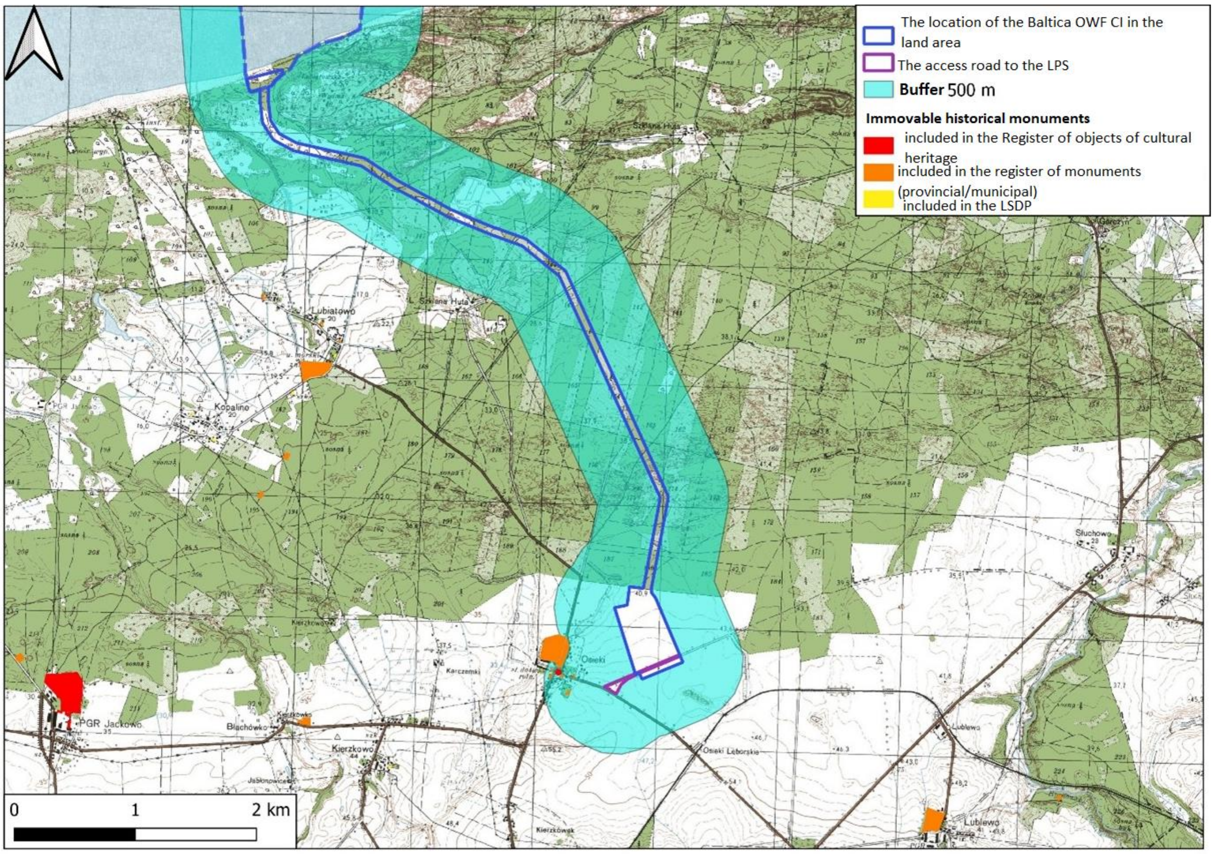



*Figure 3.73. Location of the Baltica OWF CI in reference to the immovable monuments [Source: internal materials based on the data of the Pomorskie Voivodeship Heritage Conservation Officer]*

According to the information obtained, none of the immovable monuments is located within the boundaries of the planned project. The nearest immovable monuments are located in the village of Osieki Lęborskie, 255 m west of the boundary of the access road to the OnSS and 485 m from the boundary of the OnSS. These are 9 monuments and protected areas entered into the record of monuments, and 2 immovable monuments entered into the register of monuments. Other monuments identified in other towns are located more than 1 km (in the village of Lubiatowo) and more than 2 km (in the villages of Lublewo and Kierzkowo) from the boundaries of the planned project.

All the immovable monuments inventoried located in the 500 m wide buffer delineated for the purpose of surveys are presented in Table 3.61. The table contains a complete set of information, i.e. it includes the names/functions of objects, the address and numbers of plots, the numbers of entries in the register of monuments or the record of monuments, and the distance from the boundary of the planned project. The exact location of the immovable monuments located in the 500 m wide buffer is also shown in Figure 3.74.

*Table 3.61. List of immovable monuments located within the 500 m wide buffer delineated around the Baltica OWF CI [Source: internal materials based on the data provided by the Pomorskie Voivodeship Heritage Conservation Officer and the historical monument record sheets of the Choczewo commune]*

| No. on the map | Form of protection | Number in the register/record of monuments | Object | Address | Plot numbers | Distance from the boundary of the planned project |
|---|---|---|---|---|---|---|
| 1a | Register | Register: A-1235 (formerly 1042)<br>VRM: 89<br>CRM: 97 | Filial church of Saint Mary's Star of the Sea | Osieki Lęborskie | 22 | 380 m from an access road to OnSS<br>590 m from OnSS |
| 1b | Register | Register: A-1235 (formerly 1042)<br>VRM: 90<br>CRM: 98 | Church graveyard | Osieki Lęborskie | 22 | 380 m from an access road to OnSS<br>580 m from OnSS |
| 2a | VRM/CRM | VRM: 91<br>CRM: 99 | Former Evangelic graveyard | Osieki Lęborskie | 23 | 280 m from an access road to OnSS<br>555 m from OnSS |
| 2b | VRM/CRM | VRM: 91<br>CRM: 99 | Historic burial chapel in the cemetery | Osieki Lęborskie | 23 | 325 m from an access road to OnSS<br>600 m from OnSS |
| 3 | VRM/CRM | VRM: 92<br>CRM: 100 | Palace (manor house) park | Osieki Lęborskie | 15/43, 15/44, 15/45, 15/46 | 450 m |
| 4 | VRM/CRM | VRM: 93<br>CRM: 101 | Palace farm | Osieki Lęborskie | 15/35 | 445 m from an access road to OnSS<br>640 m from OnSS |
| 5 | VRM/CRM | VRM: 94<br>CRM: 102 | Residential building | Osieki Lęborskie 8 | 33/9 | 345 m from an access road to OnSS<br>570 m from OnSS |
| 6 | VRM/CRM | VRM: 95<br>CRM: 103 | Former inn, now a residential building | Osieki Lęborskie 11 | 17/50 | 265 m from an access road to OnSS<br>485 m from OnSS |
| 7 | VRM/CRM | VRM: 98<br>CRM: 104 | Outbuilding (stone) | Osieki Lęborskie 11 | 33/54 | 255 m from an access road to OnSS<br>490 m from OnSS |
| 8 | VRM/CRM | VRM: 96<br>CRM: 105 | Residential building | Osieki Lęborskie 18 | 15/8 | 445 m from an access road to OnSS<br>660 m from OnSS |
| 9 | VRM/CRM | VRM: 97<br>CRM: 106 | Residential building | Osieki Lęborskie 19 | 15/15 | 450 m from an access road to OnSS<br>675 m from OnSS |

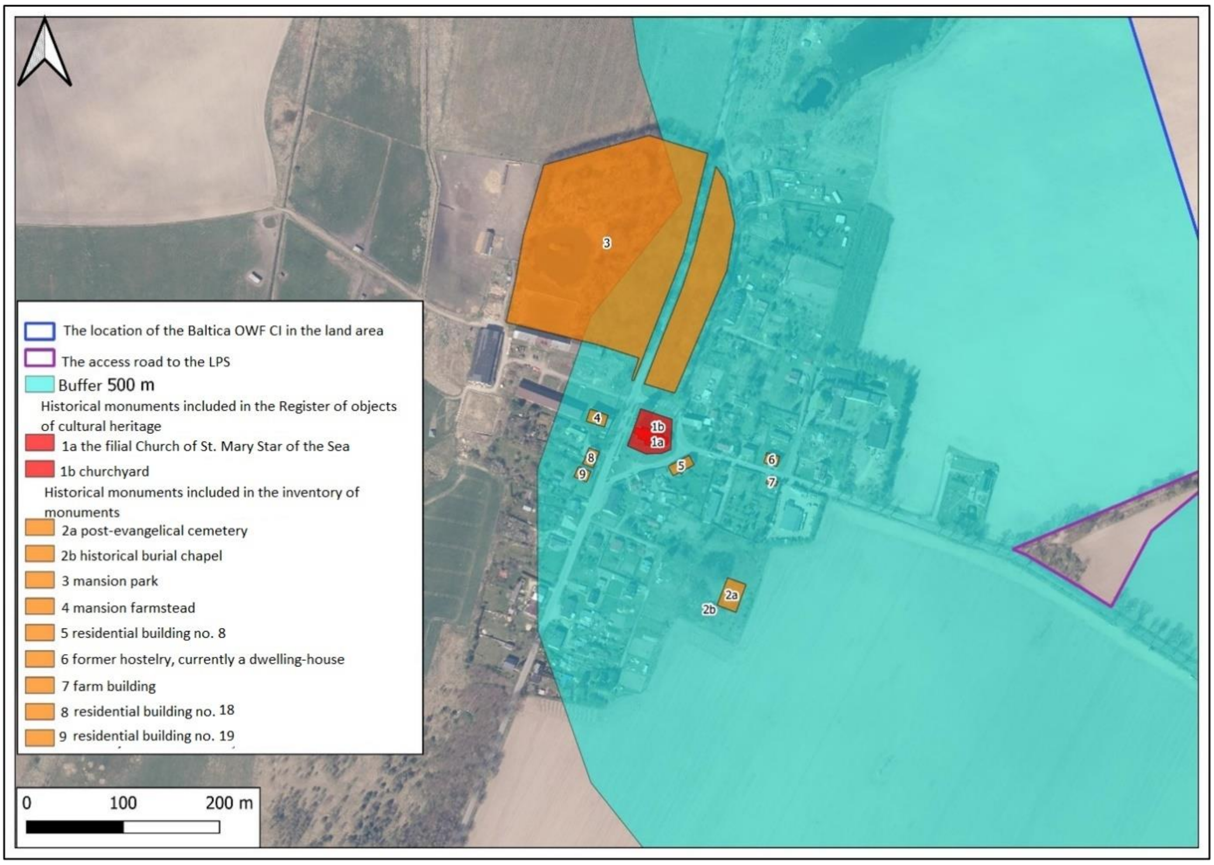



*Figure 3.74. Immovable monuments located within the 500 m buffer delineated around the Baltica OWF CI [Source: internal materials based on the data provided by the Pomorskie Voivodeship Heritage Conservation Officer and the Study of Conditions and Directions of Spatial Development of the Choczewo Commune]*

The above-mentioned monuments are examples of the monuments of regional culture characteristic of this region, i.e. a residential building of the so-called Pomeranian house type, made of red bricks on a stone foundation and a stone farm building. The manor park, on the other hand, is a remnant of the former manor and farm complex in Osieki (Osseck, Ossecken), the first records of which date back to the end of the 13$^{th}$ century. The manor house itself was destroyed and in 1964 it was decided to demolish it. The farm that has remained is now privately owned. All the objects listed in Table 3.61 are located at a considerable distance from the planned OnSS (more than 450 m from the OnSS boundary), among the buildings of the village of Osieki Lęborskie.

Other monuments identified in the area of other villages, e.g. in the village of Lubiatowo, are located more than 1 km from the boundaries of the planned project, and in the villages of Lublewo and Kierzkowo, more than 2 km away.

The nearest object entered into the register of monuments [the church graveyard in Osieki Lęborskie entered under the number A-1235 (formerly 1042)] is located 580 m from the boundary of the planned OnSS and 375 m from the access road to the OnSS (no. 1b in Figure 3.74). In addition, within the cemetery, there is a church dedicated to the Blessed Virgin Mary, Star of the Sea (no. 1a in Figure 3.74), also entered in the register of monuments under the same number which is located 590 m away from the boundary of the OnSS and 380 m from the access road to the OnSS.

Although the Study of the Conditions and Directions of Spatial Development is not an act of local law, it is worth paying attention to the areas highlighted in the Study drawing, as they are the basis for all activities undertaken in the commune concerning spatial planning and development. In the case of adopting the LSDP for a given area, the findings contained in the Study are binding when preparing the LSDP. Therefore, pursuant to the recently adopted change of the Study for the Choczewo commune (Resolution no. XXVIII/220/2021 of the Choczewo Commune Council of 26.01.2021), two types of areas have been identified within the 500 m wide buffer around the Baltica OWF CI: "parks at manor and park complexes" and "spatial layouts and complexes (protection of the forecourt and structure)."

For the area marked in the Study drawing as "the park at manor and park complex", covering the historic manor park entered in the record of monuments (no. 3 in Figure 3.74), the document establishes a strict protection and a systematic maintenance of the tree stand. In the case of the area marked as "spatial layouts and complexes (protection of the forecourt and structure)," covering the historic village of Osieki Lęborskie, the Study imposes the following directives:

- preservation of the communication layout and the historical plan of the village;
- preservation of the historical distribution of residence ownership;
- preservation of the clear boundaries of the compact arrangement of historic rural buildings;
- preservation of the clear principles of the layout of complexes forming the development structure (farmsteads and others) with all its components (including: buildings, yards and their arrangement, the accompanying greenery, etc.);
- conservation of the existing historic monument structure;
- continuation of historical building traditions in new developments;

as well as the prohibition of:

- the construction of buildings with dimensions dominating in relation to the historical buildings;

and the request to:

- remove or recompose the existing disharmonious elements from the spatial development arrangement.

Additionally, the northern part of the "park at manor and park complex" was also included in the area covered by the currently binding LSDP of the Choczewo Commune (Resolution no. XIV/145/2008), marked on the plan map as "8ZP" – park green space. The text of the LSDP does not introduce specific provisions for this area (general provisions should be applied). The entire area of the historic buildings of the village of Osieki Lęborskie lies beyond the boundaries of the LSDP.

**Archaeological monuments**

An archaeological monument is any trace of human activity in the ground or under water, the preservation of which is in the public interest because of its historical, artistic or scientific value. Archaeological monuments can be both movable and immovable.

The location of all archaeological sites was determined on the basis of the Archaeological Monument Record Sheets made available by PVHCO in Gdańsk in August 2021. The project area analysed is located within two sheets AZP 2-37 and AZP 3-37 developed as part of the Archaeological Photo of Poland Programme (AZP). All the analysed record sheets of archaeological monuments were created or updated in 2019 on the basis of the surface surveys conducted in 2017–2018. The data presented in this section, as well as the spatial range of the sites illustrated in the maps, are up-to-date and consistent with the knowledge of the PVHCO.

Table 3.62 presents a detailed compilation of 7 archaeological sites located in the analysed 500 m wide buffer around the boundaries of the Baltica OWF CI. The table presents, in each case, the number of the site in the AZP area, the village and number of the site in the village, the site function, its chronology, protection zone in accordance with the LSDP, description of the objects inventoried, their location and distance from the boundary of the planned project.

One site entered into the register of monuments (AZP 2-37/9) is in collision with the Baltica OWF CI (in Table 3.62, it is marked in bold), and in the impact buffer of the planned project, additional 6 archaeological sites were identified, including one site entered into the register of monuments (AZP 2-37/8). All the sites identified are also shown in Figure 3.75.

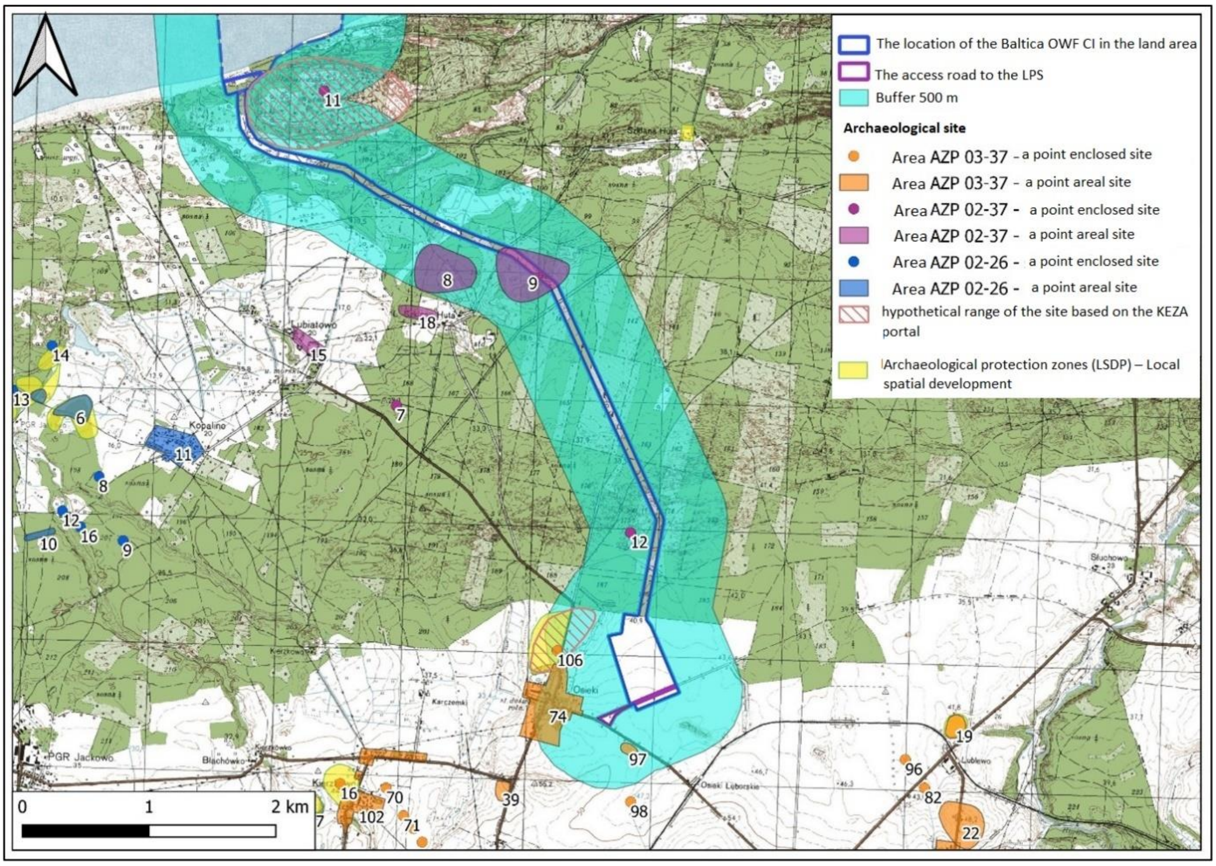



*Figure 3.75. Location of archaeological sites in the area and in the vicinity of the Baltica OWF CI [Source: internal materials based on the data provided by the Pomorskie Voivodeship Heritage Conservation Officer and the LSDP of the Choczewo commune (Resolution No. XIV/145/2008)].*

*Table 3.62. Archaeological sites situated within the area or in the impact buffer of the Baltica OWF CI [Source: internal materials based on the Archaeological Monument Record Sheets of the Pomorskie Voivodeship Heritage Conservation Officer, the Local Spatial Development Plan of the Choczewo Commune (Resolution no. XIV/145/2008) and the data of the Archaeological Museum in Gdańsk]*

| AZP area | Site number in the AZP* | Site number in a village/town | Village/town in the AZP | Function | Chronology | Object description | Location: village/town, precinct and survey plot numbers | Distance from the boundary of the Baltica OWF CI [m] | Form of protection | Source of information: |
|---|---|---|---|---|---|---|---|---|---|---|
| 2–37 | 11* | 10 | Kierzkowo | 1. Settlement<br>2. Traces of settlement<br>3. Settlement | 1. Early Iron Age<br>2. Late La Tène Period<br>3. Early Middle Ages | 1. ceramic pieces with cereal grain impressions<br>2. ceramic pieces<br>3. ceramic pieces, iron products and slags, flint and stone products, chunks of amber, animal bones | Lubiatowo, precinct: Kierzkowo, plot no. 292–298, 312, 313 | 0 | VRM | Data of the Archaeological Museum in Gdańsk; PPMC data |
| **2–37** | **9*** | **8** | **Kierzkowo** | **Barrow burial site** | **unidentified** | **At least 10 earthen mounds, approx. 7–14m in diameter and 0.5–1.3m high, with traces of stone mantles** | **Szklana Huta, precinct: Kierzkowo, plot no. 319, 320, 321** | **0** | **Site entered in the register of historical monuments on 23.03.1976 under no. 273/Archeol.**<br>**At present it has been assigned a new register number in book C: C-350** | **PVHCO data** |
| 2–37 | 8* | 7 | Kierzkowo | Barrow burial site | Bronze Age, Lusatian culture | At least 16 earthen mounds, approx. 5–12 m in diameter and 0.5–1 m high, with traces of stone mantles | Szklana Huta, precinct: Kierzkowo, plots no. 321, 322 | 95 | Site entered in the register of historical monuments on 23.03.1976 under no. 272/Archeol.<br>At present it has been assigned a | PVHCO data |

| AZP area | Site number in the AZP* | Site number in a village/town | Village/town in the AZP | Function | Chronology | Object description | Location: village/town, precinct and survey plot numbers | Distance from the boundary of the Baltica OWF CI [m] | Form of protection | Source of information: |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | new register number in book C: C-349 | |
| 2–37 | 12* | 11 | Kierzkowo | Motte-and-bailey castle | Early Middle Ages | A defensive structure on a morainic plateau measuring approximately 30–35 m, with a shallow moat and a rampart approx. 1.3–1.6 m high | Osieki Lęborskie, precinct: Kierzkowo, plot no. 338 | 145 | VRM | PVHCO data |
| 3–37 | 106* | 37 | Kierzkowo | Trace of settlement | Early Middle Ages (12th c. – 1st half of the 13th c.) | 2 ceramic pieces | Osieki Lęborskie, precinct: Kierzkowo, plot no. 15/32 | 410 | VRM, special archaeological protection zone in the LSDP | Data of the Archaeological Museum in Gdańsk; PPMC data, LSDP |
| 3–37 | 74* | 21 | Kierzkowo | Historical village | Late Middle Ages (from late 13th c.) – early modern period | Historical area of the Osieki Lęborskie village | Osieki Lęborskie, precinct: Kierzkowo, numerous plots | 335 | VRM | PVHCO data |
| 3–37 | 97* | 28 | Kierzkowo | 1. Trace of settlement<br>2. Settlement<br>3. Settlement | 1. Prehistory (Neolithic Age – early Bronze Age)<br>2. Late Middle Ages (14th–15th c.)<br>3. Early modern period (16th–17th c.) | 1. 1 flint flake, 1 ceramic piece<br>2. 12 ceramic pieces<br>3. 8 ceramic pieces | Osieki Lęborskie, precinct: Kierzkowo, plot no. 33/73 | 275 | VRM | PVHCO data |

** Site number in Figure 3.75*

In the case of the two archaeological sites, i.e. AZP 2-37/11 and AZP 3-37/106, the latest surface surveys did not confirm the presence of listed historical objects within the area. However, the existence of a historical monument in the area should not be excluded. Therefore, the area originally delineated around the sites was left as a hypothetical spatial range of the site (in accordance with the submitted Archaeological Monument Record Sheets). The hypothetical range of the archaeological site AZP 2-37/11 coincides with the eastern boundary of the planned project in its northern part. The intention of the cable connection routing was to bypass it.

The cable route was prepared on the basis of the data available prior to the surveys conducted in 2017–2018. In the course of the surface survey of immovable archaeological monuments conducted in 2017–2018 on commission from the Pomorskie Voivodeship Heritage Conservation Officer, archaeological sites were verified negatively or positively, their spatial range being updated at the same time. Finally, as a result of updating the Monument Record Sheets after the surveys, two registered sites (AZP 2-37/8 and AZP 2-37/9) had their spatial range modified, and the designed cable infrastructure was identified as being in collision with the site AZP 2-37/9 [Figure 3.76].

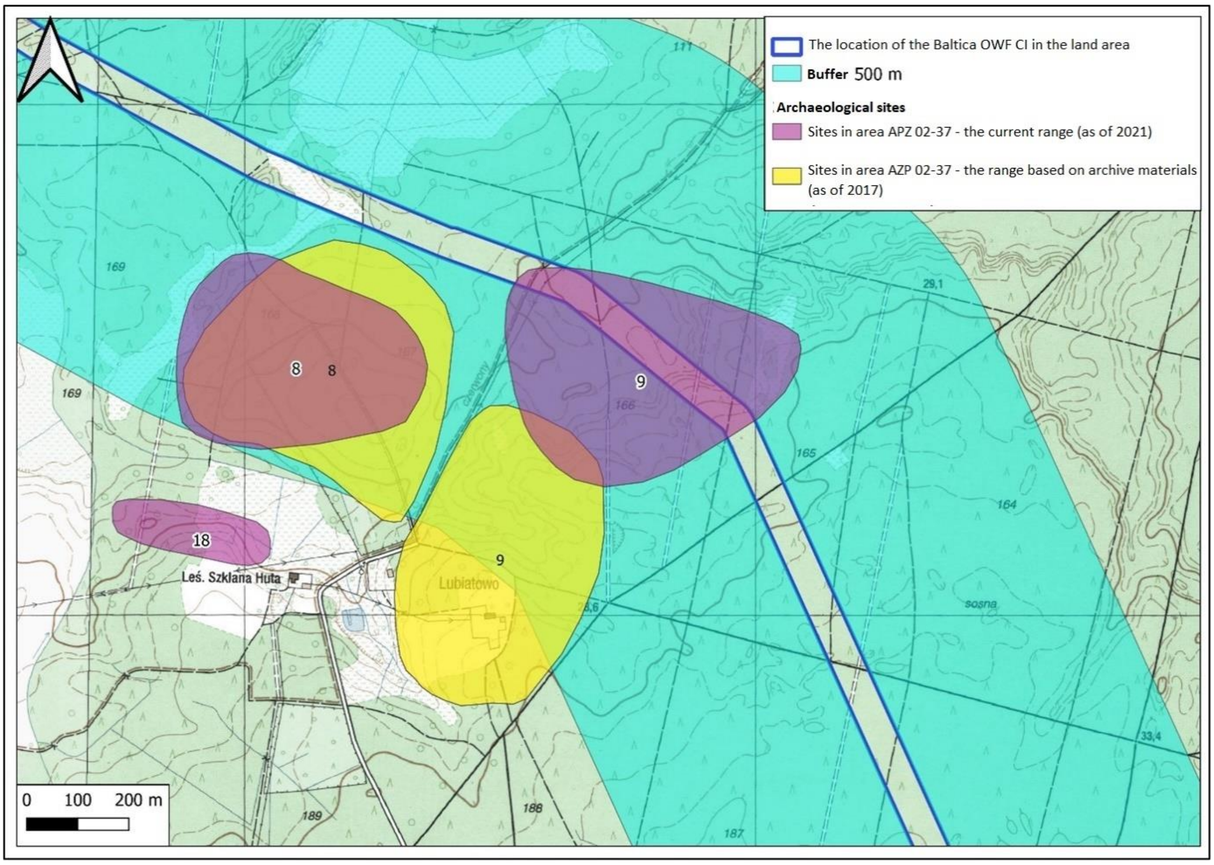



*Figure 3.76. Change in the spatial range of the sites AZP 2-37/8 and 2-37/9 resulting from surface surveys carried out in 2017–2018 [Source: internal materials based on the Archaeological Monument Record Sheet AZP 2-37/9 of the Pomorskie Voivodeship Heritage Conservation Officer].*

The planned project collides with the archaeological site no. AZP 2-37/9, within which the presence of 10 barrows was confirmed, however, the course of the Baltica OWF CI was delineated in a way to avoid the barrows inventoried [Figure 3.77]. As part of the opinion obtained from the PVHCO, the Applicant was obliged to carry out non-invasive archaeological surveys within the site indicated. On the basis of the survey results, the PVHCO will issue an opinion on a possible method of crossing the site area (open excavation method or trenchless method).

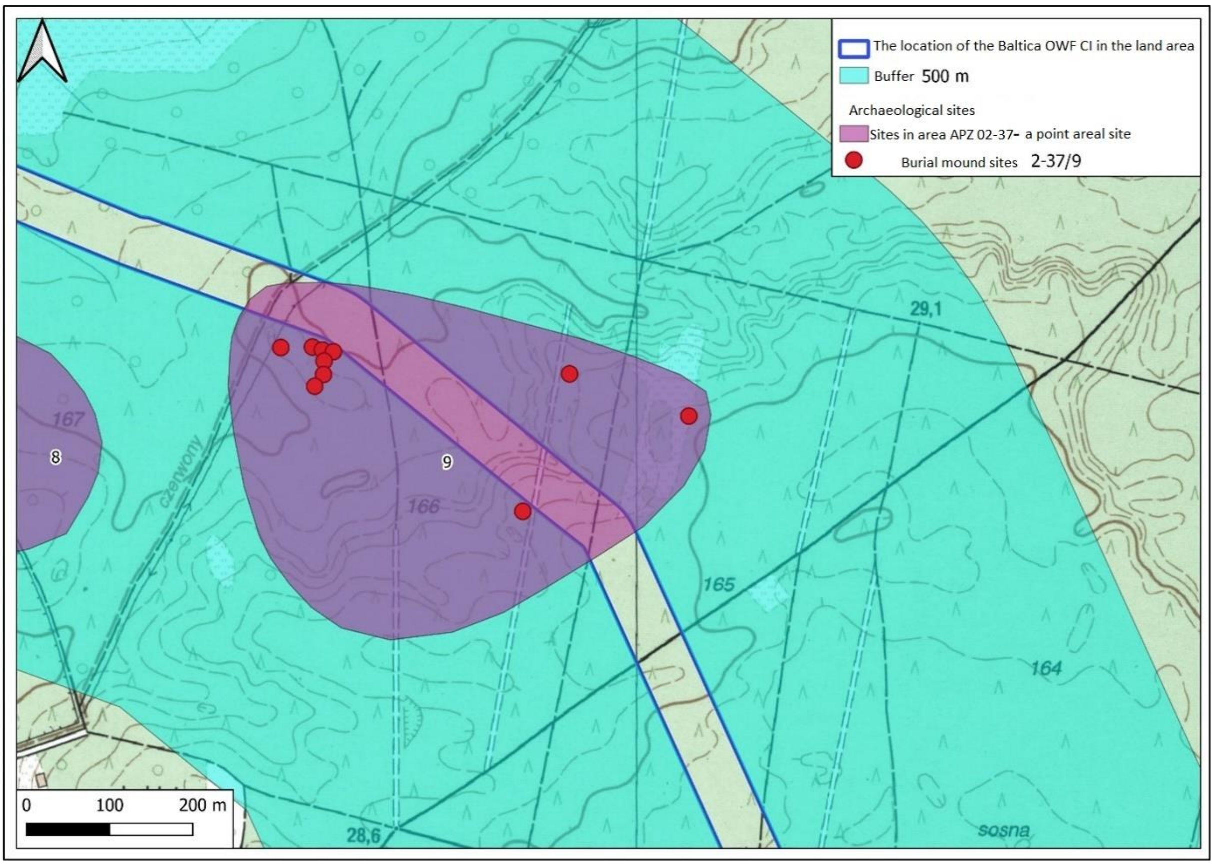



*Figure 3.77. The barrows inventoried within the archaeological site 2-37/9 in the vicinity of the Baltica OWF CI [Source: internal materials based on the Archaeological Monument Record Sheet AZP 2-37/9 of the Pomorskie Voivodeship Heritage Conservation Officer].*

Pursuant to Article 7 point 4 of the Act of 23 July 2003 *on the protection and care of monuments* (Journal of Laws of 2003, item 710, as amended), the arrangements of the local spatial development plan are also regarded as a form of conservation protection. Only one of the archaeological sites indicated in Table 3.62 is located in the area covered by the local spatial development plan in the Choczewo commune. It is the site no. AZP 3-37/106, and the hypothetical spatial range of the site partly coincides with the conservation protection zone indicated on the drawing of the plan (Resolution no. XIV/145/2008 of the Choczewo Commune Council of 19 March 2008 *on adopting a local spatial development plan "Wiatraki w Osiekach" of the Choczewo commune)*. Article 4 point 3 of the above-mentioned resolution for the area marked as "11R" provides for the application of "*the principles of cultural heritage protection as well as the protection of historical monuments and contemporary cultural heritage: the area 11R partially in the archaeological protection zone, as shown in the drawing of the plan – archaeological supervision is required for any earthworks within the zone.*"

Additionally, in the adopted Study of Conditions and Directions of Spatial Development of the Choczewo Commune (Resolution no. XXVIII/220/2021 of the Choczewo Commune Council of 26.01.2021), the role played by barrows and barrow burial sites in the cultural landscape of the commune is emphasised. Among the requirements of archaeological conservation protection there is a provision on marking and clearer identification (e.g. by means of information boards) of barrows and burial grounds existing in the area of Lublewo and Szklana Huta.

It should be taken into account that in the locations designated for the Baltica OWF CI, in which no archaeological monuments have been registered so far, the possibility of their existence is not excluded. According to Article 32 section 1 of the Act of 23 July 2003 *on the protection and care of monuments*, in the event of encountering any elements indicating the possibility of the existence of archaeological monuments at a given location, all works which could damage or destroy the artefact discovered should be immediately suspended, while the artefact and the place of discovery should be secured using available means, and the relevant territorially competent voivodeship heritage conservation officer or the head of a commune or town/city mayor should be immediately notified.

## 3.22 Use and management of land and tangible property

The greater part of the project analysed, covering almost the entire cable line, is planned to be located in forest areas, managed by the Choczewo Forest District Inspectorate, Szklana Huta Forestry. Only the land intended for the location of the OnSS and the busbar systems connecting the OnSS with the Choczewo substation is currently an agricultural area. The access to the above-mentioned substation will be obtained from the district road no. 1432G (Osieki Lęborskie – Lublewko) via a modernised road for the implementation of which arable land shall be used.

Along the route of the Baltica OWF CI, there is no tangible property nor existing residential or industrial developments.

The planned project area is covered by the Study of Conditions and Directions of Spatial Development of the Choczewo Commune adopted by the Resolution no. VI-58/2003 of the Choczewo Commune Council on 9 June 2003, and then amended by the Resolution no. XXVIII/220/2021 of 26 January 2021. The intended land use specified in the Study is compliant with the status quo – along the entire cable line, forest areas are marked, whereas, in the location of the planned OnSS and busbar systems, arable soils class I–IV are indicated.

Moreover, in the area intended for the location of the OnSS, the provisions of the local spatial development plan "Wiatraki w Osiekach" [Wind Turbines in Osieki] adopted by the Resolution no. XIV/145/2008 of the Choczewo Commune Council of 19 March 2008 are binding. The location of the planned project in relation to the currently biding local spatial development plans for the Choczewo commune is shown in Figure 3.78.

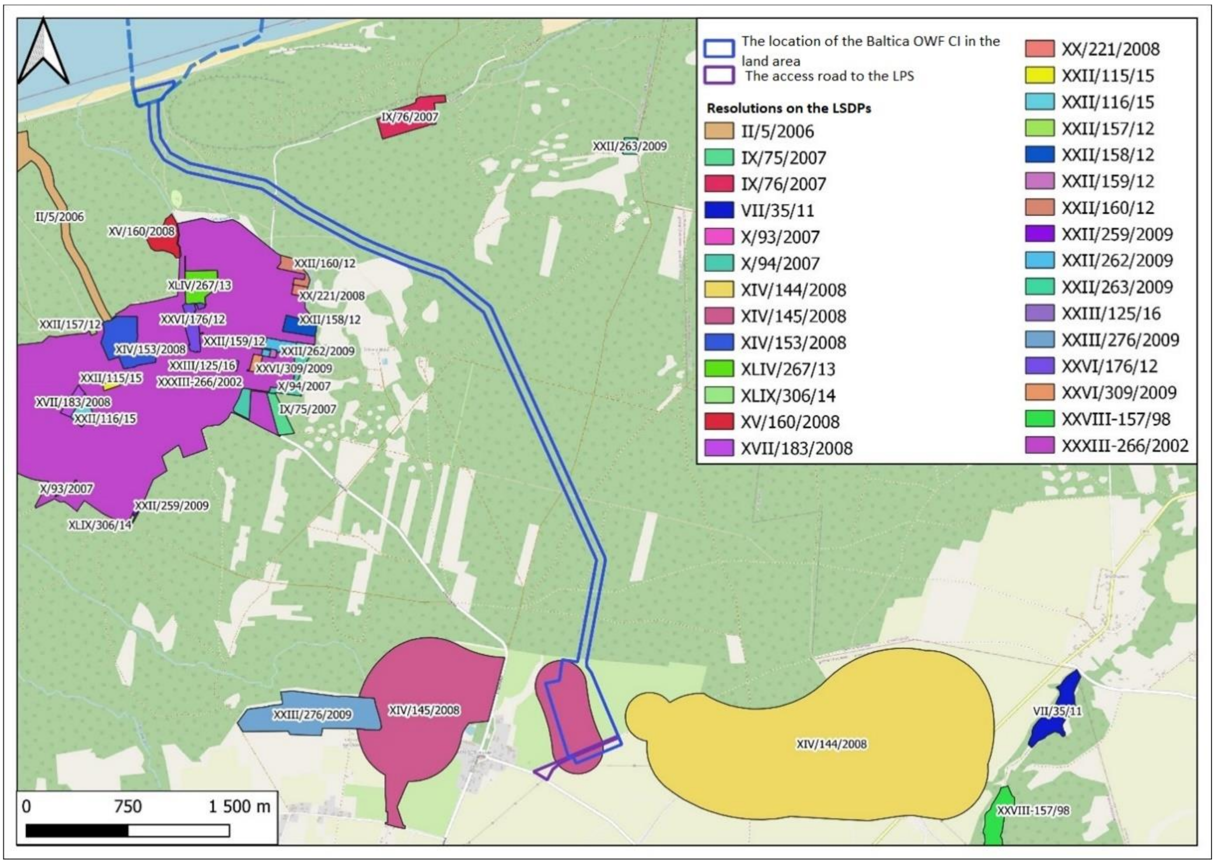



*Figure 3.78. Baltica OWF CI on the background of the currently biding local spatial development plans [Source: internal materials based on the data of the Choczewo Commune Office]*

The land marked in the plan drawing covered by the Baltica OWF CI (plots no. 17/129, 21, 25/4, 25/5, Kierzkowo precinct) includes: “R” – agricultural areas with two electricity generating units of the wind turbine “3EW” and “4EW” (located in the area intended for the construction of the OnSS), “KDW” – internal roads, and “KD” – public access roads to those units. Around the “EW” electricity generating units, development area boundaries that cannot be crossed were delineated [Figure 3.79].

The provisions of the plan introduce a “*ban on locating ‘EW’ electricity generating units of wind turbines, the impact of which, deteriorating the acoustic standard for farm buildings, extends to the ‘9MR/P’ area and beyond the boundary of the eastern part of the plan and exceeds the value of 43 dB in the eastern, southern and western boundary of the plan*.”

Moreover, the provisions of the plan establish:

- *“the parameters of the electricity network should at least meet the needs of the area covered by the plan boundaries; they should be implemented as underground networks;”*
- *“periodic monitoring of the noise level in the adjacent residential development areas;”*
- *“noise and vibration emissions from wind turbines may not exceed environmental quality standards in areas protected against noise;”*
- *“prohibition of fencing the site of individual turbine towers.”*

The plan also introduces a change in the use of some agricultural land: *“a change in the intended use of 2.2527 ha of agricultural land of mineral origin in the form of arable land: class IIIa – 0.6284 ha,* *class IIIb – 1.2006 ha as well as meadows and pastures: class II – 0.1089 ha, class IV – 0. 2487 ha for non-agricultural purposes in accordance with Decision GZ.tr.057-602-556/07 of the Minister of Agriculture and Rural Development of 24 January 2008 and the provisions of this plan."*


*Figure 3.79. Map of the local spatial development plan "Wiatraki w Osiekach" [Windmills in Osieki] within the Baltica OWF CI boundaries [Source: internal materials based on the Resolution no. XIV/145/2008 of the Choczewo Commune Council]*

## 3.23 Landscape, including the cultural landscape

The Baltica OWF CI area runs across a terrain with diversified landscape characterised by high value. This refers to both the cultural landscape, agricultural production space as well as the landscape of valuable natural resources. The variability of the landscape spatial structure is evident from the shoreline southwards, starting with dunes, through coastal accumulation plains with pine forest, and ending with a moraine upland.

One of the most important landscape-forming elements of the spatial structure of the planned project area is the Baltic Sea and the associated coastal belt. The open beaches visually integrated with the outstanding landscape element in the form of the Baltic Sea merge there with the vegetation forms covering the dune strip. The planned project, stretching southwards from the coastal zone, is a narrow strip running mostly through a dense forest complex of pine forests belonging to the Choczewo Forest Inspectorate. On the other hand, the area intended for the construction of the OnSS is an area of agricultural and meadow character supplemented locally with point developments of the local settlement network connected by a communication system in the form of municipal roads and overhead power and telecommunication lines. In the landscape structure of the planned project area, resulting from the geological structure, the OnSS area is located within a macro interior of the landscape stretching between the natural walls of forest complexes in the north and the moraine hills in the south. This area is mostly devoid of dense viewing barriers. Possible local viewing obstructions take the form of high greenery, including mid-field trees and lines of roadside trees, as well as grouped elements of anthropogenic landscape in the form of settlement development systems.

The onshore connection of the wind farm bypasses the low buildings of the village of Lubiatowo located to the south and west (the nearest buildings are approximately 360 m from the boundaries of the Baltica OWF CI) and the single residential buildings and farm buildings within Szklana Huta (at a distance of 550 to 900 m from the boundaries of the Baltica OWF CI). To the west of the planned OnSS, there is the historic village of Osieki Lęborskie (approximately 375 m from the boundary of the OnSS).

The openness of the landscape in the southern part of the project (the OnSS site) will result in the exposure of all, especially disharmonious activities in the space that reduce the aesthetic, scenic, cultural or natural values of the environment. The disharmony will result from the visible mismatch of a given element with the environment, the effect of which will be the greater, the more exposed a given technical element is, the less anthropogenically transformed the open landscape in which it is constructed or the greater the spatial order, architectural coherence and quality as well as historical value the cultural landscape that the disharmony effect concerns. An example of such an activity can be, among others, the introduction of technical buildings into the natural or semi-natural landscape, in this case, substations.

The entire Baltica OWF CI area situated within a forest complex as well as beaches and dunes of the coastal zone is within the boundaries of the Coastal Protected Landscape Area.

The issues of shaping the landscape are included in planning documents, which define spatial policy guidelines at various levels for the protection of the existing landscape resources of high nature and cultural value. This subsection provides detailed information on the issues of landscape, composition elements, exposure zones and their protection which are included in the LSDP and SC&DSD.

The Study of Conditions and Directions of Spatial Development of the Choczewo Commune emphasizes in its content the high landscape value of the commune, referring both to the cultural landscape, agricultural production space and the landscape of valuable natural resources located mainly in the northern coastal zone. It is the coastal zone with the least anthropogenic interference in the natural environment that has a special value related to the natural structure of the landscape with a strip of sandy beaches, dunes and forest complexes extending southwards to open spaces, where the features of the cultural landscape take over. Dense forests are crossed by numerous hiking and cycling paths and landscape roads, which along most of the route allow viewing the forest interior. They end at the beach exits with spectacular panoramic openings onto the sea. In fact, the entire sandy beach is a scenic viewpoint stretching along the seashore.

In the vicinity of the Baltica OWF CI, there are no distinct landscape dominants. The values of the cultural landscape stem from a historical network of roads with avenue tree plantings (especially the scenic roads in the exposed agricultural landscape provide a number of openings for viewing points) as well as centuries-old traditional spatial arrangements of villages integrated harmoniously into the local landscape by shaping the green surroundings of the buildings. This mainly applies to manor and farm complexes, historic farm buildings and production buildings, such as those located in Osieki Lęborskie. As the negative (disharmonious) examples of the cultural landscape elements, the SC&DSD of the Choczewo commune presents the overhead line (especially 110 kV) running along the southern boundary of the OnSS, cellular base stations located outside the project area in Choczewo and Żelaźno, as well as the neglected multi-family housing complexes with low architectural value in Choczewo, Zwartów and Kurów. Therefore, it should be borne in mind that the planned project may also be included in the updates of the Study as an example of negative landscape elements.

It is worth noting, how SC&DSD of Choczewo commune regards the issue of introducing new technical line infrastructure in the commune: *"in the future, attention should be paid to running overhead utility lines (power, telephone, etc.), taking into account the protection of landscape values and accumulation into infrastructure routes as well as, if possible, running cable lines."* The project in question, consisting in the construction of, among others, the onshore OWF connection fulfils the above recommendation, as it will be run as an underground cable, thus not interfering greatly with the landscape. Another principle contained in the SC&DSD of the Choczewo commune is the provision that: *"a sense of aesthetics and moderation as well as an analysis of the impact on the environment regarding even the smallest elements influencing the landscape of the commune should be the guiding principles, so as not only not to lose, but to develop the existing high landscape values."*

The SC&DSD recommendations regarding landscape protection focus on the protection of its uniqueness based on the diversity of the cultural environment harmoniously connected with its natural surroundings. Historic buildings and protection zones of historical spatial development arrangements are described in the section on monuments and cultural heritage. This chapter only mentions the need to treat (and protect) the landscape as a whole physiognomic image of space consisting of both natural and anthropogenic (cultural) elements, including historic buildings.

The SC&DSD of the Choczewo commune determines the following elements of the landscape resources in the area of the planned project [Figure 3.80]:

- main roads and landscape routes – crossing the planned project in 4 places: local roads Osieczki–Osieki Lęborskie, Białogóra–Osieki Lęborskie, Szklana Huta–Osieczki and the road from Lubiatowo towards the coastal belt. However, it should be borne in mind that in places where the planned project crosses landscape routes, underground infrastructure not affecting the views has been planned;
- protection zones for the natural and cultural landscape exposition sites (villages and complexes of high exhibition value) – two zones located around the Lubiatowo village and around the villages of Kierzkowo–Osieki Lęborskie are approximately 240 m and 220 m away from the boundaries of the planned project, respectively. According to SC&DSD, these areas are predestined for the strict protection of the existing landscape harmony, which should be understood primarily as limiting the uncontrolled development of buildings and disturbances in the spatial order resulting from the formation of disharmonious objects, especially the technical dominants in terms of height or area. The aim is to preserve the values they represent or to re-evaluate them, to make the composition more legible, and to maintain the existing cultural environment values (tradition of the place, building tradition, etc.).

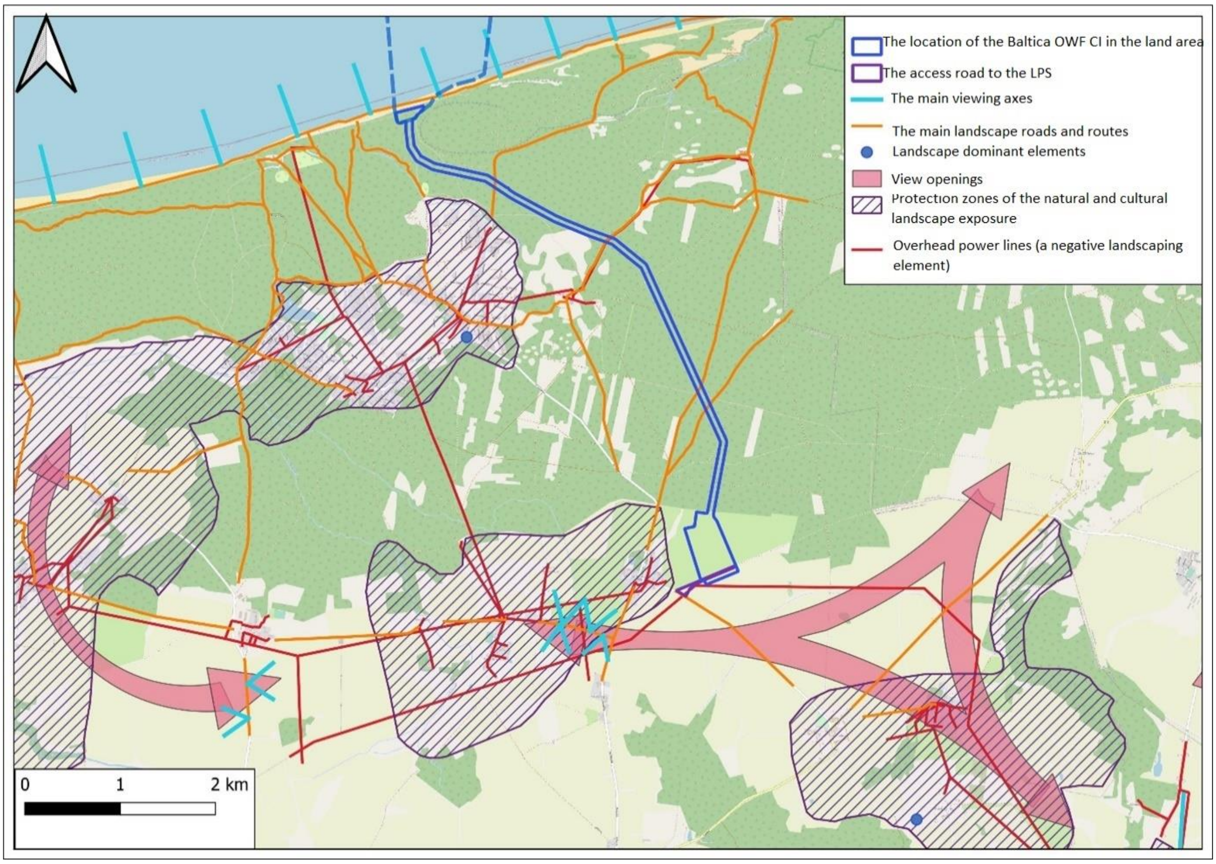



*Figure 3.80. The planned project projected on the elements of landscape composition and protection according to the SC&DSD of the Choczewo commune [Source: internal materials based on the SC&DSD of the Choczewo commune]*

Local spatial development plans (LSDP) are the most important planning documents defining the detailed principles of development and shaping the spatial arrangement in communes. As acts of local law, they constitute binding arrangements for spatial development. The provisions of local plans have a direct impact on landscape by regulating, first of all, the way of arranging the building constructions (as a prominent element of the cultural landscape spatial structure), technical and transport infrastructure, as well as vegetation. LSDPs influence the shaping of the landscape, specifying in detail the purpose of the areas and permissible (or required) building parameters, e.g. dimensions, colours, use of specific materials. These are issues related to spatial development and architectural detail (although they are obviously related to the landscape). In total, LSDPs cover a relatively small area of individual communes, therefore the findings contained therein refer only to parts of the landscape and its local conditions. They mainly relate to the protection zones of the exposition of valuable cultural landscape resources related to the existing immovable monuments and historical spatial arrangements.

The provisions of the current LSDP in force in the area covered by the planned OnSSs, i.e. the local spatial development plan adopted by Resolution no. XIV/145/2008 of the Choczewo Commune Council of 19 March 2008 on the adoption of the local spatial development plan “Wiatraki w Osiekach” [Windmills in Osieki], Choczewo commune, relate, on the other hand, to the construction of an onshore wind farm in this place. Therefore, they are not applicable to the planned project.

Summing up, the landscape sensitivity of the planned project area results from the presence of the elements of exceptional landscape and scenic values, as well as the high exposure of the area in question. Especially the northern area of the Baltica OWF CI, which is directly adjacent to the sea, is still characterised by a relatively small degree of inference in the landscape, despite being burdened with human pressure resulting from the potential advantages connected with tourism. This region requires a special protection against the introduction of disharmonious elements of technical infrastructure and a chaotic urban sprawl.

## 3.24 Population and living conditions of people

The area of the Choczewo Commune is inhabited by people of Kashubian origin (approx. 40%), while approx. 60% is the population who came here from the eastern territories of the former Republic of Poland and from central Poland. In accordance with the data of the Central Statistical Office of Poland, in 2017, the population of the commune was 5539 people. In 2000, the population of the commune was 5599, and in 1992 – 5572. Thus, it can be concluded that the number of permanent residents of the commune has not changed significantly over the last thirty years. In the Choczewo commune, similarly as in other rural communes of the Wejherowo district, there is a lower percentage of women than men in the total population. In 2000, there were 91 women for every 100 men. The people of working age (approx. 58%) constitute the largest group, followed by the people of pre-working age (approx. 20%) and the people of post-working age (approx. 12%). The average density of the Choczewo commune population, which amounts to 32 people$\cdot$km$^{-2}$, can be considered lower than in the corresponding indicators of the neighbouring communes.

The nearest residential buildings are located at a distance of approx. 360–380 m west of the planned project. These areas belong administratively to the village of Lubiatowo (in the case of the cable bed area) and to the village of Osieki Lęborskie (in the case of the OnSS).

Due to the nature of the town of Lubiatowo, which at present plays the role of a holiday village (where summer bungalows, camping sites, agritourism farms can be found), it should be assumed that in the summer, the number of inhabitants may increase even several times.

# 4 Modelling and analyses performed for the purposes of the project impact assessment

## 4.1 Modelling of noise propagation in the atmosphere

The computations of the distribution of the sound field emitted by noise sources related to the proposed installation were performed using the CadnaA 2021 4.6.155 software which enables making a forecast in accordance with the Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise and in accordance with the method stipulated in the Polish Standard PN-ISO 9613-2:2002 "Acoustics – Attenuation of sound during propagation outdoors. Part 2. General method of computation."

The following is a summary of the assumptions used in the model:

Computation standards used

- PN-ISO 9613-2:2002.

Screening, reflections, deflections, ground absorption

- Screening through terrain obstacles including buildings.
- Reflections to the second row.
- Lateral deflections.
- Ground absorption "G" = 1 for hardened ground, "G" = 0 for buildings and roads.
- The DTM downloaded from Geoportal.pl adjusted for the planned levelling within the Baltica-2 and Baltica-3 area.

Meteorology

- Temperature 10°C.
- Relative humidity 70%.

Sound power level

- The equipment sound power level was determined on the basis of information from potential suppliers.
- The sound power level of conductors at which a corona discharge will occur was determined on the basis of the measurement results presented in the paper: *Ocena hałasu emitowanego przez linie elektroenergetyczne i niektóre inne obiekty energetyczne* [literally: Assessment of noise emitted by power lines and certain other power facilities] 2013 by Tadeusz Wszołek, PhD. Eng.

Sound spectrum

- The computations were performed taking into account the ground attenuation components in individual octave bands. For the sources for which data without spectrum were entered, the computations were performed using the simplified method. Both methods are compliant with PN ISO 9613.

- The spectrum shape of individual items of equipment was determined on the basis of the curves contained in the CadnaA software database.
- The spectrum shape of corona discharge noise was determined on the basis of *Ocena hałasu emitowanego przez linie elektroenergetyczne i niektóre inne obiekty energetyczne* [literally: Assessment of noise emitted by power lines and certain other power facilities] 2013 by Tadeusz Wszołek.

The measurements were made at 7 points (receptors) which were located along the boundary of the nearest proposed or existing residential areas. Moreover, noise levels were computed at the facade of the residential building located at Osieki Lęborskie, i.e. the nearest to the proposed customer substations.

The data characterising the noise sources presented in the table in Appendix 2 of the EIA Report were used in the computations.

The computation results are presented in a graphical form – as the ranges of noise impact with a level of 40 and 50 dB – in Appendix 2 of the EIA Report for the customer substations and for the cumulative impact. For the purpose of calculating noise cumulative impacts, the parameters of the PSE S.A. substation, Baltic Power customer substation, Baltica 1 customer substation, reserves for the customer substation historically called Baltex and Ocean Wind customer substation were taken into account.

## 4.2 Modelling the distribution of electric and magnetic components of the electromagnetic field

### 4.2.1 Theoretical foundation for the computational methods

An electromagnetic field can be described by the two physical quantities: electric and magnetic fields. An electric field (called an electric component) is a component of an electromagnetic field expressed in V/m, and its value is dependent on voltage. A magnetic field (called a magnetic component) is a component of an electromagnetic field expressed in $A \cdot m^{-1}$, and its value is dependent on the intensity of the flowing current. In the case of alternating current, an electromagnetic field is additionally characterised by frequency. The power grid frequency is common across the entire Poland’s and Europe’s power systems and is 50 Hz.

Human health is protected against the effects of electromagnetic fields (EMF) through setting limits (limit values) for both EMF components in the environment. These limits were introduced by the Regulation of the Minister of Health of 17 December 2019 on the permissible levels of electromagnetic fields in the environment (Journal of Laws of 2019, item 2448).

The Regulation defines different permissible levels of the electromagnetic field in the environment for locations accessible to people and areas designated for residential development. The Regulation specifies:

1) electromagnetic field frequency ranges, for which physical parameters describing EMF are defined;
2) limit values for the physical parameters referred to in point 1, for specific frequency ranges to which the EMF levels apply.

For the EMF with a frequency of 50 Hz, the aforementioned Regulation sets out the following limit values:

1) locations accessible to people:
    a) the electric component – 10 $kV \cdot m^{-1}$,
    b) the magnetic component – 60 $A \cdot m^{-1}$;
2) areas designated for residential development:
    a) the electric component – 1 $kV \cdot m^{-1}$,
    b) the magnetic component – 60 $A \cdot m^{-1}$.

It is, therefore, concluded that fields characterised by the levels indicated above do not adversely affect any environmental component (plants, animals), including people, without having any cumulative impact.

Measurement methods are specified in the Regulation of the Minister of Climate of 17 February 2020 on methods of checking compliance with the permissible levels of electromagnetic fields in the environment (Journal of Laws of 2020, item 258).

Modelling the distribution of electric and magnetic components of the EMF was performed for the cable bed area and in the vicinity of the busbar systems.

### 4.2.2 Justification for excluding the OnSS from computing the electromagnetic field distribution

The computational determination of the electric component of the electromagnetic field within the site of the proposed substation, which is characterised by a complex geometrical configuration of current circuits and structural elements, is a complicated issue. For the purposes of environmental impact assessment reports, such computations are not required for a substation site, assuming that a fenced substation area, as an electrical operation area, is not accessible to unauthorised persons. However, relatively good estimates of the electromagnetic field distribution are obtained by comparing the results of the measurements for other similar existing facilities.

The results of the measurements of the electric component of the electromagnetic field conducted for multiple Polish substations with an upper voltage of 400, 220 and 110 kV indicate that no electric fields with intensities exceeding 1 $kV \cdot m^{-1}$ [the limit value for areas designated for residential development indicated in the Regulation of the Minister of Health of 17 December 2019 on the permissible levels of electromagnetic fields in the environment (Journal of Laws of 2019, item 2448). Exceptions usually include locations in the vicinity of high-voltage overhead lines entering a substation site, where within an area up to the first support structure, fields with intensities not exceeding a few $kV \cdot m^{-1}$ are quite often identified. It is important, however, to point out that not substation facilities but overhead lines entering its area are the source of these fields (Szuba *et al.*, 2008).

Also, in areas adjacent to a substation, the main source of a magnetic field are high-voltage overhead lines entering its site. Significantly lower field levels are recorded in areas (outside a fenced substation area) with no incoming line sections, where substation busbars (switchyard connections) and substation equipment (switches, transformers etc.) are the source of a magnetic field.

In the vicinity of Polish high-voltage substations, the highest values of magnetic field strength are identified in the vicinity of overhead lines entering a substation site, which is justified by the fact that substation line conductors are closer to a meter probe than current circuits (busbars). It is worth noting that the magnetic field intensities present there are usually significantly lower than $A \cdot m^{-1}$ – they do not exceed the limit value (60 $A \cdot m^{-1}$) established in the aforementioned Regulation for locations accessible to people. In the remaining locations (outside the fence of the substation), values of the magnetic field strength are very small: from non-measurable values up to several $A \cdot m^{-1}$.

The conclusions presented above confirm the results of the measurements of the intensities of the electric and magnetic fields with a frequency of 50 Hz near the existing substation 220/110 kV Bydgoszcz Zachód conducted by the personnel of the accredited Electromagnetic Field Measurements Laboratory of the Wrocław University of Science and Technology (Environmental Impact Assessment Report for the investment project: „Rozbudowa stacji elektroenergetycznej 220/110 kV Bydgoszcz Zachód wraz z likwidacją kolizji istniejącej linii 220 kV" [literally: Extension of the 220/110 kV substation Bydgoszcz Zachód together with resolving the conflict with the existing 220 kV line]. Control measurements of the electric and magnetic field intensities were conducted in the areas in the immediate vicinity of the existing substation, i.e. within the section between the fence of the substation and the first line pylon located outside the premises of the facility. The results of the measurements showed that the electric field strength did not exceed the value of 10 $kV{\cdot}m^{-1}$ permitted by law at any of the measurement points. A minor exceedance of 1 $kV{\cdot}m^{-1}$ was recorded only near the outgoing line sections. Also, the maximum value of magnetic field strength established during the measurements was recorded only near the outgoing line sections and was significantly lower than the value permitted by law.

The presence of electric fields exceeding the limit value for locations accessible to people outside the fence of the substation is impossible mainly due to a considerable distance of live elements from the fence of the substation. Ensuring adequately long distances is a result of the necessity to keep sufficient electrically insulating gaps between the busbars and the high voltage equipment and all metal and grounded structures, i.a. the fence of the substation. Such measures are aimed, in particular, at ensuring trouble-free operation of the facility as well as the safety of people within the substation premises. Therefore, locating live elements at a considerable distance from the areas accessible to people precludes the presence of excessive values of the electric (and magnetic) field therein.

In conclusion, the results of the measurements of the electric and magnetic field intensities conducted in the vicinity of several Polish high-voltage substations suggest that magnetic fields generated by transmission lines entering a substation are so small that in the light of current knowledge in the area of bioelectromagnetics, even when combined with electric fields present therein, they will not adversely affect fauna and flora, including the human body (Szuba *et al.*, 2008).

Naturally, the OnSS site will contain installations generating electromagnetic fields with different values of individual components. However, the OnSSs will operate without the constant presence of personnel therein; therefore, occupational exposure to electromagnetic fields will exist only during inspections of the equipment operation at the substations, its services, repairs and switching. The OSH rules applicable at the substations will at the same time ensure the reduction of occupational exposure to electromagnetic fields.

### 4.2.3 Theoretical foundation for the computational methods

For the proposed busbar systems connecting the OnSS with the proposed Choczewo Substation and for the cable lines transmitting electricity from the Baltica OWF to the above-mentioned OnSSs, the distributions of electric and magnetic field intensities[6], including the maximum value of each field component, were determined using computational methods.

[6] For cable lines, it is difficult to speak of determining the electromagnetic field strength distribution outside a cable sheath. This field identified outside an outer cable sheath is negligibly small due to the shielding properties of cable shields.

There are many computer programs designed for computing the distribution of each EMF component separately: of the electric (E) and magnetic (H) component. They mostly utilise the so-called method of mirror images and superposition method; however, also computational algorithms based on the so-called finite element method (FEM) are known.

According to the superposition principle, the electric (or magnetic) field at any point in the space surrounding busbar systems or buried cable lines is the sum of fields from all conductors of each busbar system or cable line forming a cable bed.

For busbar systems, in order to determine the electric field generated by charged bodies which are in a heterogeneous environment, e.g. near the ground, the mirror images method is used. In this method, a heterogeneous environment with different electric permittivity in which charged bodies are placed can be replaced by a heterogeneous environment by introducing appropriate fictitious charges. When introducing fictitious charges, the condition of equal tangential components of the electric field strength vector and normal components of the electric induction vector at the boundary of two environments needs to be met.

Most computer programs based on the method of superposition and the method of mirror images also employs a simplifying assumption according to which each line or busbar system conductor spanning between supporting structures or portals (of a busbar system) or each cable line is modelled with a straight, infinitely long conductor with a diameter characteristic for a specific type of actual conductor or cable.

The computational algorithms used to analyse the distribution of electric (E) and magnetic (H) fields generated by overhead power lines are complex and may also be useful for analytical determination of the distribution of the individual components associated with busbar systems operation.

It should be stressed that for the computations of the E or H distribution, which are mostly conducted in a cross-section perpendicular to the axis of a line or busbar system as well as to a cable bed[7] (only the magnetic component), always the designed, shortest distances between conductors (busbars) or cables and a computational point are adopted, as the maximum values of individual field components should be expected at these places. This means that in the case of busbar systems, computations of the distributions of electric and magnetic fields (including the maximum values of individual components) shall be conducted for the shortest distance between the phase circuits and the ground. For cable lines, computations of the magnetic field distribution over a line (including the maximum value of this component) shall be conducted for the smallest[8] designed cable line burial depth, as under these conditions, the maximum values of this component should be expected.

### 4.2.4 Assumptions for the computations of the electric and magnetic field strength distributions in the vicinity of the proposed cable bed area

For cable lines, only the magnetic component of the electromagnetic field will be introduced to the environment (the electric component is shielded by a cable sheath conductor, a metal shielding braid in particular).

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[7] In complex distribution systems, cable circuits, referred to as cable lines, which are placed in the ground in so-called cable ducts, form (power) cable routes.

[8] It should be noted that along the entire length of a cable line, the depth of burying the cable in the ground may vary, and computations of the magnetic field strength distribution are conducted for the shortest of these distances.

All computations of the magnetic field strength distribution were performed using PoIE-M software[9], the algorithm of which has the following input assumptions:

1) APV (Applicant Proposed Variant): 9 cable lines each of which consists of 3 single 220 or 275 kV AC cables, with the estimated current-carrying capacity of $I_{max}$[10]:
   - Solution 1
     - Baltica-2 – voltage of 275 kV – 914 A,
     - Baltica-3 – voltage of 275 kV – 819 A,
   - Solution 2
     - Baltica-2 – voltage of 220 kV – 1140 A,
     - Baltica-3 – voltage of 220 kV – 1024 A,
2) RAV (Rational Alternative Variant) 11 cable lines each of which consists of 3 single 220 or 275 kV AC cables, with the estimated current-carrying capacity of $I_{max}$:
   - Solution 1
     - Baltica-2 – voltage of 275 kV – 730 A,
     - Baltica-3 – voltage of 275 kV – 614 A,
   - Solution 2
     - Baltica-2 – voltage of 220 kV – 912 A,
     - Baltica-3 – voltage of 220 kV – 768 A.

Computations of the magnetic field distribution were performed identifying the value of the said quantity at a height of: 0.2, 1.0 and 2.0 MAGL in accordance with the recommendation indicated in the Regulation of the Minister of Climate of 17 February 2020 on methods of checking compliance with the permissible levels of electromagnetic fields in the environment (Journal of Laws of 2020, item 258).

The computations of the electric field distribution (similarly as of the magnetic field distribution) were performed along the cross-sections delineated in the location shown in Figure 4.1, which presents the projection of the cable bed for the RAV consisting of 9 parallel cable lines.

[9] A proprietary program. The author: Marek Szuba, PhD Eng. Biuro Konsultingowo-Inżynierskie „EKO-MARK".

[10] $I_{max}$ – the maximum value of the cable load current resulting from the power transmitted.

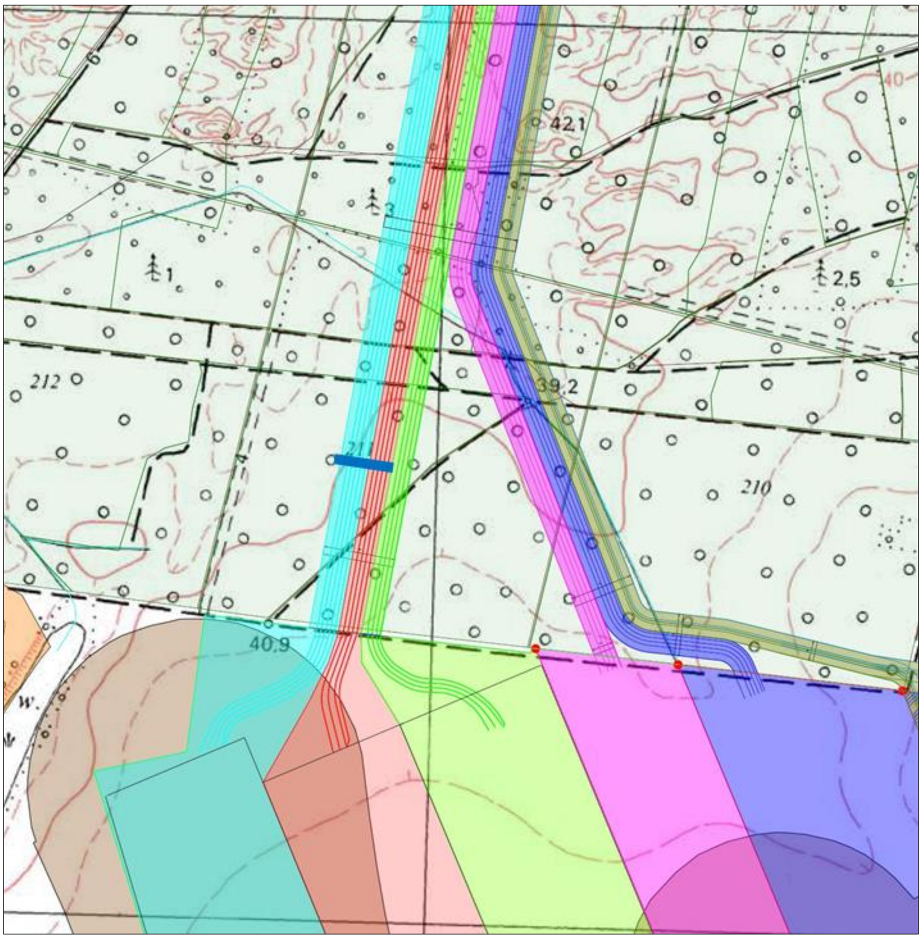



*Figure 4.1. Location of the cross-section in which the magnetic field strength distribution along the route of the cable line entering the OnSS (blue line) was determined by computational methods [Source: internal materials]*

### 4.2.5 Assumptions for the computations of the electric and magnetic field strength distributions in the vicinity of the busbar systems

It follows from the analysis of theoretical dependencies determining the computational algorithm that the maximum value and electric (E) and magnetic (H) field strength distribution near busbar systems is mainly affected by the following parameters:

- phase voltage of busbar systems (it affects only the electric field strength distribution);
- load current of each busbar system (it affects only the magnetic field strength distribution);
- distance between a busbar system (jumper in the case in question) and the ground;
- spacing between the conductors forming a busbar system;
- phase conductor arrangement (phase configuration) in adjacent busbar systems.

Other structural components of a busbar system have a lesser impact on the electric and magnetic field strength distributions. Furthermore, the electric field strength distribution in the vicinity of busbar systems is affected by its conductive surroundings, such as metal structures (e.g. a fence), buildings, etc., and the determination of impact of such surroundings on the electrical field distribution in the vicinity of busbar systems is generally only possible by measurements.

Depending on the arrangement of phases in individual conductors (wires) forming busbar systems, the distribution of both the electric and magnetic field changes. The arrangement of the phases in individual conductors (wires) of the busbar system was used in the computations of both field component distributions.

Given the specific design of conductors (wires) (tower series and type) and the assumed phase configuration, as well as the determined phase voltage value[11], the electric field strength distribution in the vicinity of each busbar system depends mainly upon the distance between the conductors (wires) and the ground. The field strength increases as this distance decreases, reaching its highest value within the cross-section[12], in which the distance between the conductors (wires) and the ground is the shortest.

For the purposes of model computations of the electric (E) and magnetic (H) field strength distribution, the following parameters for each of the 4 busbar systems were adopted:

- rated voltage of the busbar system: $U_n$ = 400 kV (the computations were performed for the worst-case scenario, i.e. the maximum working voltage: $U_{max}$ = 420 kV);
- the maximum load current of a busbar system: 2300 A;
- busbars: each phase of a busbar system in the form of a three-conductor bundle consisting of steel and aluminium conductors with a diameter of 26.1 mm; the conductors arranged as an equilateral triangle with its vertex directed downwards and side length of 40 cm;
- shortest distance between the phase conductors forming each of the busbar systems and the ground: $h_{min}$ = 13.0 m;
- distance between the axes of the phase conductors (the axes of the three-conductor bundles) in each busbar system: 6.0 m;
- above each portal of a busbar system, at a height of 28.2 m (in the middle of a span), 2 ground wires[13];
- phase arrangement in the busbar systems:
  - configuration A: L1, L2, L3; L1, L2, L3; L1, L2, L3; L1, L2, L3,
  - configuration B: L1, L2, L3; L3, L2, L1; L1, L2, L3; L3, L2, L1.

The computations of the electric field distribution (similarly as of the magnetic field distribution) were performed along the cross-section delineated in the location shown in Figure 4.2 (along the road between the OnSS fence and the Choczewo Substation fence). In this cross-section, the distance between the conductors forming each of the busbar systems and the ground is the shortest along the entire length of the busbar system and is: h = $h_{min}$ = 13.0 m. As a result, the electric (and magnetic) field strength may reach the maximum values there, whereas the strengths of both field components in any other location under the all busbar systems will certainly be lower than those determined in the said cross-section; somewhat higher values can be expected within the OnSS area.

[11] For example, the phase voltage of a line with a rated voltage of 400 kV might vary from 380 to 420 kV.

[12] (Computational) cross-section – a section of a straight line, in most cases perpendicular to a busbar system, along which, within the assumed distance range, at points located usually at a distance of 1 m, the electric and magnetic intensities are computed.

[13] Ground wires produce neither electric nor magnetic field. It is allowed that a ground wire additionally contains an optical fibre.

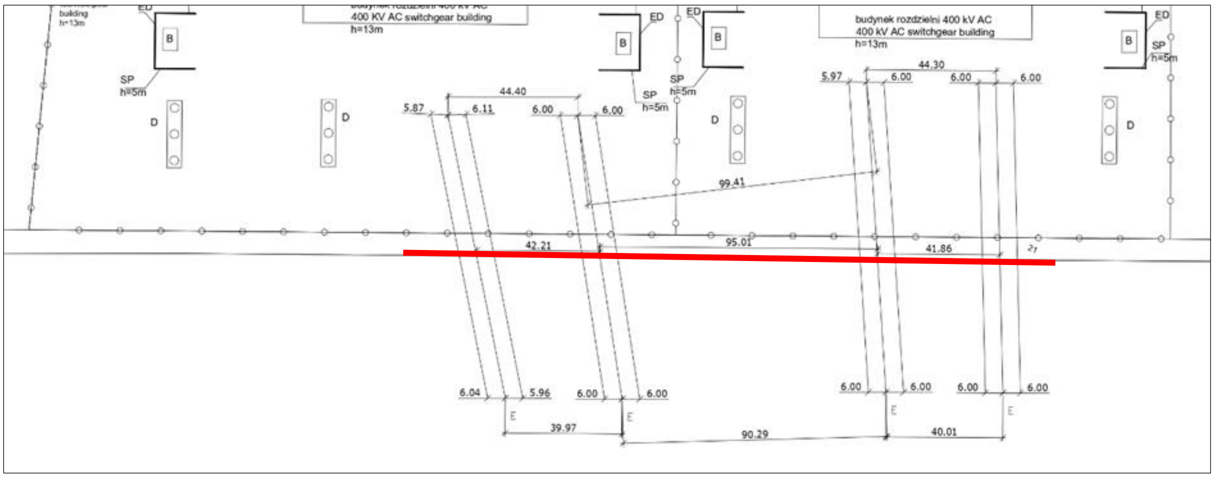



*Figure 4.2.* *Location of the busbar systems evacuating power from the OnSS and the position of the computational cross-section along which the electric and magnetic field distribution was determined [Source: internal materials]*

At this point, it should be stated that the purpose of the computations is to check whether under the technical assumptions used in the project documentation the environmental quality standards may be exceeded, also under the most unfavourable operating conditions of the busbar systems (the shortest designed distance between the conductors/busbars and the ground and the maximum phase voltage and the load of the busbar systems evacuating power from the OnSS).

As already mentioned, the maximum value of the electric field strength $E_{max}$ and magnetic field intensity $H_{max}$ under the conductors of the busbar systems (in the locations accessible to people) should be expected in the place where the distance between the conductors of each busbar system and the ground is shortest ($h = h_{min}$). Therefore, the computations were performed for the shortest[14] designed distance between the phase conductor (wires forming the bus system) and the ground, which is $h_{min}$ = 13.0 m.

The results of computations of the magnetic field distribution in the vicinity of the proposed cable bed and of computations of the electric and magnetic field strength distributions in the vicinity of the busbar system at the operation stage for the APV are presented in Section 6.1.2.5, and for the RAV, in Section 6.2.2.1.

## 4.3 Modelling of thermal impact of cable lines

Electricity transmission via high-voltage cable lines is naturally associated with the presence of thermal impact in their immediate vicinity. The thermal impact of typical power cable lines occurs as a result of power losses in the conductor and dielectric losses in the main insulation. The heat flux generated by individual power losses flows into the immediate surroundings upon an increase in cable temperature above the ambient temperature. The thermal impact range depends mainly on technical parameters of the cable lines, their lying method and depth, the size of external temperature fields coming from other heat sources and the thermal parameters of the soil itself.

[14] The shortest distance between the conductors and the ground which will be used in a given line span depends on numerous factors, the most important of which are: the height of towers, span length, tension of conductors, topography and the presence of facilities under the line (intersections and contiguous zones).

The thermal parameters of the soil, including its thermal resistivity, depend largely on the humidity, density and the type of fraction. Normal soil humidity, as well as its temperature, change periodically throughout the year. The cyclical changes in soil resistivity are mainly caused by the changeability of atmospheric conditions, in particular the amount of precipitation, exposure to direct sunlight, and the strength and direction of the wind. Under domestic conditions, typical value of the thermal resistivity of a very wet sand is 0.5 m·K/W, while for a very dry sand or till the values are 1.2–1.5 m·K/W and for an extremely dry sand it is 2.5 m·K/W.

The analysis aims at assessing the extent of the thermal impact of the system of the high-voltage cable lines evacuating the power generated by the Baltica OWF to be located in the Baltic Sea to the national power system. In the present case, the location of the cable assembly installed in the vicinity of the cable lines in question evacuating power from the OWF of a third party was taken into consideration.

The cable lines owned by a third party were marked as BT-OWF, whereas the cable assemblies of the Baltica-2 and Baltica-3 OWFs were marked as: B-2 OWF + B-3 OWF. The computations were performed in two variants [Table 4.1].

*Table 4.1. List of the computational variants for modelling of the thermal impact of cable lines [Source: internal materials]*

| **Variant** | **BT OWF** | **B-2 OWF + B-3 OWF** |
|---|---|---|
| | **number of cable lines** | |
| Variant 1 | 4 | 11 |
| Variant 2 | 4 | 9 |

In order to determine the extent of the cumulative thermal impact generated by the high-voltage cable lines for the system in question, the computational method based on the finite element method (FEM) was utilised.

The heat equation used for all domains:

$$\nabla\ (-k\nabla\theta) = Q$$

$$q = -k\nabla\theta$$

where:

- $\nabla$ cable operator
- k thermal conductivity
- $\nabla\theta$ temperature gradient
- Q heat source
- q local heat-flux density

The computations were performed for all the uniformly, maximally loaded cable lines of the entire system, which results in reaching the limit temperature value of the conductor of 90°C. The limit value of the heat source size was determined on the basis of Variant 1 for the cable line which reaches the highest temperature value and represents the limit values of the thermal impact of the system in question.

In the representative design case, the use of additional casing pipes filled with temperature stable material with an assumed constant resistivity value at the level of 1 m·K/W was envisaged. The computations were performed assuming the homogeneity of the local native soil.

For the purpose of computations, standard design XLPE insulated power cables with a copper conductor commonly used in the domestic power industry.

Basic computational assumptions:

- number of cable circuits: 13 for Variant 2 and 15 for Variant 1;
- laying method – flat;
- axial distances between individual cable circuits – 5 m;
- axial distance between phases in each circuit – 0.3 m;
- laying depth – 2 m;
- filled casing pipes with a diameter of 200 mm;
- ground surface temperature 20°C – a boundary condition;
- average soil resistivity value – 1 m × K/W;
- cable line load factor – LF = 1;
- symmetrical loading of all circuits;
- frequency – 50 Hz.

The design assumptions for soil conditions in accordance with the IEC 60287-3-1 standard for Poland, whereas the material properties based on the IEC 287-2-1 standard.

The design assumptions for soil conditions are compliant with the IEC 60287-3-1 standard for Poland.

The modelling results for the thermal impact are presented in Section 6.1.5.1.3.

## 4.4 Analysis of air pollution propagation

The impact of the planned project on air quality was assessed by comparing the sources envisaged in the project and parameterised in the course of working on different facilities in terms of emissions and possible impact. The evaluation of the emission potential of the sources and the potential scale and range of the impact drew upon the multiyear experience in emission and immission analysis, including field surveys, grain size determinations, wind tunnel testing. The evaluation of possible solutions mitigating the impact made use of the implementation work related to the methods of suppression, mainly of dust.

The scope of the emission analysis included the following types of sources:

a) emissions from internal combustion engines;
b) emissions from handling aggregate materials;
c) emissions from vehicle traffic on unpaved roads;
d) emissions from vehicle traffic on paved roads;
e) emissions from wind erosion of storage piles and sites.

The following, internationally recognised, methodologies were used to estimate emissions from different types of sources:

**Ad a) emissions from internal combustion engines**

EMEP/EEA emission factors Non-road mobile sources and machinery at Tier 1 and 2, referred to actual fuel consumption data for machinery.

**Ad b) emissions from handling aggregate materials**

Methodology of the U.S. EPA AP 42 13.2.4 Aggregate Handling And Storage Piles, based on the following formula:

$$EF = k(0{,}0016)\frac{\left(\frac{U}{2{,}2}\right)^{1{,}3}}{\left(\frac{M}{2}\right)^{1{,}4}}$$

where:

EF – emission factor [kg·Mg$^{-1}$];
k – correction factor (TSP, PM10, PM2,5);
U – mean wind speed [m·s$^{-1}$];
M – material moisture content [%].

**Ad c) emissions from vehicle traffic on unpaved roads**

Methodology U.S. EPA AP 42 13.2.2 Unpaved Roads, based on the following formula:

$$EF = k\left(\frac{s}{12}\right)^{a}\left(\frac{W}{3}\right)^{b} \times 281{,}9$$

where:

EF – emission factor (g·VKT$^{-1}$; VKT – *vehicle kilometre travelled*);
k – correction factor (TSP, PM10, PM2,5);
s, Sc, silt content – content of fine particles (smaller than 75 µm [%] in diameter) in the road surface material;
W – mean vehicle weight [Mg].

The emission analyses were conducted on the basis of both the values of the Silt content (s) factors according to the experience of the U.S. EPA and own experience (sampling of road surfaces and laboratory sieve analyses).

The estimation of annual emissions took account of the meteorological conditions prevailing in a given area according to the following formula:

$$E_{ext} = EF\left[\frac{365 - P}{365}\right]$$

where:

$E_{ext}$ – annual size-specific emission factor extrapolated for natural mitigation (g·VKT$^{-1}$; VKT – *vehicle kilometre travelled*);
P – number of days in a year with at least 0.254 mm of precipitation

**Ad d) emissions from vehicle traffic on paved roads**

Methodology of the U.S. EPA AP 42 13.2.1 Paved Roads, based on the following formula:

$$EF = k(sL)^{0{,}91}x\ (W)^{1{,}02}$$

where:

EF – emission factor ($g \cdot VKT^{-1}$; VKT – *vehicle kilometre travelled*);
k – correction factor (TSP, PM10, PM2,5);
sL (*silt loading*) – road surface silt loading [$g \cdot m^{-2}$];
W – average weight of the vehicles travelling the road [Mg].

The emission analyses were conducted on the basis of both the values of the *Silt loading* (sL) factors according to the experience of the U.S. EPA and own experience (sampling of road surfaces and laboratory sieve analyses).

The annual emission was estimated taking into consideration meteorological suppression, according to the formula:

$$E_{ext} = EF\left[1 - \frac{P}{4N}\right]$$

where:

$E_{ext}$ – annual size-specific emission factor extrapolated for natural mitigation ($g \cdot VKT^{-1}$; VKT – *vehicle kilometre travelled*);
P – number of days in a year with at least 0.254 mm of precipitation (0.1 in);
N – number of days per year.

**Ad e) emissions from wind erosion of storage piles and sites**

Methodology of U.S. EPA AP 42 13.2.5 Industrial Wind Erosion, based on a potential wind erosion model:

$$P = 58(u^* - u_t^*)^2 + 25\,(u^* - u_t^*)$$

where:

P – wind erosion potential [$g \cdot m^{-2}$];
u* – friction velocity [$m \cdot s^{-1}$];
$u_t$* – threshold friction velocity specific for a given material type [$m \cdot s^{-1}$].

In the case of specific materials for which the methodology of U.S. EPA does not state the values of the threshold friction velocity factors, detailed analyses were conducted, including wind tunnel testing, while maintaining the velocity profile specific for the movement of air masses above the ground.

The computations were conducted in the models with different time resolutions, including the models of 365 days per year (the analysis of meteorological data aimed at determining the highest wind velocity for each subsequent day of the year).

For the purpose of modelling concentrations of substances in the air, the reference methodology described in the Regulation of the Minister of the Environment of 26 January 2010 on reference values for certain substances in the air (Journal of Laws of 2010, No. 16, item 87) was employed in the computations for the comparative sources, except some roads, for which the EPA Caline model was used on the basis of Article 12, section 2 of the Environmental Protection Law.

For the purpose of the assessment of meteorological conditions, the characteristics of atmospheric stability and the wind rose prepared by the IMWM-NRI for the location of the project site (in accordance with the IMWM methodology) was used

# 5 Description of the environmental impacts anticipated in the case the project is not implemented, taking into account the available information on the environment and scientific knowledge

The implementation of the project is necessary to integrate the power generated in the Baltica OWF CI into the National Power System. The issue of abandoning the project in question should, therefore, be considered together with the issue of failing to develop the Baltica OWF, for which a decision on the environmental conditions has already been issued approving the project implementation. If the project is not implemented, the development of the Baltica OWF is also groundless, which means that joining the wind farm development programme would be impossible.

The Baltica OWF, along with its transmission infrastructure, is a project of strategic importance for the diversification of energy sources. This project is a tool for achieving a range of political and economic objectives, the most important including:

- the reduction of emissions of air pollutants, including greenhouse gases, to stop climate change and improve the quality of human life and health. The development of the Baltica OWF alone would result in avoidance of significant emissions of hazardous substances to the atmosphere. Assuming the use of 45% of its power output and 25 years of operation, the 1500 MW Baltica-2 OWF and the 1050 MW Baltica-3 OWF could generate 284.81 TWh/1025.33 PJ of electricity, thus avoiding the emission of over 102 million Mg $CO_2$, over 1381 million Mg $SO_2$, approximately 187 thousand Mg of nitrogen oxides and more than 3.1 million Mg of particulate matter from lignite-fired power plants[15];
- the sustainable economic development of Europe and Poland based on energy security achieved among others through diversification of energy sources. In accordance with the assumptions adopted, over time, the Polish Offshore Grid would gain the opportunity of integrating with subsea grids of other Baltic Sea states, thus enabling transboundary power transmission. This is of high importance for improving the energy security and the reliability of the power supply in the northern regions of Poland as well as in the seaside areas of other Baltic Sea states. Integrating the power transmission systems of the Baltic Sea states is one of the strategic economic objectives mainly for the reasons of the security of energy supply.

Failure to implement the project would lead to numerous consequences for the environment in the field of natural, social and economic conditions. Failure to implement the project in combination with other offshore wind farms in the long-term would mean abandoning the option of using an alternative source of electricity with a significant power output (covering over 7% of national electric power demand), which would require a compensation through exploitation of conventional sources with a similar power output, along with the emissions of gaseous and particulate pollutants from combustion of fuels (hard coal or lignite), the generation of approx. 20% of waste from combustion in relation to the amount of the fuel combusted, and indirectly with the effects of environmental changes in the areas where fossil fuels are extracted.

[15] European Environment Agency (EEA), Air pollution from electricity-generating large combustion plants. An assessment of the theoretical emission reduction of $SO_2$ and $NO_X$ through implementation of BAT as set in the BREFs. EEA Technical report No. 4, 2008; available at: https://www.eea.europa.eu/publications/technical_report_2008_4.

The lack of opportunities for the wind power industry development as an element of increasing the flexibility of the national power system will slow down the diversification of the energy mix and will result in maintaining its dominant proportion of emission sources. Failure to implement the project in combination with the Baltica OWF is likely to significantly reduce the chance of meeting the targets for reducing greenhouse gas emissions and increasing the proportion of renewable energy sources by Poland.

The development of the Baltica OWF CI will entail a variety of impacts on the marine and coastal environment described in Section 6 herein. From a direct perspective, the abandonment of the project would eliminate these anticipated impacts and biotic and abiotic components of the environment would not be affected. They would also be excluded from the pool of cumulative impacts, thus reducing their scale, range and environmental impact in the overall calculation. Not implementing the Baltica OWF CI means no restrictions on the availability of these areas to the existing and potentially new users [navigation, fisheries, tourism and possible production of hydrocarbons (crude oil and natural gas extracted from below the seabed)]. It should be stressed, however, that the potential impacts of the project have been mostly assessed as moderate, low and/or negligible. Thus, the environmental, social and economic benefits resulting from the project implementation greatly outweigh potential damage to the environment which might occur as a consequence of its implementation.

# 6 Project impact identification and assessment

## 6.1 Applicant Proposed Variant (APV)

### OFFSHORE AREA

### 6.1.1 Construction phase

#### 6.1.1.1 Impact on geological structure, seabed relief, seabed sediments and access to raw materials and deposits

A significant aspect of the assessment of the project impact on the processes taking place on the seabed and the seabed itself is to determine the scale of impact intensity and impact range. The impact significance is considered high or very high if the change to the character of the surface and the structure of the seabed is greater than the size of geomorphological forms potentially occurring at the seabed. The impact range determined as local, in geological and geomorphological terms, refers to spot changes or linear changes (cable laying) to the topography and structure of the seabed and does not extend beyond the dimensions of the forms possibly created in a given area, in specific conditions. The local range refers to changes taking place in the immediate vicinity of the impact associated with the planned project.

The sensitivity, i.e. the response of the seabed topography and structure, is assessed on a five-step scale in accordance with the data from Table 6.1.

*Table 6.1. Sensitivity of seabed topography and structure to impacts resulting from the activities related to the Baltica OWF CI construction [Source: internal materials]*

| Sensitivity | Description |
|---|---|
| Irrelevant | No changes to the topography and structure of the seabed or changes similar to the ones observed caused by natural processes |
| Low | Changes noticeable, but not altering the character of the topography and structure of the seabed; local range |
| Moderate | Changes noticeable, altering the character of the topography and structure of the seabed to a degree not affecting the general character of the area; local range |
| High | Changes affecting the topography and structure of the seabed, altering its character and affecting processes taking place on the seabed; local range, limited to the project area, possible small impact on the character of the topography of adjacent areas |
| Very high | Changes significantly affecting the topography and structure of the seabed in the area analysed, which may significantly affect geological and geomorphological processes of the project area and adjacent areas |

Depending on its structure, the seabed may exhibit different sensitivity to the impact of the project during the construction phase. The seabed made of till and till with a stony cover is difficult to wash out and withstands morphological changes. A sandy, sand and silt, and silty seabed is more prone to washout and material movement. Thus, the elements of the connection infrastructure may be exposed or buried, both as a result of natural processes involving the movement of rock material along the seabed and as a result of this movement being disrupted by the connection infrastructure components.

The implementation of the project may cause the following types of impacts on the seabed:

- changes in the shape of the seabed due to: the seabed preparation for cable laying, levelling of seabed unevenness along the cable route; changes in the seabed morphology will also occur as a result of the possible storage of rock material excavated during the seabed preparation for cable laying;

- seabed level changes due to the deposition of rock material raised and moved during preparatory and construction works;
- pits forming in the seabed at the anchoring locations of vessels installing the elements of connection infrastructure;

Assessment of the scale of impacts identified on the geological structure, seabed relief and seabed sediments is presented in Table 6.2.

*Table 6.2. Assessment of the scale of impacts on geological structure, seabed relief and seabed sediments [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Changes in the seabed relief | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Changes in the seabed level | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |
| Pits forming in the seabed at vessel anchoring locations | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.3. Assessment of the impact significance on geological structure, seabed relief and seabed sediments [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Changes in the seabed relief | Low | Moderate | Low |
| Changes in the seabed level | Low | Moderate | Low |
| Pits forming in the seabed at vessel anchoring locations | Low | Irrelevant | Negligible |

Along the planned route of the Baltica OWF CI, cable lines are to be installed below the seabed surface. The power cables from the OSS to the sea-land drilling site are to be installed at a depth of approx. 0.5 to 3.5 MBSB (depth range preferred by the Applicant), whereas within the Baltica-2 and Baltica-3 areas and between the OSSs, the cables are to be installed at depths reaching up to 3 MBSB. Additionally, in certain areas, e.g. areas of prospective extraction of natural aggregates, the depth of cable line burial will be up to 6 MBSB. The width of the seabed strips covered by works directly interfering with the seabed for each cable line is expected to be approximately 16 m, while at route sections where the seabed will be cleared of rocks and boulders, it will be 25 m. Moreover, within the area of the Baltica-2 and Baltica-3, internal connections will be made between OnSSs, the joint maximum length of which will be approx. 62 km. Therefore, the expected seabed surface covered by the works interfering with the seabed will be 17.97 km$^2$ at maximum.

Along the route, the seabed is composed mainly of glacial and fluvioglacial deposits. Local accumulations of glaciolacustrine sediments were also identified. Glacial sediments and modern marine sands were identified at the seabed surface.

Bearing in mind the geological structure and character of the seabed sediments along the planned route of the Baltica OWF CI, the sensitivity of the receptor such as the seabed sediments was assessed to be insignificant. The assessment of impacts showed that their significance will be negligible Table 6.30.

Also the impact on the seabed relief along the Baltica OWF CI route will be negligible or low. In the majority of the area analysed, the route runs along flat or undulating seabed. Only at a few locations, forms of glacial origin, forming hills extending approximately 0.5–1.0 m above the surrounding seabed surface, with slopes of up to several degrees at a maximum will be crossed. As for the other higher forms visible in the seabed relief along the cable route, they can be bypassed in the vicinity, along a reasonably flat seabed. The details of cable routing are unknown at this stage.

The overall impact of the project during its construction phase was assessed as negligible for the general character of the seabed and its structure – the changes will be minor, local, distributed over a small surface of the seabed and linear (along individual cable routes).

In geological terms, taking into account the nature of deposits forming the seabed surface of the Baltica OWF CI area, no significant changes in the character of deposits are expected. The impact on surface sediments will be negligible. Regardless of the method of cable backfilling adopted, it will not affect the character of the seabed sediments. In seabed sections composed of glacial and fluvioglacial sediments, glaciolacustrine sediments as well as seabed sections composed of marine sandy sediments, even mixing of the seabed sediment as a result of construction activities will have a negligible impact on the character of the sediment and the seabed composed of this sediment. In seabed sections where more than one type of sediment has been identified within the depth of the planned trenching, changes in the character of the sediment may occur if these sediments are mixed. In such a situation, from a geological point of view and given the scale and extent of the phenomenon, the impact on surface sediments should be considered negligible.

In the area discussed, no accumulations of fine and medium sands and gravels which could constitute a mineral deposit [within the meaning of the Act of 9 June 2011 – *Geological and Mining Law* (consolidated text: Journal of Laws of 2021, item 1420) and the Regulation of the Minister of the Environment of 1 July 2015 *on the geological documentation of mineral deposits, excluding hydrocarbon deposits* (Journal of Laws of 2015, item 987)] were identified. In the area of the Polish Exclusive Economic Zone of the Baltic Sea, three concessions for oil and gas prospecting, exploration and production are in force: Rozewie (no. 38/2001/Ł), Łeba (no. 37/2001/Ł) and Gotland (no. 36/2001/Ł). In its offshore part, the Baltica OWF CI area neither borders on nor is situated within the area covered by any of these concessions. The closest concession, Łeba, is situated approximately 50 km northeast of the area under analysis. The planned project will not affect its area.

#### 6.1.1.2 Impact on the quality of seawater and seabed sediments

Water and sediments in water bodies are strictly connected with each other. A form of balance exists between the various components of the marine environment and, in particular, between water and seabed sediment. A change in one component (e.g. sediments) causes changes in the other (water) and vice versa.

Most of the contaminants (heavy metals and toxic organic compounds of low solubility and difficult to degrade) released into the environment as a result of the human economic activity and reaching surface waters are retained in sediments [Bojakowska, 2001]. Sediments, however, are not only a place of deposition of persistent and toxic pollutants reaching the environment but also a place of existence, source of nourishment, place of reproduction and growth of numerous aquatic organisms. Contaminated sediments pose high risks to the biosphere because some of the harmful substances contained in sediments may pass into the water as a result of chemical and biochemical processes, and be accessible to living organisms [Fröstner, 1980; Bourg and Loch, 1995].

This subsection identifies, characterises and evaluates the impact of the Baltica OWF CI on the quality of sea water and seabed sediments. It was found that during the construction phase the Baltica OWF CI may cause various types of impacts on the receptors discussed (water and seabed sediments). These are:

- the release of contaminants and nutrients from sediments into water;
- the contamination of water and seabed sediments with petroleum products,
- the contamination of water and seabed sediments with antifouling agents;
- the contamination of water and seabed sediments by accidental release of municipal waste or domestic sewage;
- the contamination of water and seabed sediments with accidentally released chemicals and waste.

##### 6.1.1.2.1 Release of pollutants and nutrients from sediments into water

The disturbance of the seabed sediment associated with cable burial or ship anchoring is a process conducive to the passage of contaminants from the sediments to the water column (Uścinowicz, 2011; Bourg and Loch, 1995; Fröstner, 1980; Dembska, 2003). During construction works, substances including labile metal forms, POPs, i.e. PAHs and nutrients will pass into the water.

The most important parameters influencing the impact level are: the length of cable sections as well as the width and depth of the cable trench (and hence the volume of the sediment disturbed), the types and amount of pollutants accumulated in seabed sediments, as well as the type of rock material forming the seabed.

The sediments analysed within the Baltica OWF CI area are generally characterised by a low proportion of fine fractions and a low concentration of metals and persistent organic pollutants (see Subsection 3.2.2). Therefore, it is estimated that the processes related to the release of nutrients and POPs will occur at low intensity in the entire Baltica OWF CI area.

It should be emphasised that the substances released from the sediment will pass into water. However, within approx. 1 year from the completion of the construction activities, these substances will transfer back into sediments after reaching an equilibrium.

Power cable burial in the seabed can be carried out using three main technologies:

- SLB – simultaneous laying and burial of the cable in the seabed sediment;
- PLB – post-lay burial of the cable;
- construction of a trench in the seabed, cable laying, and its subsequent burial.

The scenario characterised by the greatest negative environmental impacts is the application of PLB technology in both the RAV and in the APV, and the use of remotely operated self-propelled equipment in construction works. In the case of this technology, the volume of sediment disturbed will be larger than in the case of the two other technologies described above.

Considering the cable-laying technology, the seabed area occupied and the cable burial depth (see Subsection 1.1), in the calculations of the pollutant load that will pass into the water column it was assumed that the maximum volume of excavation in the offshore area and hence of the sediment disturbed during cable installation in the APV (including internal connections between the OSSs) will be 11 814 008 $m^3$.

Moreover, during cable laying, the seabed sediment will also be disturbed due to anchoring of vessels. The anchoring process itself is short-term, affecting a small area (local) to a depth of approximately 3 m, so the volume of the sediment disturbed will be small.

Considering the content of pollutants and nutrients in the seabed sediment in the Baltica OWF CI area, and their potential to pass into the water column (see Subsection 3.2.2), as well as the volume of sediment that may be disturbed due to the cable installation, an estimation was made as to the emission of metals, nutrients and organic pollutants from the sediment to the water column, which can occur in the APV due to the installation of 9 cables with a maximum length of a single line up to 89 km [Table 6.4]. For comparison purposes, Table 6.4 presents the quantities of contaminants that may pass from the sediment to the water column in the RAV due to the installation of 11 cables with a maximum length of a single line up to 89 km. The calculations assume an average sediment volumetric density of 1.52 $g \cdot cm^{-3}$ (1520 $kg \cdot m^{-3}$) and an average sediment moisture content of 20.1%. For the purpose of calculations, the volume of sediment disturbed as a result of the cable laying process was assumed at 11 814 008 $m^3$ for the APV and 14 242 252 $m^3$ for the RAV (including internal connections between OSSs).

The table also presents, for comparative purposes, the loads entering annually the Baltic Sea with the rivers of Poland and with precipitation [Uścinowicz, 2011]. The results of the State Environmental Monitoring carried out by CIEP in 2003–2012 as well as in 2018 and 2019 were also taken into account. As shown, the estimated results obtained for the remobilisation of individual indicators during cable laying in both variants are insignificant.

*Table 6.4. Comparison of the loads of pollutants and nutrients that may be released into water during the Baltica OWF CI construction (construction phase in the APV and RAV) with the load entering the Baltic Sea through Polish rivers and rain [Source: internal materials]*

| **Parameter** | **APV (9 cables)** | **RAV (11 cables)** | **Annual load entering the Baltic Sea through rivers** | **Annual load entering the Baltic Sea through rain** |
|---|---|---|---|---|
| Volume of the sediment disturbed [$m^3$] | 11 814 008 | 14 242 252 | - | - |
| Weight of the sediment disturbed [Mg] | 17 957 293 | 21 648 223 | - | - |
| Dry weight of the sediment disturbed [Mg] | 14 365 834 | 17 318 578 | - | - |
| Lead (Pb) [kg] | 38 213 | 46 068 | 24 000–1700 | 200 000 |
| Copper (Cu) [kg] | 9338 | 11 257 | 100 000–47 400 | No data available |
| Chromium (Cr) [kg] | 13 360 | 16 106 | 3800 | No data available |
| Zinc (Zn) [kg] | 59 187 | 71 352 | 61 900 | No data available |
| Nickel (Ni) [kg] | Concentration in the Baltica OWF CI sediments below the limit of quantification | | 687 000–46 100 | No data available |

| Parameter | APV (9 cables) | RAV (11 cables) | Annual load entering the Baltic Sea through rivers | Annual load entering the Baltic Sea through rain |
|---|---|---|---|---|
| Cadmium (Cd) [kg] | Concentration in the Baltica OWF CI sediments below the limit of quantification | | 2300−500 | 7100 |
| Mercury (Hg) [kg] | Concentration in the Baltica OWF CI sediments below the limit of quantification | | 2100−100 | 3400 |
| Arsenic [kg] | Concentration in the Baltica OWF CI sediments below the limit of quantification | | No data available | No data available |
| PCB congeners [g] | Concentration in the Baltica OWF CI sediments below the limit of quantification | | 260 000 | 715 000 |
| PAH analytes [g] | 7183 | 8659 | No data available | No data available |
| Available phosphorus (P) [kg] | 770 009 | 928 276 | 9 500 000–4 810 000 ($P_{tot.}$) | 163 000 |
| Nitrogen (N) kg] | Concentration in the Baltica OWF CI sediments below the limit of quantification | | 150 000 000–89 720 000 | 5 700 000 |

The seabed sediment which will be disturbed during the underwater works will be used only for cable burial and will not be transferred to other locations of the sea area nor transported to the land. If a different decision is made and the sediment removed is transported to shore, the level of heavy metals, pollutants and nutrients released will be lower. Similarly, if SLB technology is applied and a trench in the seabed is made in which a cable is laid and then backfilled, in that case the seabed area including the sediments disturbed is significantly smaller and the impact will be lower.

At the same time, disturbing seabed sediments may slightly improve their quality (increase in oxygenation and decrease in the amount of pollutants and nitrogen compounds in the sediment due to their transfer to water). The improved oxygenation of the sediments may, however, reduce (limit) the passage of phosphorus from the sediment, since this process occurs under anoxic (reducing) conditions [Alloway and Ayres, 1999].

The release of contaminants and nutrients from seabed sediments during the construction phase is a direct negative impact of a local range, short-term and reversible. Given the small scale of the impact and the moderate sensitivity of the receptor (water), the significance of this impact during the implementation phase in the APV was assessed as low for seawater.

A summary of the assessment of the scale and significance of the impacts on seawater and seabed sediments are presented in Table 6.5 and Table 6.6.

*Table 6.5. Assessment of the scale of impact on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Release of pollutants from sediments into the water column | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.6. Assessment of the impact significance on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Release of pollutants and nutrients from sediments into the water column | Low | Moderate | Low |

#### 6.1.1.2.2 Contamination of water and seabed sediments with petroleum products

Pollutants entering water during normal operation of vessels form the second largest source of oil pollution at sea. This is the source of approx. 33% of oil released into the environment (mainly due to increased maritime traffic in the Baltic Sea region) [Kaptur, 1999]. In comparison, approximately 37% of oil entering the sea is a run-off from land brought by rivers, while the tanker disasters only rank third (12%).

During the construction phase, vessels (ships, barges, etc.) will be used, from which small amounts of petroleum products (lubricating oil, fuel oil, petrol, etc.) may leak into the water during normal operation. To a minor extent, they may contribute to the deterioration of water quality. A visible effect of an oil spill is an oil slick which, under the influence of gravity and surface tension, spreads at a speed depending on the type of oil and ambient conditions. The size of the spill is determined by such factors as oil volume, density, viscosity, temperature, wind speed and time. The estimated speed of an oil slick movement in large water bodies is approx. 2–3% of the wind speed.

It should be assumed that these will be small spills (Tier 1), up to 20 $m^3$. Visible traces of such contaminants may disappear spontaneously in favourable conditions, as a result of evaporation and dissipation in water. The size of these spills will be practically limited to the Baltica OWF CI area and a zone along the fairways used by vessels involved in the project implementation. Additionally, the Baltica OWF CI area is crossed by a shipping route, within which permanent and organised vessel traffic takes place.

Contamination of seawater and/or seabed sediments with petroleum products released during the normal operation of vessels is a direct negative impact which is regional, momentary or short-term, and reversible.

A summary of the assessment of the scale and significance of the impacts on seawater and seabed sediments are presented in Table 6.7 and Table 6.8.

*Table 6.7. Assessment of the scale of impact on the quality of seawater and seabed sediments [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Contamination of water and seabed sediments with petroleum products | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.8. Assessment of the impact significance on the quality of seawater and seabed sediments [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Release of pollutants and nutrients from sediments into the water column | Low | Moderate | Low |

### 6.1.1.2.3 Contamination of water and seabed sediments with antifouling agents

Hulls of vessels are protected against fouling with biocides, which may contain e.g. copper, mercury and organotin compounds (e.g. TBT). These substances may pass into the water and eventually be contained in the sediment. It should be assumed that the releases of those compounds will be limited due to their dilution in the water. Among the substances listed, organotin compounds are the most harmful (toxic) to aquatic organisms. The use of TBT (the most harmful substance) in anti-fouling paints is now prohibited, but the presence of those compounds in older vessels cannot be ruled out. The sensitivity of sea waters and seabed sediments to biocides released from hulls was assessed as medium.

Vessels (ships, barges, etc.) will be used at each phase of the project and their hulls may release certain amounts of anti-fouling substances into the water during normal operation. Consequently, they can contaminate sediments. To avoid this, at every stage of the project it is recommended to use vessels the hulls of which have not been coated with anti-fouling paint containing TBT. This will eliminate this most harmful impact on aquatic organisms.

The most important parameters influencing the level of impact are the type and amount of anti-fouling substances released as well as the type of rock material forming the seabed. The sensitivity of both receptors is moderate.

Contamination of water and/or seabed sediments with antifouling substances during the construction phase forms a direct negative impact of a local or regional range, short-term and reversible. Given the moderate scale of impact, the significance of this impact during the construction phase in the APV and in the RAV was assessed as low for sea waters and seabed sediments.

A summary of the assessment of the scale and significance of the impacts on seawater and seabed sediments was presented in Table 6.9 and Table 6.10.

*Table 6.9. Assessment of the scale of impact on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Contamination of water and seabed sediments with antifouling agents | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.10. Assessment of the impact significance on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Contamination of water and seabed sediments with antifouling agents | Low | Moderate | Low |

#### 6.1.1.2.4 Contamination of water and seabed sediments by accidental release of municipal waste or domestic sewage

At each project stage, waste will be generated on vessels and at the onshore site facilities (located in a port supporting the project implementation) – mainly municipal and other waste, unrelated to the construction process directly, as well as domestic sewage. Waste and sewage may be accidentally released into the sea while being received from vessels by another vessel, resulting in a local increase in nutrient concentrations and the deterioration of water and sediment quality. However, the pollutants are expected to disperse quickly, and thus will not contribute to a permanent deterioration of the environment in the project area. The sensitivity of sea waters and seabed sediments to this type of impact is assessed as low.

The most important parameters affecting the level of this impact are the type and quantity of the waste or sewage released, the weather conditions as well as the type of rock material forming the seabed. The sensitivity of both receptors is low.

The contamination of water or seabed sediments with municipal waste or domestic sewage is a direct negative impact of local range, which is short-term or momentary, and reversible. Given the low scale of impact and the low receptor sensitivity, the significance of this impact during the implementation phase in the APV was assessed as negligible for sea waters and seabed sediments.

A summary of the assessment of the scale and significance of the impacts on seawater and seabed sediments was presented in Table 6.11 and Table 6.12.

*Table 6.11. Assessment of the scale of impact on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Contamination of water and seabed sediments by accidental release of municipal waste or domestic sewage | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.12. Assessment of the impact significance on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Contamination of water and seabed sediments by accidental release of municipal waste or domestic sewage | Low | Low | Negligible |

#### 6.1.1.2.5 Contamination of water and seabed sediments with accidentally released chemicals and waste

During the construction of the Baltica OWF CI, waste directly related to the Baltica OWF CI construction process will be generated on vessels and within the project location [mostly representing waste from group 17 of the appendix to the Regulation of the Minister of Climate of 2 January 2020 *on waste catalogue* (Journal of Laws of 2020, item 10)]. Waste produced during the construction phase will include e.g. cable scrap, sanitary waste from ships, flammable waste, oil and chemical waste, as well as construction waste. Waste should be neutralised in accordance with the applicable regulations concerning industrial waste.

The most important parameters affecting the level of this impact are the type and quantity of the waste or sewage released, the weather conditions as well as the type of rock material forming the seabed.

Generally, for projects such as the Baltica OWF CI, a detailed plan is prepared to prevent the risks and contamination generated during the implementation, operation and decommissioning of the OWF, which contains mitigating measures and a procedure to be followed in case of such events. The sensitivity of both receptors in the case of this impact is moderate.

Contamination of seawater and/or seabed sediments connected with the Baltica OWF CI implementation process is a direct negative impact of a local range, short-term or momentary, and reversible. Given the moderate scale of impact, the significance of this impact during the implementation phase in the APV was assessed as low for sea waters and seabed sediments.

A summary of the assessment of the scale and significance of the impacts on seawater and seabed sediments was presented in Table 6.13 and Table 6.14

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Contamination of water and seabed sediments with accidentally released chemicals and waste | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

Table 6.14.

*Table 6.13. Assessment of the scale of impact on the quality of water and seabed sediments [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Contamination of water and seabed sediments with accidentally released chemicals and waste | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.14. Assessment of the impact significance on the quality of water and seabed sediments [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Contamination of water and seabed sediments with accidentally released chemicals and waste | Low | Moderate | Low |

#### 6.1.1.3 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

During the construction phase of the Baltica OWF CI, an increased emission of pollutants into the atmosphere can be expected (including greenhouse gases), due to the increased traffic and operation of vessels involved in the project construction.

Depending on the subsea cable line construction technology adopted, it is possible to employ vessels of different types and uses. Due to the limited possibilities of carrying out construction works in the sea area (environmental and weather-related aspects, etc.) the works are to be organised in a focused manner, being performed as briefly as possible and continuously in one sea area. The number of vessels involved in the offshore construction works will vary depending on the existing needs, whereas the anticipated maximum number of vessels operating simultaneously at sea during the cable line installation will be 7. Vessels of different sizes and tonnage ratings, carrying out different tasks, are expected to be involved in the project. The largest of them, specialist vessels used for transport and laying of power cables on the seabed, i.e. Cable Laying Vessels (CLVs), can measure up to 200 m in length.

Considering the vessels used for offshore operations, they will consume between 50 kg (small vessels) and 5000 kg (large vessels, e.g. CLVs) of diesel fuel per hour. This is associated with exhaust emissions to the atmosphere, with highly efficient ship engines producing significant emissions, the quality of which is related to the quality of the fuel. Fuels meeting the criteria and quality standards compliant with the recommendations of the MARPOL Convention and the so-called Sulphur Directive of the European Parliament and the Council (EU) are expected to be used. Fuel combustion products will not be concentrated due to favourable wind conditions at open sea.

The following table [Table 6.15] presents daily emissions of contaminants of individual substances contained in exhaust gases, depending on the size of vessels, assuming maximum values of fuel consumption and nominal daily working time of vessels (up to 10 h for small vessels and 24 h for large vessels).

*Table 6.15. Emissions of individual substances from the combustion of diesel oil during the cable line construction in the offshore areas [Source: Environmental Scoping Report for the Project: "Infrastruktura Przyłączeniowa MFW Baltica B-2 i B-3" – literally: Connection Infrastructure of the Baltica B-2 and B-3 OWFs]*

| **Substance** | **Emission factor [g·kg$^{-1}$ of fuel]** | **Emissions [kg·d.$^{-1}$]** | | |
|---|---|---|---|---|
| | | **Vessels** | | |
| | | **Small** | **Medium** | **Large** |
| Nitrogen oxides (NOx) | 32.629 | 65.26 | 1174.64 | 3915.48 |
| Non-Methane Volatile Organic Compounds (NMVOC) | 3.377 | 6.75 | 121.57 | 405.24 |
| Carbon oxide (CO) | 10.774 | 21.55 | 387.86 | 1292.88 |
| Total suspended particulate (TSP), including up to 100% of PM10 and PM2.5 | 2.104 | 4.21 | 75.74 | 252.48 |
| Sulphur dioxide (SO2) | 0.020 | 0.04 | 0.72 | 2.40 |
| Aliphatic hydrocarbons (HC al.) | 2.195 | 4.39 | 79.02 | 263.40 |

| Substance | Emission factor [g·kg$^{-1}$ of fuel] | Emissions [kg·d.$^{-1}$] | | |
|---|---|---|---|---|
| | | Vessels | | |
| | | Small | Medium | Large |
| Aromatic hydrocarbons (HC ar.) | 1.182 | 2.36 | 42.55 | 141.84 |

Based on vessel traffic data in 2015 and 2016, using the IWRAP programme, it was calculated that vessels operating within the Baltica OWF CI area use over 12 000 Mg of fuel, emitting over 40 000 Mg of $CO_2$, over 700 Mg of $SO_2$, over 1200 Mg of $NO_x$ and over 90 Mg of particulate matter over a period of one year [Baltica OWF EIA Report]. Assuming the maximum traffic associated with cable laying (1000 days of operation of 12 vessels including 2 small, 5 medium and 5 large ones), total fuel consumption will be up to 316 000 Mg and emissions will not exceed 1 053 333 Mg of $CO_2$, 7 Mg of $SO_2$, 10 500 $NO_X$ and 7 Mg of particulate matter.

As the project work will be conducted in open sea areas, where the exhaust gases emitted will spread very quickly over a wide area in the absence of terrain unevenness and obstacles, and thus their concentration will decrease quickly, the exhaust gases emitted by ships and other equipment over a limited period of time are not expected to cause a significant increase in atmospheric air pollution in the long term.

An assessment of the impact resulting from exhaust emissions on air quality is presented in Table 6.16.

*Table 6.16. Assessment of impacts on climate conditions and air quality of the marine environment [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Exhaust emissions | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

As the scale of the impact of exhaust emissions on air quality is moderate **and** the resistance of the receptor was assessed as low, the significance of this impact is low [Table 6.17].

*Table 6.17. Significance of the impact on climatic conditions and air quality of the marine environment [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Exhaust emissions | Low | Low | Negligible |

#### 6.1.1.4 Impact on ambient noise

The ambient noise level in the Baltica OWF CI area will increase due to the rise in the number of vessels related to the cable line construction and the equipment used for cable laying. It will be a continuous sound in the low frequency range.

Higher sound intensities will increase both the sound detectability and the potential risk of negative sound impacts on receptors. The extent of this impact will be restricted in time, to the period of the cable laying works, and in space, as a result of noise attenuation by water – from a few hundred metres for high frequencies to several kilometres from the sound source of low frequencies. Passing ships mostly generate low-frequency sounds. The direct negative impact on ambient noise levels will be local and short-term. The impact on ambient noise level was assessed to be low.

A summary of the assessment of the scale and significance of the impact on ambient noise is presented in Table 6.18 and Table 6.19.

*Table 6.18. Assessment of impacts on ambient noise [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Noise generated by ships and equipment | 3 | | | | | 1 | | 3 | | | | | 1 | 8 |

*Table 6.19. Significance of the impact on ambient noise [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Noise generated by ships and equipment | Moderate | Low | Low |

#### 6.1.1.5 Impact on nature and protected areas

##### 6.1.1.5.1 Impact on biotic elements in the offshore area

###### 6.1.1.5.1.1 Phytobenthos

An analysis of the literature on the subject has shown that there are 2 factors potentially affecting phytobenthos during the project construction phase:

- change in the substrate structure;
- redistribution of nutrients and contaminants from sediments to the water depth.

Among these factors, the one most strongly affecting phytobenthos, according to Köller *et al.* (2006), Zucco *et al.* eds. (2006), and Birklund (2007), is the disturbance of the substrate structure comprising sand or sand and silt sediments as well as stony seabed overgrown by phytobenthos. During construction works on the seabed, local direct damage to macroalgae growing on boulders in the area of the works may occur. This is a negative, direct and permanent impact once the hard substrate is removed. If the stones are left undisturbed, it will be possible for the seabed to become overgrown with phytobenthos again within a year (brown algae) or several years (red algae) after the impact ceases. Therefore, the sensitivity of macroalgae to the impact was assessed as moderate. Considering the negligible amount of macroalgae in the area and their potential total destruction, the impact level should be assessed as high. In view of the above, the significance of the impact on phytobenthos was assessed as moderate. The significance of macroalgae in the area is irrelevant, which means that their loss is not important for the ecosystem.

The last factor potentially affecting the phytobenthos, as identified on the basis of data from literature, is the redistribution of nutrients and pollutants from the sediment into the water column (Zucco *et al.* eds., 2006). It results from sediment disturbance during works conducted on the seabed, when nutrients and contaminants (e.g. heavy metals) are released into the water. In this situation, phytobenthos communities are exposed to an increased concentration of nutrients (which may cause an increase in plant mass) and contaminants in the water (which may cause physiological disruption). The impact is mainly of a local character and depends on the depth and type of sediments, which influence the content of nutrients and contaminants in the sediments (in general, the greater the depth and the finer the sediment, the higher the content of the above mentioned substances, which remain in the water column for a longer time). In the case of the Baltica OWF CI area, the impact of the compounds released from the sediments on phytobenthos occurring in trace amounts in this area will be unlikely, considering the low content of nutrients and contaminants in the sediments of the Baltica OWF CI. Consequently, the sensitivity of macroalgae to this impact was assessed as irrelevant and the significance of the impact as negligible.

*Table 6.20. Assessment of the scale of impact on phytobenthos [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Habitat disturbance due to a change in substrate structure | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Redistribution of contaminants from sediments into the water column | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.21. Assessment of the impact significance on phytobenthos [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Habitat disturbance due to a change in substrate structure | High | Moderate | Moderate |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Redistribution of pollutants from sediments into the water column | Low | Irrelevant | Negligible |

#### 6.1.1.5.1.2 Macrozoobenthos

Two factors were identified which could potentially affect the zoobenthos during the construction phase of the Baltica OWF CI:

- disturbance of the seabed sediment structure;
- redistribution of pollutants from sediments into the water column.

**Disturbance of the seabed sediment structure** is the factor that most strongly affects the zoobenthos inhabiting the surface and the interior of the seabed sediments [Köller *et al.*, eds., 2006; Zucco *et al.*, eds., 2006; Birklund, 2007]. This applies in particular to zoobenthic species inhabiting the surface of sandy and silty sediments as well as rocky seabeds, which are not able to move actively in the sediments. As a result of the sediment structure disturbance, the zoobenthos in the areas of seabed disturbance is eliminated. In the case of the OWF Baltica CI, the impact on zoobenthos will be limited to the area of the seabed intervention works. The zoobenthos of the Baltica OWF CI area is not unique in terms of quality and quantity composition in the context of zoobenthos resources inhabiting similar habitats in the remaining part of PMA. Moreover, it is characterised by a high capacity to recover its resources in a relatively short time.

**Redistribution of pollutants** from sediments into the water column is a factor potentially affecting the zoobenthos [Zucco *et al.*, eds., 2006]. It takes place in effect of sediment disturbance during seabed works. This results in the exposure of the zoobenthos communities to an increased concentration of pollutants contained in the sediment (e.g. toxic chemicals, heavy metals).

*Table 6.22. Assessment of the scale of impact on macrozoobenthos [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Destruction due to the disturbance of the seabed sediment structure | 3 | | | | | 1 | | | | 2 | | 2 | | 8 |
| Redistribution of pollutants from sediments into the water column | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.23. Assessment of the impact significance on macrozoobenthos [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Destruction due to the disturbance of the seabed sediment structure | Moderate | Moderate | Low |
| Redistribution of pollutants from sediments into the water column | Low | Irrelevant | Negligible |

#### 6.1.1.5.1.3 Ichthyofauna

The main impacts on the ichthyofauna will be as follows:

- behavioural changes due to noise and vibration emissions;
- change in the habitat structure;
- change in chemical parameters of the habitat.

The methodology of impact assessment was modified by adding in the assessment of sensitivity of ichthyofauna taxa – in addition to the general resistance – the anticipated intensity of individual impacts during the Baltica OWF CI construction, operation and decommissioning phases.

##### 6.1.1.5.1.3.1 Behavioural changes due to noise and vibration emissions

Using their hearing organs, fish receive sounds coming from the environment. Acoustic stimuli from the environment allow for orientation in the environment, assessment of ambient conditions and communication between individuals. They also play an important role in reproductive processes (mating), also facilitating predator avoidance and prey location [Andersson, 2011; Popper and Hawkins, 2018]. The range of frequencies detected by fish is mostly between under 50 Hz and approximately 300–500 Hz, although some species can hear sounds with a much broader frequency range (from 3 to 4000 Hz) [Ladich and Fay, 2013; Popper and Hawkins, 2019].

The sensitivity of fish to sound is primarily dependent on the structure of their auditory organs. Fish without a swim bladder (e.g. adult flatfish) or fish in which the swim bladder is far away from the ear (e.g. salmon) are only able to perceive the movement of water particles. This is due to the narrow range of frequencies heard (usually up to approx. 500 Hz) and the higher hearing threshold. In the case of fish with a swim bladder located close to or directly connected to the ear (e.g. cod and herring), variations in pressure can also be detected. As a result, their hearing threshold is lower and the range of recorded frequencies can reach 3000–4000 Hz [Popper and Hawkins, 2019].

On the one hand, the range of noise impact depends on the aforementioned structure of the hearing organ, and on the other hand – on sound intensity. Environmental factors affecting sound propagation, e.g. seabed morphology and salinity, also play an important role. Fish can perceive anthropogenic sounds from a distance of up to dozens of kilometres. Thomsen *et al.* [2006] suggest that the cod is able to detect sounds generated by piling at a distance of even 80 km, while the salmon and the flatfish can hear them from a distance of several kilometres.

Depending on the noise intensity and the distance from its source, the impact can have various effects, ranging from behavioural changes to the death of fish [Table 6.24].

*Table 6.24. Potential impact of noise on ichthyofauna [Source: internal materials based on Popper et al., 2014]*

| No. | Impact effect | Impact characteristics |
|---|---|---|
| 1. | Death | Death due to the damage resulting from exposure to sound |
| 2. | Damage to tissue; disturbance of physiology | Example of damage: internal haemorrhage, damage to organs filled with gas, such as swim bladder and surrounding tissues |
| 3. | Hearing system damage (TTS, PTS) | Hair cell damage, temporary (TTS) or permanent threshold shift (PTS) |
| 4. | Masking | Masking of important biological sound signals from the environment, including from other individuals |
| 5. | Behavioural changes | Disturbance of normal activities, such as: feeding, spawning, creating shoals, migration, movement from preferred areas, avoidance response |

The process of cable laying on the seabed will involve noise emissions. It will be generated both by the traffic of vessels involved in the construction and by the operation of the underwater machinery and equipment used for the project implementation. The noise generated by vessels reaches between 160 and 190 $\mu Pa^2s$, depending on the size and speed of the vessel [OSPAR Commission, 2009]. The sound generated by a vessel laying a cable should not differ from that of other vessels of similar size [Worzyk, 2009], while the low speed (up to 3 knots) during operation should further reduce noise levels. According to Hammar *et al.* [2014] the impact of this factor on cod in the area of an OWF located in the Danish Straits will be negligible.

Very little information is available in literature on the noise emitted by jetting equipment or devices flushing away the sediment from the furrow. According to Nedwell and Howell [2004], the noise level generated during the ploughing of trenches for cables was 178 dB re 1 $\mu Pa^2s$ at a distance of 1 metre from the sound source. These authors assessed the potential impact of this noise level taking into account the hearing thresholds of different fish species: cod, salmon and common dab. For none of these taxa was the sound level emitted at a distance of 100 m from the noise source found to exceed the hearing threshold by more than 75 dB. This value, according to Nedwell and Howell [2004], is the threshold above which a moderate behavioural response, such as avoidance, is to be expected. A higher noise level generated during such works, i.e. 187 dB re 1 $\mu Pa^2s$, was reported by Taormina *et al.* [2018]. Model simulations based on these values indicate that an increased noise level (120 dB re 1 µPa) will occur within an area of 400 $km^2$ from the sound source. A detailed analysis of the potential impact of noise generated during a high-voltage cable installation planned across the Strait of Georgia (Canada) showed that the predicted noise level during the works would not differ from the level existing in the area of the planned project [JASCO Research Ltd, 2006].

Most sources [Meissner *et al.*, 2006; BERR, 2008; OSPAR Commission, 2008, OSPAR Commission, 2012; Bergström *et al.*, 2014; Taormina *et al.*, 2018] assume that the impact of this factor on marine organisms will be relatively small.

In the case of fish with a swim bladder, such as cod, herring, sprat, sand goby, common goby and twaite shad, the species sensitivity is assessed to be high, whereas for fish without a swim bladder, such as flounder, common seasnail and straightnose pipefish, it is assessed to be moderate.

As the noise generated during cable trenching should not exceed the TTS value, the sensitivity of fish with a swim bladder, such as cod, herring, sprat, sand goby, common goby and twaite shad to this impact was assessed as moderate, whereas that of fish without a swim bladder, such as flounder, common seasnail and straightnose pipefish – as low.

###### 6.1.1.5.1.3.2 Change in the habitat structure

The co-occurrence of several adverse impacts associated with the construction of transmission infrastructure, such as noise, may cause fish to avoid the work area. The significance of this effect, particularly at the population level, will depend both on the size of the project area and on the duration and season of the year when the works take place. The effect of fish avoiding even a small area that is an important spawning ground may be noticeable on a much larger sea area [Bergström *et al.*, 2012]. The scale of impact is also related to individual species biology and life stage [Wilson *et al.*, 2010].

When trenches are made for cable laying, the seabed structure is considerably disturbed. In the case of using ploughs with skids, the width of the seabed strip subjected to the disturbance ranges from 2 to 8 m [Carter *et al.*, 2009]. According to BERR [2008], in the course of a properly conducted cable burial operation using a plough, the seabed disturbance should affect a small area while a major part of the furrow should be backfilled with the sediment running down from its slopes immediately after the passage of the equipment. According to Carter *et al.* [2009], in the case of cable burial using the water jetting method (sediment fluidisation with a water jet injected under the surface of the sediment causes spontaneous sinking of the cable), the width of the disturbed seabed strip should not exceed 5 m.

Physical disturbance of the sediment and the seabed morphology may result in the disturbance of fish spawning [ICES, 1992; ICES, 2001; Phua *et al.*, 2004; Posford Duvivier Environment and Hill, 2001; Birklund and Wijsman, 2005]. The disruption of the primary sediment structure may result in periodical suspension of spawning or result in unfavourable development conditions for roe or fry [de Groot 1980, Phua *et al.*, 2004]. Such a reaction may concern herrings requiring, for the purposes of spawning, a sediment-covered seabed enabling the attachment of roe [Kiørboe *et al.*, 1981, Posford Duvivier Environment and Hill, 2001].

During the works, some benthic organisms will be physically destroyed, especially the infauna, i.e. the organisms living below the sediment surface. This may lead to the reduction of food supply for benthivorous fish and cause the reduction of their number [Daan et al, 1990; Cohen et al, 1980; Sissenwine et al, 1984]. It may be assumed that this should not be a significant problem for fish as organisms actively seeking food, but the reduction of food resources in the area of the works may result in temporary abandonment of the area by benthivorous fish.

During the works, the roe deposited on the seabed or on vegetation attached to the seabed may be destroyed. This will affect such species as herring, ammodytids and protected species such as common seasnail and some species of gobies. In the case of gobies, spawning takes place in shallow water areas down to a depth of approximately 10 m. In cases where works are carried out in spawning or nursery areas, the significance of the area affected must be assessed. If its exclusion is likely to cause a significant effect on the ichthyofauna of the area, consideration should be given to carrying out works in periods outside spawning and nursery rearing [BERR, 2008]. Taormina *et al.* [2018] assess the potential impact of habitat changes on fish as low.

The Baltica OWF CI area is neither a spawning ground of cod nor of the deep-water spawning European flounder, dominant in this area, nor sprat. Herring spawning may occur in the area surveyed, but it can be assumed that any disturbances in the reproductive process will not affect the recruitment of this species at the population level. The presence of a few larvae of ammodytids, shorthorn sculpin, common seasnail, straightnose pipefish and turbot in the samples collected indicates that spawning of these taxa may occur in the near-shore area. This is confirmed by the data from literature pointing to shallow, near-shore areas with the seabed covered with sandy or gravelly sediment as a natural environment conducive to the reproduction of these fish. However, bringing the cables ashore using the trenchless method will reduce the impact in the coastal zone. It is assumed that the seaward drilling exit/entry points will be located in a depth zone of approx. 15 m to approx. 7 m, and the drilling start point in the offshore area will be located beyond the reef zone, at a distance of at least 700 m from the line defined by the seaward dune base.

The species sensitivity was assessed as high for cod, flounder, common seasnail, sand goby and common goby, straightnose pipefish and herring, whereas for sprat and twaite shad it was assessed as insignificant.

Taking into account the relatively small area of the habitat altered, the sensitivity to impacts for cod, flounder, common seasnail, sand goby and common goby, straightnose pipefish and herring was assessed as low, whereas for sprat and twaite shad – as insignificant.

###### 6.1.1.5.1.3.3 Emission of toxic chemicals

During cable laying operations, harmful chemical substances may be released. They may originate from pollutants deposited in the sediments. During the ploughing of the furrows in which transmission infrastructure cables will be laid, re-suspension of suspended solids will take place and the accumulated contaminants will be released into the water column. A number of toxic substances may transfer into the water, e.g. heavy metals (cadmium, chromium, copper, lead, mercury, nickel, zinc, arsenic), chlorinated biphenyls, chloro- and phospho-organic pesticides, TBT and its decomposition products, the sum of hydrocarbons, polychlorinated dibenzodioxins, polychlorinated dibenzofurans and PCBs [HELCOM, 2007]. Therefore, before the commencement of the works, it is advisable to test the concentrations of toxic substances in the sediments in the area of the planned project to enable cable routing in such a way so as to bypass areas at risk of high concentrations of toxic substances in the sediments [URS Corporation, 2006]. This applies particularly to areas near ports, areas connected with gas and oil extraction or areas that served as landfills in the past. Previous surveys of sediments in PMAs had not indicated the presence of high concentrations of these substances. The detected concentrations of PCBs, organochlorine and organophosphorus pesticides and heavy metals (copper, zinc, cadmium, lead, mercury) in the sediments from different locations of PMAs were too low to cause negative effects for organisms [Dąbrowska *et al.*, 2013]. Also, the concentrations of DDT, HCB, PCDD/F in the sandy sediments of this area are at levels which do not cause toxic effects in marine organisms [Szlinder-Richert *et al.*, 2012] The low concentrations of heavy metals in the sediments of the Polish part of the Southern Baltic are indirectly confirmed by the results of the Polak-Juszczak study [2013], during which no significant accumulation of harmful substances was found in the tissues of the flounder leading a benthic lifestyle. Also the results of the surveys conducted in the planned project in 2016–2017 showed low concentrations of particularly harmful substances and priority substances in the sediment.

Additional sources of emissions may be the spills of petroleum products resulting from equipment and vessel failures. During a failure of equipment fitted with hydraulic cylinders, spillage of hydraulic fluids may occur. According to BERR [2008], the most probable source of serious contamination with these substances is remotely operated underwater vehicles (ROVs), the leakage of which may range from 60 to 100 litres of hydraulic fluids. However, it can be assumed that compliance with the practices resulting from the International Convention for the Prevention of Pollution from Ships (MARPOL) by vessels involved in the construction should significantly reduce the risk of such accidents.

The sensitivity of fish to harmful substances depends on their developmental stage, sex and species. Maturing females, embryos and early larval stages are particularly sensitive. High concentrations of some harmful substances in the gonads of spawning fish may cause high mortality of their offspring [Hansen *et al.* 1985; Westin *et al.* 1985; Cameron *et al.* 1986].

The exposure of fish to toxic substances may cause morphological changes, such as abnormal development of reproductive organs, deformities of the lower jaw, eyes, spinal anomalies and a reduced larval size at hatching. Such effects were observed during surveys at the North Sea in such species as common dab, flounder, cod [Dethlefsen *et al.*, 1986] and herring [Lindén, 1976].

Physiological changes such as reduced heart rate and endocrine disruptions, including those that reduce spawning efficiency, may also take place. Some authors [Jacquin, 2020; Struhsaker, 1977; Wedemeyer *et al.*, 1984] provide information also on behavioural disorders resulting in the reduced effectiveness of fish feeding.

Given the potential for fish to actively avoid contaminated areas, the relatively small extent of the impact and the likely rapid dilution of substances released from the sediment, it can be assumed that the risk to fish in the context of emissions of harmful substances released during the works is low, assuming that highly polluted areas are avoided [OSPAR Commission, 2008]. Taormina *et al.* [2018] assess the potential impact of toxic substance emissions on fish as low.

The concentrations of persistent organic pollutants (i.e. PAHs, PCBs and TBT) and hazardous substances such as metals or mineral oils, which were identified during surveys conducted in 2016–2017 in the planned project area surveyed were low and did not deviate substantially from the data from literature regarding the sandy sediments of the Southern Baltic. The sediments tested were also characterised by low concentrations of the radioactive element $^{137}$Cs typical for sandy sediments.

In the case of cod, flounder, common seasnail, sand goby and common goby, sprat, herring, straightnose pipefish and twaite shad, species sensitivity to the impact was assessed as moderate. Considering the actual level of contamination in the survey area, the sensitivity to impact will be low for all species.

###### 6.1.1.5.1.3.4 Summary of impacts on marine ichthyofauna during the construction phase

An assessment of the scale of impact on marine ichthyofauna is presented in Table 6.25, whereas the assessment of the impact significance in Table 6.26.

*Table 6.25. Assessment of the scale of impact on marine ichthyofauna [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Behavioural changes due to noise and vibration emissions | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Change in the habitat structure | 3 | | | | | 1 | | | 3 | | | | 1 | 8 |
| Change in chemical parameters of the habitat | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.26. Assessment of the impact significance on marine ichthyofauna [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Behavioural changes due to noise and vibration emissions | Low | Moderate – cod, herring, sprat, sand goby, common goby, twaite shad | Low |
| | | Low – flounder, common seasnail, straightnose pipefish | Negligible |
| Change in the habitat structure | Moderate | Low – cod, herring, flounder, common seasnail, sand goby, common goby, straightnose pipefish | Low |
| | | Irrelevant – sprat, twaite shad | Negligible |
| Change in chemical parameters of the habitat | Low | Low | Negligible |

#### 6.1.1.5.1.4 Marine mammals

The following potential impacts on marine mammals were identified for the Baltica OWF CI construction phase:

- behavioural changes due to increased underwater noise;
- change in chemical parameters of the habitat;
- change in food supply.

Characteristics of the individual impacts are presented below. No important or significant impacts were identified during the assessment, and the response to all impacts is likely to be very similar for all species, if they are present in the area of the works.

###### 6.1.1.5.1.4.1 Behavioural changes due to increased underwater noise

During the Baltica OWF CI construction phase, noise will be generated by vessel traffic and the operation of the underwater equipment interfering with the seabed. The noise generated by both large vessels with dynamic positioning systems and smaller vessels as well as subsea cable laying equipment is detectable by marine mammals. As the sound sources will move at different depths within the sea area, and the propagation conditions of the generated sounds will change, the exact ranges of the impact cannot be determined; however, it is known that the extent of the impact will be local, within up to a few hundred metres of the sound source. As demonstrated by modelling the range of underwater noise emitted during the preparation of the export cable trench using jetting technology, the intensity of the underwater sound will cause a strong behavioural response in harbour porpoises, namely flight, up to a distance of approximately 140 m from the source of this noise [Nedwell *et al.*, 2012]. Potential negative impacts in the immediate vicinity of the noise source, which may result in marine mammals experiencing a temporary or permanent shift in hearing threshold (TTS, PTS) or other injuries, are highly unlikely as harbour porpoises and seals avoid areas in which works generating underwater noise are conducted. Results of surveys conducted during dredging works indicate that avoidance by harbour porpoises occurred within 600 m from a noise source [Diederichs *et al.*, 2010].

###### 6.1.1.5.1.4.2 Change in chemical parameters of the habitat

Increased contamination may be caused by increased ship traffic or the release of contaminants as a result of works disturbing the seabed sediments. Based on the results of geochemical surveys conducted in the project area, it can be assumed that interference in the seabed will result in the release of small volumes of harmful chemicals.

Increased ship traffic during construction works may generate leakage of pollutants into the water, and the risk of oil spillage due to ship collision is also elevated. However, the likelihood of such events is low. At the same time, ships are subject to legal requirements to prevent marine pollution. Due to their high mobility, marine mammals will avoid the area of potential disturbance.

###### 6.1.1.5.1.4.3 Zmiana bazy pokarmowej

The habitat of the harbour porpoise is the water depth, where this animal spends its entire life. Seals temporarily come ashore to rest or breed. As a result of the Baltica OWF CI construction, this habitat will be locally disturbed by increased underwater noise and increased pollution. All these may cause temporary and local deterioration of habitat parameters for marine mammals. Given the possibility of avoiding unfavourable habitat conditions and the existence of alternative habitat areas, this disturbance will not cause significant changes in the functioning of marine mammals. After the construction activities cease, habitat parameters will return to pre-disturbance conditions within a relatively short time, allowing continued use by marine mammals. This will occur as a result of the disappearance of the cause of impact in the case of noise and potential contaminants.

The installation of power cables will change the surface and subsurface structure of the seabed along the Baltica OWF CI route. The physical interference with the seabed will cause temporary loss of habitats for benthic communities and benthic organisms, also disturbing spawning grounds (no areas of importance for fish spawning were identified in the Baltica OWF CI area). The trenchless landfall will help avoid adverse impacts in the zone up to the depth of 13 m, whereas the disturbance of spawning in the deeper zone will not affect individual fish species at a population level. Recolonisation of the soft bottom by benthic communities takes place relatively quickly.

The temporary loss of benthic communities in the area may result in changes in the functioning of spawning grounds of fish that serve as food for mammals.

Table 6.27 provides characteristics of the impacts by assigning them attributes in line with the methodology presented in Section 1.5, while an Table 6.28 presents receptor sensitivity and significance assessment for each impact.

*Table 6.27. Assessment of the scale of impact on marine mammals [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Behavioural changes due to increased underwater noise | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Change in chemical parameters of the habitat | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Change in food supply | | 2 | | | | 1 | | | 3 | | | | 1 | 7 |

*Table 6.28. Assessment of the impact significance on marine mammals [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Behavioural changes due to increased underwater noise | Low | High | Low |
| Change in chemical parameters of the habitat | Low | Low | Negligible |
| Change in food supply | Low | Low | Negligible |

### 6.1.1.5.1.5 Seabirds

The analysis of activities planned during the construction phase showed that the main potential sources of impact on seabirds present in the Baltica OWF CI will be:

- bird disturbance due to vessel traffic;
- disturbance of fish that constitute food for piscivorous birds (the razorbill, the common guillemot) due to noise and vibration from vessels and equipment;
- reduction of feeding areas of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to destruction of benthic communities;
- disturbance of feeding activity of piscivorous birds (the razorbill, the common guillemot) and benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to water turbidity and sediment re-suspension.

The traffic of vessels servicing the construction of the cable lines may result in direct disturbance of water-dwelling birds and their relocation to other sea areas, unaffected by the construction works. Water-dwelling birds are mainly the species wintering in the nearshore area between October and March. Bird disturbance is expected to have a local character and will cease completely once construction works in the specific cable construction area are completed. The impact will therefore be negative, temporary (limited only to the duration of the construction works) and reversible. It should also be emphasised that disturbance is only attributed to wintering birds (the razorbill, the common guillemot, the long-tailed duck, the common scoter and the velvet scoter) and will not affect gulls, whose presence in the survey area is associated with the presence of fishing boats, which these birds accompany during fishing. In this context, the sensitivity of the receptor, namely wintering birds, is assessed as low and that of gulls – as insignificant.

Underwater noise associated with the construction of the cable lines will result in fish disturbance in the area of the works and thus, in a possible local decrease of the food supply of piscivorous birds (the razorbill, the common guillemot and gulls). The range of this indirect impact on piscivorous species will depend on the parameters of noise and vibration, but considering the planned construction method, the impact is expected to be only local. The character of the impact was identified as negative, temporary and reversible, as it will cease completely immediately upon the completion of the construction works. The sensitivity of piscivorous birds to a decrease of fish supply due to underwater noise was assessed to be low because these birds will find good feeding conditions in other sea areas near the construction area, outside the area affected by noise and vibration emissions.

The analysis indicated a low value of macrozoobenthos resources in the context of food supply for benthivorous birds (see Subsection. 3.7.1.2). Therefore, in the Baltica OWF CI construction area, these birds do not find favourable conditions for feeding. Consequently, the possible loss of macrozoobenthos resources along the route of the cable line construction will not significantly affect the behaviour of benthivorous birds. After the completion of the construction phase, macrozoobenthos resources will be restored within several years. The sensitivity of benthivorous birds to this impact, in the context of poor food supply (macrozoobenthos) in the Baltica OWF CI construction area, was assessed as irrelevant.

Table 6.29 provides characteristics of the impacts by assigning them attributes in line with the methodology presented in Section 1.5, while Tablle 6.30.

*Table 6.29. Assessment of the scale of impact on seabirds [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Bird disturbance due to vessel traffic | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Disturbance of fish that constitute food | | 2 | | | | 1 | | | | | 1 | | 1 | 5 |

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| for piscivorous birds (the razorbill, the common guillemot) due to noise and vibration from vessels and equipment | | | | | | | | | | | | | | |
| Reduction of feeding grounds of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to destruction of benthic communities | | 2 | | | | 1 | | 3 | | | | | 1 | 8 |
| Disturbance of feeding activity of piscivorous birds (the razorbill, the common guillemot) and benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to water turbidity and sediment resuspension | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |

*Table 6.30. Assessment of the impact significance on seabirds [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Bird disturbance due to vessel traffic | Low | Low | Negligible |
| Disturbance of fish that constitute food for piscivorous birds (the razorbill, the common guillemot) due to noise and vibration from vessels and equipment | Irrelevant | Irrelevant | Negligible |
| Reduction of feeding grounds of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to destruction of benthic communities | Moderate | Moderate | Low |
| Disturbance of feeding activity of piscivorous birds (the razorbill, the common guillemot) and benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to water turbidity and sediment | Low | Moderate | Low |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| resuspension | | | |

###### 6.1.1.5.2 Impact on the Natura 2000 protected areas

###### 6.1.1.5.2.1 Impact on protected areas other than Natura 2000 sites

In the offshore area of the planned project location and in the range of its potential impact there are no territorial forms of protection other than the areas of the Natura 2000 European ecological network. Therefore, no activities related to the construction of the Baltica OWF CI will cause any impact on such areas.

###### 6.1.1.5.2.2 Impact on the Natura 2000 protected areas

The impacts generated during the construction phase of the Baltica OWF CI on the Natura 2000 site *Przybrzeżne wody Bałtyku* (PLB990002) will affect the subjects of protection within this area, i.e. six bird species (see Subsection 3.7.2). The main impacts on the subjects of protection within the area will be:

- bird disturbance due to vessel traffic;
- disturbance of fish that constitute food for piscivorous bird species (the razorbill) due to noise and vibration;
- water turbidity and disturbance of feeding activity of piscivorous birds (the razorbill) due to sediment re-suspension;
- reduction of feeding areas of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) and piscivorous birds (the razorbill) due to destruction of benthic communities.

The traffic of vessels involved in the construction of cable lines will cause the scaring of birds in the immediate vicinity of such works. The disturbance will cease immediately after the construction works are completed. The scaring effect will most probably not involve the European herring gull, the individuals of which often accompany vessels sailing at sea. What is more, for that reason, its abundance in the offshore area in the construction phase may even periodically increase. The scaring effect is not expected to be intensified by the noise generated by vessels.

The underwater noise generated during the construction works will result in the scaring of fish and a decrease in their abundance in the area of the underwater operations. This will reduce the food supply for the razorbill. The range of this impact will depend on the intensity of noise.

The destruction of macrozoobenthos on the seabed covered by the underwater operations may potentially lead to the depletion of the food supply for benthivorous birds, e.g. the velvet scoter and the long-tailed duck. However, the macrozoobenthos surveys did not show that the qualitative and quantitative resources of macrozoobenthos in the planned project area could indicate an exceptionally rich food supply for these species (see Subsection 3.7.1.2). After the completion of construction, within a few years, the damaged macrozoobenthos will become regenerated.

Water turbidity as a result of the seabed sediment re-suspension during the cable line construction may prevent benthivorous birds as well as piscivorous birds from locating food under water. The spatial and temporal range of this impact will depend mainly on the volume and type of the seabed sediments disturbed as well as the direction and force of sea currents.

Table 6.31 provides characteristics of the impacts by assigning them attributes in line with the methodology presented in Section 1.5, while

presents receptor sensitivity and significance assessment for each impact.

No impacts on the integrity of the site or on the connections with other Natura 2000 sites are anticipated.

*Table 6.31. Assessment of the scale of impacts on seabirds subject to protection within the Przybrzeżne wody Bałtyku (PLB990002) Natura 2000 site [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Disturbance due to vessel traffic – the long-tailed duck, the velvet scoter, the common scoter and the European herring gull | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Disturbance of fish that constitute food for piscivorous bird species (the razorbill) due to noise and vibration | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |
| Reduction of feeding grounds of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) and piscivorous birds (the razorbill) due to destruction of benthic communities | | 2 | | | | 1 | | | 3 | | | | 1 | 7 |
| Water turbidity and disturbance of feeding activity of piscivorous birds (the razorbill) due to sediment re-suspension | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |

*Table 6.32. Assessment of the impact significance on seabirds subject to protection within the Przybrzeżne wody Bałtyku (PLB990002) Natura 2000 site [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance due to vessel traffic – the long-tailed duck, the velvet scoter, the common scoter and the European herring gull | Low | Low | Negligible |
| Disturbance of fish that constitute food for piscivorous bird species (the razorbill) due to noise and vibration | Low | Irrelevant | Negligible |
| Reduction of feeding grounds of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) and piscivorous birds (the razorbill) due to destruction of benthic communities | Low | Moderate | Low |
| Water turbidity and disturbance of feeding activity of piscivorous birds (the razorbill) due to sediment re-suspension | Low | Moderate | Low |

#### 6.1.1.5.3 Impact on wildlife corridors

Although no wildlife corridors were identified in the Southern Baltic area where the Baltica OWF CI will be located, it is clear that this area is used by numerous animal species, including ichthyofauna, birds and marine mammals, as a place of migration in search of feeding grounds, breeding and reproduction sites as well as wintering grounds. During the construction phase, these migrations will be disturbed by various offshore operations, involving particularly the presence and movement of ships, operation of equipment on the seabed as well as underwater noise. These impacts were analysed in terms of individual environmental components (see Subsection 6.1.1.5.1) and, in terms of impacts on wildlife corridors, they should be regarded as a set of impacts that may interfere with the movement of animals.

Table 6.33 provides characteristics of the impacts by assigning them attributes in line with the methodology presented in Section 1.5, while Table 6.34 presents receptor sensitivity and the assessment of impact significance. While not all works will involve direct impacts, it was assumed that for constituent impacts, the highest negative value among all the assessments is adopted in the assessment. The sensitivity of the receptor was assessed as low in the context of the impacts predicted and their scale. The significance of this impact was assessed to be low.

*Table 6.33. Assessment of the scale of impacts on animals moving within the area and in the region of the Baltica OWF CI [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Disturbance to animal migration due to works in the offshore area | 3 | | | | 2 | | | | | 2 | | | 1 | 8 |

*Table 6.34. Assessment of the impact significance on animals moving within the area and in the region of the Baltica OWF CI [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance to animal migration due to works in the offshore area | Moderate | Low | Low |

#### 6.1.1.5.4 Impact on biodiversity

##### 6.1.1.5.4.1 Phytobenthos

The phytobenthos biodiversity identified during the environmental survey for the EIA Report, i.e. the taxonomic composition of the individual organism groups under analysis, is typical for the survey area.

Impacts on macroalgal species diversity in the APV are analogous to those found for phytobenthos (Subsection 6.1.1.5.1.1), substrate disturbance or redistribution of nutrients and contaminants from sediments to the water column.

The most significant impact is the disturbance of the substrate (destruction of macroalgae), which may cause a decrease in the number of species in the area. These will be a negative, direct and a short-term impact. After the impact ceases, it will be possible for the seabed to become overgrown again within a year (brown algae) or several years (red algae). Therefore, the sensitivity of macroalgae species to the impact was assessed as moderate. Considering the negligible amount of macroalgae in the area and their potential total destruction, the impact level should be assessed as high, whereas the significance of impact on species diversity – as moderate. It should be remembered, however, that the significance of macroalgae in the area is irrelevant, which means that their loss is not significant for the ecosystem.

As a result of sediment disturbance during construction works, water turbidity will increase and so will the deposition of sediments on the seabed. This will result in reduced availability of light in the near-seabed layer – shading of macroalgal species on the seabed – which may disrupt photosynthesis for a short time but will not affect the number of macroalgal species. Such situations also occur naturally in the environment. As a result of storms and strong near-seabed currents, macroalgae are covered by sandy sediments, which are predominant in the APV. The sensitivity of macroalgae is, therefore, irrelevant in this case. The impact will be negative, indirect, local and momentary, while its scale will be moderate. The significance of the impact was identified as negligible.

During the works conducted on the seabed, nutrients and contaminants (e.g. heavy metals) will be released into the water. Phytobenthos communities will be temporarily exposed to an increased concentration of nutrients (which may cause an increase in plant mass) and contaminants in the water (which may cause physiological disruption). The impact will be negative, indirect, local and momentary, while its scale will be moderate. The results of sediment chemical analyses, performed for the preparation of this report, indicate that the concentrations of nutrients (total nitrogen and total phosphorus) in the APV do not exceed values typical of the Southern Baltic sediments. Moreover, the concentrations of persistent organic pollutants (i.e. PAHs, PCBs and TBT) and toxic substances such as metals or mineral oils are low and do not deviate substantially from the data from literature regarding sandy sediments of the Southern Baltic. Consequently, the sensitivity of macroalgae to this impact was assessed as irrelevant and the significance of the impact as negligible.

The redistribution of nutrients and contaminants from sediments to the water column will not affect the number of macroalgal species in the area.

###### 6.1.1.5.4.2 Macrozoobenthos

**Habitat diversity**. The implementation of the planned Baltica OWF CI will not result in significant changes in the characteristics of seabed habitats, which are the habitats of macrozoobenthos communities, along the route of the linear project. On the soft bottom, the power cables will be buried in the sediment and covered by an *in situ* sediment layer. On a hard bottom, the solutions applied to protect the cables, namely concrete mattresses, riprap or concrete protective structures, will constitute as favourable substrate for the settlement of periphyton organisms as the surface of pebbles and boulders naturally occurring there, despite lacking natural character and being newly introduced elements.

**Taxonomic diversity**. In both types of habitats identified in the area of the planned Baltica OWF CI project, the function of the habitat will be restored within 3–4 years after the completion of the works, which corresponds to the life span of the longest living bivalve species. As the basic characteristics of the soft-bottom habitat and the hard-bottom habitat will not be altered, no changes in the taxonomic diversity of macrozoobenthos are anticipated.

###### 6.1.1.5.4.3 Ichthyofauna

During the construction phase, negative impact on the ichthyofauna biodiversity can be expected (reduction of the number of fish taxa present in the area). It can be assumed that it will result from the avoidance of the area during cable laying works. The noise associated with the process (increased ship traffic, operation of cable laying equipment) may deter particularly the fish with a low response threshold such as the clupeids and cod. However, the negative impact of this factor will be local and short-term, directly related to the area where the works are conducted at a given time.

Habitat alteration associated with the destruction of some of the benthic organisms may result in a reduction of the food supply for benthivorous fish and consequently in the abandonment of the area by benthivorous fish. However, it seems that this effect will be limited only to the construction zone.

Therefore, it can be assumed that the effect of the works will be a temporary decrease in the number of fish species occurring in a spatially limited area.

###### 6.1.1.5.4.4 Marine mammals

A potential negative impact of the project that may affect marine mammals in the context of biodiversity is the temporary disturbance in the use of the construction area due to deterioration of habitat conditions, primarily as a result of noise generated by ships and construction equipment. Given the local and medium-term nature of this impact, the lack of evidence that the area is of significant importance to individual marine mammal species, as well as their sporadic occurrence and the possibility of using other areas with similar environmental conditions, this impact was assessed as moderate. After the cessation of works in the area, the conditions existing before the disturbance will be restored within a relatively short period of time, allowing the same species of marine mammals to use the area.

###### 6.1.1.5.4.5 Seabirds

In the case of the construction phase, no impacts were identified that could result in a change of the species structure of seabirds occurring in the area of the planned project. There will be a short-term and local disturbance of waterbirds, which will cease after the completion of the construction works. Environmental changes determining limited accessibility to the food supply, which could theoretically determine long-term changes in distribution of piscivorous and benthivorous seabirds, will also occur in the immediate area of the underwater works and in the case of piscivorous species they will cease upon the completion of the works. In conclusion, the impacts identified for the construction phase are not expected to affect the seabird biodiversity within the Baltica OWF CI area.

#### 6.1.1.6 Impact on cultural values, monuments and archaeological sites and objects

No shipwrecks of historical significance have been identified in the offshore part of the Baltica OWF CI area (see Subsection 3.8). Consequently, the Baltica OWF CI will have no impact on cultural values, monuments and archaeological sites and objects during the construction phase.

#### 6.1.1.7 Impact on the use and management of the sea area and tangible property

Impacts on shipping will result from the presence of vessels involved in the cable line construction activities. Taking into account the specificity of these impacts, the impact assessment methodology is presented below.

The primary purpose of assessing the impact of the presence of vessels associated with the construction of the Baltica OWF CI on other vessels is to identify the risks and to estimate the risk level to enable ranking, and to manage risks appropriately. Each step in the risk assessment process should be seen as an opportunity to identify potential means of risk reduction.

The structure of the risk matrix is based on the comparison of the event severity (effect or consequences of an event) expressed as a numerical equivalent with the frequency (probability) of its occurrence interpreted as the number of events per ship year. In practice, given a significant probability range, a logarithmic severity index (SI) and a logarithmic frequency index (FI) are applied. These indices are presented in Table 6.35 and Table 6.36.

*Table 6.35. Logarithmic severity index – SI [Source: MSC-MEPC.2/Circ.12/Rev.2, IMO]*

| SI | Event severity | Effects on human safety | Effects on ship | Equivalent fatalities (S) |
|---|---|---|---|---|
| 1 | Minor | Single or minor injuries | Local equipment damage | 1.0E−02 |
| 2 | Significant | Multiple injuries or a single severe injury | Non-severe ship damage | 1.0E−01 |
| 3 | Severe | Single fatality or multiple severe injuries | Severe ship damage | 1.0 |
| 4 | Catastrophic | Multiple fatalities | Total loss | 10 |

*Table 6.36. Logarithmic frequency index – FI [Source: MSC-MEPC.2/Circ.12/Rev.2, IMO]*

| FI | Event frequency | Definition | F (events per ship year) |
|---|---|---|---|
| 7 | Frequent | Likely to occur once per month on one ship | 10 |
| 5 | Reasonably probable | Likely to occur once per year on one ship (equivalent of a few events during the ship's life) | 1.0E−01 |
| 3 | Remote | Likely to occur once per year in a fleet of 1000 ships (equivalent of repeatable events in the total life of several ships) | 1.0E−03 |
| 1 | Extremely remote | Likely to occur once in the lifetime (20 years) of a fleet of 5000 ships | 1.0E−05 |

With respect to the damage to the marine environment expressed by the severity index (SI)caused by oil spill-related pollution of the sea, 6 categories are distinguished, depending on the pollution severity. This classification is presented in Table 6.37.

*Table 6.37. Logarithmic severity index – SI [Source: MSC-MEPC.2/Circ.12/Rev.2, IMO]*

| SI | Severity | Definition |
|---|---|---|
| 1 | Category 1 | Oil spill size < 1 tonne |
| 2 | Category 2 | Oil spill size between 1.0 –10.0 tonnes |
| 3 | Category 3 | Oil spill size between 10 – 100 tonnes |
| 4 | Category 4 | Oil spill size between 100 – 1000 tonnes |
| 5 | Category 5 | Oil spill size between 1000 – 10 000 tonnes |
| 6 | Category 6 | Oil spill size >10 000 tonnes |

An example of a risk matrix resulting from the juxtaposition of incident severity and frequency is presented in Table 6.38. Table 6.39 presents the risk index assessment and risk management using the **ALARP** method.

*Table 6.38. Risk index – RI [Source: MSC-MEPC.2/Circ.12/Rev.2, IMO]*

| FI | Frequency | Severity (SI) | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| | | Minor | Significant | Severe | Catastrophic |
| 7 | Frequent | 8 | 9 | 10 | 11 |
| 6 | | 7 | 8 | 9 | 10 |
| 5 | Reasonably probable | 6 | 7 | 8 | 9 |
| 4 | | 5 | 6 | 7 | 8 |
| 3 | Remote | 4 | 5 | 6 | 7 |
| 2 | | 3 | 4 | 5 | 6 |
| 1 | Extremely remote | 2 | 3 | 4 | 5 |

*Table 6.39. Risk index and risk management assessment using the ALARP methodology [Source: MSC-MEPC.2/Circ.12/Rev.2, IMO]*

| Risk index | Description |
|---|---|
| 1–4 | Acceptable risk level, no risk reduction measures required. |
| 5–8 | Risk within the ALARP range – as low as reasonably practicable. Relatively high risk level. However, it may be considered acceptable providing that economically justifiable reduction measures are implemented. |
| 9–11 | Intolerable risk level. Other solutions or very significant risk reduction measures are required. |

In order to directly assess and manage the risks during the construction phase, the Project was divided into sea areas differing in terms of traffic intensity and type of vessels. The description of sea areas is presented in Table 6.40 and on the map [Figure 6.1]. Sea areas A3 and A5 are within the area of domestic passenger shipping of classes A and B, while area A7 – of classes A, B and C.

*Table 6.40. Division of the Baltica OWF CI project in the construction phase into sections by traffic frequency and vessel types in the given sea area [Source: internal materials]*

| Name of the sea area | Description | Alignment direction | Axial length [km] | Impact on shipping/ cumulative impact |
|---|---|---|---|---|
| A1 | CI implemented within the B-2 OWF area – EEZ | W–E | 18.3 | Bałtyk II OWF |
| A2 | CI implemented within the B-3 OWF area – EEZ | W–E | 20.4 | Bałtyk III OWF, Baltic Power OWF |
| A3 | CI implemented beyond the OWF, up to the TSS boundary – EEZ/TS | N–S | 7.7 | Insignificant traffic of small vessels, potential traffic of vessels associated with the OWF construction |
| A4 | CI in the TSS traffic lane, eastern part (W direction) TS | N–S | 2.9 | Significant traffic of large merchant vessels |
| A5 | CI in the TSS separation zone | NW–SE | 4.6 | Insignificant traffic of small merchant vessels |
| A6 | CI in the TSS traffic lane, eastern part (E direction) TS | WE | 12.5 | Significant traffic of large vessels |
| A7 | CI in the coastal water area | N–S | 4.9 | Domestic passenger shipping – C, D |
| A8 | CI in the area of the drill entry point towards the shoreline | N–S | 1.2 | Domestic passenger shipping – D |

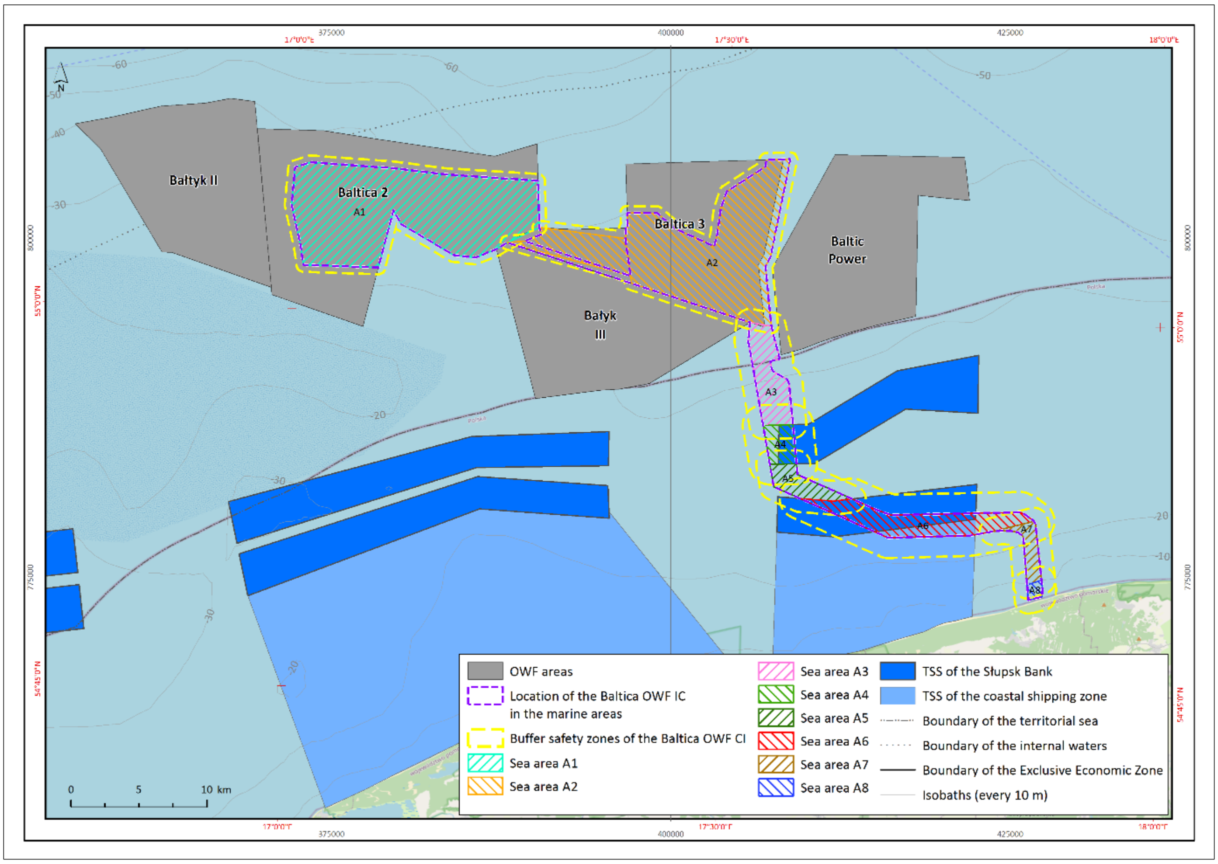



*Figure 6.1. Division of the Baltica OWF CI project in the construction phase into sections by traffic frequency and vessel types in the given sea area [Source: internal materials]*

The main risks associated with the project are collisions and contacts, and – in the case of nearshore operations – running aground.

A collision is understood as ships striking or being struck by another ship, regardless of whether the ships are underway, anchored or moored; however, this category does not include ships striking underwater wrecks. The following scenarios should be considered in the context of collisions:

a) a collision of a navigating merchant vessel with another vessel – in the vicinity of the project;
b) a collision of a fishing vessel with another vessel in the area or vicinity of the project;
c) the presence of a fishing vessel causing a collision between two other vessels;
d) the presence of a recreational craft causing a collision between two other vessels;
e) a collision of a vessel with an anchored vessel in the area or vicinity of the project;
f) the presence of an anchored vessel causing a collision between two other vessels;
g) the presence of a construction or maintenance vessel causing a collision between two other vessels;
h) a collision between two vessels carrying out construction or maintenance operations;
i) a collision between a passing vessel and two functionally connected construction or maintenance vessels in the area or vicinity of the project;
j) the presence of functionally connected construction or maintenance vessels leads to a collision of other vessels.

Contact (allision) is an unavoidable contact between a vessel and a fixed structure / a case of a vessel striking an external object or being struck by an external object, which is neither another vessel nor the seabed. Plausible scenarios for the sections under analysis: A1, A2, A3 are as follows:

a) a vessel (by type and class, including small one-man vessels) underway makes contact with a floating or permanently fixed OWF object;
b) a construction or maintenance vessel makes contact with an OWF object;
c) a vessel not under command (drifting) makes contact with an OWF object;

whereas for all the sea areas under consideration:

a) a vessel (broken down by type and class, including small one-man vessels) underway makes contact with a stabilising anchor line, rode or navigational markings;
b) a construction or maintenance vessel makes contact with a stabilising anchor line, rode or navigational markings;
c) a vessel not under command (drifting) makes contact with a stabilising anchor line, rode or navigational markings;
d) a vessel – unknowingly or in response to a hazard – drops its anchor which catches on a cable.

Grounding or stranding events can be divided into two groups:

- a vessel being supported on the seabed or an underwater obstacle that allows for relatively easy refloating through the adjustment of ballast and/or cargo, assistance from another ship (tugboat) or rising tide;
- a vessel sitting on the seabed or an underwater obstacle that prevents easy refloating through the adjustment of ballast and/or cargo, assistance from a tugboat or rising tide;

In the event of a ship running aground, the following scenarios can be assumed:

a) a vessel underway runs aground and there is a risk of stranding in the project implementation area;
b) a construction or maintenance vessel runs aground in the project implementation area;
c) a drifting vessel, not under command, runs aground and there is a risk of stranding in the project implementation area;
d) a vessel navigating in the vicinity runs aground due to the lack of adequate manoeuvring space;
e) a vessel navigating in the area or vicinity runs aground due to natural shallows.

The risk assessment and risk management proposals are presented in Table 6.41. All risk control measures will be agreed with the maritime administration. Sea area closures will be based on local law provisions, whereas information concerning safety zones will be disseminated in navigational warnings and notices to mariners.

*Table 6.41. Risk assessment and risk management [Source: internal materials]*

| **Sea area identification** | **Vessel traffic description** | **Potential risks** | **Risk** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | **Primary** | | | **Risk reduction measures** | **Secondary** | | |
| | | | **F** | **C** | **R** | | **F** | **C** | **R** |
| Section A1, part of the connection line in area B-2 | No traffic, area closed due to OWF construction | Collision, contact | 3 | 4 | 7 | Sea area closed for shipping and fishing. Safety zone designated on the basis of a request of the offshore works manager | 1 | 4 | 5 |
| | Limited number of vessels servicing OWFs and the Baltica OWF CI | | 2 | 3 | 5 | Internal safety procedures (SMS) | 1 | 2 | 3 |
| Section A2, part of the connection line in area B-3 | No traffic, area closed due to OWF construction | Collision, contact | 3 | 4 | 7 | Sea area closed for shipping and fishing. Safety zone designated on the basis of a request of the offshore works manager | 2 | 3 | 5 |
| | Limited number of vessels servicing OWFs and the Baltica OWF CI, as well as traffic of Bałtyk III OWF vessels | | 3 | 3 | 6 | Internal safety procedures (SMS) | 1 | 3 | 4 |
| Sea area A3, perpendicular to the main shipping routes, passing at a distance of 0–4 NM from the TSS, eastern part (direction W) | Variable distance from perpendicular traffic of vessels over 300 000 DWT, very rare, frequent traffic of vessels over 200 000 DWT | Collision, contact | 5 | 4 | 9 | Recommended minimum protective buffer of 0.5 NM. Safety zone designated on the basis of a request of the offshore works manager. Direct monitoring, marking of the sea area from the TSS side, Securite messages, security procedures in connection with zone violations | 2 | 3 | 5 |
| | Limited number of Baltica OWF CI vessels | | 2 | 3 | 5 | Internal safety procedures (SMS) | 1 | 2 | 3 |
| Sea area A4, section of the connection line perpendicular to the main shipping routes, intersecting the TSS, eastern part (W direction) | Very rare intersecting traffic of vessels over 300 000 DWT, frequent traffic of vessels over 200 000 DWT | Collision, contact | 7 | 4 | 11 | Recommended minimum protective buffer of 0.8 NM. Safety zone designated on the basis of a request of the offshore works manager. Direct monitoring, marking of the sea area with buoys, Securite messages, security procedures in connection with zone violations | 3 | 3 | 6 |
| | Limited number of Baltica OWF CI vessels | | 2 | 3 | 5 | Internal safety procedures (SMS) | 2 | 2 | 4 |

| Sea area identification | Vessel traffic description | Potential risks | Risk | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Primary | | | Risk reduction measures | Secondary | | |
| | | | F | C | R | | F | C | R |
| Sea area A5, section of the connection line in the TSS traffic separation lane, eastern part | Very rare perpendicular traffic of small vessels, domestic passenger shipping area for classes A and B | Collision, contact | 2 | 4 | 6 | Recommended minimum protective buffer of 0.5 NM. Safety zone designated on the basis of a request of the offshore works manager. Direct monitoring, marking of the sea area with buoys, Securite messages, security procedures in connection with zone violations | 2 | 2 | 4 |
| | Limited number of Baltica OWF CI vessels | | 1 | 3 | 4 | Internal safety procedures (SMS) | 1 | 2 | 3 |
| Sea area A6, section of the connection line parallel to the main shipping routes, intersecting the TSS, eastern part (E direction) | Very rare perpendicular and parallel traffic of vessels over 300 000 DWT, frequent traffic of vessels over 200 000 DWT | Collision, contact | 7 | 4 | 11 | Recommended minimum protective buffer of 0.8 NM. Safety zone designated on the basis of a request of the offshore works manager. Direct monitoring, marking of the sea area with buoys, Securite messages, security procedures in connection with zone violations | 3 | 3 | 6 |
| | Limited number of Baltica OWF CI vessels | | 2 | 3 | 5 | Internal safety procedures (SMS) | 2 | 2 | 4 |
| Sea area A7, section of the connection line perpendicular to the main shipping routes, passing to the south of the TSS at a distance of 0.9 NM | Variable distance from perpendicular traffic of vessels over 300 000 DWT very rare, frequent traffic of vessels over 200 000 DWT, passenger shipping area for classes A, B and C | Collision, contact | 4 | 4 | 8 | Recommended minimum protective buffer of 0.5 NM. Safety zone designated on the basis of a request of the offshore works manager. Indirect monitoring, marking of the sea area with buoys, Securite messages, security procedures in connection with zone violations | 2 | 3 | 5 |
| | Limited number of Baltica OWF CI vessels | | 2 | 4 | 6 | Internal safety procedures (SMS) | 2 | 2 | 4 |
| Sea area A8, section of the connection line | Passenger shipping area for classes A, B, C and D | Collision, contact, grounding | 4 | 3 | 7 | Recommended minimum protective buffer of 0.5 NM. Safety zone designated on the basis of a request of the offshore works manager. Direct monitoring, marking of the sea area with buoys, Securite messages, security procedures in connection with zone violations | 2 | 2 | 4 |
| | Limited number of Baltica OWF CI vessels | | 2 | 4 | 6 | Internal safety procedures (SMS) | 2 | 2 | 4 |

With regard to the location of hazards and the degree of impact on shipping, the significance of the Baltica OWF CI implementation will be the highest in sea areas A4, A5 and A6. The total axial length of these sea areas is approx. 20 km. Assuming the presented cable laying speed at 70–400 $m \cdot h^{-1}$, the laying time will range from 50 to 285 hours for a single cable line. This means serious disruptions to vessel traffic at the TSS *Ławica Słupska* for a period of 2 to 12 days. Weather conditions are an important factor in cable laying operations. While planning for a 2-day weather window is feasible, the possibility of continuing uninterrupted work for 12 days is unlikely, which in consequence may prolong the duration of the project in these sea areas.

In the case of the project implementation, it is possible to make an exemption consisting in temporary suspension of the obligation to navigate through the eastern part of the TSS *Ławica Słupska*. It will allow to maintain the safety zones established and, providing proper marking and direct navigation supervision, to maintain the conditions for safe navigation. Such a decision is taken by the director of a maritime office and is issued in the form of an appropriate disposition. Change in traffic organisation within the TSS *Ławica Słupska* area will also require communication in the form of navigational warnings and nautical publications.

Table 6.42 provides characteristics of the impacts by assigning them attributes in line with the methodology presented in Section 1.5.

*Table 6.42. Characteristics of impacts on fishing activities [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Impact on fishing activities due to the establishment of a protection zone | | 2 | | | | 1 | | 4 | | | | 2 | | 9 |

The summary assessment showed that the scale of the impact will be moderate. Taking into account the nuisance caused by the impact, and the need to apply existing legislation and regulations associated with operations in offshore areas, the sensitivity of the receptor, i.e. shipping, including fishing vessel traffic, was assessed to be moderate. The significance of the impact was assessed to be low.

During the construction phase of the Baltica OWF CI, the impact on fisheries in the context of fishing activity will result from the presence of vessels associated with the cable line construction and from the establishment of the protection zone for the cable lines by the Director of the Maritime Office in Gdynia. Fishing restrictions (most likely a ban on bottom fishing gear) will be in force within this zone to protect cable lines from damage or destruction. An analysis of commercial catches and fishing effort in statistical rectangles L8, M8, N7, N8, O6 and O7 (see Subsection 3.10.2) showed that there are no significant commercial fisheries within their boundaries. Table 6.43 provides characteristics of the impacts by assigning them attributes in line with the methodology presented in Section 1.5.

*Table 6.43. Characteristics of impacts on fishing activities [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Impact on fishing activities due to the establishment of a protection zone | | 2 | | | | 1 | | 4 | | | | 2 | | 9 |

The temporal extent of the impact was assessed to be "long term" as it will not cease after the end of the construction phase – the protection zone will be maintained at least until the end of the cable line operation phase. The summary assessment showed that the scale of the impact will be moderate. Given the low significance of the statistical rectangles, the sensitivity of the receptor, i.e. fisheries, was evaluated as "low" in the context of the exclusion of bottom fishing gear from use in the protection zone. The significance of the impact was assessed to be low.

Restrictions to shipping may result from the presence of vessels involved in the cable line installation works. The Baltica OWF CI construction area crosses the customary shipping route to and from the ports of Gdynia and Gdańsk (see Subsection 3.10.1). Vessels sailing along this route will have to adjust their course in order to avoid the vessels involved in the construction works. Table 6.44 provides characteristics of the impacts by assigning them attributes in line with the methodology presented in Section 1.5.

*Table 6.44. Characteristics of the project impacts on shipping [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Impact on shipping due to the establishment of a safety zone | 3 | | | | 2 | | | | | 2 | | | 1 | 8 |

The summary assessment showed that the scale of the impact will be moderate. Considering the minor nuisance of the impact, the sensitivity of the receptor, i.e. navigation, was assessed as irrelevant. The significance of the impact was assessed as negligible.

The construction of the cable lines is not expected to generate impacts on other forms of sea area development during the Baltica OWF CI construction phase.

#### 6.1.1.8 Impact on landscape, including the cultural landscape

In the Baltica OWF CI construction phase, the potential impact of the project on the landscape, including cultural landscape, may result exclusively from the presence of vessels involved in the installation of cable lines. The involvement of various types of vessels, i.e. CLVs, cable barges, tugboats, service vessels or other multi-purpose vessels is expected. The largest vessels expected to participate in the construction works are CLVs, which are up to 200 m long. However, their presence is not expected to change the landscape, as the Baltica OWF CI construction area is intensively used by the transport fleet sailing to and from the ports of Gdynia and Gdańsk, as well as fishing and recreational vessels. Therefore, vessels used during the construction phase will not be an element that is uncommon in the landscape of this part of the Baltic Sea.

The construction of the Baltica OWF CI will not involve the construction of elements extending above the sea surface that could permanently alter the seascape.

Also the coastal landscape will remain undisturbed during the construction phase, as the cable lines will be brought ashore by means of directional drilling over up to 1700 m, which will allow the coastal water area, the beach and the dune zone to be excluded from the construction works.

Considering the manner of implementation of the planned project and the current use of the area, there will be no impact on the landscape, including the cultural landscape, during the construction phase of the Baltica OWF CI.

#### 6.1.1.9 Impact on population, health and living conditions of people

Cable line construction will result in a partial exclusion of L8, M8, N7, N8, O6 and O7 statistical rectangle areas from fishing activities – providing a safety zone for subsea cables. Within the entire PMA, the statistical rectangles do not constitute important fishing grounds for commercial species and are not intensively used by fishermen (see Subsection 3.10.1.1). The significance of the impact on the population will be the same as on fisheries (see Subsection 6.1.1.7), i.e. low.

During the Baltica OWF CI construction phase, minor impediments are also expected for ships navigating along the usual route to and from the ports in Gdynia and Gdańsk, i.e. the necessity to modify the sailing course due to the presence of vessels involved in the cable line construction. However, this will be a minor impediment and will cease after the construction phase is completed. The significance of the impact on the population will be the same as on shipping (see Subsection 6.1.1.7), negligible.

No other impacts on population, human health and living conditions are expected to occur during the construction phase.

### 6.1.2 Operation phase

#### 6.1.2.1 Impact on geological structure, seabed topography, seabed sediments and access to raw materials and deposits

Changes within the seabed associated with the impact of the project during the operation phase will be of a local nature and, within the entire area occupied by the project site, insignificant for the overall seabed character and its structure.

Depending on its structure, the seabed may exhibit different sensitivity to the impact of the project during its operation phase. The seabed made of till and till with a stony cover is difficult to wash out and withstands morphological changes. A sandy, sandy and silty, and silty seabed is more prone to washout and material movement. Thus, the elements of the connection infrastructure may be uncovered or buried, both as a result of natural processes involving the movement of rock material along the seabed and as a result of this movement being disrupted by the connection infrastructure components.

Activities related to the project operation may cause the following types of impacts on the seabed:

- local changes in the seabed topography associated with the presence of the connection infrastructure components and their impact on the processes of sediment transport and deposition: seabed washouts upstream/downstream of the connection infrastructure components, formation of sediment accumulation upstream/downstream of infrastructure components (sandy drifts), depressions in the seabed formed at the anchoring places of the maintenance vessels.

During the operation phase of the cable line, the impact on the seabed topography will be negligible. No impact on the geological structure or seabed sediments is envisaged. Table 6.45 presents an assessment of the scale of impacts on the seabed topography identified.

*Table 6.45. Assessment of the scale of impacts on the seabed topography [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Permanent | Long-term | Medium-term | Short-term | Temporary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Local changes in seabed topography | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.46. Assessment of the significance of impacts on the seabed topography [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Local changes in seabed topography | Low | Irrelevant | Negligible |

Works which might be required in case of the necessity to replace damaged cable sections, might locally alter the character of the seabed topography. Nevertheless, the impact of the project during the operation phase can be assessed as negligible. Such works would not affect the near-surface ground layers which would be already altered locally.

#### 6.1.2.2 Impact on the quality of seawater and seabed sediments

During the Baltica OWF CI operation, maintenance work affecting the quality of water and seabed sediments will be carried out in its area.

It was found that during its operation phase, the Baltica OWF CI may cause two types of impacts on the receptors discussed (water and seabed sediments). These are the contamination of water and seabed sediments with petroleum products as well as a change in the temperature of seabed sediments and water due to the heat reception from transmission cables.

###### 6.1.2.2.1 Contamination of water and seabed sediments with oil derivatives during normal operation of vessels in the course of routine maintenance activities

During normal operation of vessels when carrying out service works on transmission infrastructure, leakages of various types of oil derivatives (lubricating and diesel oils, petrol) may take place.

To a minor extent, they may contribute to the deterioration of water quality. Heavier oil fractions may undergo sorption on the surface of organic and mineral suspended solids, which will increase their specific gravity and make them gradually sink to the bottom. This is where they may be bound in seabed sediments.

Contamination of sea waters and/or seabed sediments with petroleum products released during the normal operation of vessels during the Baltica OWF CI operation period is a direct negative impact which is regional, temporary or short-term, and reversible. Given the moderate impact scale and the moderate receptor sensitivity, the significance of this impact during the operation phase in the APV was assessed as low for sea waters and seabed sediments.

A summary of the assessment of the scale of the impacts identified and the assessment of the significance of the impacts on seawater and seabed sediments was presented in Table 6.47 and Table 6.48.

*Table 6.47. Assessment of the scale of impacts on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Permanent** | **Long-term** | **Medium-term** | **Short-term** | **Temporary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Contamination of water and seabed sediments with oil derivatives during normal operation | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.48. Assessment of the significance of impacts on the quality of seawater and seabed sediments [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Contamination of water and seabed sediments with oil derivatives during normal operation | Small | Moderate | Low |

#### 6.1.2.2.2 Change in water and sediment temperature due to the heat reception from transmission cables

Power in the APV will be evacuated from the Baltica OWF via up to 9 extra-high voltage subsea alternating current cables with a rated voltage of 220 kV and/or 275 kV.

The electric current flowing through a power cable causes its heating related to power losses due to resistance, in accordance with Joule's law. As the temperature of the cable increases above the ambient temperature, the transfer of heat from the cable to the surrounding environment commences.

An increase in the temperature of the sediments in which the cable is buried and the interstitial waters (water filling the spaces between sand grains in the sediment) may cause:

- increased bacterial activity resulting in accelerated decomposition of organic matter;
- decrease in water oxygen content;
- release of harmful substances, including metals, from sediment into water;
- adverse effects on benthic organisms.

The most important parameters affecting the impact level are the depth of cable burial and the seabed type.

For example, in the operating Nysted Offshore Wind Farm, the increase in the temperature emitted by the transmission cable (132 kV) buried at a depth of 1 m did not exceed 1.4°C in a layer of 20 cm above the cable, whereas on the seabed surface, the temperature changes were already unnoticeable (Merck, 2009). This cable was buried in gravel sediment, which is conducive to much higher heat losses in interstitial spaces between sediment grains than in the case of fine-grained sediment (Merck, 2009). Both these types of sediment are common in the area of the planned construction of the Baltica OWF CI, yet the transmission cable planned by the project will have a rated voltage of 220 and/or 275 kV.

Heating of the seabed sediment and interstitial waters may also be conducive to the transfer of metals from sediment to the water depth and accelerate the processes of decomposition of organic pollutants in the seabed sediment. In fact, benthic fauna is naturally adapted to significant seasonal temperature changes and is insensitive or exhibits very low sensitivity to a temperature increase of 2°C (Birklund, 2009). According to the standards proposed by the German Federal Agency for Nature Conservation, the increase in temperature due to heat emission by an OWF transmission cable in a layer 20 cm below the seabed, which is the main habitat of the infauna, must not exceed 2°C.

An increase in sediment temperature by 1°C may cause a 10-fold increase in bacterial activity, which may accelerate and increase organic matter decomposition processes. This situation may also favour the decomposition of organic nitrogen, which becomes more available due to an increased and accelerated mineralisation into inorganic compounds (the number of inorganic nitrogen forms – generally well soluble in water – increases). An increase in temperature may also cause a decrease in water oxygen content (Miętus and Sztobryn, 2011; Zalewska, 2012; Ramsing, 2012) and be conducive to the conversion of ammoniacal nitrogen compounds contained in water and sediments into a gaseous form, which is harmful to living organisms (Falkowska, 1999). At a temperature of 5°C and pH 8.2, approximately 2% of ammonium compounds turn into a gaseous form, while at a temperature of 25°C, approximately 8% of ammonium compounds turn into a gaseous form (approx. a 4-fold increase). The proportion of the different forms of ammonia is very important for fish and other marine organisms, for which the gaseous form ($NH_3$) is toxic, as opposed to the $NH_4^+$

ions (Falkowska, 1999). According to Directive 76/464/EEC, the lethal concentration of ammonia for rainbow trout is 5 $mg \cdot dm^{-3}$, whereas for crustaceans it is 8 $mg \cdot dm^{-3}$.

Heating of the seabed sediment and interstitial waters may also favour (the intensity of the processes of) the transfer of metals from sediment to the water depth and accelerate the processes of decomposition (degradation) of organic pollutants in the seabed sediment. Moreover, the nutrient and oxygen content may be changed as a result of disturbance in the temperature profile (Worzyk, 2009).

Burying the subsea cable lines in the sediment at a depth of more than 1 m will result in the exclusion of the surface sediments layer and the near-seabed water layer from the impacts generated by the heat dissipation from cables. If the subsea cables are laid on the seabed and covered with protection structures, it is expected that the heat emitted will immediately dissipate in the seawater and will not affect the marine environment condition.

#### 6.1.2.3 Impact on climate, including greenhouse gas emissions and impacts relevant to adaptation to climate change, impact on atmospheric air (air quality)

The environmental impact assessment of the cable lines during the operation phase was conducted while taking into account the following receptors (environmental components):

- in terms of the impact on climatic conditions:
  - greenhouse gas emissions,
  - change in physical parameters of the near-water atmosphere layer (i.a. increase in air temperature, change in wind conditions),
  - change in dynamic conditions of the sea (i.a. wave motion, water flow),
  - change in hydro-physical conditions of the sea (i.a. increase in water temperature, change in salinity);
- in terms of the impact on climatic conditions:
  - air quality deterioration (increase in particulate and gaseous pollutant concentrations).

Having considered the methodology of environmental impact assessment presented in Section 1.5, an assessment of the magnitude of impacts of the cable lines on the above-listed receptors and an assessment of their resistance (sensitivity) were carried out in accordance with the adopted matrix [Table 1.6], which resulted in obtaining information on the significance of impact in relation to the scale of impact and the value of the resource.

During the operation phase, periodic inspections of the power cables laid on the seabed by relatively small service vessels are envisaged along their entire length.

The heat generated during the operation of the cable lines may affect the thermal conditions of water in, at most, the near-seabed layer and only along the cable line route. Therefore, the cable line impact will be very limited in space and insignificant. For these reasons, the actions taken are not expected to have any noticeable impact on climate, greenhouse gas emissions or air quality.

An assessment of the scale of impact on the above-listed receptors is provided in Table 6.49, whereas the assessment of the significance of impacts can be found in Table 6.50.

*Table 6.49. Assessment of the scale of impacts on climate conditions and air quality of the marine environment [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Permanent** | **Long-term** | **Medium-term** | **Short-term** | **Temporary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Greenhouse gas emissions | | | 1 | | | 1 | | | | | 1 | | 1 | 4 |
| Change in physical parameters of the near-water atmosphere layer | | | 1 | | | 1 | | | | | 1 | | 1 | 4 |
| Change in dynamic conditions of the sea | | | 1 | | | 1 | | | | | 1 | | 1 | 4 |
| Change in hydro-physical conditions of the sea | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |
| Air quality | | | 1 | | | 1 | | | | | 1 | | 1 | 4 |

The impact significance obtained for each of the environmental receptors for the project construction stage is presented in the table below [Table 6.50].

*Table 6.50. Assessment of the significance of impacts on climatic conditions and air quality of the marine environment [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Greenhouse gas emissions | Irrelevant | Low | Negligible |
| Change in physical parameters of the near-water atmosphere layer | Irrelevant | Irrelevant | Negligible |
| Change in dynamic conditions of the sea | Irrelevant | Irrelevant | Negligible |
| Change in hydro-physical conditions of the sea | Low | Irrelevant | Negligible |
| Air quality | Irrelevant | Low | Negligible |

#### 6.1.2.4 Impact on ambient noise

Operating transmission infrastructure buried in the seabed or laid and secured on the seabed does not generate noise. The only source of noise at the stage of operation of the planned project will be the noise resulting from the presence of vessels used for maintenance work. The assumed intensity of these activities is considerably lower than at the stage of cable line construction. Therefore, the impact of the planned project on the ambient noise during the operation stage will be negligible.

#### 6.1.2.5 Impact on the electromagnetic field

The impact of underwater cables buried in the seabed on the electromagnetic field is negligible. According to Normandeau Associates Inc. *et al.* (2011) depending on the distance from a cable buried in the seabed at a depth of 1 m under the seabed, the strength of the electric component of the field is up to $8 \cdot 10^{-4}$ $V \cdot m^{-1}$ on the seabed, $3.4 \cdot 10^{-5}$ $V \cdot m^{-1}$ in the water depth 5 m above the seabed and $1.24 \cdot 10^{-5}$ $V \cdot m^{-1}$ in the water depth 10 m above the seabed. The magnetic field strength induced by AC cables is 0.89 $A \cdot m^{-1}$ on the seabed, $4 \cdot 10^{-2}$ $A \cdot m^{-1}$ in the water depth 5 m above the seabed and $1.5 \cdot 10^{-2} A \cdot m^{-1}$ in the water depth 10 m above the seabed.

#### 6.1.2.6 Impact on nature and protected areas

##### 6.1.2.6.1 Impact on biotic elements in the offshore area

###### 6.1.2.6.1.1 Phytobenthos

When a cable section is laid on the seabed surface and protected against damage or destruction by means of protective measures (e.g. concrete mattresses, rip-rap, concrete protections), macroalgae may grow on the surface of the protection elements, forming an artificial reef together with periphytic fauna (Köller *et al.* eds., 2006; Rostin *et al.*, 2013; De Backer *et al.*, 2020). If protection systems are installed at a depth of approx. 20 m, it can be expected that the structures will be covered in small amounts mainly with red algae, which will be replaced by mussels and balanuses in the later phase of the artificial reef development (Mańkowski and Rumek, 1975; Rostin *et al.*, 2013). The course of succession of periphyton communities is not fully known and not always uniform, as it depends on the interaction of biotic factors (interspecific competition) and abiotic factors (hydrodynamic regime of waters, type of substrate introduced) (Petersen and Malm, 2009). The emergence of an artificial reef in the area is regarded as a negative impact (disturbance of the original conditions prevailing before the commencement of the project) or positive one (local increase in biodiversity) (Danheim *et al.*, 2020; De Backer *et al.*, 2020).

The sensitivity of macroalgae shall be considered high as they have a high potential to develop in the presence of hard substrate to which they easily attach.

As no phytobenthos is present on the sandy seabed and no direct impact of heat and EMF emission on macroalgae growing on rocks has been proven, this impact will not be assessed.

The significance of the impact was assessed as negligible.

*Table 6.51. Assessment of the scale of impacts on phytobenthos [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Permanent | Long-term | Medium-term | Short-term | Temporary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Creation of new habitats for phytobenthos | | 2 | | | | 1 | | 4 | | | | | 1 | 8 |

*Table 6.52. Assessment of the significance of impacts on phytobenthos [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Creation of new habitats for phytobenthos | Moderate | High | Moderate |

#### 6.1.2.6.1.2 Macrozoobenthos

Two basic factors were identified that could potentially affect the zoobenthos during the operation phase:

- presence of artificial hard substrate at sections of the route of the power cables protected against damage or destruction by means of protective measures;
- heat and EMF emission.

**Artificial hard substrate (mattresses, concrete protective structures or rip-rap)** will be present at the route sections of the line project where it will be impossible or difficult to bury power cables due to the accumulation of pebbles and boulders. At such route sections, the cables laid on the seabed surface will be protected with concrete mattresses, rip-rap or concrete protective structures. In consequence, the organisms living on the surface occupied by a newly introduced substrate will be eradicated (Köller *et al.* eds., 2006; Zucco *et al.* eds., 2006). However, due to the local nature of this factor impact and the fact that artificial substrate characteristics do not differ in terms of suitability for colonisation by periphyton communities from the other hard-bottom areas as well as due to the formation period of a periphyton community on an artificial reef, the structure and composition of such community will not differ substantially after 3–4 years in terms of parameters from the community colonising the natural substrate.

The **heat and EMF emission** from power cables during the operation phase is an impact which might adversely affect benthic organisms. The key issues include: the depth at which cables are laid below the seabed surface, the insulation technology applied and the resultant heat and EMF emission. The literature on the subject does not present conclusive results from the studies on the influence of these factors. It can be assumed that no direct EMF impact on the sedimentary environment of macrozoobenthos has been proven, while the increase in the sediment temperature, which is spatially limited to the immediate vicinity of the cable, is within the wide range of seasonal changes in the temperature of the near-seabed water layer and surface sediments within the range of depths observed in the location of the Baltica OWF CI. In conclusion, the sensitivity of the receptor (macrozoobenthos) to heat and EMF emission shall be considered low, while the scale of impacts – insignificant.

The analysis of the two main pressures on the soft-bottom and hard-bottom macrozoobenthos during the Baltica OWF CI operation phase showed that these impacts were assessed as negligible [Table 6.53 and Table 6.54].

*Table 6.53. Assessment of the scale of impacts on macrozoobenthos [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Permanent | Long-term | Medium-term | Short-term | Temporary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Presence of artificial hard substrate | 3 | | | | | 1 | 5 | | | | | | 1 | 10 |
| Heat and electromagnetic field emissions | 3 | | | | | 1 | 5 | | | | | | 1 | 10 |

*Table 6.54. Assessment of the significance of impacts on macrozoobenthos [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Presence of artificial hard substrate | High | Irrelevant | Negligible |
| Heat and electromagnetic field emissions | High | Irrelevant | Negligible |

#### 6.1.2.6.1.3 Ichthyofauna

##### 6.1.2.6.1.3.1 Noise and vibrations

Cable vibration resulting from AC current flow is associated with sound emissions. Sound measured during a period of very low ambient noise levels at a distance of 100 m from a 138 kV AC transmission line passing through Trincomali Channel (Canada) did not exceed 80 dB re 1 µPa. Taking into account the cylindrical model of sound attenuation, it can be assumed that the noise level at a distance of 1 m from the cable will be approximately 100 dB re 1 µPa (JASCO Research Ltd, 2006). According to Meissner *et al.* (2006), it can be assumed that the impact should not be significant. A similar assessment was made by Taormina *et al.,* stressing that due to the lack of data on the long-term noise impacts on living organisms, this problem should be approached with special attention.

As the cable will be buried deeper than 1 m below the seabed surface or it will be secured, the noise level will be insignificant.

Emission of noise and vibrations generated during the operation of the transmission infrastructure may directly and negatively affect the ichthyofauna. These impacts will be of negative, direct, local and permanent nature.

In the case of fish with a swim bladder, such as cod, herring, sprat, sand goby, common goby and twaite shad, the species sensitivity is assessed to be high, whereas for fish without a swim bladder, such as flounder, common seasnail and straight-nose pipefish, it is assessed to be moderate.

Considering the level of noise emitted during the operation, the sensitivity to the impact for all species was assessed to be irrelevant. The significance of the impact was assessed to be low.

###### 6.1.2.6.1.3.2 Habitat change

In locations where cable burial in the sediment is impossible, it may be necessary to apply various means of infrastructure protection against damage. These may include various types of concrete structures (concrete mats), boulder and stone embankments, plastic and metal covers (BERR, 2008). Such objects, as well as the cable itself lying on the sediment surface, create a new habitat that can be colonised by organisms (Taormina *et al.*, 2018). In this case, the so-called artificial reef effect occurs, the scale of which depends both on the size of the area where these structures are placed, on their surface area and complexity as well as the environmental conditions in which it was created and the composition of the fauna in its area (Langhamer, 2012; Hammar *et al.*, 2016). The formation of an artificial reef on a seabed lacking hard substrate will have a much more significant impact than in an environment where such substrate is present (Taormina *et al.*, 2018).

At the first stage, the reef is inhabited by periphyton organisms, macrophytes and invertebrates (Feger, 1971). As soon as several months later, numerous populations of fish (Turner *at al.*, 1969, Stone *et al.*, 1979) appear in the reef area, both those returning after the cessation of the disturbances related to the construction (Rellini *at al*., 1994) as well as those previously absent in the area (increase in biodiversity). According to Kerckhof *et al.* (2019), after 6 years, one can speak about a fully developed complex of organisms inhibiting the artificial reef (climax community).

After being inhabited by periphyton, macrophytes and invertebrates, artificial reef becomes an attractive habitat for ichthyofauna. The information on this issue is based on studies conducted in the offshore wind farm area. However, there have been no studies on the artificial reef effect caused by the presence of elements protecting the transmission infrastructure on the seabed. It may be assumed, however, that despite its smaller scale, the nature of this impact will be similar to the one identified for the OWF. Artificial reefs formed by cable protection structures, as well as the cable itself lying on the seabed, can offer rich food resources and shelter, also creating favourable conditions for the reproduction of many fish species, for adult stages as well as roe, larvae and juvenile individuals. Such a situation was observed in the case of structural elements of wind turbines and anti-erosion protection solutions, which offered attractive hiding places for young (2–3-year-old) cod (Reubens *et al.*, 2011). The studies by Reubensa *et al.* (2013), which compared the fish catch efficiency of cod and bib on a sandy seabed and in regions where hard artificial substrates were present (wrecks, OWFs), indicated distinct groupings of these species in the project area, particularly in the periods of intense feeding (summer, autumn). Artificial reefs may also provide favourable breeding conditions for numerous fish species such as herring, pogge, garfish, lumpfish and rock gunnel (Zucco *et al.* eds., 2006). According to Jensen *et al.* (2006), the artificial reef area also provides preferable spawning conditions for gobies, which include species protected in Poland.

Surveys carried out by Bergström *et al.* (2013) in the area of the Lillgrund OWF located in the Sound strait showed visible aggregations of such fish species as cod, shorthorn sculpin, black goby, viviparous eelpout and eel in the project area. The results of the surveys on the long-term impact of the Horns Rev 1 OWF on the abundance and taxonomic composition of fish showed that the artificial reef effect was significant enough to cause an increase in the number of fish that prefer a hard substrate and, at the same time, too small to cause a decrease in the number of fish that prefer a sandy substrate (Stenberg *et al.*, 2015). However, it should be remembered that the above information refers to the artificial reef effect related to OWF structural elements, the scale of which will be larger than that of transmission infrastructure protection systems.

Artificial reefs offering environmental conditions significantly different from those previously prevailing in a given area may constitute an environment facilitating invasion of alien species (Langhamer, 2012). Most of the information about the appearance of alien species on artificial reefs concerns the periphyton and crustaceans, but it cannot be excluded that such areas may create a favourable environment also for alien fish species.

The newly created habitat, with its hard substrate and relatively rich food supply for benthivorous fish, may constitute a favourable environment for the colonisation by the invasive round goby. However, artificial reefs created as a result of the construction of transmission infrastructure are not an area where the reproduction of this species takes place. Round goby spawns at depths of 0.2 to 1.5 m, i.e. in areas where the construction of cable protection elements on the seabed surface is unlikely (Wandzel, 2003; Sapota *et al.*, 2014).

Taormina *et al.* (2018) identify the potential impact of the artificial reef effect created by subsea cables as small, while emphasising the need for further studies to collect more information on the subject. Meissner *et al.* (2006) estimate that due to the small width of the strip of hard substrate created by the cable or its protective structures, the impact will be highly localised, although long-lasting.

The impact related to the change of habitat will be positive, direct, local, permanent and long-term.

The species sensitivity to the impact was assessed as high for cod, flounder, herring, common seasnail, sand goby and common goby and straight-nose pipefish, whereas for sprat and twaite shad it was assessed as low.

Taking into account a low probability of creating a new habitat at a considerably large seabed area, the sensitivity to the impact for cod, flounder, herring, common seasnail, sand goby, common goby and straight-nose pipefish was assessed as moderate, whereas for sprat and twaite shad it was assessed as low.

The significance of the impact is assessed as low for all the fish species examined.

###### 6.1.2.6.1.3.3 Electromagnetic field impact

An electric current flowing through a conductor induces a magnetic field, the intensity of which depends on the current intensity. The field intensity decreases, both horizontally and vertically, with the distance from the current conductor. In the case of AC, the direction of flow changes, which entails changes in the magnetic field over time. As a result, the changing magnetic field induces an alternating electric field in seawater (Gill *et al.*, 2009). The use of three-phase AC cables practically enables eliminating the emission of the magnetic field outside the cable due to current phase shifts in individual conductors of the cable (OSPAR Commission, 2012).

The technical solutions used in the planned project practically enable elimination of the effects of magnetic field on fish. The size of the emitted field will be smaller than the Earth's natural magnetic field, when a cable is buried in the sediment already at a depth of 1.5 m.

The impact related to the emission of EMF will be negative, direct, local and long-term.

The species sensitivity to the impact was assessed to be irrelevant for all the fish species examined. The significance of the impact is assessed as negligible for all the fish species examined.

###### 6.1.2.6.1.3.4 Summary of impacts on marine ichthyofauna during the operation phase

A summary of the assessment of the scale of the impacts identified and the assessment of the significance of the impacts on ichthyofauna was presented in Table 6.55 and Table 6.56.

*Table 6.55. Assessment of the scale of impacts on marine ichthyofauna [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Permanent** | **Long-term** | **Medium-term** | **Short-term** | **Temporary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Noise and vibration emissions | 3 | | | | | 1 | | 4 | | | | | 1 | 9 |
| Electromagnetic field impact | 3 | | | | | 1 | | 4 | | | | | 1 | 9 |
| Habitat change* | 3 | | | | | 1 | | 4 | | | | | 1 | 9 |

**positive impact*

*Table 6.56. Assessment of the significance of impacts on marine ichthyofauna [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Noise and vibration emissions | Moderate | Low | Low |
| Electromagnetic field impact | Moderate | Irrelevant | Negligible |
| Habitat change | Moderate | Moderate – cod, herring, flounder, common seasnail, sand goby, common goby, straight-nose pipefish<br><br>Low – sprat, twaite shad | Low |

##### 6.1.2.6.1.4 Marine mammals

A potential negative impact of the project in the operation phase, which may affect marine mammals, is the disturbance from the noise generated by ships and underwater equipment used during system maintenance. However, due to the local and short-term nature of this impact, the lack of evidence as to the importance of this area for particular marine mammal species and the sporadic occurrence of such species in the project area, this impact will be no greater than during the construction phase.

###### 6.1.2.6.1.5 Seabirds

During the operation phase, no impacts that could significantly affect seabirds will occur. Periodic inspections of subsea cables will be carried out by at least two relatively small vessels. The necessity of conducting possible repairs of subsea cables may occur almost exclusively in emergency situations and is very unlikely due various types of cable line protections: their durable design, burial in the seabed sediment or proper protection if they are laid on the seabed, as well as a special avoidance zone for cable lines established by the Director of the Maritime Office in Gdynia.

Periodic inspections of the cable lines will only involve bird scaring in the vicinity of vessels. In this part of the sea, vessel traffic is intense due to the presence of the shipping route of cargo vessels. Therefore, a short-term presence of a single vessel will not contribute to a noticeable increase in bird disturbance in the Baltica OWF CI area, particularly in the context of the already intense shipping use of the sea area in which the project is located. After the construction phase is finished, the restoration of macrozoobenthos complexes, constituting a possible food supply for benthivorous birds, will begin. At the operation stage, all the impacts identified for the construction phase will cease.

The operation of the cable lines may have a positive impact on seabirds. The establishment of a protection zone for the cable lines may involve restrictions on some forms of commercial fishing within its boundaries and consequently reduce the by-catch of birds – mainly ducks diving into the fishing nets. At this stage, it is impossible to determine the scale of this impact, and as a result it was not assessed.

Summarising the above information, it should be assumed that during the operation phase there will be no negative impacts on birds which could manifest in a noticeable or measurable manner.

##### 6.1.2.6.2 Impact on protected areas

###### 6.1.2.6.2.1 Impact on protected areas other than Natura 2000 sites

In the offshore area of the planned project location and in the extent of its potential impact there are no territorial forms of protection other than the areas of the Natura 2000 European ecological network. Therefore, no activities related to the operation of the Baltica OWF CI will cause any impact on such areas.

###### 6.1.2.6.2.2 Impact on Natura 2000 protected sites

During the operation phase, no impacts that could significantly affect the subjects of protection of the *Przybrzeżne wody Bałtyku* (PLB990002) Natura 2000 site will occur. Periodic inspections of the subsea cables will be carried out by at least two relatively small vessels. The necessity of conducting possible repairs of subsea cables may occur almost exclusively in emergency situations and is very unlikely due to various types of cable line protection measures: their durable design, burial in the seabed sediment or proper protection if they are laid on the seabed, as well as a special avoidance zone for cable lines established by the Director of the Maritime Office in Gdynia.

Periodic inspections of the cable lines will only involve bird scaring in the vicinity of vessels. In this part of the sea, the traffic of vessels is intensive due to the shipping route of cargo vessels, therefore, a short-term presence of a single vessel does not contribute to a visible increase in bird-scaring in the area; particularly in the context of the already intense shipping use of the sea area in which the project is located. After the construction phase is finished, the restoration of macrozoobenthos complexes, constituting a possible food supply for benthivorous birds, will begin. At the operation stage, all the impacts identified for the construction phase will cease.

The operation of the cable line may have a positive impact on the Natura 2000 site features subject to protection. Establishing a protection zone for the cable lines may involve restrictions on some forms of commercial fishing within its boundaries and as a result on the by-catch of birds – mainly ducks diving into the fishing nets. At this stage, it is impossible to determine the scale of this impact, therefore it was not assessed.

Summarising the information above, it should be assumed that during the operation phase, there will be no negative impacts on seabirds subject to protection in the *Przybrzeżne Wody Bałtyku* site (PLB990002), which could manifest in a noticeable or measurable manner.

No impacts on the integrity of the site or on the connections with other Natura 2000 sites are anticipated.

#### 6.1.2.6.3 Impact on wildlife corridors

During the operation of the Baltica OWF CI, the scope and significance of environmental impacts will be much smaller compared to the construction phase. No impacts that could adversely affect the movement of animals within and near the Baltica OWF CI area are anticipated.

#### 6.1.2.6.4 Impact on biodiversity

##### 6.1.2.6.4.1 Phytobenthos

When artificial reef (Subsection 6.1.2.6.1.1) is formed on cable protection systems placed on the hard bottom, and macroalgae are part of it, species diversity in the area may increase. The cable protection elements may host not only species native to the area (Subsection 3.7.1.1), but also new species whose spores have been brought in from other parts of the Baltic Sea with the sea currents.

The impact of introduction of additional hard substrate in the area should be assessed as negative (disturbance of the original conditions existing before the commencement of the project) / positive (local increase in species diversity), indirect, local and long-term. The magnitude of this impact will be insignificant, as the boulder areas on which the protection can be built constitute less than 1% of the total surface area of the APV, which means that the surface which could possibly be grown will be small. The sensitivity of macroalgal species was assessed as high because they have a high potential to thrive in the presence of hard substrates to which they easily attach.

##### 6.1.2.6.4.2 Macrozoobenthos

The operation phase of the Baltica OWF CI will not lead to any changes in biodiversity – neither in terms of habitat nor taxonomic aspects.

In the case of the soft bottom, the cables embedded in the seabed will not affect the surface layer of the sediments, the physical and chemical structure of which and the macrozoobenthos community colonising the sediments will be restored after a few years at the latest. In the case of the hard bottom, covering the power cables with concrete covers or rip-rap will not alter the substrate characteristics in terms of its suitability for periphyton to colonise it.

The taxonomic diversity on both types of habitats will be restored close to its original condition after 3–4 years since the beginning of the operation phase at the latest.

###### 6.1.2.6.4.3 Ichthyofauna

The assessment of impacts occurring during the operation phase (noise and vibration, EMF, habitat change, release of harmful substances) indicates that they will not be significant. In the case of the first two impacts, they are minimised by the technical solutions proposed by the Applicant. A possible impact of the structures protecting the cables laid on the seabed surface which could provide a substrate for the formation of an artificial reef (habitat change) will be insignificant due to the exceptionally low probability of such situation to occur. Therefore, it can be assumed that the operation phase will have no impact on biodiversity in the context of ichthyofauna.

###### 6.1.2.6.4.4 Marine mammals

During the operation phase of the Baltica OWF CI, there will be no disturbance in the marine mammal habitat preventing its use by these animals. Therefore, it will not affect the biodiversity in the context of marine mammals.

###### 6.1.2.6.4.5 Seabirds

During the operation phase, there will be no impacts that could affect the biodiversity in the context of birds.

#### 6.1.2.7 Impact on cultural values, monuments and archaeological sites and features

No shipwrecks of historical significance have been identified in the offshore part of the Baltica OWF CI area (see Subsection 3.8). Consequently, there will be no impacts on cultural values, monuments and archaeological sites and features in the offshore area during the operation phase.

#### 6.1.2.8 Impact on the use and management of the sea area and tangible property

During the operation phase, the impact on the use and management of the sea area will only result from the establishment of cable line protection zones by the Director of Maritime Office in Gdynia, within which the use of bottom fishing gear will be prohibited. The significance of this impact will be low according to the assessment performed for the construction phase (see: Subsection 6.1.1.7), as it will not cease upon the completion of this phase and will persist at least until the end of the operation phase.

Impacts on other forms of use and management of the sea area and tangible property are not anticipated.

#### 6.1.2.9 Impact on landscape, including the cultural landscape

During the operation phase, cable line inspections which will be carried out by relatively small service vessels are envisaged. Their presence in the offshore area will not affect the landscape character, which is formed anthropogenically by the intensive use of this part of the Baltic Sea for navigation.

#### 6.1.2.10 Impact on population, human health and living conditions

Restrictions for the public will result from the establishment by the Director of the Maritime Office in Gdynia of cable line protection zones, in which bottom fishing will be prohibited. This will affect the fisheries, for which the significance of this impact was assessed as low (see: Subsection 6.1.1.7). The same assessment was made for the significance of the prohibition on bottom fishing within the cable protection zones for the population, namely fishermen who will be affected by this restriction. No other impacts on the population, human health and living conditions are anticipated during the operation phase.

### 6.1.3 Decommissioning phase

Two methods of implementing the decommissioning phase are adopted – decommissioning by deactivating the infrastructure (the method preferred by the Applicant) and decommissioning by complete dismantling of the Baltica OWF CI (cutting the cables into sections and retrieving them on board a CLV). In the former case, most of the impacts which will be generated during the operation phase are expected to cease. In the case of dismantling, the impact and their significance will be identical to those identified for the construction phase due to the intended scope of dismantling work being very similar to the scope of construction work. For each of the environmental components examined, both methods of implementing the decommissioning phase were analysed to identify new impacts which were subsequently analysed to assess their significance.

#### 6.1.3.1 Impact on geological structure, seabed sediments, access to raw materials and deposits

The option of deactivating the transmission infrastructure assumes that the cable lines in the offshore area will be de-energised and deactivated once the operation phase is completed. The cable lines will not be dismantled. In such a case, there will be no impact on the geological structure, seabed topography or seabed sediments

The option of cable line dismantling assumes that the impacts will be similar to the impact present during the construction phase, however, they will be less intense. The extent of interference in the seabed will not be as severe as in the case of the implementation phase.

Changes within the seabed associated with the decommissioning of the project will be of a local nature and, within the entire area occupied by the project site, insignificant for the overall nature of the seabed and its structure. The seabed topography and structure along the cable lines will be altered already during the project implementation phase. The work carried out during the decommissioning phase will only disturb the sediment modified during the project implementation phase and will lead to a local change in the seabed topography resulting in the formation of small alluvia along the route caused by the retrieval of the cables. In the event that the seabed surface is not levelled after these operations, the natural processes occurring on the seabed will cause a gradual fading of the effects of the work conducted during the decommissioning phase.

For the option of the cable line dismantling, the impact on the seabed topography will be negligible. No impact on the geological structure or seabed sediments is envisaged.

Possible decommissioning of the project might cause impact on the seabed through local changes in its topography related to the removal of connection infrastructure components and depressions in the seabed formed at the anchoring places of the vessels participating in the decommissioning of the connection infrastructure.

An assessment of the scale of impacts on the seabed topography identified is presented in Table 6.57, whereas the assessment of the significance of impacts can be found.

*Table 6.57. Assessment of the scale of impacts on the seabed topography [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Permanent | Long-term | Medium-term | Short-term | Temporary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Local changes in seabed topography | 3 | | | | | 1 | | | | 2 | | | 1 | 6 |

*Table 6.58. Assessment of the significance of impacts on the seabed relief [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Local changes in seabed topography | Low | Irrelevant | Negligible |

#### 6.1.3.2 Impact on the quality of seawater and seabed sediments

In the case of possible dismantling of the Baltica OWF CI, it is expected that impacts of the same significance as those identified for the construction phase will occur (see: Subsection 6.1.1.2). In the case of deactivation, no impacts on the quality of seawater and seabed sediments will arise.

#### 6.1.3.3 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

In the case of potential dismantling of the Baltica OWF CI, the impacts and their significance are expected to be the same as during the construction phase (see: Subsection 6.1.1.3). In the case of deactivation, there will be no impacts on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, or on atmospheric air (air quality).

#### 6.1.3.4 Impact on ambient noise

In the case of leaving the cables buried in the seabed after the discontinuation of the transmission infrastructure operation, no impacts on the ambient noise will arise.

In the case of removing the cables from the seabed, vessels and equipment necessary to retrieve the cables and to transport them onto land for utilisation purposes will be used. The impacts on the ambient noise related to these operations will be local and limited in time. They will not be greater than during the construction phase, which means that they will be of low significance.

#### 6.1.3.5 Impact on the electromagnetic field

In either option of the Baltica OWF CI decommissioning, there will be no sources generating electromagnetic field.

#### 6.1.3.6 Impact on nature and protected areas

##### 6.1.3.6.1 Impact on biotic elements in the offshore area

###### 6.1.3.6.1.1 Phytobenthos

For the option of the decommissioning by removing the transmission infrastructure components, only the impact “disturbance of the sediment structure” will be a factor that most strongly affects the phytobenthos. The significance of the impact "redistribution of nutrients and contaminants from sediments to the water depth" will be the same as in the case of the construction phase. During the decommissioning of the cables and their protection systems, most probably, there will be a decrease in the species diversity and in the biomass of macroalgae growing on the artificial substrate to a depth of approx. 20 m. This will result in the ecosystem alteration in the area of the connection infrastructure, i.e. the original conditions prevailing before the infrastructure construction will be restored. In the case of the Baltica OWF CI area, the removal of cables together with the artificial reef is not likely to have a significant impact on the phytobenthos in the Baltica OWF CI area, as due to its trace amounts on the rocky seabed, also periphytic flora is unlikely to occur in abundance.

By contrast, if it is decided to deactivate the transmission infrastructure, no impacts on phytobenthos will arise.

###### 6.1.3.6.1.2 Macrozoobenthos

In the case of potential dismantling of the Baltica OWF CI, the impacts on macrozoobenthos and their significance are expected to be the same as during the construction phase (see: Subsection 6.1.1.5.4.2). In the case of decommissioning by deactivation, there will be no impacts on macrozoobenthos.

###### 6.1.3.6.1.3 Ichthyofauna

In the case of potential dismantling of the Baltica OWF CI, impacts on ichthyofauna and their significance are expected to be the same as during the construction phase (see: Subsection 6.1.1.5.4.3). In the case of decommissioning by deactivation, there will be no impacts on ichthyofauna.

###### 6.1.3.6.1.4 Marine mammals

If the infrastructure of the Baltica OWF CI is deactivated, there will be no impacts on marine mammals. However, if a decision is made to dismantle the Baltica OWF CI infrastructure after the operation phase, the impacts on marine mammals are expected to be of the same nature and significance as those identified for the construction phase (see: Subsection 6.1.1.5.4.4).

###### 6.1.3.6.1.5 Seabirds

If the infrastructure of the Baltica OWF CI is deactivated, there will be no impacts on seabirds. However, if a decision is made to dismantle the Baltica OWF CI infrastructure after the operation phase, the impacts on seabirds are expected to be of the same nature and significance as those identified for the construction phase (see: Subsection 6.1.1.5.1.5).

##### 6.1.3.6.2 Impact on protected areas

###### 6.1.3.6.2.1 Impact on protected areas other than Natura 2000 sites

In the offshore area of the planned project location and in the extent of its potential impact there are no territorial forms of protection other than the areas of the Natura 2000 European ecological network. Therefore, no activities related to the possible decommissioning of the Baltica OWF CI will cause any impact on such areas.

###### 6.1.3.6.2.2 Impact on Natura 2000 protected sites

In the case of the possible dismantling of the Baltica OWF CI infrastructure, technologies and equipment similar to those used during the construction phase are expected to be used. Therefore, the potential impacts on seabirds protected under the Natura 2000 site will be the same as those identified for the construction phase (see: Subsection 6.1.1.5.2.2). In the case of decommissioning by deactivation, there will be no impacts on the *Przybrzeżne wody Bałtyku* site (PLB990002).

#### 6.1.3.6.3 Impact on wildlife corridors

In the case of the possible dismantling of the Baltica OWF CI infrastructure, technologies and equipment similar to those used during the construction phase are expected to be used. Therefore, the potential impacts on animals moving within the Baltica OWF CI area and its vicinity will be the same as those identified for the construction phase (see: Subsection 6.1.1.5.3).

No impacts on the integrity of the site or on the connections with other Natura 2000 sites are anticipated.

#### 6.1.3.6.4 Impact on biodiversity

##### 6.1.3.6.4.1 Phytobenthos

After the discontinuation of the operation, when a decision is made to commence the decommissioning phase and to dismantle the cables, most probably, there will be a decrease in the species diversity and in the biomass of macroalgae, which will result in the ecosystem alteration in the area of the connection infrastructure, i.e. the original conditions prevailing before the infrastructure construction will be restored. In the case of the Baltica OWF CI area, the removal of cables together with the artificial reef is not likely to have a significant impact on the phytobenthos diversity in the Baltica OWF CI area, as due to the trace amounts on the seabed also periphytic flora is unlikely to occur in abundance. After the dismantling, the environmental conditions prevailing in the seabed area before the construction of the project will be restored. By contrast, in the case of leaving the transmission infrastructure in the seabed, i.e. at their burial location, the decommissioning phase will have no impact on the phytobenthos biodiversity.

##### 6.1.3.6.4.2 Macrozoobenthos

For the option “deactivation of the transmission infrastructure” involving leaving the power cables at their burial locations, the decommissioning phase will have no impact on the biodiversity in the context of macrozoobenthos.

For the option “decommissioning by removing the transmission infrastructure components”, the same disturbance factors will occur as during the construction phase. However, considering the characteristics of the seabed habitats in the Baltica OWF CI Area, as well as the characteristics of macrozoobenthos species inhabiting these habitats, no negative changes in the biodiversity of the survey area should be expected as a result of operations conducted during the Baltica OWF CI decommissioning phase.

##### 6.1.3.6.4.3 Ichthyofauna

If the infrastructure is not removed, the only environmental effects of adopting the first solution will be the cessation of the impact generated by EMF and the noise emitted by the cables. Since both these impacts were considered insignificant, it can be assumed that the failure to remove the infrastructure components will be neutral for biodiversity.

The process of dismantling the connection line elements will involve similar impacts as in the case of the construction phase.

###### 6.1.3.6.4.4 Marine mammals

In the case of the Baltica OWF CI infrastructure deactivation, no activities that could affect the marine mammal biodiversity are anticipated.

###### 6.1.3.6.4.5 Seabirds

In the case of the Baltica OWF CI infrastructure deactivation, there will be no impacts that could affect the biodiversity of birds. In the case of decommissioning by dismantling, the impacts will most likely be the same as in the construction phase and will cease after the completion of this phase. Their scale and intensity are not expected to affect bird biodiversity.

#### 6.1.3.7 Impact on cultural values, monuments and archaeological sites and features

No shipwrecks of historical significance have been identified in the offshore part of the Baltica OWF CI area (see Subsection 3.8). Consequently, the Baltica OWF CI will have no impact on cultural values, monuments and archaeological sites and objects during the decommissioning phase.

#### 6.1.3.8 Impact on the use and management of the sea area and tangible property

During the decommissioning phase, in the case of cable line dismantling, minor impacts on shipping are anticipated due to the need for vessel course correction in order to avoid vessels involved in possible dismantling operations. The significance of this impact will be the same as the significance assessed for the construction phase, i.e. negligible. The decommissioning of the Baltica OWF CI will involve the removal of cable line protection zones and the cessation of impacts on fisheries.

In the second scenario, i.e. the deactivation of the Baltica OWF CI without its dismantling, there will be no impacts on shipping but the impacts on fisheries will possibly remain if the cable line protection zones are not removed. The significance of the impact will be the same as for the operation phase, i.e. low. No other impacts on the use and management of the sea area and tangible property will occur.

#### 6.1.3.9 Impact on landscape, including the cultural landscape

The possible dismantling of the cable lines in the decommissioning phase is expected to be carried out by vessels with parameters similar to those involved in the construction works (see: Subsection 6.1.1.8). Therefore, it should be assumed that there will be no impact on the landscape, including cultural landscape, during the decommissioning phase either.

#### 6.1.3.10 Impact on population, human health and living conditions

In the case of dismantling the Baltica OWF CI, impacts occurring during the decommissioning phase will result from the impacts identified for the use and management of the sea area within the Baltica OWF CI area. In the case of dismantling the Baltica OWF CI, there will be a negligible impact on population due to minor restrictions on shipping activities (see: Subsection 6.1.3.8). If the decommissioning phase involves deactivation of the cable lines and the maintenance of safety zones, impacts on people will occur due to restrictions on fishing, which were assessed as low (see: Subsection 6.1.3.8).

## ONSHORE AREA

### 6.1.4 Construction phase

#### 6.1.4.1 Impact on geological structure, coastal zone, soils, and access to raw materials and deposits

##### 6.1.4.1.1 Impact on geological structure

The geological structure may be potentially affected by crossing the coastal zone by means of a trenchless method (e.g. horizontal directional drilling (HDD) or Direct Pipe) at a depth of up to 20 MBSL. The crossing of the coastal zone at such great depths is aimed at avoiding potential failures of the planned infrastructure, connected mainly to the coastal zone dynamics. The drilling of a borehole and the extraction of the softened spoil on the ground may disturb the system of sediment layers and entail a risk of contamination of deeper sediment layers in case of failure.

For the area analysed, the land-sea transitional zone, there are no detailed data on the geological structure, therefore, before the commencement of works, a detailed identification of the geological structure of that area will be conducted, not only on the basis of spot data (drillings), but also on the basis of seismic surveys. The borehole parameters and trajectory, as well as the precise location of the connection landfall will be specified depending on the final technological solution of the Baltica OWF CI, the drilling method, geological structure, morphodynamics in the near-seabed zone as well as the environmental conditions. On the basis of the results of the surveys conducted, the appropriate type of drilling fluid and drilling equipment will be selected. Usually, bentonite drilling fluids, which do not pose a direct threat to the environment, are used for that purpose.

It should be remembered that in the case of a failure to maintain an appropriate technological regime, the soil and the deeper sediment layers may become contaminated (indirectly and directly also the contamination of water may take place) with fuel spills from the construction machinery. However, if the location of work is properly secured and the work organised, the probability of such an event can be considered low.

In the light of the conducted analysis of the geological conditions, the construction of the OnSS and the transmission line further inland (trench depth – 2 MBGL on average, and in the case of watercourse, road or archaeological site crossings with a trenchless method up to a maximum depth of 5 MBGL) does not pose a risk to the geological structure.

The assessment of the scale of impact on geological structure is presented in Table 6.59, whereas, the assessment of the significance of impact in Table 6.60.

*Table 6.59. Assessment of the scale of impact on geological structure [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Disturbance of sediment layers by | 3 | | | | | 1 | | | | 2 | | 2 | | 8 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| drilling through the coastal zone and the removal of the spoil | | | | | | | | | | | | | | |

*Table 6.60. Assessment of the impact significance on geological structure [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Disturbance of sediment layers by drilling under the coastal zone and the removal of the spoil | Moderate | Moderate | Low |

#### 6.1.4.1.2 Impact on the topography and dynamics of the coastal zone

As part of the implementation of the project designed, it is planned to construct a borehole using a trenchless method. The borehole will be made at a depth of up to 20 MBGL within the coastal zone. At the current stage, the precise location of the cable landfall has not yet been specified and it will result from the identification of the geological and geotechnical conditions of the coastal zone. However, it is known that the borehole from the land side will be located behind the landward slope of the dune at a distance of up to several hundred metres inland from the coastline, and will therefore be located outside the coastal zone. As part of the planned project, no construction works nor the location of the construction site or access roads are envisaged on the coastal zone surface. Taking the above into consideration, the project is not anticipated to affect the shaping of the coastal zone dynamics at the construction stage.

#### 6.1.4.1.3 Impact on soils

In terms of the interference in the soil environment, the planned project will have an impact mainly at the stage of implementation (construction), due to the work carried out at the stage of cable laying, i.e. the construction of a trench, soil and dirt tipping, trench dewatering, ground levelling, and the removal of trees and shrubs, as well as, at the OnSS construction stage, i.e. the construction of trenches for engineering structures and buildings as well as the possible dewatering of the substation area. A detailed description of the planned works is presented in Section 2.

The first stage of works indirectly interfering with the soil structure will be the removal of trees and shrubs along the section of the cable connection route running in the forest areas. The estimated surface of the area in which felling is to be conducted in the onshore area in the APV will be 39.5 ha. The next stage will involve ground levelling so that cable lines could be laid horizontally along short sections. However, in the case of longer sections with a difference in ground elevation, the cable lines will be laid at a constant depth underground, with the existing terrain topography maintained to the greatest extent possible.

A significant interference in soil structure as part of the planned project will be the excavations and the anticipated local and temporary land dewatering for the purpose of laying the cable line. The estimated maximum volume of excavations in the onshore area of the planned project will be approx. 1 178 500 $m^3$.

Since the cable lines must be laid in a dry trench, in the case the cable connection passes through an area with a shallow water table, preliminary dewatering of the trench will have to be carried out. Local dewatering will be carried out until the cable is laid and the excavation is backfilled. The section where the work front is currently located will be drained each time. The work will progress gradually at a rate of approx. 50 m/day. The water will be drained beyond the construction site, and will be collected in nearby watercourses and forest areas adjacent to the site, if possible. At the same time, it should be underlined that the vast majority of the project area is located in a place where the water table of the first, subordinate aquifer is deposited at depths of at least 5 MBGL, thus the necessity to conduct dewatering will most probably not occur. The disturbance of the first aquifer water table may, however, occur in the coastal strip, i.e. up to 1–2 km inland, where, as the hydrogeological maps show, the water table occurs within the range from 1 to 2 m or approx. 2 MBGL. It is anticipated that during earthworks, dewatering may be necessary maximally up to a 1/3 of the length of the cable connection onshore section.

Moreover, in places of the planned cable line collisions with the existing infrastructure, i.e. with paved roads, watercourses or in places with weak soils, trenchless methods of cable line laying will be used, in form of pneumatic moling or non-directional drilling with hydraulic moling. Trenchless method of cable line laying does not entail significant negative impact on the soil environment. Currently, it is impossible to indicate all locations and areas on land where the application of trenchless cable-laying method will be necessary. However, the length of a single borehole in the onshore area will not exceed 700 m (with the exception of the land-sea borehole, the total length of which may reach up to 1700 m).

The planned OnSSs will be located in arable land, where already anthropogenically transformed soils are present. The project is intended to be partially located on good and moderately good soils (soil quality classes IIIa and IIIb) – south-western fragment of the OnSS – and poorer soils (soil quality classes IVa, IVb, V) – north-eastern fragment of the OnSS.

Moreover, within the entire area of the project in question, the operation of construction equipment and heavy-duty machinery will mainly pose a potential risk for the soil and soil and water environments. On the one hand, the equipment used will extort strong pressure on the soil surface, which may contribute to the compaction of the topsoil, while on the other hand it will pose a potential risk of incidental ground contamination by hazardous substances from the leakages from vehicles and equipment used for construction works. To minimise the possibility of such an impact, parking locations for machinery will be provided, and during construction works, on-going inspections of machinery and equipment will be carried out to ensure early detection of possible faults and failures, including leakages. Access to sorbents will be ensured on site. In case of a failure resulting in fuel, oil or other chemical substance spill, the contaminated soil will be immediately removed and dumped in a specially prepared landfill site. It should be noted that impacts of this kind can only be short-term (even temporary) and practically isolated in terms of frequency of occurrence. In such cases only small quantities of pollutants may be released to the environment and the spatial range of such impacts should be considered spot-like.

Hazardous substances may permeate into the soil also as a result of improperly stored construction materials, inadequately located and secured tanks, materials and packaging left or buried in the ground. To prevent this, all wastes, including hazardous wastes generated on site will be stored in separated locations adopted for that purpose. Waste will be secured against the access of unauthorised persons and animals, and also secured against the impact of unfavourable meteorological conditions and possible infiltration of precipitation water into the ground.

Generation of waste can have an indirect impact on soil. It is anticipated that at the OnSS construction stage mainly wastes from group 17 will be generated – construction and demolition wastes (including excavated soil from contaminated sites). The earth from excavations constructed for the foundations in the OnSS area will be collected on site and will be used for excavation backfilling or distribution in the project implementation area. However, in the case of the cable bed area, the excavated soil and earth masses will be stored as backfill on one side of the excavation, at a small distance from its edge or tipped for later used. Pursuant to Article 2 section 3 of the Waste Act of 14 December 2012 (consolidated text: Journal of Laws of 2021, item 779, as amended), its provisions do not apply to uncontaminated soil and other naturally occurring material excavated in the course of construction activities providing it is certain that the material will be used for the purpose of construction in its natural state on the site from which it was excavated. Thus, earth masses fulfilling the above-mentioned conditions will not be classified as waste. The humus layer of the soil will be secured appropriately. Its protection will involve the removal of the surface soil layer and dumping it in a pile on the construction site, and then, after the completion of works, its distribution in the project implementation area with the exception of permanently occupied places. Waste will be collected selectively in containers on the construction site. All hazardous waste will be collected in separate containers, factory-adjusted to this type of waste. When the containers are filled, the waste will be handed over to companies with appropriate licenses for recycling or utilisation. The contractor for construction works should handle the waste generated in accordance with the requirements of the Waste Act and the related executive acts. Assuming that waste management during the project implementation will be conducted in compliance with the binding regulations, no significant risk to the environment is anticipated, regardless of the quantity of waste generated.

Summing up, the planned project will undoubtedly cause soil degradation within the area planned for cable line laying and within the OnSS construction area. The planned OnSSs will be mostly located on good and moderately good soils (soil quality classes IIIa and IIIb) covering approx. 60% of the OnSS surface area; poorer soils of quality classes IVa, IVb and V have a smaller share. Taking into consideration the poorly-permeable nature of the subsoil (loamy sands on light clay), the possible leaks of hazardous substances are not expected to spread over a larger area before they are removed. The planned soil dewatering will be temporary and will be limited to the locations in which the groundwater table is located at a depth of up to 2 MBGL. At the construction stage, the possible impact on the soil surface will be short-term and reversible with the exception of places permanently occupied by newly-constructed buildings.

The assessment of the scale of impact on soil is presented in Table 6.61, whereas, the assessment of the impact significance in Table 6.62.

*Table 6.61. Assessment of the scale of impact on soils [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Alteration to the water regime as a result of excavation dewatering | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Soil degradation | 3 | | | | | 1 | | | | 2 | | 2 | | 8 |
| Risk of contamination of the ground- | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| water environment | | | | | | | | | | | | | | |

*Table 6.62. Assessment of the impact significance on soils [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Alteration to the water regime as a result of excavation dewatering | Low | High | Low |
| Soil degradation | Moderate | High | Moderate |
| Risk of contamination of the ground-water environment | Low | Moderate | Low |

#### 6.1.4.1.4 Impact on the access to raw materials and deposits

At present, in the area of the planned project and in its nearest surroundings, no mineral deposits or mining areas and sites have been documented; therefore, the project will not affect access to raw materials and deposits. The project area is covered by concession no. 5/2019.Ł for prospecting and exploration of crude oil and natural gas deposits, and for extraction of crude oil and natural gas. In compliance with the schedule of actions presented in the concession, hydrocarbon deposit prospecting works should be carried out currently within the concession area, which should last until 2024. However, in accordance with the information obtained from the concessionaire, the schedule of geological works has been modified (implicitly delayed) as a result of the COVID-19 pandemic. It was assumed that the construction phase of the planned project will last approx. 600 days, as a result, there is a high probability that the construction of the Baltica OWF CI will continue at the same time as the hydrocarbon prospecting phase or will be completed even before their commencement. Therefore, there is a risk that at the construction stage, the Baltica OWF CI may prevent the drilling of boreholes in the area of the planned project, if the concessionaire plans to drill boreholes in that particular location. At the moment, the exact locations of the planned boreholes are unknown, however, the concessionaire has emphasised that the area of the planned Baltica OWF CI is characterised by an exceptionally favourable prognosis of the unconventional oil resource volume, which is why the Baltic Shale company plans to carry out such a number of boreholes so as to maximise the extraction of crude oil and natural gas.

### 6.1.4.2 Impact on the quality of surface waters

During the project construction phase, the main causes of surface water contamination may be:

- runoff of precipitation and snow melt from the construction site;
- improperly stored construction materials;
- unsuitable location of the construction site facilities, including improperly prepared plumbing system;
- chemical substances leaking as a result of machinery or equipment failures.

In terms of infrastructure investments, all watercourses will be treated as vulnerable areas. In the case of the Baltica OWF CI collision with two drainage ditches identified in the planned project area, in order to maintain the continuity of water flow it will be necessary to apply a trenchless method in the form of directional drilling or a traditional method with the so-called by-pass, which involves redirecting the water flow to a temporary watercourse bed constructed. It will be waterproofed with a geomembrane and the slopes will be protected against subsidence. The water in the watercourse will then be diverted into a temporary watercourse bed for the duration of the cable line laying. Another possibility of crossing the watercourse during the Baltica OWF CI implementation is the pumping of water from the upper to the lower part of the watercourse. The trench and the slopes of the watercourse between the bulkheads will be excavated to the appropriate foundation elevation of the cable line. The bottom of the trench will be inspected and levelled. The cable line will be laid in the excavated trench.

To provide the best protection of surface waters against contamination, the prefabricated elements as well as fittings and apparatus should be stored on a hardened surface. Portable toilets equipped with a reservoir and a tank for sanitary sewage serviced by specialist companies should be located on the construction site. However, no permanent sanitary facilities nor water intakes points will be constructed. Also, no water use for technological purposes is anticipated, however, watercourses may be used as receivers of the water from excavation dewatering.

Surface waters may be directly polluted by petroleum products (diesel oils, greases and petroleum) leaking from construction machinery and equipment, for example, as a result of a failure. The most hazardous can be spills in the immediate vicinity of watercourses and in depressions where water stagnates. In such a case, fast spreading of pollutants in surface waters and their migration through soil into ground- and deep waters may occur.

In the area analysed, with appropriate securing of the construction site as well as proper organisation of work and operation of construction machinery, the probability of such an event can be considered low. Such situations should be eliminated through appropriate supervision over their operation as well as the maintenance of construction machinery in good technical condition. Construction teams should be equipped with absorbents and basic equipment for removal of minor spills.

Taking that into consideration, no negative impact on the surface water bodies within the area analysed, i.e. the immediate catchment area of the sea CWDW1801 and the RWB Chełst River to its outlet into Lake Sarbsko RW200017476925, is anticipated. The status for those WBs has not been specified.

The assessment of the scale of impact on surface waters is presented in Table 6.63, whereas, the assessment of the impact significance in Table 6.64.

*Table 6.63. Assessment of the scale of impact on surface waters [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |

| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contamination of surface waters | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.64. Assessment of the impact significance on surface waters [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Contamination of surface waters | Low | Moderate | Low |

#### 6.1.4.3 Impact on hydrogeological conditions and groundwater

The negative impact on groundwater may be the consequence of the construction works conducted. That impact concerns two aspects in particular:

- quantitative (temporary disturbance of water relations);
- qualitative (pollution and deterioration of water quality).

In order to meet the needs of water supply for sanitary and fire purposes, it is planned to build internal groundwater intake in the OnSS area. Additionally, during the construction works conducted using trenchless method (drilling), large quantities of process water will be used to prepare drilling fluid. The water is to be provided, among other things, from groundwater intakes.

Moreover, at the construction stage of the planned project, indirect, short-term impacts on groundwater may occur, which are related to excavation dewatering. They may only cause short-term lowering of water levels (drainage effect). However, proper execution and immediate backfilling of excavations should result in the cessation of disturbance of water relations in the nearby areas.

Similarly as for the surface waters, the main reasons for groundwater contamination during the construction phase of the project can be the following:

- a runoff of precipitation and snow melt from the construction site;
- improperly stored construction materials;
- an unsuitable location of the construction site facilities, including improperly prepared plumbing system;
- chemical substances leaking as a result of machinery or equipment failures.

To ensure the best protection of groundwater against pollution, prefabricates and construction equipment must be stored on a hardened surface. The construction site should be equipped with portable toilets with a reservoir and a tank for sanitary sewage which will be serviced by specialist companies.

Groundwater can be indirectly contaminated with petroleum products (diesel oils, greases and petroleum) leaking from construction machinery and equipment, for example, as a result of a failure, due to previous contamination of soil or surface waters, which will then come into contact with the groundwater aquifer. The most hazardous can be the spills in the immediate vicinity of watercourses and in depressions where water stagnates. In such a case, fast spreading of pollutants in surface waters and their migration through soil to ground- and deep waters may occur.

In the area analysed, with appropriate securing of the construction site as well as proper organisation of work and operation of construction machinery, the probability of such an event can be considered low. Such situations should be eliminated through appropriate supervision over the operation of machinery and vehicles as well as their maintenance in good technical condition. Construction teams should be equipped with absorbents and basic equipment for removal of minor spills.

The assessment of the scale of impact on hydrogeological conditions and groundwater is presented in Table 6.65, whereas, the assessment of the impact significance in Table 6.66.

*Table 6.65. Assessment of the scale of impact on hydrogeological conditions and groundwater [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Groundwater contamination | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |
| Water abstraction for technological or domestic use | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.66. Assessment of the impact significance on hydrogeological conditions and groundwater [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Groundwater contamination | Low | Moderate | Low |
| Water abstraction for technological or domestic use | Low | Low | Negligible |

### 6.1.4.4 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

To assess the impact of the planned project on air quality, an analysis of wind directions and the location of the planned project was conducted including the following characteristics resulting from the terrain topography (especially to identify sensitive areas, i.e. places inhabited by people):

1. The route of cable lines delineated in compliance with the criteria of land occupation, corresponds very well with the reduction/elimination objectives regarding inhabited areas of the project construction stage:

    - the distance of cable lines from the centre of Lubiatowo (the crossing of Bałtycka Street with Spacerowa Street) is approx. 1.4 km;
    - the minimum distance from the developed areas of Lubiatowo (at Borówkowa, Zawilcowa streets) is approx. 350 m;
    - the distance from the scattered developments of Szklana Huta is approx. 500 m.

    The probability of transfer of contamination from the cable bed construction site (disregarding its negligible scale due to small emissions, discussed later in this section), at the same time, taking into consideration the high rate of the construction site movement, is very low (NNE, ENE and E wind directions occur only 20% of the year). For such a (trace) impact to occur, both circumstances must take place simultaneously: wind from the above-mentioned directions and works carried out at that particular moment along the section nearest to Lubiatowo with a length of approx. 1.5 km. Considering the rate of the construction site movement of approx. 100 $m \cdot d.^{-1}$, this can last for 15 days (approx. 45 days when laying 3 lines per year, which corresponds to 12% of the year). The low value of the above-mentioned calculus of probability will be additionally affected by the nature of emission – variable in terms of the place of generation and therefore the impact. The resultant of both factors is a practical lack of impact, even without analysis of the scale of emissions. With the above-mentioned distances and wind direction, the impact of emissions (both from the construction equipment combustion engines and emissions from the handling of soil material, traffic of vehicles on roads and wind erosion) connected to cable line laying and construction of the OnSS is completely negligible.

2. Location of the coastal zone borehole passage

   The borehole through the coastal zone will be executed from the station located in direct vicinity of the beach, outside the first dune embankment. The distance to the nearest developments of Lubiatowo exceeds 1 km. With that distance and wind conditions of the coastal zone discussed in Section 3.17.2.1 or even more favourable ones, the flue gases from machinery will be very effectively diluted in the air, not resulting in increased concentrations in Lubiatowo.

3. Location of onshore substations (OnSS)

   The western boundary of the OnSS will be located at a distance of approx. 350 m from the Nursing Home in Osieki Lęborskie and the nearest single-family housing there. With the diluted nature of the emission from the construction site and the dominant western wind directions (wind direction from the OnSS to Osieki Lęborskie occurs in only 7–8% throughout the year), the probability of emission impacts from the planned OnSS on atmospheric air within the Osieki Lęborskie development (approx. 550 m from the central point of the OnSS) is low. Emissions from the OnSS construction site will have a marginal impact on the air quality in the inhabited areas.

Summing up the above-mentioned wind direction analysis, in terms of the emission impact, the cable bed area, as well as the borehole through the coastal zone and the OnSS have been located along favourable, even optimal directions with regard to the residential developments of Lubiatowo and Osieki Lęborskie.

When assessing the emission of pollutants to air, which can be generated by the planned project at the construction stage, the following processes were distinguished:

- fuel combustion in construction machinery engines;
- handling of soil material during the laying of cable lines and the OnSS construction;
- traffic of construction machinery on access roads (hardened and unhardened);
- wind erosion of soil surface in the area of cable lines and the OnSS.

**Fuel combustion**

Fuel combustion in construction machinery engines will be the main source of emission of substances to air at the project construction stage. In the case of light-duty machinery (portable and light-duty vehicles), the consumption of fuel is so low that the emissions accompanying their operation are completely negligible. In the case of heavy-duty machinery (diggers, drilling rigs, etc.), the assessment should be carried out for the concentration of machinery at the implementation of individual tasks and their distance from the developments.

First of all, it is important to note an important feature of the heavy-duty construction equipment that is used for earthworks and excavations. Such machines are intensively used in difficult conditions, at the same time, with their full availability required (no failures due to wear). As a result, in most cases, they have a short lifetime and used machines are replaced by brand new vehicles. In practice, such characteristics make it necessary to use equipment with modern combustion engine designs, meeting the flue gas standards relevant to the equipment year of manufacture. The variation in exhaust emission standards between engine production technologies (stages) results in emissions considered representative by the European Environment Agency (EEA). Across the years, a big progress was made in terms of exhaust emissions, for example, for carbon black, from a level of 3.414 $kg \cdot Mg^{-1}$ ON for vehicles without emission reducing methods, to a level below 100 $g \cdot Mg^{-1}$ ON for stage IIIB, IV, and V. Also, in the scope of incomplete combustion of hydrocarbons and emissions of other organic compounds (NMVOC), a significant reduction was achieved, from a level of 8.077 $kg \cdot Mg^{-1}$ ON, to a level below 1 $kg \cdot Mg^{-1}$ ON (EMEP/EEA air pollutant emission inventory guidebook 2019). Very significant flue gas reductions results directly in lower emissions and lower impact on air in the vicinity of the operating machines.

From the distances between emission sources and residential development described earlier in this section, the smallest distance concerns the construction of cable bed area opposite the Borówkowa and Zawilcowa Streets in Lubiatowo (approx. 350 m).

A significant reduction in the amount of heavy-duty equipment operating in a single location simultaneously is anticipated. Cable laying along the section between the shoreline and the OnSS will be divided into implementation sections. Along a single section, two cable lines will be laid in parallel. Such sections will be located in different parts of the cable bed area, thus, there will be no cumulative impact The above conditions result in 4 lines, 2 in each of the two different locations, being laid simultaneously.

It is anticipated that within the area of a single section, the laying of a single cable line will require the use of the following equipment: 1 digger, 1 truck, 1 power generator and 1 pump unit, if dewatering of the ground is necessary. The demand of the above-mentioned machinery for fuel during the laying of 1 cable line along 1 section was calculated at a level of approx. 157.5 kg of diesel oil. These are not quantities that could cause exhaust emissions affecting the development located at a distance of 350 m considering the characteristics of the meteorological conditions discussed and the significant speed of the work front movement. The air quality in such locations will essentially continue to depend on the low emissions from household hearths and local traffic and not on the laying of cable lines.

Also, no significant impact is anticipated on the residential areas located closest to the borehole in the coastal zone, which will be located at a distance of over one kilometre away from the development along the NNW wind direction which occurs at only 4% time of the year corresponding to less than 15 days. The equipment planned to be used for the execution of the borehole in the coastal zone (with an estimated fuel consumption of approx. 4516.6 kg oil $d.^{-1}$) will have an impact on atmospheric air only within the nearest area of the construction site.

More equipment will be used on the OnSS construction site, however, it will be more scattered. The nature of the machinery operation is also different, since when used only to support the work of people, they have a significantly lower factor of work under load. It is anticipated that the following equipment will be used: 8 backhoe loaders, 4 bulldozers, 2 cranes, 4 compactors and 10 trucks. The estimated demand for fuel is approx. 4516.6 kg of diesel oil per day. Also, in the case of the OnSS construction, a favourable location regarding the residential development and dominant wind directions as well as significant distance from the developments (approx. 550 m from the central point of the OnSS), will prevent the migration of flue gases in significant quantities over residential areas.

The construction of the access road to the OnSS will probably require the use of the following equipment: 3 diggers, 1 grader, 3 rollers, 5 trucks, 2 farm tractors and a bitumen machine. The estimated fuel consumption is 665.2 kg of diesel oil per day. The linear nature of emissions and the location of the road east of Osieki Lęborskie will in practice determine lack of burdensomeness.

Analysing the exhaust emissions at the stage of project implementation, the potential impact of machinery and material transport to and from the construction site was also assessed. In terms of the OnSS, the designed access road enables the elimination of the impact on Osieki Lęborskie (exit from the road Osieki Lęborskie – Lublewko) opposite the OnSS before Osieki Lęborskie. In reference to the remaining part of the construction site, at the current stage of the project designing, it is impossible to determine in detail the routes of service roads enabling access to the construction sites. The design engineer prefers to intend the cable bed area for the purposes of temporary communication, however, they also permit for the solution involving the use of the existing roads. In case existing roads are used, methods to reduce nuisance should be analysed and taken into account, such as the appropriate location of exit points from public roads and optimisation of the number of transits.

**Handling of soil material**

Another important aspect of impact on the quality of atmospheric air, can be the handling of soil material during the construction of the project. In most cases it will not result in dusting due to the moisture of the material taken from the ground, which prevents the fine grains (dust) from separating from coarser grains and its emission into the air. In exceptional cases (when handling dried dusty soil portions) it is possible to estimate emissions. The standard method of estimation of the United States Environmental Protection Agency (U.S. EPA) AP-42 described in Section 13.2.4. Aggregate Handling And Storage Piles is used for that purpose (see Subsection 4.4).

In the case of the project assessed, such a situation will not take place, because the cable lines do not remain unprotected (exposed) for a long period of time. Within a short period of time after the trench has been excavated and the cables laid, they are backfilled with the material collected. Thus, the collected soil masses will not be exposed to drying for a longer period of time. In the case of handling wet (moist) soil masses, the number of handling operations is irrelevant. Both technologies of excavation (with direct tipping of material aside or transferring it to a dump) are, in terms of dusting from the material handling, practically emission-free.

**Vehicle traffic on roads (road surface emission)**

Another important environmental impact is emissions from road surfaces, which in the case of the planned project will occur only on intensively used (stream of high-intensity traffic) unpaved roads or paved roads with a high degree of surface soiling. At the construction stage of the planned project, service roads within the cable line installation belt, access roads to the installation belt and the borehole station in the coastal zone as well as the access road to the OnSS will be used.

Service roads that will be used with low intensity, for example, for cable laying in trenches, in accordance with the above-mentioned dependence, can become dirt roads. They will not be able to generate emissions that could significantly affect air quality. Roads with a higher traffic intensity can be used as dirt or gravel roads, if they are located at significant distances from residential development, i.e. along the route of the cable bed area (except for the solution involving the transport of large quantities of materials/equipment from the OnSS to the borehole in the coastal zone by road along the cable bed area. In such a case, the selection of a paved road or reduction of the number of passages or hardening of that road should be considered).

If it is necessary to construct access roads to the construction sites in the direct vicinity of residential areas (also recreational areas when they are used) and intended for intensive use, temporary hardening of the road with concrete slabs or other techniques is applied, which enables preventing or significantly reducing emissions from unpaved roads. This type of pavement does not deform under the pressure of wheels, and if constructed and used properly, does not cause emissions from the pavement.

Emission from paved roads (with a bentonite or asphalt pavement) is described in methodology U.S. EPA AP-42 (see section 4.4). The scale of emissions depends on the pavement level of contamination with particulates (silt loading). For that reason, proper laying of slabs (above the ground surface, with vehicle passing bays with slabs provided). Thanks to this solution, contamination of the road with the dirt from the roadside is prevented and the effectiveness of the pavement self-cleaning is increased. Roads can be also hardened with aggregate in a way preventing the dust emission or reducing it significantly.

Considering the mechanism of material transfer from the unhardened area to the paved road, entries to the road (beginning of paved road – i.e. preliminary section) should be located beyond the range of emission impact on vulnerable areas, so that the first section of the road, on which intensive transfer of material from the wheels on the pavement occurs, and which is exposed to increased emissions, did not constitute a nuisance.

Apart from the two above-mentioned technical solutions for the road section located near residential areas or recreational development (when it is used as such), an organisational solution should be used which involves a significant speed limit. Since the disturbance of dust from road surfaces depends very much on the speed of moving vehicles, which is common knowledge. Very low speed limit for vehicles is of crucial importance in the case of spills on the road or to reduce the dust entrainment from the roadside. The issue of the soil surface wind erosion is presented in the further part of the section.

The knowledge on wind erosion is also reflected in the widely used elementary method of dust suppression from the transport of bulk materials, which is covering open boxes with tarpaulins. When transporting dry, powdery materials such as humus or low-moisture clay soil across development or recreational-use areas, that method should absolutely be applied.

The use of the four above-mentioned methods should practically ensure a lack of emissions from the surface of paved roads into residential or recreational areas.

A special case of a paved road exposed to contamination by material being entrained from an unpaved road is the access road to the OnSS. During the OnSS construction, trucks will enter the access road from the construction site in large numbers, mainly trucks delivering construction materials. Managing of the locations of exits from the construction site to the access road should be integrated with the scale of material transfer so that the preliminary section, on which the material transferred from the construction site is removed from the road, was located entirely on the access road to the OnSS, and in effect, the contamination of the road Lublewko – Osieki Lęborskie and the nuisance near Osieki does not take place. If it is necessary to locate the exit from the OnSS construction site near a local road and in case of a risk of significant contamination of the road during unfavourable meteorological conditions (drying of the road pavement at eastern wind direction), the use of suppression methods is possible. In practice, cleaning of the wheels of vehicles leaving the construction site is implemented or a road fragment is constructed on which the self-cleaning of wheels using the hydrodynamic method (i.e. the impact of a stream of water) takes place with high frequency. Due to a significant distance of the area of exit from the construction site to the road Lublewko – Osieki Lęborskie and a low frequency of the above-mentioned weather conditions, the probability of such a situation and the need for the suppression methods is low.

**Wind erosion of soil surface**

The surface of bulk materials, including soil exposed to wind action, may cause emission connected to the phenomenon of erosion. It is the greater, the higher the material susceptibility to wind action and the higher the wind speed and the larger the surface exposed.

Another methodology U.S. EPA AP-42, described in Section 13.2.5 Industrial Wind Erosion (see: Subsection 4.4), is used to determine emissions from wind erosion at an international level. Emission takes place when the threshold speed of friction, which is the derivative of several material properties, including grain size, is exceeded by the wind. Until the wind does not exceed the threshold value, no emission takes place since, it is unable to disturb the surface and stir up the fine particles contained in its top layer. When the threshold speed is exceeded, fine particles are entrained and constitute the emission, and the potential of wind erosion becomes exhausted. Another emission incident will be possible after the potential is renewed, which takes place after the surface is disturbed (material is disturbed or new material is added). Because, only then, new fine particles become "available" to the wind.

The destruction of erosion potential is also possible as a result of the surface becoming dump or solidified. That phenomenon is used by suppression methods based on spraying the heaps with water or preparations that produce a crust on the surface of the material, which dramatically increases the parameter of the threshold speed of friction and prevents the surface from being disturbed by the wind. That phenomenon also occurs naturally during rain, which can be observed in the form of a specific pavement texture after rain. Coarse particles remain on the surface, whereas, fine particles are displaced deeply into the material and "glued" to the coarser grains.

Another main method for reducing secondary dusting from the surfaces is limiting their exposure to wind action. In industrial plants, but also in agriculture, to reduce drying, professional semi-permeable partitions (wind barriers) are used, which do not generate increased-speed zones, just as solid barriers do, but they rather decrease the wind speed to a level at which the threshold friction speed is not exceeded.

The effect of stabilising the flow without turbulence zones and increased-speed zones is achieved by using cutting-edge semi-permeable materials (meshes, perforated steel sheets, straps).

Analogically, the "stabilisation" of the air mass flow above the ground surface is provided by the forest, which is modelled as a porous medium in dust mechanics analyses (air flow with significantly decreased speed relative to the anemometric speed).

The above simplified description of the phenomenon allows assessing the project in terms of potential dust emissions to the air from wind erosion. In the first step, the locations in which the soil will be disturbed should be indicated. These will be the following areas with a significant surface area:

- cable line location area;
- the OnSS construction site.

In terms of material properties, in both locations the soil will be characterised by fineness enabling wind erosion (if exposed to strong wind). In terms of material moisture, the soil in heaps created during the construction of the cable line excavations will be exposed to drying for a short period of time. There will be not enough time for the material to dry to a level that allows significant dusting, until it is already used to backfill the cable laid. However, the material on the OnSS construction site will be exposed to drying.

In terms of the surface erosive potential renewal, individual locations will be characterised by the following conditions:

- within the location of the cable bed area:
  - the area of the excavation and the heap: without erosive potential due to the material high moisture content, or with a very low potential – one-time erosive potential,
  - the area after cable burial: one-time erosive potential (until emission occurs or the first rain);
- within the OnSS construction site: when the soil top layer is dried, the erosive potential is renewed each time the surface is disturbed and it is proportional to the surface disturbed.

In terms of meteorological conditions that determine wind erosion, individual locations will be characterised by the following conditions:

- within the cable line location area: air flow completely stabilised in all wind directions (with the exception of wind along the transmission line) as a result of the wind barrier, i.e. the forest;
- within the OnSS construction site: the direction significant from the point of view of the migration of compounds released to the air in the area of the construction site over Osieki Lęborskie occurs in about 7–8% of time throughout the year for the E and ENE directions. For the remainder of the year, wind from other directions will occur, and any possible emissions will have no impact on the nearby developments. For the directions analysed (E, ENE), the distance of the construction site from the forest complex is approx. 1 km, which goes significantly beyond the stabilised flow zone secured by the forest. To assess the frequency of the inhabitants exposure to the dust blow from the construction site, the data on the wind speed from those directions (visible in the wind rose figure in the form of successive envelopes for individual levels of wind speed summation) should be analysed in detail. When only the wind speed, which may cause surface erosion, is taken into consideration (safely estimating above 4 $m \cdot s^{-1}$ at an anemometer height of 14 m), the frequency of wind occurrence from the exposure directions (E, ENE) is 2.3% and 1.7% respectively, which corresponds to only 8 and 6 days throughout the year. With such low frequency of wind from the E and ENE directions, the significance of that emission factor for air quality in Osieki Lęborskie is negligible.

When summing up the assessment of the above-mentioned conditions, both the cable line area, and the OnSS area will not constitute the sources of dust emissions from wind erosion, which could affect the air quality in residential areas.

The assessment of the scale of impact on atmospheric air quality is presented in Table 6.67, whereas, the assessment of the impact significance in Table 6.68.

*Table 6.67. Assessment of the scale of impact on air quality in residential development area [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| **Fuel combustion in machinery engines** | | | | | | | | | | | | | | |
| Air pollution due to the operation of construction equipment on the OnSS construction site | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Air pollution due to the operation of construction equipment along the cable bed area | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution due to the operation of construction equipment **crossing the coastal zone** | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Air pollution due to the operation of construction equipment **crossing the coastal zone** | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Air pollution as a result of possible truck traffic through Lubiatowo and Osieki Lęborskie | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| **Transfer of soil material** | | | | | | | | | | | | | | |
| Air pollution by dust from cable line installation | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution by dust from OnSS construction | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| **Vehicle traffic on paved roads (surface emissions)** | | | | | | | | | | | | | | |
| Air pollution by dust during machinery traffic on access roads in the immediate vicinity of residential areas | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Air pollution by dust during machinery traffic on access roads in the remaining area | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| **Vehicle traffic on unpaved roads (surface emissions)** | | | | | | | | | | | | | | |
| Air pollution by dust during machinery traffic on access roads in the immediate vicinity of | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| residential areas | | | | | | | | | | | | | | |
| Air pollution by dust during transport of large quantities of materials/equipment from the OnSS to the shoreline drilling site along the cable bed area | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Air pollution by dust during machinery traffic on access roads in the remaining area | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| **Wind erosion of soil surface** | | | | | | | | | | | | | | |
| Air pollution by dust from the cable bed area | 3 | | | | | 1 | | | | | 1 | | | 6 |
| Air pollution by dust from the OnSS area | 3 | | | | | 1 | | | | 2 | | | | 7 |

*Table 6.68. Assessment of the impact significance on air quality in residential development area [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| **Fuel combustion in machinery engines** | | | |
| Air pollution due to the operation of construction equipment on the OnSS construction site | Low | Irrelevant | Negligible |
| Air pollution due to the operation of construction equipment along the cable bed area | Low | Irrelevant | Negligible |
| Air pollution due to the operation of construction equipment **crossing the coastal zone** | Low | Irrelevant | Negligible |
| Air pollution as a result of possible truck traffic through Lubiatowo and Osieki Lęborskie | Low | Very high | Moderate |
| **Transfer of soil material** | | | |
| Air pollution by dust from cable line installation | Low | Irrelevant | Negligible |
| Air pollution by dust from OnSS construction | Low | Irrelevant | Negligible |
| **Vehicle traffic on paved roads (surface emissions)** | | | |
| Air pollution by dust during machinery traffic on access roads in the immediate vicinity of residential areas | Low | Very high | Moderate |
| Air pollution by dust during machinery traffic on access roads in the remaining area | Low | Irrelevant | Negligible |
| **Vehicle traffic on unpaved roads (surface emissions)** | | | |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Air pollution by dust during machinery traffic on access roads in the immediate vicinity of residential areas | Low | Very high | Moderate |
| Air pollution by dust during transport of large quantities of materials/equipment from the OnSS to the shoreline drilling site along the cable bed area | Low | Very high | Moderate |
| Air pollution by dust during machinery traffic on access roads in the remaining area | Low | Irrelevant | Negligible |
| **Wind erosion of soil surface** | | | |
| Air pollution by dust from the cable bed area | Low | Irrelevant | Negligible |
| Air pollution by dust from the OnSS area | Low | Irrelevant | Negligible |

#### 6.1.4.5 Impact on ambient noise

The source of noise generated at the stage of project implementation will be construction machinery and equipment (diggers, backhoe loaders, bulldozers, compactors, pump unit, vibro hammer), as well as trucks delivering materials and equipment to the construction site and collecting waste and drilling fluid from the site.

Depending on the type and scope of the works, their location and the characteristics of the operating equipment, the level of noise during the project implementation will be quite varied. The acoustic power level of the construction machinery operating at the Baltica OWF CI construction is estimated at 75–119 dB. On the basis of the analysis of the available measurement results from various construction sites, the scope of acoustic climate deterioration can be specified at 100–150 m from a group of construction machinery and equipment.

The greatest acoustic nuisance will be connected to the execution of boreholes. Continuous works are anticipated (drillings 24/7), and finishing a single borehole will last approx. 2–6 months. During the land-sea borehole execution, it is necessary to construct a start chamber using sheet piling driven into the ground with a vibro hammer with an acoustic power of $L_{WA}$ approx. 119 dB. It is assumed that the vibro hammer can be operated only at daytime during the entire reference period. It is anticipated that the construction of a single chamber will take approx. 20 days. A significant distance of the land-sea borehole construction site will not result in the deterioration of the acoustic climate of the acoustically protected areas. Another issue is the transport of water for the purposes of the drilling fluid and the collection of waste, which is discussed below.

The cable bed area should be treated as a project constituting a surface source of noise, as part of which, the traffic of elementary sources – construction machinery – will take place. Acoustic impact at the stage of construction works will be concentrated and will mainly affect the location in which the construction works will be taking place.

The duration of that impact will be strictly limited to the duration of the construction works and will cease completely upon completion of the implementation stage of a particular section of the project.

At the implementation stage of the OnSS, the noise sources will be concentrated, and emission will be generated by a large number of construction machines running. A large concentration of machinery and equipment will have a negative impact on the acoustic climate in the immediate vicinity of the area covered by construction works. As a result, the works in the OnSS area should be particularly carefully planned with regard to their impact on the surroundings. The distance of the

OnSS from the existing developments is 300 m, therefore, it is assumed that during construction works in the OnSS area, the propagation of sound will not affect the acoustically protected areas.

Trucks with an acoustic power of 103 dB transporting people, materials and equipment to the construction sites and water for the drilling fluid for the purposes of the land-sea drilling, as well as transporting waste away from the construction site, will have a significant impact on the level of sound at the stage of project implementation. At the current stage of the project, no access roads to the construction sites are known.

The assessment of the scale of the noise impact on residential development areas is presented in Table 6.69, whereas, the assessment of the impact significance in Table 6.70.

*Table 6.69. Assessment of the scale of noise impacts on residential development areas [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Noise emitted by construction equipment on site | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Noise emitted by means of transport on access roads in the immediate vicinity of residential areas | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Noise emitted by means of transport on access roads in the remaining area | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.70. Assessment of the noise impact significance on residential development areas [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Noise emitted by construction equipment | Low | Irrelevant | Negligible |
| Noise emitted by means transport on access roads in the immediate vicinity of residential areas | Low | Very high | Moderate |
| Noise emitted by means of transport on access roads in the remaining area | Low | Irrelevant | Negligible |

### 6.1.4.6 Electromagnetic field emission

At the Baltica OWF CI implementation stage, there will be no emission of electromagnetic field, as it concerns devices which are energised, i.e. in operation.

#### 6.1.4.7 Impact on nature and protected areas

##### 6.1.4.7.1 Impact on biotic elements in the onshore area

###### 6.1.4.7.1.1 Fungi

**Physical destruction of fungi habitats.** Three plots of rare fungi species are located within the cable bed area (scaly hedgehog/tooth *Sarcodon imbricatus*, *Diplomitoporus flavescens* and *Lentinus cyathiformis*), whereas, in the direct impact area of the access road, only a single plot was found (silky rosegill *Volvariella bombycina*). They are not under legal protection. *Lentinus cyathiformis* is connected to dead wood, and the remaining species are arboreal species. Three plots of arboreal species will be eliminated due to physical felling of trees on which they grow.

**Removal of dead wood**, which is a substrate for fungi, from the construction site, will result in physical destruction of species habitats, including the habitat of *Lentinus cyathiformis* which is considered to be a resource of high value.

Two plots of rare fungi species, including one species classified as very rare, are located within the borehole zone. They will not be affected by the project.

**Overdrying of species habitats caused by dewatering during construction works.** Nine fungi plots are located within the zone of the Baltica OWF CI impact, additionally, in a place with lower level of groundwater. In case it is necessary to carry out dewatering of the excavation, overdrying of soils in the vicinity of the Baltica OWF CI may occur. However, dewatering of excavations will not take long, therefore, no change in water relations that could negatively impact the occurrence of fungi in the vicinity of the Baltica OWF CI should be expected.

The plots located within the Baltica OWF CI indirect impact area will be subject to **air pollution as a result of exhaust emissions** from construction machinery and vehicles as well as transport of materials and humans, and also **as a result of dust emissions** during construction works and erosion of exposed soil layers. Such emissions can cause a deterioration of the mycelium health status.

The assessment of the scale of impact on fungi is presented in Table 6.71, whereas, the assessment of the impact significance in Table 6.72

*Table 6.71. Assessment of the scale of impact on fungi [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Physical destruction of fungi species habitats | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Removal of dead wood, which is a substrate for fungi, from the site | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Overdrying of species habitats caused by | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| dewatering during construction works | | | | | | | | | | | | | | |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.72. Assessment of the impact significance on fungi [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical destruction of fungi species habitats | High | High | Important |
| Removal of dead wood, which is a substrate for fungi, from the site | High | High | Important |
| Overdrying of species habitats caused by dewatering during construction works | Low | Moderate | Low |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

###### 6.1.4.7.1.2 Lichens

**Physical destruction of habitats of species growing on trees and soil.** 32 plots of lichen species, which are subject to protection and/or belong to endangered species, are located within the cable bed area. In that group, a single plot was classified as a resource of high value – the covered lichen (a species not subject to legal protection, but classified as critically endangered both in Poland and in Gdańsk Pomerania). All of them can be found on trees or on soil. Those plots will be destroyed due to the destruction of soil or physical felling of trees on which they grow.

The plots of grey reindeer lichen, located in the borehole zone, will not be affected by the project.

Within the cable bed indirect impact area, 65 plots of protected and rare species of lichen, including 3 classified as resources of high value, are located. Another plot of 8 protected and rare species of lichen, including 2 classified as resources of high value, is located within the indirect impact area of the access road to the OnSS (tree alley). Those plots will be subject to **air pollution as a result of exhaust emissions** from construction machinery and vehicles as well as transport of materials and humans, and also **as a result of dust emissions** during construction works and erosion of exposed soil layers. Such emissions can cause a deterioration of the thalli health status.

The assessment of the scale of impact on lichens is presented in Table 6.73, whereas, the assessment of the impact significance in Table 6.74.

*Table 6.73. Assessment of the scale of impact on lichens [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Physical destruction of habitats of species growing on trees and soil | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.74. Assessment of the impact significance on lichens [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical destruction of habitats of species growing on trees and soil | High | Moderate | Moderate |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Moderate | Low |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Moderate | Low |

###### 6.1.4.7.1.3 Mosses and liverworts

**Physical destruction of species habitats.** Two plots of 6 moss species, which are subject to protection and/or belong to endangered species, are located within the cable bed area. In that group, there are no species classified as resources of high value. Six species create a common plot covering the entire route of the cable bed in forests and has a surface area of 41.15 ha. The plot of leucobryum moss *Leucobryum glaucum*, which covers a surface area of 17.7 ha, coincides with it. Those plots constitute a fragment of much more extensive plots covering areas adjacent to the Baltica OWF CI. Fragments of those plots within the planned project boundaries will be destroyed as a result of deforestation and complete transformation of the area.

**Overdrying of species habitats caused by dewatering during construction works.** The plots of species located in the Baltica OWF CI direct impact area are continued in the cable bed indirect impact area. There are 6 further spot sites of 5 moss species and 1 liverwort species in that area (dilated scalewort *Frullania dilatata*). That group of plants is especially vulnerable to the changes in moisture conditions. In case it is necessary to carry out dewatering of the excavation, overdrying of soils in the vicinity may occur. However, dewatering of excavations will not take long, therefore, no change in water relations that could negatively impact the occurrence of mosses or liverworts in the vicinity of the Baltica OWF CI should be expected. Those plots will be subject to **air pollution as a result of exhaust emissions** from construction machinery and vehicles as well as transport of materials and humans, and also **as a result of dust emissions** during construction works and erosion of exposed soil layers. Such emissions can cause a deterioration of the turf health status.

The assessment of the scale of impact on mosses and liverworts is presented in Table 6.75, whereas, the assessment of the impact significance in Table 6.76.

*Table 6.75. Assessment of the scale of impact on mosses and liverworts [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical destruction of species habitats | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Overdrying of species habitats caused by dewatering during construction works | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.76. Assessment of the impact significance on mosses and liverworts [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Physical destruction of species habitats | High | High | Important |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Overdrying of species habitats caused by dewatering during construction works | Low | Moderate | Low |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

#### 6.1.4.7.1.4 Vascular plants and natural habitats

**Physical destruction of species habitats and natural habitats.** Natural habitat 2180 occupies in the area of the cable bed a surface area of 11.62 ha. At the same time, it is a plot of 6 protected and/or endangered vascular plant species (cross-leaved heath, lesser rattlesnake plantain, sweetgale, sand sedge, black crowberry, and marsh Labrador tea). That surface will be destroyed as a result of forest clearance and complete transformation of the ground surface. Also, a small fragment (0.78 ha) of habitat 9110 located in a depression connected to the Bezimienna Stream valley will be destroyed, if that area is crossed using a trenching method, as well as the black crowberry plot connected to the fresh coniferous forest in the southern section of the cable bed.

Patches of habitat 2120 and *2130 located within the land-sea borehole zone will remain under the influence of the Baltica OWF CI.

**Overdrying of species habitats caused by dewatering during construction works.** The plots of all natural habitats and vascular plat species described above are continued in the cable bed indirect impact area. In case it is necessary to carry out dewatering of the excavation, overdrying of soils in the vicinity may occur. However, dewatering of excavations will not take long, therefore, no change in water relations that could negatively impact the occurrence of natural habitats and vascular plant species in the vicinity of the Baltica OWF CI should be expected.

Those plots will be subject to **air pollution as a result of exhaust emissions** from construction machinery and vehicles as well as transport of materials and humans, and also **as a result of dust emissions** during construction works and erosion of exposed soil layers. Such emissions may result in the deterioration of health status of the groundcover species of habitat patches adjacent to the cable bed area, whether shrubs, herbaceous plants, bryophytes or lower shrubs.

The assessment of the scale of impact on vascular plants and natural habitats is presented in Table 6.77, whereas, the assessment of the impact significance in Table 6.78.

*Table 6.77. Assessment of the scale of impact on vascular plants and natural habitats [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical destruction of species habitats and natural habitats | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Overdrying of species habitats caused by dewatering during construction works | | 2 | | | | 1 | | | | 2 | | | 1 | 6 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.78. Assessment of the impact significance on vascular plants and natural habitats [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical destruction of species habitats and natural habitats | High | High | Important |
| Overdrying of species habitats caused by dewatering during construction works | Low | Moderate | Low |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

#### 6.1.4.7.1.5 Invertebrates

*Formica polyctena* usually form polygynous nests, numerous mother and daughter colonies, maintaining close ties between them, connected by canals or roads frequented by ants, thus forming complex polygynous systems, comprising up to dozens of nests, on a large surface area sometimes up to several meters in size. Therefore, when analysing impacts, not only the impacts on the observed above-ground mounds should be taken into consideration, but the underground structure of the nests and their connections as well. Not only the type or scope of impact may be crucial, but also the timing of their occurrence, as the distribution of mounds in different seasons of the year can vary – those ants can form summer and winter nests; during the active season they inhabit all types of nests, while in winter they concentrate in deeper winter nests. Moreover, a key moment is the period from April to June (mainly May), when the mating flights (i.e. swarming) take place.

Therefore, in the case of that species, consequences of the **physical destruction of a habitat** are possible here, since part of the network belonging to the ant colony system may be located within the cable bed area. Another consequence of the environmental structure disturbance within the cable bed area is also **habitat fragmentation**, which will prevent contact between individual nests. The destruction of the environment within the boundaries of the cable bed area may also have an indirect impact on the functioning of the colony by **destroying the habitats of organisms which constitute their food supply**. Such impacts are irreversible (a particular nest or connection will not be restored) or partially reversible, since the remaining part of the colony will be probably able to restitute the system by creating new nests and connections between them in the adjacent, more favourable sites.

On the other hand, the mounds of *Formica polyctena*, located in the cable bed indirect impact area, may also be destroyed as a result of secondary effect of various impacts connected to land transformation in the vicinity (disturbance of soil, temporary changes in water relations, even **mechanical damage**, by animals scared away by the noise of machinery and the presence of people during construction works within the cable bed area boundaries. The sites will also be subject to **air pollution, for example, as a result of dust emissions** during construction works or as a result of the erosion of the exposed soil layers, or **as a result of exhaust emissions.** These can be factors that adversely affect ants when acted upon directly, but mainly indirectly through reduced food resources or other environmental changes.

During construction works the **destruction or transformation of the habitat locations of invertebrate species**, which visit those locations in search of food, or temporary hiding or feeding locations will take place, thus resulting in their permanent or temporary relocation to other areas. Such mobile insects will be mainly bumblebees (in the area – common species, for example, *Bombus pascuorum, B. lucorum*, or *B. terrestris* and rarer species*, B. veternus, B. subterraneus, B. pratorum*), which usually penetrate an area within an approx. 1 km radius form the nest and if the environmental conditions change, they will relocate to other regions. The species observed here are connected to various types of environments, and if they prefer forest areas, they inhabit not only the deep forest areas, but also its edges, various brushes, and even open areas, therefore, they are quite flexible.Predatory ground beetles, on the other hand, which are predominantly active at night (e.g. ground beetles *Carabus coriaceus*, *C. marginalis* typical of pine coniferous forests) are connected to the microenvironments penetrated in search of food that are also used as places of refuge. Those species will relocate to forest sites with more stable conditions.

The assessment of the scale of impact on invertebrates is presented in Table 6.79, whereas, the assessment of the impact significance in Table 6.80.

*Table 6.79. Assessment of the scale of impact on invertebrates [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical destruction of a habitat | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Habitat fragmentation | | 2 | | | | 1 | | | 3 | | | | 1 | 7 |
| Physical destruction of habitats of species connected by trophic relationships | | 2 | | | | 1 | | | 3 | | | | 1 | 7 |
| Disturbance to the structure of the environment (transformation of the surrounding land, presence of people, machinery, etc.) | | 2 | | | | 1 | | | 3 | | | | 1 | 7 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.80. Assessment of the impact significance on invertebrates [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Physical destruction of a habitat | High | Moderate | Moderate |
| Habitat fragmentation | Low | Moderate | Low |
| Physical destruction of habitats of species connected by trophic relationships | Low | Moderate | Low |
| Disturbance to the structure of the environment (transformation of the surrounding land, presence of people, machinery, etc.) | Low | Low | Negligible |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

#### 6.1.4.7.1.6 Herpetofauna

**Entrapment of amphibians and reptiles in excavations** – the potential impact concerns especially the cable bed area intersecting within the wintering area of amphibians north of Osieki Lęborskie (deep excavations become traps that can especially negatively affect at least 6 confirmed amphibian species during their seasonal migrations in months III–IV and IX–X) and the cable bed area crossing the forest edges at the OnSS and at the coastal zone borehole construction site (deep excavations are traps that could especially negatively affect at least 4 confirmed reptile species) within the wintering area designated in the forests.

**Collisions of construction equipment with amphibians during their migration from and to wintering grounds** – traffic of heavy-duty equipment and mechanical vehicles, especially during seasonal amphibian migrations in months III–IV and IX–X may cause losses among at least 6 species of locally occurring amphibians.

**Destruction of a reptile site in an ecotone habitat at the forest edge by the OnSS** – works connected to the construction of the OnSS will result in an irreversible destruction of part of the site of at least 3 reptile species at the forest edge in that location.

**Destruction of a reptile site in an ecotone habitat at the forest-dune edge by the drilling site in the nearshore zone** – the functioning of the borehole construction site will temporarily affect the destruction of a small fragment of a site of at least 4 reptile species in that location.

**Vibration due to the use of heavy-duty equipment** in reptile habitats (at the forest edges at the OnSS and at the land-sea borehole construction site) – the laying of cable lines will involve the use of heavy-duty equipment in the OnSS area, as well as within the area of the borehole in the coastal zone. The side effect of the operation of this type of machinery are vibrations of the substratum, which will cause disorientation and stress in locally occurring reptiles, especially snakes. Those animals will avoid the sites of operation of this type of equipment even within the limits of their habitat.

The assessment of the scale of impact on herpetofauna is presented in Table 6.81, whereas, the assessment of the impact significance in Table 6.82

*Table 6.81. Assessment of the scale of impact on herpetofauna [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Entrapment of amphibians and reptiles in excavations at the construction site | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Collisions of construction equipment with amphibians during their | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| migration from and to the wintering grounds | | | | | | | | | | | | | | |
| Destruction of a reptile site in an ecotone habitat at the forest edge by the OnSS | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Destruction of a reptile site in an ecotone habitat at the forest-dune edge by the drilling site in the coastal zone | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Vibration due to the use of heavy equipment in reptile habitats | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.82. Assessment of the impact significance on herpetofauna [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Entrapment of amphibians and reptiles in excavations at the construction site | Low | Very high | Moderate |
| Collisions of construction equipment with amphibians during their migration from and to wintering grounds | Low | High | Low |
| Destruction of a reptile site in an ecotone habitat at the forest edge by the OnSS | High | Moderate | Moderate |
| Destruction of a reptile site in an ecotone habitat at the forest-dune edge by the drilling site in the coastal zone | Low | Irrelevant | Negligible |
| Vibration due to the use of heavy equipment in reptile habitats | Low | Low | Negligible |

#### 6.1.4.7.1.7 Birds

**Physical destruction of a habitat or its fragment** – this impact will affect mainly forest bird species and will involve deforestation of the cable bed area. The nature of the habitat will change from forest to open, which will result in the change of bird species composition. Species connected to the presence of tree and shrubs will stop nesting within the boundaries of the strip deforested. At the same time, the area will start to be used by forest species, but associated with mid-forest open areas (e.g. European nightjar, woodlark), and forest edge species (e.g. yellowhammer). At the construction stage, also the strips of tree plantings within the area of the planned access road to the OnSS will be removed. Also, the holiday tree plantation, which is a habitat for a series of protected bird species, will be partially destroyed. Also, a habitat in the form of an open crop field, which is the nesting location for several protected bird species, including the common quail – a species included in the Red List of Birds (Wilk *et al.*, 2020), will be destroyed. The nature of that impact will be similar for both rare and common and widely distributed species, but the assessment of the significance of this impact on these groups of birds differs [Table 6.83].

**Destruction of nests and broods during tree felling** – that risk is associated mainly with tree felling carried out on significant surface areas for the purposes of the cable bed construction, if the felling will be executed in the bird breeding season. Nests located on trees and bushes as well as on the ground can be destroyed. The broods located within the strips of tree plantings near the OnSS, at the holiday tree plantation and in the open field intended for the OnSS location may also be at risk, if felling is carried out during the bird breeding season.

**Disturbance (presence of people, operation of machinery, lighting)** – that risk will affect both breeding and migratory birds, however, a much greater negative impact will affect the breeding species essentially attached to a particular fragment of land. Rare and moderately abundant species sensitive to scaring (hawk, tawny owl, long-eared owl, European nightjar, and black woodpecker) will be particularly vulnerable. The scaring may cause local losses in broods and the abandonment of breeding sites.

The assessment of the scale of impact on birds is presented in Table 6.83, whereas, the assessment of the impact significance in Table 6.84..

*Table 6.83. Assessment of the scale of impact on birds [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical destruction of a habitat or its fragment (rare and moderately abundant breeding species) | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Physical destruction of a habitat or its fragment (common breeding species) | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Destruction of nests and broods during tree felling | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Disturbance (presence of people, operation of machinery, lighting) | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.84. Assessment of the impact significance on birds [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical destruction of a habitat or its fragment (rare and moderately abundant breeding species) | high | high | Important |
| Physical destruction of a habitat or its fragment (common breeding species) | high | low | Low |
| Destruction of nests and broods during tree felling | high | high | Important |
| Disturbance (presence of people, operation of machinery, lighting) | low | moderate | Low |

#### 6.1.4.7.1.8 Mammals

**Destruction of habitats**. During construction works, the species habitats will be destroyed as a result of land transformation for the purposes of the cable bed and the OnSS construction. The transformation of the land for the needs of temporary development, such as storage yards, service roads and other necessary elements required to facilitate construction works, will also be of major significance. The deforested land with its altered soil structure will deviate from its current character completely. Areas with high groundwater levels may be transformed due to changes in water relations.

**Unintentional killing of animals during construction works.** The construction of roads, service platforms, earthworks and excavations generate the risk of collisions or creation of traps into which animals can fall.

**Disturbance caused by works involving traffic-, noise- and vibration-generating equipment as well as by the lighting of the construction site and presence of people**. The construction works conducted will affect the construction site and the adjacent areas. The main factors are noise, vibrations, presence of people, and increased traffic and lighting, which will result in changes in the activity and local movement routes across an area larger than the project area.

The assessment of the scale of impact on mammals is presented in Table 6.85, whereas, the assessment of the impact significance in Table 6.86

*Table 6.85. Assessment of the scale of impact on mammals [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Destruction of habitats | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |
| Unintentional killing of animals during construction works | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Disturbance caused by | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| works involving equipment generating noise and vibration as well as by the lighting of the construction site and the presence of people | | | | | | | | | | | | | | |

*Table 6.86. Assessment of the impact significance on mammals [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Destruction of habitats | High | High | Important |
| Unintentional killing of animals during construction works | Low | High | Low |
| Disturbance caused by works involving equipment generating noise and vibration as well as by the lighting of the construction site and presence of people | Low | High | Low |

#### 6.1.4.7.2 Impact on protected areas

##### 6.1.4.7.2.1 Impact on protected areas other than Natura 2000 sites

The only protected area across which the cable bed route runs is the Coastal Protected Landscape Area. The OnSSs are located outside the boundaries of that area. At the Baltica OWF CI implementation stage, the following impacts will mainly occur:

a) permanent deforestation of a forest fragment;
b) permanent transformation of the lithosphere top layer;
c) physical destruction of plant, fungi and animal species sites;
d) scaring of animals (presence of people, operation of machinery, construction site lighting);
e) air pollution as a result of exhaust emissions from construction machinery and vehicles as well as transport of materials and humans, and also as a result of dust emissions during construction works and erosion of exposed soil layers,
f) negative visual impacts associated with the works and movement of heavy construction equipment across the landscape along the access roads in the drilling location and at the OnSS construction site. A significant part of the works in connection with the construction of the Baltica OWF CI, i.e. works at the cable bed construction site, will be carried out a few dozen metres from the road in the forest; therefore, people staying in the forest will not see vehicles and heavy equipment moving along the service roads.

The impacts listed above can be divided into:

1) permanent and irreversible – include impacts listed in points a) and b);

2) temporary and reversible, which will cease after the works are finished, cable lines are buried and reconstruction works are completed in the cable bed area – includes impacts listed in points from c) to h);
3) covering the area of the planned project, which refer only to the cable bed area – include impacts listed in points from a) to e);
4) covering the area extending beyond the planned project area, and associated with the traffic of vehicles transporting people, machinery, structural elements to the construction sites, and collecting waste and drilling fluid – include impacts listed in points from d) to f).

Moreover, at the Baltica OWF CI implementation stage, the following impacts can potentially occur:

a) destruction of nests and broods during tree felling carried out in the bird breeding season;
b) unintentional killing of animals during construction works.

Individual impacts and their effects at the implementation stage were assessed with reference to particular environmental components in Sections: 6.1.4.1, 6.1.4.2, 6.1.4.3, 6.1.4.4 and 6.1.4.7.1. In this section, a joint assessment of the planned project implementation stage on the Coastal Protected Landscape Area was carried out and the impact was assessed as being of low significance.

The implementation of the project will infringe a series of bans specified in Resolution No. 259/XXIV/16 of the Pomorskie Regional Assembly of 25 July 2016 on the protected landscape areas in the Pomorskie Voivodeship (Official Journal of the Pomorskie Voivodeship, item 2942). However, pursuant to Article 24 section 2(c) of the *Nature Conservation Act* of 16 April 2004 (consolidated text: Journal of Laws of 2021, item 1098, as amended), the bans applicable within the protected landscape area do not apply to the public purpose investments, which the planned project can be classified as.

##### 6.1.4.7.2.2 Impact on Natura 2000 sites

In the course of the administrative procedure for obtaining the decision on cable laying and maintenance in the territorial sea, the investor withdrew from the execution of the Baltica OWF CI on the eastern side of the *Wydmy Lubiatowskie* dunes in the vicinity of the western border of the Natura 2000 site PLH220003 Białogóra. Thus, at the project designing stage, a risk of impact on the subjects of protection in that area was ruled out. The project also does not pass directly through other Natura 2000 sites in its vicinity. As a result, there is no possibility of the project direct impact on subjects of protection in Natura 2000 sites.

The technology of the project implementation will also not cause indirect impact on the subjects of protection within the sites. Taking into account the list of subjects of protection of individual sites, the location of this project is in a collision-free area for the protection of integrity and coherence of Natura 2000 sites, also in combination with other projects.

#### 6.1.4.7.3 Impact on wildlife corridors

As a result of tree stand felling within the boundaries of the cable bed in a strip 62–68 m wide, the spatial continuity of the Coastal Wildlife Corridor of supra-regional rank will be interrupted. At present, the work schedule is not known, so the worst-case variant from the point of view of the wildlife corridor continuity was adopted for the assessment, which involves the felling of the entire cable bed width at once. The corridor continuity will be interrupted for the entire duration of the Baltica OWF CI construction, i.e. for 600 days (almost two vegetation seasons). The felling of trees and the maintenance of the cable bed area terrain as low grassland will create a barrier effect within the extent of the supra-regional Coastal Wildlife Corridor. Scaring away of animals by the operating machinery, the presence of people and the lighting of the construction site will be limited to the section under construction. Since the cable-laying works will be carried out simultaneously along at least two sections at a distance from each other, and along a single section two cable lines will be laid simultaneously, the reduction of the functionality of the Coastal Wildlife Corridor will be limited.

An assessment of the scale of impact on wildlife corridors is presented in Table 6.87, whereas the assessment of the impact significance – in Table 6.88.

*Table 6.87. Assessment of the scale of impact on wildlife corridors [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Reduction of the functionality of the Coastal Wildlife Corridor | | 2 | | | 2 | | | | 3 | | | 2 | | 9 |

*Table 6.88. Assessment of the impact significance on wildlife corridors [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Reduction of the functionality of the Coastal Wildlife Corridor | Moderate | Moderate | Low |

#### 6.1.4.7.4 Impact on biodiversity

Pursuant to Article 2 of the Convention on biodiversity, biodiversity is a diversification of all living organism forms, for example, terrestrial, marine and other aquatic ecosystems and the ecological complexes, which they are a part of. It refers to diversity within species (genetic diversity), between species and between ecosystems.

The crucial impacts of the planned project at the implementation stage in terms of biodiversity will concern:

- occupation of biologically active areas;
- occupation of habitats of protected species and natural habitats;
- noise emissions, which may result in scaring of vulnerable species;
- transformation of water relations;
- the permeation of pollutants into water and soil and directly into habitats.

The effects of the above-mentioned negative impacts will manifest mainly in:

- the limitation of the availability of the food supply, reproduction locations, etc.;
- temporary abandonment of habitats;
- increase in mortality through direct collisions during construction works.

Individual impacts and their effects at the operation stage were assessed with reference to particular components of the biotic environment in Subsection 6.1.4.7.1. In this section, a joint assessment of the planned project implementation stage on biological diversity was carried out and the impact was assessed to be moderate.

#### 6.1.4.8 Impact on cultural values, monuments and archaeological sites and objects

The impact on monuments and archaeological sites is the greatest at the construction stage of the planned project, and this is connected to the course of the construction process, which generates increased operation of mechanical equipment, transport and material storage, land occupation and disturbance of the ground surface. Most planned works will take place at a certain distance from historic objects – the nearest historic objects are located at a distance of 255–265 m west of the boundary of the planned access road to the OnSS. Those are the buildings located in the village of Osieki Lęborskie which are included in the register of historic monuments: outbuilding (stone) and former inn, which is now a residential building. On the other hand, a historic area/object nearest from the boundary of the planned OnSS is a palace (manor) park located at a distance of approx. 450 m to the west. Due to such a large distance, the planned project will not pose a direct risk to any of the historic properties.

The objects identified in the buffer around the project should, therefore, be considered as potentially exposed to indirect impacts in the form of dusting from the transport of bulk materials or vibrations transmitted from the construction site. The transport of construction machinery to/from the OnSS construction site will be executed on regional road no. 213, and further in Lublewko will be directed to the road Osieki Lęborskie – Lublewko and opposite the OnSS, before Osieki Lęborskie, to the exit to the OnSS access road. Potential dusting will take place at irregular time intervals, which will have a direct impact on the dust sediment density, and thus, its severity for solid surfaces. Moreover, the bulk substances transported will be characterised by a diversified structure, which in the case of a denser structure (gravel, dirt or stone), which will prevail in the transports, causes minor dusting. It should also be remembered that depending on the location of powdery substances intake, they will often be significantly moistened, which will also help to reduce the risk of dust. In the case of powdery substances, sands/fine gravel, protective covers will be used during the movement of trucks to protect the material from being blown away. The circumstances indicated above clearly establish the fact that dusting, even if it occurs under the circumstances described, will not pose any threat to the historic buildings located in Osieki. It is also not anticipated that possible vibrations resulting from the operation of heavy construction equipment in the area of the planned OnSS or the access road could endanger the historic substance located in Osieki Lęborskie.

The planned project may constitute an indirect and direct hazard to two archaeological sites. The first one is site AZP 2-37/11, the hypothetical (not confirmed by the latest surface surveys) extent of which runs along the eastern boundary of the cable bed in its northern section. The site is located within the *Wydmy Lubiatowskie* dunes, within the boundaries of which aeolian processes take place and they could have led to the transformation of the historic substance in that area; therefore, a repeated identification of the location of archaeological objects may currently be difficult. The route of the cable connection was delineated to avoid that archaeological site; thus, no adverse impact of the planned project on this archaeological site is anticipated.

On the other hand, in the case of the second archaeological site − AZP 2-37/9 (listed in the register of monuments), which collides with the planned cable bed in its middle section, the Applicant obtained the opinion of the Pomorskie Voivodeship Heritage Conservation Officer regarding the possible routing of the investment across that site (letter no. ZA.5183.1056.2021.SS of 27.08.2021). On the basis of the opinion obtained, the Applicant, in order to exclude the possibility of damaging the historic material in the area covered by the construction works, prior to the commencement of the works, will conduct non-invasive archaeological surveys in the area in question, which include:

- magnetic surveys on the ground surface and imaging of the anomalies detected;
- electrical resistivity profiling on the ground surface and imaging of the anomalies detected;
- electrical resistivity tomography (ERT) on the ground surface and imaging of the anomalies detected;
- georadar surveys (GPR) and imaging of the anomalies detected;
- archaeological sounding surveys – if necessary.

The results of the above surveys will be presented to the Pomorskie Voivodeship Heritage Conservation Officer, so that on their basis they will be able to give a favourable opinion on the laying of the cable connection through the site using an open excavation method in the case when the surveys confirm that there are no archaeological objects within the area of the planned earthworks. If the above-mentioned surveys confirm the presence of archaeological objects along the cable bed route, it will be necessary to route the cable lines using a trenchless method beneath the archaeological site at a depth of at least 5 MBGL.

Both possible methods (trenchless and open excavation) of the cable bed crossing the archaeological site, due to a detailed identification of the site by a series of non-invasive surveys, should not pose a risk to the historic substance potentially present within its boundaries. As a result, the probability of encountering artefacts during construction works should be identified as low or very low.

The risk of damage to the historic substance of archaeological sites at the construction stage is a potential risk. As has been indicated above, the Applicant carried out a series of non-invasive archaeological surveys within the area of site AZP-2-37/9, to rule out the presence of artefacts within the area covered by construction works. Therefore, no impact of the project on archaeological sites is anticipated.

#### 6.1.4.9 Impact on the use and development of the land area and tangible goods

Within the Baltica OWF CI area, there is no tangible property nor existing residential or industrial developments.

As a result of the construction works conducted involving the construction of an excavation and laying of cables, tree and shrub felling will be necessary. After the construction is finished, a reconstruction of the area and restoration works, involving the backfilling of the excavation and covering it with the top soil removed previously from the same location, are planned.

Roads, access roads and all other objects or elements of land development damaged or affected by construction will be restored and reconstructed as quickly as possible in accordance with the legal requirements in agreement with the owners and managers and possibly with the competent administrative authorities. Service roads within the cable bed boundaries in places, where they will be paved with, for example, concrete slabs, will be disassembled, and soils restored to the previous condition. Service roads located in the path of maintenance roads for the operational stage may be left after construction and possibly adapted to the function of a maintenance road.

The assessment of the scale of impact on land use and development is presented in Table 6.89, whereas, the assessment of the impact significance in Table 6.90.

*Table 6.89. Assessment of the scale of impact on land use and development [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Tree felling and shrub clearance for the purpose of cable bed area preparation | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |

*Table 6.90. Assessment of the impact significance on land use and development [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Tree felling and shrub clearance for the purpose of cable bed area preparation | High | Moderate | Moderate |

### 6.1.4.10 Impact on landscape, including the cultural landscape

During the Baltic OWF CI construction phase, **negative visual impacts** will occur which will be associated with earthworks (excavations, levelling), the storage of mechanised equipment and construction materials, the traffic of vehicles and machinery, including the transport of oversized elements and the erection of station equipment in an agricultural landscape characterised by low levels of investment. Such impacts will occur mainly in the location of works connected to the implementation of a borehole and in the OnSS construction area. However, most works will be conducted several dozen meters away from the forest road, thus, strolling people will not be able to see vehicles travelling along the service roads, as they will be separated from them by trees and undergrowth. Therefore, **the negative visual impacts during construction will be limited to the northern and southern sections of the Baltica OWF CI onshore area.** However, they will also take place, in the area with vehicle traffic transporting people, equipment and materials to the site, as well as collecting waste.

Negative visual impacts will occur gradually in space together with the progress of cable line laying, and their duration will be limited to the period of the construction works implementation. After the completion of the construction works, the areas around the excavations and along the temporary access roads will be restored to their previous use (without afforestation of the areas within the boundaries of the cable bed). Permanent changes **compromising the visual quality and structure of the landscape** will occur along the cable route, including within the boundaries of the land-sea borehole construction site and in the locations of the OnSS and busbar system foundations.

The spatial extent of the impact concerns the area of the project implementation, as well as the area from which particular works or structures erected will be visible.

The assessment of the scale of impact on landscape is presented in Table 6.91, whereas, the assessment of the impact significance in Table 6.92.

*Table 6.91. Assessment of the scale of impact on landscape [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Negative visual impacts related to construction works | 3 | | | | | 1 | | | 3 | | | | 1 | 8 |
| Deterioration of visual quality and landscape structure | 3 | | | | | 1 | | | 3 | | | | 1 | 8 |

*Table 6.92. Assessment of the impact significance on the landscape [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Negative visual impacts related to construction works | Moderate | High | Moderate |
| Deterioration of visual quality and landscape structure | Moderate | High | Moderate |

#### 6.1.4.11 Impact on population, human health and living conditions

During the project construction, impact on human health may potentially occur. In this context, the aerosanitary conditions and the acoustic climate in the project surroundings are of key significance. These impacts will be related mainly to vehicle traffic, exhaust emissions, dust from roads as well as noise. However, they will be limited to the project area and will occur with varied intensity during the period of works, and will cease thereafter.

Given the dispersed nature of emissions from the construction site and the prevailing wind directions from the west, the probability of occurrence of emission-related impact from the planned project on the atmospheric air in the area of the nearest buildings in Osieki Lęborskie and Lubiatowo is low. Emissions from the project construction sites will have a marginal impact on the air quality in the inhabited areas.

The nuisance related to the impact of the road transport of construction materials, equipment and people, i.e. air pollution (exhaust fumes and dust from roads), noise and ground vibrations will be limited spatially (road surroundings) and temporally (the period of construction works).

Individual impact types and their effects on the population, health and living conditions at the construction stage were assessed in Sections 6.1.4.4, 6.1.4.5 and 6.1.4.10. In this section, a joint assessment of the planned project implementation stage on population, health and living conditions of people was carried out and the impact was assessed to be moderate.

### 6.1.5 Operation phase

#### 6.1.5.1 Impact on geological structure, coastal zone, soils, and access to raw materials and deposits

##### 6.1.5.1.1 Impact on geological structure

In the operation phase of the planned project, no impacts which may adversely affect the geological structure are anticipated.

##### 6.1.5.1.2 Impact on the topography and dynamics of the coastal zone

Due to the potential negative impact on the condition and dynamics of the coastal zone at the design stage of the planned project, the routing of the Baltica OWF CI in an open trench through the coastal zone (the sandbank zone, the beach and the dunes) was excluded. Instead, trenchless technologies (HDD or Direct Pipe) were chosen in order to preserve the natural arrangement of the rock layers in the coastal zone without disturbing its current dynamic state. However, special attention should be paid to the variable extent of the coastal zone.

On the basis of the analyses conducted it was found that in the next 30 years, the seashore in the area of the project will be in a dynamic equilibrium, i.e. erosion and accumulation processes will alternate seasonally. Therefore, no significant erosion of the shore is anticipated, which would pose a threat during the operation period of the connection infrastructure. Based on the information collected, the risk of the damage and displacement of the cables designed in the coastal zone was assessed as insignificant. The possible risk of the cable damage or displacement may result from the heterogeneity of the geological structure – interbeddings of negligible bearing capacity (e.g. organic soil, dusty soil, etc.). A reliable assessment of this type of threat will have to be preceded by a geological/geotechnical investigation at the site of the planned course of the cable route.

Aeolian processes take place in the coastal zone of the planned project, but their intensity and scale do not change significantly the character of the *Wydmy Lubiatowskie* dune area, given the fact that it is forested. The area without vegetation cover was reduced between 2005 and 2020. In part of these areas the existing aeolian processes change the character of the dunes and move the dune forms eastwards. However, the scale of these processes is relatively small and only affects small areas of the *Wydmy Lubiatowskie* dunes. With due diligence during construction works and a proper protection of the dunes surface with plantings for the duration of operation, such processes should not be initiated on larger areas than the currently observed areas of active aeolian processes. Taking into account the approximate course of the planned project, possible changes in the relief will be slow and the displacement of sand masses are expected to be considerably smaller than those currently observed within the exposed, high dune embankments of the adjacent *Wydmy Lubiatowskie* dunes (i.e. not greater than 1 $m \cdot y^{-1}$). The connecting chambers for offshore and onshore cables will be located on the landward side of the dune. The height and width of the dune at this section of the shoreline is from approx. 5 to approx. 30 m. The calculations of dune erosion caused by extreme storms do not indicate any risk of disrupting the dune continuity at this section of the shore.

As part of the implementation of the project, which will involve, among others, tree felling within the dune strip with a width of 68 m as well as making an excavation for cables, the initiation of aeolian processes that could affect the dynamic nature of the dune areas and the adjacent *Wydmy Lubiatowskie* dunes is not expected. However, to prevent the works performed from affecting the dynamic nature of the dune areas, they will be carried out in the shortest time possible, and the surface of the dunes within the excavation strip will be protected with plantings of dune vegetation. These works will be carried out in consultation and cooperation with the employees of the Choczewo Forest Inspectorate and the employees of the Maritime Office in Gdynia. With a properly protected surface of the dunes (replanting dune vegetation protecting the dunes exposed as a result of construction works and securing them against being blown away), no additional changes in the relief of the dunes should be expected in the strip designated for the planned project or in its vicinity.

If the dune surface remains unprotected after deforestation of the strip designated for the connection infrastructure, aeolian processes will be initiated. In such a situation, the strip of dunes devoid of vegetation would be blown away and the deflation field will gradually expand to the adjacent areas, mainly eastwards. As a result of the processes initiated, the elements of the connection infrastructure may get exposed and sandy material may be transported towards ENE, E and ESE directions. However, considering the current state of the analysed section of the dune area, which is managed by the Choczewo Forest Inspectorate and the Maritime Office in Gdynia, such a scenario is unlikely.

###### 6.1.5.1.3 Impact on soils

The main source of the project impact on soils at the operation stage will be the emission of heat from the cable lines to the ground. Figure 6.2–Figure 6.11 present graphs of temperature field distribution as a function of vertical distance over the system in question for the purpose of estimating the range of thermal impact.

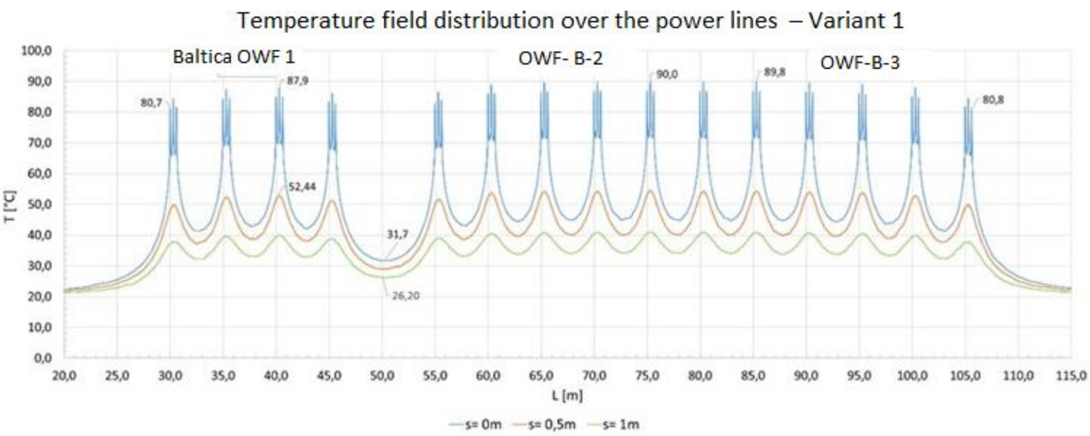



*Figure 6.2.* *Distribution of the cumulative temperature field of the soil for selected distances above the cable system for Variant no. 1 [Source: internal materials]*

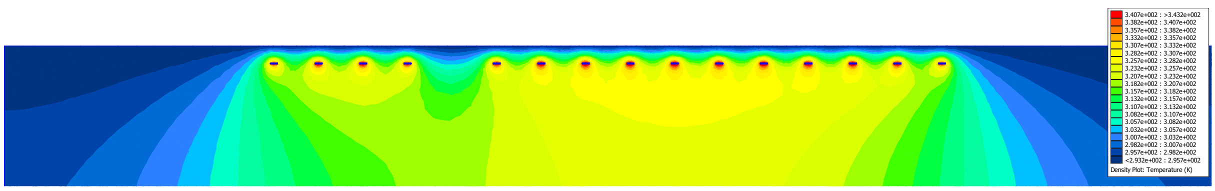


*Figure 6.3.* *Spatial distribution of the cumulative temperature field of the soil for Variant no. 1 [Source: internal materials]*

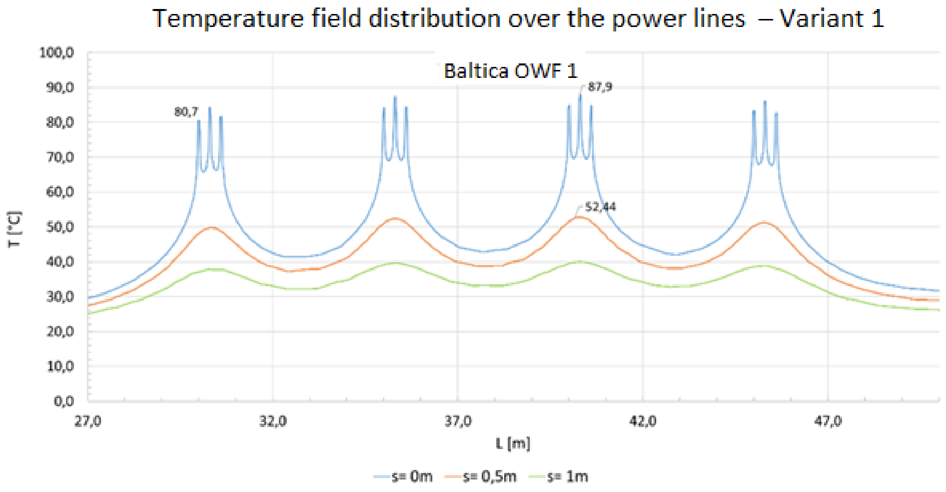



*Figure 6.4. Distribution of the temperature field of the soil for selected distances above the cable system for Variant no. 1, Baltica 1 OWF system [Source: internal materials]*

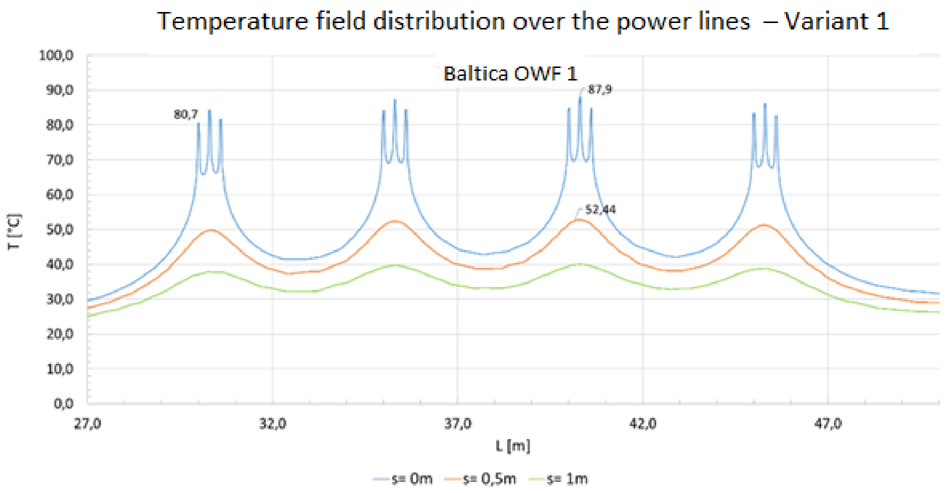



*Figure 6.5. Distribution of the temperature field of the soil for selected distances above the cable system for Variant no. 1, B-2 OWF system [Source: internal materials]*

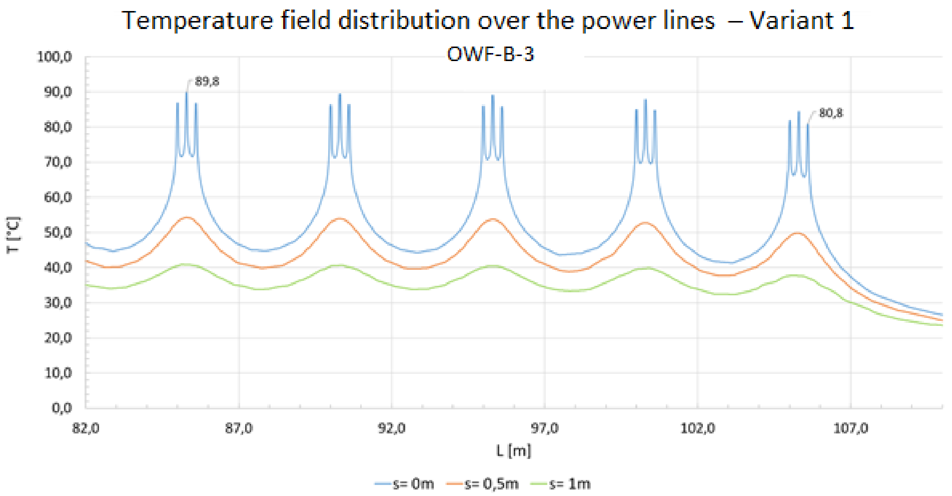



*Figure 6.6.* *Distribution of the temperature field of the soil for selected distances above the cable system for Variant no. 1, B-3 OWF system [Source: internal materials]*

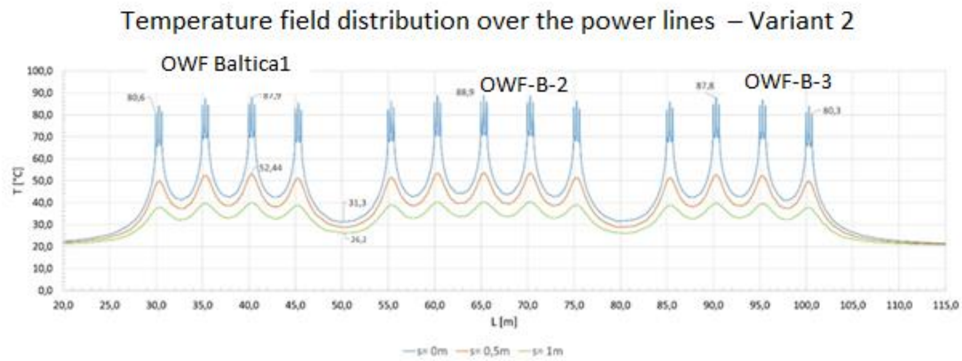



*Figure 6.7.* *Distribution of the cumulative temperature field of the soil for selected distances above the cable system for Variant no. 2 [Source: internal materials]*

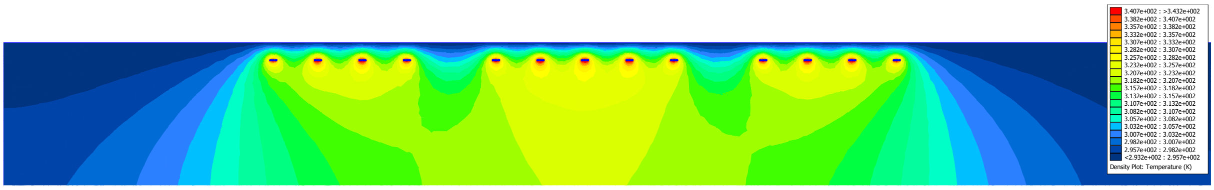


*Figure 6.8.* *Spatial distribution of the cumulative temperature field of the soil for Variant no. 2 [Source: internal materials]*

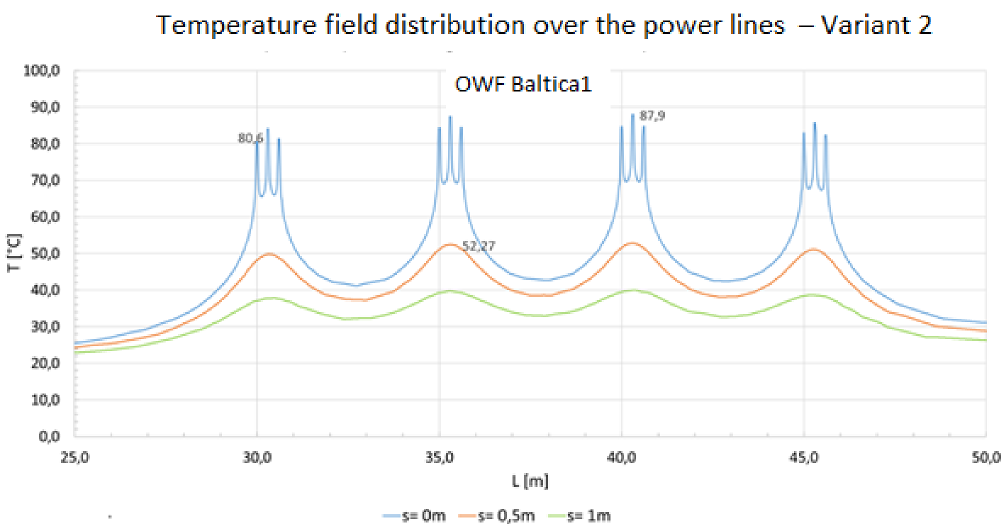



*Figure 6.9. Distribution of the temperature field of the soil for selected distances above the cable system for Variant no. 2, Baltica 1 OWF system [Source: internal materials]*

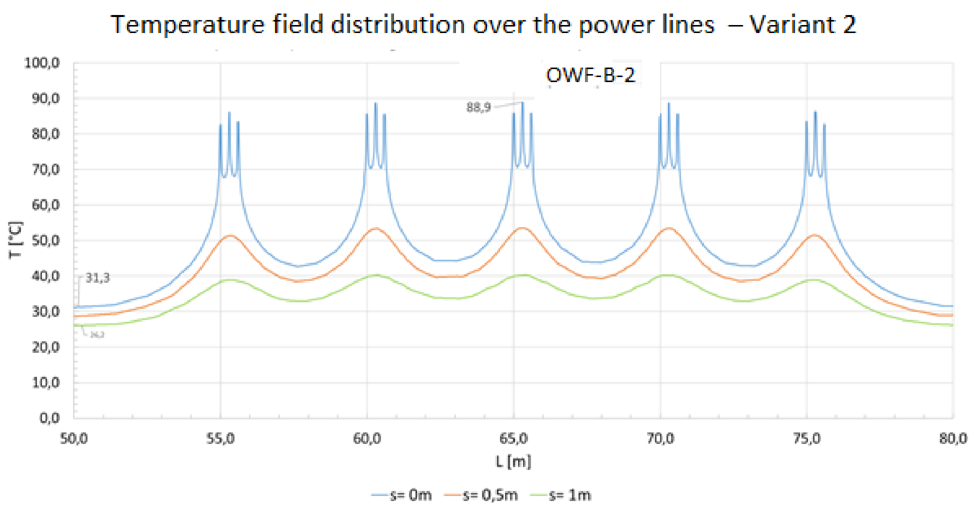



*Figure 6.10. Distribution of the temperature field of the soil for selected distances above the cable system for Variant no. 2, B-2 OWF system [Source: internal materials]*

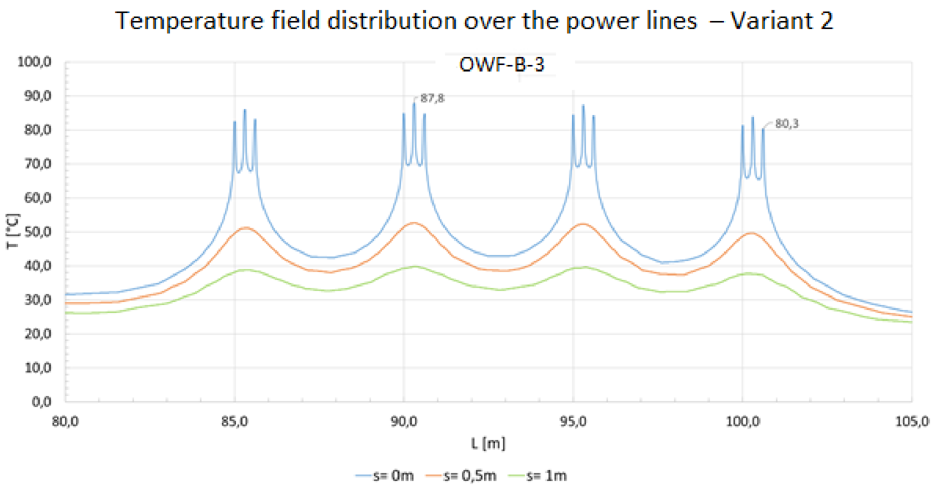



*Figure 6.11. Distribution of the temperature field of the soil for selected distances above the cable system for Variant no. 2, B-3 OWF system [Source: internal materials]*

The results obtained indicate the presence of significant thermal impact within a limited range. The boundary isotherms at a level of 50°C close in the area directly adjacent to the casing pipes of cable lines or at a distance of approximately 1 m from them, for the outermost cable lines.

The results obtained for variant no. 2 indicate a positive effect of applying a larger distance between the Baltica-2 and Baltica-3 cable groups on the magnitude of the total thermal impact. The layout and, in particular, the distances between the individual power line circuits, allow the generated heat to be effectively dissipated into the environment.

The cable lines in the outermost circuits demonstrate the lowest temperatures, which has a significant impact on minimising the extent of horizontal impact on adjacent areas. The greatest cumulative heat impact occurs in the inner circuits, and their central cables reach the highest temperatures.

The computational results of the analyses conducted allow for the conclusion that at a distance of more than 10 m from the extreme cable lines, the cumulative thermal impact will be at the level of several degrees above the assumed local ground temperature.

The results obtained for temperature field distributions show a relatively small influence of the cable lines of another entity (BT-OWF) when a distance of 10 m is maintained.

The temperature field generated in the ground may cause local drying of the soil in the immediate vicinity of the cable system, when the temperature exceeds the limit value of 50°C for the set value of critical saturation in the case of typical compact soils, and it is caused by the occurrence of moisture migration aligned with the direction of heat flux from the cable system.

The ultimate selection of design solutions and the adoption of the implementation technology should account for aspects related to the minimisation of thermal impact on the environment.

In the case of electrical systems, there is a risk of leakage of hazardous substances to the ground in emergency situations. The hazardous substance to be used at the OnSS site will be transformer oil contained in transformers and reactors. In total, all transformer units may contain up to approx. 1550 Mg of transformer oil. To minimise the risk of contamination with oil from the equipment installed in the OnSS area, installations with separators and leak-proof tanks will be used to collect the substance in case of failure. Transformers and reactors will be equipped with oil sumps with a capacity of at least 10% larger than the volume of oil contained in them. In addition, during the operation of the OnSS, periodic inspections of the technical condition of the equipment will be carried out in order to detect irregularities and prevent technical failures that may cause adverse environmental impacts, and additionally the substation will be equipped with leakage detection systems.

In summary, the operation of the project will result in an increase of soil temperature in the immediate vicinity of the cable lines, which in turn will affect soil overdrying. The spatial range of this impact is usually up to several metres from the source, so the impact of such emissions on the surrounding environment will be local. It is worth emphasising, however, that power cable burial is also the most effective way of minimising the environmental impact of the temperatures and electromagnetic fields they generate. In addition, underground cable lines are much less exposed to adverse environmental factors, and consequently their failure rate is much lower than that of overhead lines. Therefore, the impact on soils at the operation stage will be lower. In effect, the operation of the cable line connection together with the substation will not generate significant emissions of pollutants that could affect soil condition and quality. The threat to this component is only related to the risk of a major failure. However, accidental oil spills from transformers at substation sites are extremely rare and are generally small in terms of scale and range.

*Table 6.93. Assessment of the scale of impact on soils [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Exclusion of land from existing use | | | 1 | | | 1 | 5 | | | | | 2 | | 9 |
| Soil drying in the cable bed area | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |
| Risk of soil contamination due to accidental release of hazardous substances from the OnSS site | | 2 | | | | 1 | | | | | 1 | | 1 | 5 |

*Table 6.94. Assessment of the impact significance on soils [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Exclusion of land from existing use | Moderate | High | Moderate |
| Soil drying in the cable bed area | High | Moderate | Moderate |
| Risk of soil contamination due to accidental release of hazardous substances from the OnSS site | Irrelevant | Moderate | Negligible |

##### 6.1.5.1.4 Impact on the access to raw materials and deposits

In the operation phase, the Baltica OWF CI will not hinder access to the currently documented deposits of raw materials, but it should be noted that the currently conducted exploration works for hydrocarbon deposits, which also include the area of the planned project, may reveal the existence of a deposit. Unfortunately, such impact cannot be assessed at this stage, as the exploration works will continue until 2024 or longer. According to the information obtained from Baltic Shale (the concessionaire), the project area is characterised by a particularly favourable forecast with regard to unconventional oil resources. If the exploratory boreholes confirm the above-mentioned forecasts, the planned OWF CI may potentially hinder the extraction and transmission of oil from the deposit (the concessionaire is planning to build a transmission system). However, since the subject of the planned project mainly covers linear underground infrastructure (cable line connection), it can be assumed that it will neither constitute a significant obstacle in access to potential deposits of raw materials nor in the possible installation of a transmission line (above ground).

#### 6.1.5.2 Impact on the quality of surface waters

During normal operation of the system, no impact of the planned project on the quality of surface waters is anticipated, as there are no watercourses within the boundaries of the planned project, except for an agricultural drainage ditch that crosses the cable bed area but dries up in the summer. At the stage of operation, no impact of the project on that ditch is anticipated.

#### 6.1.5.3 Impact on hydrogeological conditions and groundwater

In case of insufficient water supply infrastructure and lack of water supply for sanitary purposes from a water supply network, independent groundwater intakes are to be constructed in the OnSS area. The water intake will also be used for fire-fighting purposes.

No negative impact is expected on the groundwater bodies occurring in the survey area, i.e. GWB 13 (PLGW240013) in the northern and central part of the project and GWB 11 (PLGW240011) in the southern part of the project. The status assessment for 2012 for both GWBs indicated good chemical, quantitative and general statuses.

The construction of water facilities and groundwater intake will be preceded by a hydrological survey and a procedure for obtaining a water permit, which will define permissible amounts of water to be abstracted so as to limit the impact on GWBs.

The assessment of the scale of impact on hydrogeological conditions and groundwater is presented in Table 6.95, whereas the assessment of the impact significance – in Table 6.96.

*Table 6.95. Assessment of the scale of impact on hydrogeological conditions and groundwater [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Water abstraction for domestic use and fire-fighting purposes | 3 | | | | | 1 | 5 | | | | | | 1 | 10 |

*Table 6.96. Assessment of the impact significance on hydrogeological conditions and groundwater [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Water abstraction for technological or domestic use | High | Low | Low |

### 6.1.5.4 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

In order to assess the impact of the Baltica OWF CI operation on the atmospheric air, the occurrence of emissions from the following sources was analysed:

- fuel combustion in engines of service vehicles, power generator tests;
- vehicle traffic on the access road to the OnSS (paved road) and service roads (unpaved roads).

At the project operation stage, no significant emissions are expected except for exhaust emissions from two emergency power generators, which will be activated periodically for testing purposes. It is envisaged that the OnSS will be equipped with two power generators, each with a fuel combustion of approx. 121.2 $dm^3 \cdot h^{-1}$, which corresponds to a rated power of approx. 0.49 MW. Due to a short generator operation time (test once a month for an hour), no significant impact on the air is expected. Inspections of service vehicles along the route of the cable lines will be carried out using cars on a negligible scale, which will result in negligible emissions. At the operation stage of the planned project, no other significant sources of exhaust emissions are anticipated.

During the project operation, service roads intended for the movement of cable inspection vehicles and for possible repairs as well as the access road to the OnSS are to be used. Service roads will be constructed using reinforced road technology (dirt road with aggregate reinforced surface, commonly referred to as gravel road). In terms of emissions, this is an unpaved road with a reduced content of fine particles (silt) in the surface. Vehicles moving on such roads cause the surface to deform under the pressure of their wheels, which is one of the two main factors determining the scale of emissions (friction of the material and its lifting on the surface of the wheels), according to the following equation (see U.S. EPA AP-42, Unpaved Roads):

$$EF = k\left(\frac{s}{12}\right)^{a}\left(\frac{W}{3}\right)^{b} \times 281{,}9$$

where:

EF – emission factor (g·VKT$^{-1}$; VKT – *vehicle kilometres travelled*);
k – correction factor (TSP, PM10, PM2,5);
s, Sc, silt content – content of fine particles (smaller than 75 µm [%] in diameter) in the road surface material;
W – mean vehicle weight [Mg].

Analysing the above relationship, it is easy to notice that even with a significant proportion of fine particles in the road surface and the maximum possible mass of the service vehicle, resulting in a relatively high EF value, the service road intended for the project cannot generate emissions of a significant magnitude, since the indicator obtained (expressed in grams per kilometre travelled by one vehicle) will be the basis for estimating emissions, multiplied by the number of vehicles moving on the road, and the number is negligible in the case of service works.

The assessment of the scale of impact on atmospheric air quality is presented in Table 6.97, whereas the assessment of the impact significance – in Table 6.98.

*Table 6.97. Assessment of the scale of impacts on air quality [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| **Fuel combustion in machinery engines** | | | | | | | | | | | | | | |
| Air pollution from power generator tests at the OnSS | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution from service vehicle traffic | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| **Vehicle traffic on paved roads (surface emissions)** | | | | | | | | | | | | | | |
| Air pollution by dust from vehicle traffic on the access road to the OnSS | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| **Vehicle traffic on unpaved roads (surface emissions)** | | | | | | | | | | | | | | |
| Air pollution by dust from service vehicle traffic on service roads | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.98. Assessment of the impact significance on air quality [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| **Fuel combustion in machinery engines** | | | |
| Air pollution from power generator tests at the OnSS | Low | Low | Negligible |
| Air pollution from service vehicle traffic | Low | Irrelevant | Negligible |
| **Vehicle traffic on paved roads (surface emissions)** | | | |
| Air pollution by dust from vehicle traffic on the access road to the OnSS | Low | Irrelevant | Negligible |
| **Vehicle traffic on unpaved roads (surface emissions)** | | | |
| Air pollution by dust from service vehicle traffic on service roads | Low | Irrelevant | Negligible |

### 6.1.5.5 Impact on ambient noise

#### 6.1.5.5.1 Noise levels permissible in the environment

The types of areas subject to acoustic protection are defined in the Environmental Protection Law, whereas permissible levels of noise emitted to the environment by specific groups of noise sources are set out in the Regulation of the Minister of the Environment *on permissible noise levels in the environment*. The permissible noise levels are expressed in the form of $L_{Aeq\,D}$ and $L_{Aeq\,N}$ indicators for the daytime (6.00–22.00) and night-time (22.00–6.00), respectively. The noise sources planned within the project should be included in the group of "other noise source objects and activities". For this group, the acoustic conditions are assessed using the reference time interval T for daytime, which is equal to 8 least favourable consecutive daylight hours, and for night-time – equal to 1 least favourable hour at night. The maximum permissible values applicable to this type of installation are provided in the table below. The areas that are not listed in the Regulation of the Minister of the Environment and in the table are not subject to noise protection.

*Table 6.99. Maximum noise levels in the environment during the construction and operation phases based on the Regulation of the Minister of the Environment [Source: internal materials]*

| No. | Land use | Day $L_{Aeq\,D}$ | Night $L_{Aeq\,N}$ |
|---|---|---|---|
| 1. | Health resort protection zone "A"<br>Hospital areas outside the city | 45 dB | 40 dB |
| 2. | Single family housing areas<br>Development areas with buildings related to permanent or temporary stay of children and adolescents [1)]<br>Nursing home areas<br>Hospital areas in cities | 50 dB | 40 dB |
| 3. | Multi-family housing and collective housing areas<br>Homestead housing areas<br>Recreational and leisure areas<br>Residential and commercial areas | 55 dB | 45 dB |
| 4. | Inner city zones of cities with a population of more than 100 000[2)] | 55 dB | 45 dB |

*[1)]If these areas are not used in accordance with their function during night-time, the permissible noise levels during night-time do not apply there.*

*[2)] An inner city zone in cities with a population of more than 100 000 is an area of compact residential development with a concentration of administrative, commercial and service facilities. In cities where there are districts with more than*

*100 000 residents, an inner city zone may be designated, if it is characterised by compact residential development with a concentration of administrative, commercial and service facilities.*

Pursuant to Art. 114, section 1 of the Act of 27 April 2001 – Environmental Protection Law (Journal of Laws of 2001, No. 62, item 627, as amended), the basis for categorisation of areas subject to protection against noise are the provisions of local spatial development plans.

No acoustically protected areas are situated in the direct vicinity of the project. This is indicated by the provisions of local spatial development plans (LSDPs):

– Resolution No. XIV/ 144/2008 of the Choczewo Commune Council dated 19 March 2008 on adopting the local spatial development plan "Wiatraki w Lublewie" [Wind Turbines in Lublewo], Choczewo commune,
– Resolution No. XIV/ 145/2008 of the Choczewo Commune Council dated 19 March 2008 on adopting the local spatial development plan "Wiatraki w Osiekach" [Wind Turbines in Osieki], Choczewo commune.

As indicated in the aforementioned resolutions, the areas directly adjacent to the site covered by the acoustic model are marked as:

– 3EW, 4EW, 713W – areas in which electric power devices are located;
– 5R, 6R, 9R – agricultural areas, cultivated fields, animal breeding, horticulture, fruit farming; location of residential functions within the agricultural settlements is excluded; location of farm buildings, sheds and arbours is permissible for the purpose of supporting agricultural production,
– 8E – an area for the location of electric power equipment – the Main Power Supply Station,
– 15KDW, 16KDW, 23KDW – areas of internal roads,
– 14KD, 18KD – area of a public road in the access road class, a commune road.

The nearest area protected against noise is a single-family development on lot 17/115, Kierzkowo precinct, at a distance of approx. 270 m from the fence of Baltica-2 station.

###### 6.1.5.5.2 Audible noise sources in the area of the planned substation

In order to determine the impact of noise emitted to the environment by a substation it is necessary to determine the level of noise emissions in the vicinity of the facility. This analysis should acknowledge that it will be a facility at which the following significant noise sources will operate, shaping the acoustic climate in the immediate surroundings:

1) Within the Baltica-2 OnSS area:
   - HV/EVH transformers;
   - shunt reactors;
   - MV/EVH transformers;
   - harmonic filters;
   - busbar systems;
   - pumping stations;
   - STATCOM reactors;
   - STATCOM cooler;
   - GIS 400kV;
   - GIS 400kV split AC units;
   - GIS 400kV fans;

- GIS 275kV;
- GIS 275kV split AC units;
- GIS 275kV fans;
- infrastructure building (ventilation and air conditioning).

2) Within the Baltica-3 OnSS area:
- HV/EVH transformers;
- shunt reactors;
- MV/EVH transformers;
- harmonic filters;
- busbar systems;
- pumping stations;
- STATCOM reactors;
- STATCOM cooler;
- GIS 400kV;
- GIS 400kV split AC units;
- GIS 400kV fans;
- GIS 275kV;
- GIS 275kV split AC units;
- GIS 275kV fans;
- infrastructure building (ventilation and air conditioning).

It was also assumed that all the equipment at the substation will operate simultaneously and without interruption (around the clock), i.e. at the maximum sound power level, which means the most unfavourable conditions in terms of environmental impact. As a precautionary measure, the calculations account for emergency diesel generators that will be activated for test purposes approximately once per month for approximately 1 hour. Although each unit will most likely be tested on a different day, the model assumes a worst-case situation when the generators located at Baltica-2 and Baltica-3 OnSS are tested simultaneously.

###### 6.1.5.5.3 Results of the noise level calculation results

Having the sound power levels of the designed equipment available, the predicted sound levels in the vicinity of the facility were calculated. The computation results for the projected noise level emitted to the environment at monitoring points, including one located by the facade of an existing building, are presented for daytime and night-time in Table 6.100.

*Table 6.100. Maximum noise levels in the environment during the construction and operation phases based on the Regulation of the Minister of the Environment [Source: internal materials]*

| **Receptor** | **Type of land** | **Computed level** | | **Maximum level** | | **Exceedance** |
|---|---|---|---|---|---|---|
| | | **Day $L_{Aeq}$ (dB)** | **Night $L_{Aeq}$ (dB)** | **Day $L_{Aeq}$ (dB)** | **Night $L_{Aeq}$ (dB)** | |
| R1 | The area with land development conditions for a single-family house | 38.5 | 37.8 | 50.0* | 40.0* | No |
| R2 | Undeveloped land. Potentially intended for residential development in the future | 39.7 | 38.6 | 50.0* | 40.0* | No |
| R3 | Undeveloped land. Potentially | 38.8 | 38.2 | 50.0* | 40.0* | No |

| Receptor | Type of land | Computed level | | Maximum level | | Exceedance |
|---|---|---|---|---|---|---|
| | | Day $L_{Aeq}$ (dB) | Night $L_{Aeq}$ (dB) | Day $L_{Aeq}$ (dB) | Night $L_{Aeq}$ (dB) | |
| | intended for residential development in the future | | | | | |
| R4 | Undeveloped land. Potentially intended for residential development in the future | 40.8 | 37.0 | 50.0* | 40.0* | No |
| R5 | The facade of the residential building on plot no. 17/115, Kierzkowo precinct | 37.9 | 32.1 | 50.0 | 40.0 | No |
| R6 | Boundaries of plot 17/115 | 37.6 | 33.3 | 50.0 | 40.0 | No |
| R7 | Undeveloped land. Potentially intended for residential development in the future | 40.5 | 38.4 | 50.0* | 40.0* | No |

**The area is currently not subject to noise protection*

The calculations conducted for the noise levels show that the night-time (40 dB) and daytime (50 dB) noise limits set out for single-family development will not be exceeded at any monitoring point at the boundary of the existing and potential residential developments.

The results of computations presented in graphical form – as ranges of noise impact at 40 and 50 dB – are included in Appendix 2 to this Report.

The assessment of the scale of the noise impact on existing and potential residential development areas is presented in Table 6.101, whereas the assessment of the impact significance in Table 6.102.

*Table 6.101. Assessment of the scale of noise impacts on existing and potential residential development areas [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Noise impacts from the OnSS area on existing and potential residential development areas | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |

*Table 6.102. Assessment of the impact significance on existing and potential residential development areas [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Noise impacts from the OnSS area on existing and potential residential development areas | High | Moderate | Moderate |

### 6.1.5.6 Electromagnetic field emission

#### 6.1.5.6.1 Cable lines

The results of calculations of the maximum values of the magnetic field strength (H) that can be expected above the cable line are presented in Table 6.103, while the diagrams of the distribution of the magnetic field strength (H) in the cross-section transverse to the axis of the cable bed area are indicated in the figures in Appendix 3. That Appendix also contains a detailed description of the assumptions made for the calculations.

*Table 6.103. Results of calculations of expected maximum values of magnetic field strength in the surroundings of the cable bed area (9 cable lines, flat layout) [Source: internal materials]*

| Solution | Voltage [kV] | B2 | | B3 | | Maximum expected value of the magnetic field intensity H [$A \cdot m^{-1}$] determined at a height of [MAGL] | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.2 | 1.0 | 2.0 |
| | | Number of cable lines | $I_{max}$ [A] | Number of cable lines | $I_{max}$ [A] | | | |
| 1 | 275 | 5 | 914 | 4 | 819 | 22.1 | 10.2 | 5.8 |
| 2 | 220 | | 1140 | | 1024 | 27.6 | 12.7 | 7.2 |

Calculations of the distribution of the magnetic field (H) generated by the cable bed area supplying power to the OnSS have shown that in each of the solutions adopted – assuming the maximum load current of each cable line for the purpose of calculations – the value of the field intensity will not exceed the permissible value ($H_p$ = 60 $A \cdot m^{-1}$) set out in the regulations for places accessible to people, within the height range from 0.2 to 2.0 MAGL.

#### 6.1.5.6.2 Busbar system

The results of calculations of expected maximum values of electric field strength (E) and magnetic field strength (H) determined at the height of 2.0 MAGL – assuming the most unfavourable conditions of operation of busbar systems from the environmental perspective, i.e. $U_n$ = 400 kV ($U_{max}$ = 420 kV), with a permissible current-carrying capacity of $I_{max}$ = 2300 A for each busbar system are presented in Table 6.104, while the distributions of electric (E) and magnetic (H) components of the electromagnetic field in the calculated cross-section are presented in the figures contained in Appendix 3 to this Report.

*Table 6.104. Results of calculations of expected maximum values of the electric (E) and magnetic (H) field strength in the surroundings of 4 busbar systems for two phase configurations (configuration A and B) [Source: internal materials]*

| **Maximum operating voltage of the busbar system (permissible long-term)**<br>**$U_{max}$ = 420 kV**<br>**Maximum load on each busbar system $I_{max}$ = 2300 A** | | | |
|---|---|---|---|
| **Maximum expected value of the electric field strength E [kV·m$^{-1}$]** | | **Maximum expected value of the magnetic field strength H [A·m$^{-1}$]** | |
| Configuration A | Configuration B | Configuration A | Configuration B |
| 3.9 | 4.2 | 22.5 | 26.4 |

The calculations of electric (E) and magnetic (H) field distributions, which had been carried out for the shortest distance of the phase conductors (cables) forming the busbar systems ($h = h_{min}$ = 13 m) from the ground, showed that the total electric field strength (E) under the 4 busbar systems – at the height of 2 MAGL – will not exceed the values of 3.9 kV·m$^{-1}$ for the busbar configuration A and 4.2 kV·m$^{-1}$ for the busbar configuration B. Thus, irrespective of the configuration, the maximum electric field strength will be significantly lower than the regulatory limit value (10 kV·m$^{-1}$) for places accessible to people.

The nearest existing housing developments are located at a distance of 520 m and potential housing developments – at a distance of 385 m from the axis of the 4 busbar systems. Therefore, both the existing and the potential housing developments are situated in an area where the electric field strength is considerably lower than 1 kV·m$^{-1}$ (permissible value for residential areas).

The calculations of magnetic field distribution (H) indicated that its intensity under the four busbar systems, identified at the height of 2 MAGL at the most unfavourable operating conditions of the busbar systems, will not exceed the value of 22.5 A·m$^{-1}$, and hence it will be significantly lower than the permissible value (60 A·m$^{-1}$) established in regulations governing places accessible to people.

Assessment of the scale of impact of the electromagnetic field in the cable bed area is presented in Table 6.105, whereas the assessment of the impact significance in Table 6.106.

*Table 6.105. Assessment of the scale of impact of the electromagnetic field [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Magnetic field impacts in the vicinity of the cable bed area | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Electric and magnetic | 3 | | | | | | 1 | 5 | | | | 2 | | 11 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| field impacts in the vicinity of busbar systems | | | | | | | | | | | | | | |

*Table 6.106. Assessment of the significance of the electromagnetic field impacts [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Magnetic field impacts in the vicinity of the cable bed area | High | Irrelevant | Negligible |
| Electric and magnetic field impacts in the vicinity of busbar systems | High | Irrelevant | Negligible |

### 6.1.5.7 Impact on nature and protected areas

#### 6.1.5.7.1 Impact on biotic elements in the onshore area

##### 6.1.5.7.1.1 Fungi

**Physical loss of habitat or its fragment due to maintenance works.** The cable bed area may be colonised by new fungi species. As a result of maintenance works, if the cable bed area is maintained in the form of low grassland vegetation, these plots will be destroyed. However, it is not anticipated that rare and threatened species may be affected in this context.

**Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area**. Forest clearing in a 62–68 m wide strip will change the light and moisture conditions in the forest edge zone, which may affect the occurrence of fungi species, particularly mycorrhizal fungi. Lower soil moisture may reduce the occurrence of fruiting bodies and may lead to the disappearance of species requiring higher moisture levels from the area (e.g. jellied bolete *Suillus flavidus,* drab tooth *Bankera fuligineoalba,* scaly hedgehog *Sarcodon imbricatus,* cinnamon fairy stool *Coltricia cinnamomea,* slimy spike-cap *Gomphidius glutinosus,* fused cork hydnum *Phellodon confluens,* fused tooth *Phellodon connatus,* woolly tooth *Phellodon tomentosus*).

The assessment of the scale of impact on fungi is presented in Table 6.107, whereas the assessment of the impact significance in Table 6.108.

*Table 6.107. Assessment of the scale of impact on fungi [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical loss of habitat or its fragment due to maintenance works | 3 | | | | | 1 | 5 | | | | | | 1 | 10 |
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |

*Table 6.108. Assessment of the impact significance on fungi [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of habitat or its fragment due to maintenance works | High | Low | Low |
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | High | Moderate | Moderate |

#### 6.1.5.7.1.2 Lichens

**Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area**. Forest clearing in a 62–68 m wide strip will change the light and moisture conditions in the forest edge zone. It will have a significant impact on lichen groups growing on trees and soil. Currently, in the area of the planned project, there are mainly "forest" species preferring shade and relatively high humidity. Forest clearing and leaving an exposed strip of land, along which the cable bed will be situated, will cause increased insolation and a change in air humidity conditions. Maintaining such a condition over the long term of operation will change the species composition of the lichen biota in the forest edge zone. "Forest" species will give way to lichens with a higher tolerance for insolation and low air humidity. At present, it is difficult to predict the final effect of changes that will take place after the project is implemented.

**Physical loss of habitat or its fragment due to maintenance works.** The cable bed area may be colonised by new lichen species. As a result of maintenance works, if the cable bed area is maintained in the form of low grassland vegetation, these plots will be destroyed. However, it is not anticipated that rare and threatened species may be affected in this context.

The assessment of the scale of impact on lichens is presented in Table 6.109, whereas the assessment of the impact significance in Table 6.110.

*Table 6.109. Assessment of the scale of impact on lichens [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |
| Physical loss of habitat or its fragment due to maintenance works | 3 | | | | | 1 | 5 | | | | | | 1 | 10 |

*Table 6.110. Assessment of the impact significance on lichens [Source: internal materials]*

| Oddziaływanie | Skala oddziaływania | Wrażliwość receptora | Znaczenie oddziaływania |
|---|---|---|---|
| Zmiana warunków świetlnych oraz wilgotnościowych w strefie lasu sąsiadującej bezpośrednio z ławą kablową | Duża | Umiarkowana | Umiarkowane |
| Fizyczna likwidacja siedliska lub jego fragmentu w wyniku realizacji prac utrzymaniowych | Duża | Mała | Mało ważne |

#### 6.1.5.7.1.3 Mosses and liverworts

**Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area.** That group of plants is particularly sensitive to changes in light and moisture conditions. However, forest clearing in a 62−68 m wide strip will change these conditions in the forest edge zone, through which the Baltica OWF CI will be routed, which may influence qualitative and quantitative changes of local moss and liverwort populations.

The assessment of the scale of impact on mosses and liverworts is presented in Table 6.111, whereas the assessment of the impact significance in Table 6.112.

*Table 6.111. Assessment of the scale of impact on mosses and liverworts [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |

*Table 6.112. Assessment of the impact significance on mosses and liverworts [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | High | Moderate | Moderate |

#### 6.1.5.7.1.4 Vascular plants and natural habitats

**Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area.** Forest clearing in a 62–68 m wide strip will result in the modification of microclimate conditions in the forest ecotone zone. It should be expected that within this zone, compared with the forest interior, mean air temperature will increase, whereas the humidity of air and surface soil layers will decrease. Additionally, the deforested strips may serve as wind corridors (tunnel effect). However, this is expected to have little effect on the vegetation of the pine forests and a greater effect will be visible only within areas characterised by a naturally high groundwater table.

**Spread of invasive species as a result of leaving the project area in a deforested condition and using service roads.** During the operation of the project, the occurrence of certain species that are non-native in terms of habitat and geographical provenance should be expected along the cable bed area. One of such taxa is the foxglove *Digitalis purpurea*, which occurs in forests along roads, in tree felling and windthrow areas.

The assessment of the scale of impact on vascular plants and natural habitats is presented in Table 6.113, whereas the assessment of the impact significance in Table 6.114.

*Table 6.113. Assessment of the scale of impact on vascular plants and natural habitats [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |
| Spread of invasive species as a result of leaving the project area in a deforested condition and using service roads | | | 1 | | | 1 | 5 | | | | | 2 | | 9 |

*Table 6.114. Assessment of the impact significance on vascular plants and natural habitats [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | High | Moderate | Moderate |
| Spread of invasive species as a result of leaving the project area in a deforested condition and using service roads | Moderate | Moderate | Low |

#### 6.1.5.7.1.5 Invertebrates

Altered environmental conditions may contribute to changes in the species structure of the invertebrate fauna, particularly those trophically related to different vegetation types. However, these will be transformations of a local character (e.g. withdrawal of species connected with the forest interior in favour of other, more flexible species) or changes in the qualitative and quantitative structure of mobile species penetrating larger areas (e.g. bumblebees). Changes in faunal biodiversity may also concern its enrichment, which is typical for ecotone habitats. With regard to the sites of the red wood ant, which are relevant in this context – it is a forest species, but a flexible one, associated with various types of forest habitats, including commercially used coniferous forests, regarded as weaker habitats. However, it often occurs in sunlit areas, roadsides, on the edges of forests, and hence it should adapt to modified habitat conditions and restore its colony network over time.

Therefore, negative impacts and consequences of possible human presence and activity may include the damage of mounds and disturbance of colony functions, but these effects will be more related to individual nests, not affecting the functioning of the entire colony network, and hence easy to mitigate and reversible.

The assessment of the scale of impact on invertebrates is presented in Table 6.115, whereas the assessment of the impact significance in Table 6.116.

*Table 6.115. Assessment of the scale of impact on invertebrates [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Disturbance to the species structure of invertebrates (presence of people, displacement, disturbance) | | 2 | | | | 1 | 5 | | | | | | 1 | 9 |

*Table 6.116. Assessment of the impact significance on invertebrates [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance to the structure of the environment (presence of people, displacement, disturbance) | Moderate | Low | Low |

#### 6.1.5.7.1.6 Herpetofauna

**Amphibian site fragmentation in the wintering area** – deforestation will influence changes in the habitat and microclimate, which may adversely affect at least 6 amphibian species in the area hitherto used as wintering grounds, designated in the forests north of the Osieki Lęborskie settlement.

**Collisions of vehicles involved in service operations with amphibians during their migrations from and to wintering grounds** – traffic of mechanical vehicles, particularly during seasonal amphibian migrations in months III–IV and IX–X, may cause losses among at least 6 species of locally occurring amphibians.

**Reptile site fragmentation in ecotone habitats** (at the forest edge by the OnSS and near the drilling site in the nearshore zone) – deforestation will influence habitat changes, which may adversely affect at least 3 reptile species at the forest edge by the OnSS, and at least 4 reptile species near the drilling site in the nearshore zone.

The assessment of the scale of impact on herpetofauna is presented in Table 6.117, whereas the assessment of the impact significance in Table 6.118

*Table 6.117. Assessment of the scale of impact on herpetofauna [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Amphibian site fragmentation in the wintering area | | | 1 | | | 1 | 5 | | | | | 2 | | 9 |
| Collision of service vehicles with amphibians during their migrations from and to wintering grounds | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Reptile habitat fragmentation in ecotone habitats (at the forest edge by the OnSS and near the drilling site in the nearshore zone) | | | 1 | | | 1 | 5 | | | | | 2 | | 9 |

*Table 6.118. Assessment of the impact significance on herpetofauna [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Amphibian habitat fragmentation in the wintering area | Moderate | Moderate | Low |
| Collision of service vehicles with amphibians during their migration from and to wintering grounds | Low | Low | Negligible |
| Reptile habitat fragmentation in ecotone habitats (at the forest edge by the OnSS and near the drilling site in the nearshore zone) | Moderate | Moderate | Low |

#### 6.1.5.7.1.7 Birds

**Fragmentation of the habitat of "forest interior" species** – due to the emergence of a large open space inside the extensive forest area, the habitats of species associated with the forest interior (e.g. red-breasted flycatcher) as well as species sensitive to disturbance (the northern goshawk) will deteriorate.

**Disturbance (presence of people and vehicles during maintenance works and potential use of service roads by tourists)** – this threat will affect both breeding and migratory birds. However, the negative impact will be much greater on breeding species as they are attached to a specific fragment of the area. The disturbance may cause local losses in broods and the abandonment of breeding sites. Birds will be disturbed due to the presence of people carrying out service operations and maintenance works (e.g. vegetation cutting) both within the cable bed area and at the OnSS site. It is highly probable that the service roads will be intensively used by tourists and local residents walking from the Lubiatowo area to the beaches and back, which will significantly increase the level of anthropopressure in the forest interior. However, the present directions of human traffic indicate that this pressure will affect mainly the northern section stretching from Lubiatowo to the sea (i.e. up to 1/3 of the length of the cable bed area) and to a much lesser extent the section between Osieki Lęborskie and Lubiatowo.

**Collisions with tall structures** – threat associated with the presence of buildings up to approx. 18 m in height in the OnSS area, as well as connections between station facilities with a height of approx. 38 m and busbar systems with a total structure height of approx. 37 m. This threat will affect both breeding and migratory birds. The scale of this phenomenon in the case of migrating birds is difficult to predict and depends on the momentary intensity of migration, which may be highly variable in time (both during the day and during the entire migration season). Taking into account the anticipated low scale of collisions with infrastructure elements and the size of the migrating population, it was assessed that the scale of impact on this group of birds will be irrelevant. Therefore, the scale of impact on birds was assessed only for breeding populations.

**Electrocution** – an increased risk of electrocution is typical of low and medium voltage lines as well as transformer stations, i.e. in situations when the distances between elements carrying current of different voltages or between live and grounded elements are too small. Bird electrocution usually result in death and species with a large wingspan are the most vulnerable. Taking into account the bird species composition in the area of the planned substation (no large concentrations of the white stork and birds of prey), this impact is not expected to be significant. The threat will be limited to the site of the OnSS and busbar systems. As in the case of impacts from bird collisions with tall structures, the assessment of the impact scale was performed only for breeding populations.

**Noise (operation of substation equipment)** – the noise of anthropogenic origin is regarded as one of the most intense environmental disturbances negatively affecting bird acoustic communication, which is particularly important for their proper functioning. The effects of this negative impact concern several aspects of their life. Among others, they lead to a deterioration in their functioning as they mask biologically important signals, particularly in the case of species producing low-frequency calls, also leading to changes in bird behaviour (e.g. anti-predator responses) [Wiącek *et al.*, 2014]. This may lead to a decrease in the density and species richness of birds nesting near the noise source.

**Destruction of nests and broods during cable line maintenance works (mowing/vegetation clearing)** – bird nests and broods may be destroyed during vegetation maintenance works within the cable bed area (mowing to prevent plant succession).

The assessment of the scale of impact on birds is presented in Table 6.119, whereas the assessment of the impact significance in Table 6.120.

*Table 6.119. Assessment of the scale of impact on birds [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Fragmentation of the habitat of "forest interior" species | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |
| Disturbance (presence of people and vehicles during maintenance works and potential use of service roads by tourists) | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Collision with tall structures | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Electrocution | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Noise (operation of substation equipment) | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Destruction of nests and broods during cable line maintenance works (mowing/vegetation clearing) | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.120. Assessment of the impact significance on birds [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Habitat fragmentation for "forest interior" species | High | High | Important |
| Disturbance (presence of people and vehicles during maintenance works and potential use by tourists) | Low | Moderate | Low |
| Collision with tall structures | High | Moderate | Moderate |
| Electrocution | High | Moderate | Moderate |
| Noise (operation of substation equipment) | High | High | Important |
| Destruction of nests and broods during cable line maintenance works (mowing/vegetation clearing) | Low | High | Low |

#### 6.1.5.7.1.8 Mammals

**Habitat fragmentation.** Forest clearing along a strip with a width of several dozen metres will result in an irreversible separation of habitats of forest species and will introduce new species into the transformed habitat. Some forest species with low tolerance to crossing open areas will be isolated (e.g. the brown long-eared bat, the Natterer's bat). In the case of cable bed area maintenance in the form of low grassland with limited natural succession, the scale of the impact will be increased.

**Lighting of buildings and infrastructure elements.** Lighting of the substation equipment will be visible from the forest side, particularly in the area of the forest clearing for the cable bed area, which may be at least partially illuminated. The lighting creates a barrier effect, especially for species associated with forests or avoiding humans. On the other hand, the illumination of station equipment visible from the fields may attract insects and hence bats, thus changing the groupings of animals previously found in the area.

**Noise from substation equipment operation.** Transformer stations will permanently generate clearly audible noise which may disturb animals or restrict their use of the surrounding area as feeding grounds or resting places.

**Collisions with vehicles, unintentional killing and disturbance of animals.** During the operation phase of the cable bed area, there may be collisions with and disturbance of animals by authorised vehicles carrying out maintenance work as well as by other vehicles that are likely to move along the service roads. Also, restriction of succession (vegetation clearing, mowing) may result in unintentional killing and scaring of animals and make it difficult for them to cross open land.

The assessment of the scale of impact on mammals is presented in Table 6.121, whereas the assessment of the impact significance in Table. 6122.

*Table 6.121. Assessment of the scale of impact on mammals [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Habitat fragmentation | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |
| Lighting of buildings and infrastructure elements | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Noise from substation equipment operation | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Collisions with vehicles, unintentional killing and disturbance of animals | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.122. Assessment of the impact significance on mammals [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Habitat fragmentation | High | High | Important |
| Lighting of buildings and infrastructure elements | High | High | Important |
| Noise from substation equipment operation | High | Low | Low |
| Collisions with vehicles, unintentional killing and disturbance | Low | Low | Negligible |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| of animals | | | |

#### 6.1.5.7.2 Impact on protected areas

##### 6.1.5.7.2.1 Impact on protected areas other than Natura 2000 sites

At the stage of cable bed operation, a fairly wide (62–68 m) deforested area with up to three service roads will be visible in the landscape subject to protection within the Coastal Protected Landscape Area. The remaining operation phase impacts will concern vegetation, fungi and animals. Individual impacts and their effects at the operation stage were assessed with reference to particular environmental components in Sections 6.1.5.1, 6.1.5.2, 6.1.5.3, 6.1.5.4 and 6.1.5.7.1. In this section, a joint assessment of the planned project operation stage on the Coastal Protected Landscape Area was carried out and the impact was assessed as low.

The OnSS and 400 kV overhead lines are located outside the boundary of the Coastal Protected Landscape Area.

##### 6.1.5.7.2.2 Impact on Natura 2000 sites

During the project operation, there will be no impacts that could directly affect the Natura 2000 sites. Although the functionality of the Coastal Wildlife Corridor connecting the Natura 2000 sites *Białogóra* PLH220003 and *Mierzeja Sarbska* PLH220018 will be disrupted as a result of forest clearing for the purpose the cable bed implementation, this corridor is not considered significant for the subjects of protection of these Natura 2000 sites. As a result of an appropriate management of the cable bed area, the coherence and integrity of the Natura 2000 network will not be compromised.

#### 6.1.5.7.3 Impact on wildlife corridors

During the operation phase, service roads will be constructed within the boundaries of the cable bed area. Succession will be restricted in the cable bed area, which will not be conducive to the growth of species avoiding open areas. A barrier effect may develop due to the lack of trees, lack of host plants (invertebrates), loss of feeding grounds or soil compaction related to service road construction (e.g. moles). These factors will limit the functionality of the supra-regional Coastal Wildlife Corridor. The barrier effect can be minimised by appropriate management of the cable bed area, as described in Section 11.

An assessment of the scale of impact on wildlife corridors is presented in Table 6.123, whereas the assessment of the impact significance in Table 6.124.

*Table 6.123. Assessment of the scale of impact on wildlife corridors [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Reduction of the functionality of the Coastal Wildlife Corridor | | 2 | | | 2 | | 5 | | | | | | 1 | 10 |

*Table 6.124. Assessment of the impact significance on wildlife corridors [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Reduction of the functionality of the Coastal Wildlife Corridor | High | Moderate | Moderate |

#### 6.1.5.7.4 Impact on biodiversity

The crucial impacts of the planned project at the operation stage in terms of biodiversity will concern:

- disruption of the continuity of the forest ecosystem;
- creation of barriers in the form of new large-surface structures and new service roads;
- change in land use of the cable bed and OnSS areas.

The effects of the above-mentioned negative impacts will be manifested mainly in:

- reduced exchange of individuals between populations inhabiting separated fragments of the forest;
- qualitative change of the plant cover, fungi and animal groupings (appearance of species associated with open areas and ecotone zones, but also invasive and synanthropic species);
- increased bird mortality due to direct collisions with tall structures and busbar systems as well as due to electrocution.

The appearance of a new type of land use (open areas above the cable bed) will considerably change the local biodiversity and may even contribute to its enrichment with species preferring open areas. An important way of minimising the impact of the planned project on biodiversity will be the proper management of the cable bed area to allow its colonisation by new species.

The use of service roads within the cable bed area for purposes other than cable line maintenance will favour the spread of synanthropic species.

Individual impacts and their effects at the operation stage were assessed with reference to particular environmental components in Subsection 6.1.5.7.1. In this section, a joint assessment of the planned project implementation stage on biological diversity was carried out and the impact was assessed to be moderate.

#### 6.1.5.8 Impact on cultural values, monuments and archaeological sites and objects

No negative impact of the planned project on historical features (immovable monuments and archaeological sites) is predicted at the stage of project operation. The enclosed structures and technical infrastructure in the OnSS area may disturb the visual perception of historical buildings of Osieki Lęborskie village [according to the provisions of the Study of Conditions and Directions of Spatial Development: protection should be extended to “spatial layout and complexes (protection of the public square and structures)”].

#### 6.1.5.9 Impact on the use and development of the land area and tangible goods

Trees and shrubs that will be cleared during cable line construction will not be restored during the operation phase. The strip of land corresponding to the width of the cable bed will remain unwooded. The area currently used for agricultural purposes will be redeveloped, i.e. an OnSS and overhead busbar systems will be constructed there. Up to 3 service roads will be constructed after the reclamation process concluding the construction phase. Control tags will be located on the ground surface to enable finding the cable lines during technical inspections.

The existing agricultural land will be designated for the construction of a substation along with busbar systems and an access road.

The assessment of the scale of impact on land use and development is presented in Table 6.125, whereas, the assessment of the impact significance in Table 6.126.

*Table 6.125. Assessment of the scale of impact on land use and development [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Change in land development within the Baltica OWF CI boundaries | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |

*Table 6.126. Assessment of the impact significance on land use and development [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Change in land development within the Baltica OWF CI boundaries | High | Moderate | Moderate |

#### 6.1.5.10 Impact on landscape, including the cultural landscape

**Presence of disharmonious anthropogenic dominant landscape features.** The main impact of the planned project on landscape values concerns the visual and aesthetic aspects, since the tall structures of busbar systems as well as the tall and extensive OnSS buildings will become dominant components of the agricultural landscape hitherto characterised by few development projects. Over the period of their operation, substation facilities in colours contrasting with the sky background and ground surface will have a long-lasting impact on the landscape. The OnSS and busbar systems will be visible from the Osieki Lęborskie – Lubiatowo road and from the Osieki Lęborskie – Lublewko road, as well as from the area of the existing housing developments in Osieki Lęborskie.

The highest point in the vicinity of the planned project is situated 55.2 m above sea level, in Kierzkowo village, 717 m south of the OnSS. The location, presently an arable field, offers a view over the Osieki Lęborskie village. Considering the planned height of infrastructure buildings (approx. 18 m) and the height of busbar systems (approx. 37 m), these structures will be partly visible despite the rows of trees growing along the Osieki – Lublewko road. The view of the village buildings will not be obscured.

The best known and popular vantage point in the Choczewo commune is the Stilo lighthouse in Sasino, located approximately 10 km from the planned project. Due to the distance between the project and the lighthouse, the project will not be visible to the naked eye from the observation deck of the lighthouse.

There are no view axes in the area analysed to be occupied by the planned project. The location of the project east of the buildings in Osieki Lęborskie will not obscure the view of the historical village layout.

**Negative visual and aesthetic perception of the wide, straight, deforested area.** Leaving the cable bed deforested will have a definitely negative impact on the landscape. The negative visual and aesthetic perception of the forest clearance will be enhanced by the relatively long straight sections of the cable bed route – the deforested area will remain visible to the horizon.

The assessment of the scale of impact on landscape is presented in Table 6.127, whereas the assessment of the impact significance in Table 6.128.

*Table 6.127. Assessment of the scale of impacts on the landscape [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Presence of disharmonious anthropogenic dominant landscape features | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Negative visual and aesthetic perception of the wide, straight, deforested cable bed area | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |

*Table 6.128. Assessment of the impact significance on the landscape [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Presence of disharmonious anthropogenic dominant landscape features | High | High | Important |
| Negative visual and aesthetic perception of the wide, straight, deforested cable bed area | High | High | Important |

#### 6.1.5.11 Impact on population, human health and living conditions

The operation of the project may have a potential impact on local residents. Among others, these impacts will be related to:

- noise emissions;
- electromagnetic field emissions;
- emergency situations;
- effects of landscape changes.

Operation of the project involves the emission of electromagnetic field. Neither the intensity of the magnetic component from the cable bed area, regardless of the project variant, nor the electric component under 4 busbar systems will exceed the permissible value set out in the regulations for places accessible to people. The nearest existing and the potential housing developments are situated in an area where the electric field strength is considerably lower than 1 $kV \cdot m^{-1}$ (permissible value for residential areas).

The impact of electromagnetic field may affect, only to a small extent, the employees performing service work at the OnSS. A detailed analysis of the above issues and the question of compliance with specific health and safety requirements as well as sanitary regulations lies within the competence of entities authorised to conduct inspections in this respect (Sanitary Inspectorate, Labour Inspectorate).

At the project operation stage, no significant emissions to the air are expected except for exhaust emissions from two emergency power generators, which will be activated periodically for testing purposes. Due to a short generator operation time (test once a month for an hour), no significant impact on the air is expected. Inspections of service vehicles along the route of the cable lines will be carried out using cars on a negligible scale, which will result in negligible emissions. At the operation stage of the planned project, no other significant sources of exhaust emissions are anticipated.

An important aspect affecting people's health are extraordinary environmental hazards associated with emergency conditions of the project. Protective measures against their occurrence are an important element influencing public health. The analysis and evaluation of technological solutions showed that they ensure the minimised occurrence of emergency conditions, providing the maximum protection of public health.

The impact of noise on the existing and potential residential development areas was assessed as low.

The implementation of the project will alter the landscape of the plots of land on which the OnSS and the cable bed will be implemented. The substation equipment and busbar systems will constitute a dominant feature in the hitherto agricultural landscape. Plantings along the western boundary of the OnSS will conceal the substation equipment, making them less visible to the residents of the existing and planned residential areas of Osieki Lęborskie. In the context of the impact on population, the perception of changes in the landscape received the lowest score and it finally resulted in the impact of the project on the population, human health and living conditions being assessed as significant.

The operation of the project will have a positive impact on the economic situation of the commune, which will also be noted by its residents.

### 6.1.6 Decommissioning phase

#### 6.1.6.1 Impact on geological structure, coastal zone, soils, and access to raw materials and deposits

##### 6.1.6.1.1 Impact on geological structure

Negative impacts of the planned project on geological structure at the stage of decommissioning will be possible only in the variant involving the removal of underground transmission cables and it will be identical to the project impact at the stage of construction. It should be taken into account that the interference into geological structures will involve the geological layers already transformed (during the construction phase).

##### 6.1.6.1.2 Impact on the topography and dynamics of the coastal zone

In the event of decommissioning of the cable connection located under the coastal zone area, its dismantling will be carried out by gradual pulling of the cable ashore from the entry/exit point. The borehole will be located outside the coastal zone, and therefore no negative impact of the project is expected at this stage.

##### 6.1.6.1.3 Impact on soils

Two possible solutions for the project decommissioning are assumed, namely deactivation of the infrastructure or its complete removal.

In case of the first solution, the cable lines in the onshore part will be de-energised and deactivated after the operation period. Their dismantling is not expected; thus, there will be no direct interference in the ground structures during this phase of the project. The onshore substations, due to their nature and functionality, will not be subject to decommissioning either; therefore, no impacts on soils are anticipated for this solution.

In the case of the dismantling of the Baltica OWF CI, the decommissioning phase will be similar to the construction phase in terms of technologies, equipment and workload applied. Therefore, the main source of pollution may be the works related to cable line dismantling and demolition works in the OnSS area resulting in a transformation of soil surface due to mechanical deformation and destruction of soil structure, as well as possible contamination of the ground surface and deeper layers due to accidental leakage of substances from tanks, machinery, equipment, vehicles and waste or packaging. The impact at the decommissioning stage will be short-term and if all mitigating measures are applied by the Contractor, no significant long-term impacts on the soil environment are anticipated at this stage.

##### 6.1.6.1.4 Impact on the access to raw materials and deposits

According to the information available in the Central Geological Database of the Polish Geological Institute, as at the date of the report, neither mineral deposits nor mining areas or sites exist within the boundaries of the planned project. Due to ongoing exploration works, which cover also the area of the Baltica OWF CI, there is a probability of obstructions in the access to the potential deposits in the event of deactivation of the OnSS at the stage of project decommissioning. On the other hand, in the event of the second solution for the project decommissioning, in which the removal of the cable installation and the OnSS infrastructure is planned, the decommissioning will have a positive impact on the access to potential hydrocarbon deposits by making the previously occupied areas available.

#### 6.1.6.2 Impact on the quality of surface waters

In the case of a possible decommissioning of the Baltica OWF CI by dismantling, the impacts on surface water quality will be identical to those identified for the construction phase. In the case of the OnSS deactivation at the stage of project decommissioning, no impacts on surface waters are anticipated.

#### 6.1.6.3 Impact on hydrogeological conditions and groundwater

In the case of a possible decommissioning of the Baltica OWF CI by dismantling, the impacts on hydrogeological conditions and groundwater will be identical to those identified for the construction phase. In the case of the OnSS deactivation at the stage of project decommissioning, no impacts on hydrogeological conditions and groundwater are anticipated.

#### 6.1.6.4 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

The decommissioning variant of the planned project, which assumes shutdown of the entire installation, will not generate any impacts on the atmospheric air.

The decommissioning variant of the planned project assuming the removal of elements installed during the construction from the area (also from underneath the surface) may generate emissions from the following sources:

- fuel combustion in construction machinery engines;
- handling of soil material during cable line removal and OnSS dismantling;
- traffic of construction machinery on access roads (hardened and unhardened);
- wind erosion of soil surface in the area of cable lines and the OnSS.

Fuel combustion in construction machinery engines will be a significant source of emissions to air at the project decommissioning stage (as in the case of the construction stage). Assuming the same number of machines and the same method of conducting dismantling works as in the construction phase, exhaust emissions are not expected to have a significant impact on the nearest residential area, as they will be restricted to the immediate vicinity of the construction site. An important aspect in this context will be the technology (combustion engine design) of demolition equipment to be used in the future, which will most likely show an even higher reduction of exhaust emissions than current solutions, and therefore the impact may be significantly lower compared with the project construction stage.

It is assumed that at the soil masses moved at the decommissioning stage will be wet masses, not prone to drying out, therefore the handling of such material will be practically emission-free.

It is also assumed that the service roads within the cable bed strip, the access roads to the installation strip and the drilling site in the coastal zone, as well as the access road to the OnSS (i.e. the same as at the project construction stage) will be used for the removal of the connection infrastructure. Consequently, it is recommended that emission mitigation methods mentioned in Section 6.1.4.4 are applied to the road surfaces, which should result in practically no impact on residential or recreational areas.

The cable bed area has a low potential for wind erosion of the ground surface due to the natural protection provided by the forest as well as the high moisture content of the material. This is confirmed by the results of the calculations described in the *Shore Analysis* for the four sections forming the northern part of the cable bed area. They showed that erosive changes are to be expected in sections 1 and 4, yet of low intensity; section 2 remains in lithodynamic equilibrium, whereas in section 3 accumulation processes will occur. The OnSS site, within which the topsoil is at risk of drying out, will be subject to wind erosion (the erosion potential being renewed with each surface disturbance, proportionally to the surface area disturbed). However, due to favourable wind conditions (low frequency of strong winds and E, ENE wind directions accounting for only 7–8%) the significance of wind erosion within the area of the decommissioned OnSSs for air quality in Osieki Lęborskie should be regarded as negligible.

To sum up the assessment of the above-mentioned emissions to air from the planned project at its decommissioning stage, neither the area of the cable lines, nor the sea–land drilling route, nor the OnSS area will constitute sources of emissions of air pollutants that could affect the air quality in the inhabited areas situated in the vicinity.

#### 6.1.6.5 Impact on ambient noise

Similarly to the construction stage, the source of noise generated at the stage of project decommissioning through dismantling will be construction machinery and equipment. The duration of that impact will be strictly limited to the duration of dismantling works and will cease completely upon completion of the decommissioning stage of a given section of the project.

Acoustic impact at that stage of works will be concentrated and will mainly affect the location in which the dismantling works will be taking place. However, noise emissions from access roads to the site due to truck traffic are to be expected.

The assessment of the scale of impact of noise is presented in Table 6.129, whereas the assessment of the impact significance in Table 6.130.

*Table 6.129. Assessment of the scale of noise impact [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Noise emitted by construction equipment | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |

*Table 6.130. Assessment of the noise impact significance [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Noise emitted by construction equipment | Low | High | Low |

#### 6.1.6.6 Electromagnetic field emission

In the Baltica OWF CI decommissioning phase, there will be no emission of electromagnetic field, as it concerns devices which are energised, i.e. in operation.

#### 6.1.6.7 Impact on nature and protected areas

##### 6.1.6.7.1 Impact on biotic elements in the onshore area

###### 6.1.6.7.1.1 Fungi

**Physical loss of habitats of fungi species.** During the operation period, the Baltica OWF CI areas may be colonised by new fungi species. This may especially apply to areas above the cable lines. If the Baltica OWF CI is decommissioned by physical removal of its components, also these plots will be eliminated.

During the dismantling works, fungi plots will be subject to **air pollution from exhaust emissions** from construction machinery and vehicles as well as transport of materials and people, along with **dust emissions** from the dismantling works and erosion of the exposed soil layers. Such emissions can cause a deterioration of the mycelium health status.

If the Baltica OWF CI is decommissioned by deactivation, no impact of this project stage on fungi should be expected.

The assessment of the scale of impact on fungi is presented in Table 6.131, whereas the assessment of the impact significance in Table 6.132.

*Table 6.131. Assessment of the scale of impact on fungi [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Physical loss of habitats of fungi species | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.132. Assessment of the impact significance on fungi [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of habitats of fungi species | High | Moderate | Moderate |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

#### 6.1.6.7.1.2 Lichens

**Physical loss of habitats of species growing on trees and soil** During the operation period, the Baltica OWF CI areas may be colonised by new lichen species. This may apply particularly to the trees growing in the OnSS area. If the Baltica OWF CI is decommissioned by physical removal of its components, also these plots will be eliminated.

During the dismantling works, lichen plots will be subject to **air pollution from exhaust emissions** from construction machinery and vehicles as well as from the transport of materials and people, along with **dust emissions** from the dismantling works and erosion of the exposed soil layers. Such emissions can cause a deterioration of the thalli health status.

If the Baltica OWF CI is decommissioned by deactivation, no impact of this project stage on lichens should be expected.

The assessment of the scale of impact on lichens is presented in Table 6.133, whereas the assessment of the impact significance in Table 6.134.

*Table 6.133. Assessment of the scale of impact on lichens [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Physical loss of habitats of species growing on trees and soil | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| erosion of exposed soil | | | | | | | | | | | | | | |

*Table 6.134. Assessment of the impact significance on lichens [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of habitats of species growing on trees and soil | High | Moderate | Moderate |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Moderate | Low |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Moderate | Low |

#### 6.1.6.7.1.3 Mosses and liverworts

**Physical loss of species habitats.** At the stage of operation, the Baltica OWF CI will most probably be rich in moss species typical of coniferous forests, occurring also in the adjacent forest patches, as well as in some ubiquitous species, but they will not represent a high natural value. At the stage of decommissioning, these plots will be destroyed.

At the stage of Baltica OWF CI decommissioning, similarly to the construction stage, mosses and liverworts will be impacted by **exhaust emissions** from construction machinery and vehicles as well as transport of materials and people, along with **dust emissions** from construction works and erosion of the exposed soil layers.

If the Baltica OWF CI is decommissioned by deactivation, no impact of this project stage on mosses and liverworts should be expected.

The assessment of the scale of impact on mosses and liverworts is presented in Table 6.135, whereas the assessment of the impact significance in Table 6.136.

*Table 6.135. Assessment of the scale of impact on mosses and liverworts [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical loss of species habitats | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.136. Assessment of the impact significance on mosses and liverworts [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Physical loss of species habitats | High | Low | Low |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

#### 6.1.6.7.1.4 Vascular plants and natural habitats

**Physical loss of species habitats.** During the operation period, the Baltica OWF CI areas may be colonised by new species of vascular plants. In the area of patches of habitat 2180, psammophilous species typical of the coastal grey dunes may occur, namely grey hair-grass *Corynephorus canescens*, sand sedge *Carex arenaria*, red fescue *Festuca rubra* ssp. *arenaria*, dwarf everlast *Helichrysum arenarium,* common heather *Calluna vulgaris* and other grassland species. If the Baltica OWF CI is decommissioned by physical removal of its components, also these plots will be eliminated. No habitats patches are expected to develop.

At the stage of Baltica OWF CI decommissioning, similarly to the construction stage, vascular plants and natural habitats will be impacted by **exhaust emissions** from construction machinery and vehicles as well as transport of materials and people, along with **dust emissions** from construction works and erosion of the exposed soil layers.

If the Baltica OWF CI is decommissioned by deactivation, no impact of this project stage on vascular plants and natural habitats should be expected.

The assessment of the scale of impact on vascular plants and natural habitats is presented in Table 6.137, whereas the assessment of the impact significance in Table 6.138

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical loss of species habitats | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

Table 6.138.

*Table 6.137. Assessment of the scale of impact on vascular plants and natural habitats [Source: internal materials]*

| **Impact** | **Impact characteristics** | | | | | | | | | | | | | **Joint assessment** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | | | **Range** | | | **Duration** | | | | | **Permanence** | | |
| | **Direct** | **Indirect** | **Secondary** | **Transboundary** | **Regional** | **Local** | **Constant** | **Long-term** | **Medium-term** | **Short-term** | **Momentary** | **Irreversible** | **Reversible** | |
| | **Points** | | | | | | | | | | | | | |
| | **3** | **2** | **1** | **3** | **2** | **1** | **5** | **4** | **3** | **2** | **1** | **2** | **1** | **4–13** |
| Physical loss of species habitats | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Air pollution caused by dust emissions from | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| construction works and erosion of exposed soil | | | | | | | | | | | | | | |

*Table 6.138. Assessment of the impact significance on vascular plants and natural habitats [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of species habitats | High | Moderate | Moderate |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

###### 6.1.6.7.1.5 Invertebrates

During the operation period, the Baltica OWF CI area will be used by various species of invertebrates. However, it is difficult to predict whether the area will only be visited by individuals in search of food or some fragment will qualify as a site. It was therefore concluded that during the project decommissioning by dismantling and deactivation no impact on protected and/or endangered species of invertebrates is anticipated.

###### 6.1.6.7.1.6 Herpetofauna

Below, the impacts of the Baltica OWF CI are described for the stage of decommissioning by dismantling of its components.

**Collisions of construction equipment with amphibians during their migrations from and to wintering grounds** – traffic of mechanical vehicles, especially during seasonal amphibian migrations in months III–IV and IX–X may cause losses among at least 6 species of locally occurring amphibians;

**Vibration due to the use of heavy equipment** in reptile habitats – the removal of cable lines will involve the use of heavy equipment. The side effect of the operation of this type of machinery are vibrations of the substratum, which will cause disorientation and stress in locally occurring reptiles, especially snakes. Those animals will avoid the sites of operation of such equipment even within their habitats.

If the Baltica OWF CI is decommissioned by deactivation, no impact of this project stage on herpetofauna should be expected.

The assessment of the scale of impact on herpetofauna is presented in Table 6.139, whereas the assessment of the impact significance in Table 6.140.

*Table 6.139. Assessment of the scale of impact on herpetofauna [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Collisions of construction equipment with amphibians during their migrations from and to wintering grounds | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Vibration due to the use of heavy equipment in reptile habitats | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.140. Assessment of the impact significance on herpetofauna [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Collision on service roads with amphibians during their migration from and to wintering grounds (within the wintering area) | Low | High | Low |
| Vibration due to the use of heavy equipment in reptile habitats (at the forest edge by the OnSS and near the drilling site in the nearshore zone) | Low | Low | Negligible |

#### 6.1.6.7.1.7 Birds

Below, the impacts of the Baltica OWF CI are described for the stage of decommissioning by dismantling of its components.

**Disturbance (presence of people and vehicles during dismantling works)** – that risk will affect both breeding and migratory birds, however, a much greater negative impact will affect the breeding species essentially attached to a particular fragment of land. The disturbance may cause local losses in broods and the abandonment of breeding sites. Birds will be disturbed due to the periodic frequent presence of people performing decommissioning work.

**Physical loss of habitats developed during the operation phase** – this impact will mainly affect an extensive area of the cable bed. During the operation phase, habitats (such as grassland or heathland) will be created here and will be used by a variety of bird species, including species that are rare or listed in Annex I of the Birds Directive (the European nightjar, the woodlark). Alteration of the character of this habitat (e.g. through afforestation) will result in the withdrawal of certain species and the appearance of others, initially associated with forest crops and young stands and later with mature forests.

**Destruction of nests and broods during dismantling works as well as tree felling and shrub clearance** – this threat is mainly associated with the dismantling of buildings as well as tree and shrub clearance within the OnSS area, if the clearance is carried out during the breeding season. Both the buildings and other infrastructure elements as well as trees and bushes may be nesting sites for several bird species.

If the Baltica OWF CI is decommissioned by deactivation, **bird collisions with tall structures** are to be expected, as at the operation stage.

The assessment of the scale of impact on birds is presented in Table 6.141, whereas the assessment of the impact significance in Table 6.142.

*Table 6.141. Assessment of the scale of impacts on birds [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Disturbance (presence of people and vehicles during dismantling works) | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Physical loss of habitats developed during the operation phase | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |
| Destruction of nests and broods during dismantling works as well as tree felling and shrub clearance | 3 | | | | | 1 | | | | 2 | | | 1 | 7 |
| Collision with tall structures | 3 | | | | | 1 | 5 | | | | | 2 | | 11 |

*Table 6.142. Assessment of the impact significance on birds [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance (presence of people and vehicles during dismantling works) | Low | High | Low |
| Physical loss of habitats developed during the operation phase | High | Moderate | Moderate |
| Destruction of nests and broods during dismantling works as well as tree felling and shrub clearance | Low | High | Low |
| Collision with tall structures | High | Moderate | Moderate |

#### 6.1.6.7.1.8 Mammals

**Destruction of habitats.** If the Baltica OWF CI is decommissioned by physical removal of its components, the secondarily created habitats of species of unknown value will be destroyed.

**Unintentional killing of animals during dismantling works**. The dismantling of infrastructural elements poses a risk of collision or trapping, which might result in unintentional killing of animals.

**Disturbance caused by works involving equipment generating noise and vibration as well as by the lighting of the construction site and the presence of people.** Dismantling works will affect both areas covered by the works and those situated farther away. The main factors are noise, vibrations, presence of people as well as increased traffic and lighting, which will result in changes in the activity and local movement routes across an area larger than the area covered by the works.

If the Baltica OWF CI is decommissioned by deactivation, no impact of this project stage on mammals should be expected.

The assessment of the scale of impact on mammals is presented in Table 6.143, whereas the assessment of the impact significance in Table 6.144.

*Table 6.143. Assessment of the scale of impact on mammals [Source: internal materials]*

| Impact | Impact characteristics | | | | | | | | | | | | | Joint assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | | | Range | | | Duration | | | | | Permanence | | |
| | Direct | Indirect | Secondary | Transboundary | Regional | Local | Constant | Long-term | Medium-term | Short-term | Momentary | Irreversible | Reversible | |
| | Points | | | | | | | | | | | | | |
| | 3 | 2 | 1 | 3 | 2 | 1 | 5 | 4 | 3 | 2 | 1 | 2 | 1 | 4–13 |
| Destruction of habitats | | 2 | | | | 1 | 5 | | | | | 2 | | 10 |
| Unintentional killing of animals during dismantling works | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |
| Disturbance caused by works involving equipment generating noise and vibration as well as by the lighting of the construction site and the presence of people | 3 | | | | | 1 | | | | | 1 | | 1 | 6 |

*Table 6.144. Assessment of the impact significance on mammals [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Destruction of habitats | High | Moderate | Moderate |
| Unintentional killing of animals during dismantling works | Low | High | Low |
| Disturbance caused by works involving equipment generating noise and vibration as well as by the lighting of the construction site and the presence of people | Low | High | Low |

#### 6.1.6.7.2 Impact on protected areas

##### 6.1.6.7.2.1 Impact on protected areas other than Natura 2000 sites

In the case of the Baltica OWF CI decommissioning by dismantling there will be similar impacts on the Coastal Protected Landscape Area as during the construction (except for the permanent tree felling in a part of the forest). If the OWF Baltica CI is decommissioned by deactivation, this project stage is expected to have no impact on most groups except for birds, in the case of which collisions with tall structures of busbar systems and substation facilities will still occur. In both variants of the decommissioning phase, the cable bed area will most likely be afforested; restoration to agricultural use will occur within the OnSS area in the dismantling variant. The individual components of the environment will be subject to the impacts described in Sections 6.1.6.1, 6.1.6.2, 6.1.6.3, 6.1.6.4 and 6.1.6.7.1. This section provides an overall assessment of the impact of the planned project decommissioning stage through dismantling on the Coastal Protected Landscape Area; the impact was assessed as moderate.

##### 6.1.6.7.2.2 Impact on Natura 2000 sites

In the case the Baltica OWF CI decommissioning both by dismantling and deactivation, there will be no direct or indirect impacts on Natura 2000 sites.

After decommissioning, the cable bed area will most likely be afforested, which will result in the restoration of habitat continuity and the restoration of proper functioning of the Coastal Wildlife Corridor connecting the *Białogóra* PLH220003 and *Mierzeja Sarbska* PLH220018 Natura 2000 sites.

#### 6.1.6.7.3 Impact on wildlife corridors

In the case of the Baltica OWF CI decommissioning by dismantling, disturbance of animals will occur by working machinery, human presence and the lighting of the construction sites in the area covered by the works. It is assumed that the dismantling will be conducted in several sections distant from one another, which will not restrict the spreading of animals across other sections of the cable bed not covered by the works; therefore, there will be no significant restrictions in the free movement of animals. After the completion of the dismantling, the cable bed area will most probably be afforested and the OnSS area will be returned to agricultural use, which will result in the restoration of habitat continuity and the restoration of corridor functions.

In the case of the Baltica OWF CI decommissioning by deactivation, the cable bed area will most likely be afforested as soon as the decision on this method of decommissioning is taken. In this case, the restoration of the Coastal Wildlife Corridor functionality will be faster and no negative impacts of the decommissioning of the planned project on the corridor should be expected.

In either variant of the Baltica OWF CI decommissioning, no negative impacts of the planned project decommissioning on this corridor should be anticipated.

#### 6.1.6.7.4 Impact on biodiversity

In the case of possible decommissioning of the Baltica OWF CI, impacts in the context of biodiversity will concern:

- transformation of secondarily created species habitats;
- noise emissions, which may result in scaring of vulnerable species;
- the permeation of pollutants into water and soil and directly into habitats.

The effects of the above-mentioned negative impacts will be manifested mainly in:

- the limitation of the availability of the food supply, reproduction locations, etc.;

- temporary abandonment of habitats;
- increase in mortality through direct collisions during dismantling works.

In Section 6.1.6.7.1, the individual impacts and their effects at the operation stage were assessed with reference to the individual components of the biotic environment. In this section, a joint assessment of the planned project operation stage on biological diversity was carried out and the impact was assessed to be moderate.

#### 6.1.6.8 Impact on cultural values, monuments and archaeological sites and objects

Assuming the variant of removal of the transmission infrastructure, the impact related to the potential decommissioning of the planned project will be associated with the operation of heavy mechanical equipment, as well as transport and management of debris and demolition materials. The works are expected to cover the same area as in the case of the project implementation. In the case of the implementation of the connection within the boundaries of the archaeological site no. AZP 2-37/9 (listed in the register of historical monuments) involving trenchless drilling, the dismantling of cable lines will be carried out by pulling them out without disturbing the top layer of the ground, which may contain artefacts. However, in the case of the cable line dismantling by excavation after archaeological surveys have been carried out, the interference will affect an area that has already been surveyed and subsequently transformed. Therefore, no impact of the project on archaeological sites is expected at the stage of its decommissioning.

#### 6.1.6.9 Impact on the use and development of the land area and tangible goods

In the case of possible decommissioning of the Baltica OWF CI, the impacts will be the same as those identified for the construction phase (see Subsection 6.1.4.9).

#### 6.1.6.10 Impact on landscape, including the cultural landscape

In the case of the Baltica OWF CI decommissioning without dismantling its components, the impacts and their significance on the landscape will be identical to those identified for the operation phase (see Subsection 6.1.5.10). On the other hand, if the decommissioning phase assumes dismantling of the cable line infrastructure, the OnSS and busbar systems, the impacts on the landscape will be the same as in the construction phase (see Subsection 6.1.4.10).

#### 6.1.6.11 Impact on population, human health and living conditions

At the stage of the Baltica OWF CI decommissioning by dismantling, the same impacts on human health will occur as at the stage of construction, due to traffic, exhaust emissions, dust from roads as well as noise. In the case of the Baltica OWF decommissioning by deactivation, there will be no negative impacts on human health.

## 6.2 Rational Alternative Variant (RAV)

Compared with the APV, the Rational Alternative Variant differs in the maximum number of cable lines planned to be constructed in the offshore and onshore areas. In the offshore area, this will be directly related to the potentially larger area of the seabed covered by underwater works and the volumes of seabed sediments disturbed during the construction of the cable lines.

These potential differences are not expected to affect the assessment of the impact scale. Taking into account the same sensitivity of the receptors (environmental components affected by the impacts), it can be assumed that the impacts of the Baltica OWF CI in the RAV will be the same as in the APV.

In the case of the onshore section, the width of the cable bed crossing the forest area will be the same as for the APV, i.e. between 62 and 68 m. Similarly, there will be no changes to the location and size of the OnSS nor to the location and parameters of the access road to the OnSS. Therefore, most of the impacts of the Baltica OWF CI in both variants will be the same. Only those that will be different in the two variants are discussed below.

## 6.2.1 Construction phase

### 6.2.1.1 Impact on soils

The Rational Alternative Variant (RAV) involves routing 11 cable lines within the cable bed area. In the RAV, the route of the connection line itself and the total width of the cable bed area crossing the forest (from 62 to 68 m) will be the same as in the APV. Therefore, the extent of tree and shrub clearance and the extent of land levelling for both variants will remain the same.

Although the spatial scope of the project in this variant does not change, the mechanical interference with the ground structures will be greater, including the additional execution of two open trenches along the entire 6.5 km section. The estimated maximum volume of excavations in the onshore area of the planned project will be approx. 1 310 500 m$^3$. If soil drainage needs to be provided for cable laying at the bottom of the excavation, the extent of temporary drainage will also need to be greater for the RAV.

For the OnSS area, the scope of work under the RAV remains the same as for the APV, therefore the impact on soils will also be the same.

### 6.2.1.2 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

The only difference if this variant is selected may be related to emissions from fuel combustion by heavy construction machinery at the stage of laying 2 additional cable lines. However, given that the same number of machines are expected to be used for each single section of the cable line during installation, the project implementation variant selected will not have a significant impact on emissions and the scale of impact on atmospheric air.

## 6.2.2 Operation phase

### 6.2.2.1 Electromagnetic field emission

#### 6.2.2.1.1 Calculation of magnetic field distribution in the surroundings of the planned cable line

The calculations results of the maximum values of the magnetic field strength (H) that can be expected above the cable bed area for the RAV are presented in Table 6.145, whereas the diagrams of the distribution of the magnetic field strength (H) in the cross-section transverse to the axis of the cable bed area are indicated in the figures in Appendix 3 to this Report. The Appendix contains a detailed description of the assumptions made for the calculations.

*Table 6.145. Results of calculations of expected maximum values of magnetic field strength in the surroundings of the cable bed area (11 cable lines, flat layout) [Source: internal materials]*

| Solution | Voltage [kV] | B2 | | B3 | | Maximum expected value of the magnetic field intensity H [A·m$^{-1}$] determined at a height of [MAGL] | | |
|---|---|---|---|---|---|---|---|---|
| | | Number of cable lines | $I_{max}$ [A] | Number of cable lines | $I_{max}$ [A] | 0.2 | 1.0 | 2.0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 275 | 6 | 730 | 5 | 614 | 17.4 | 8.2 | 4.5 |
| 2 | 220 | | 912 | | 768 | 21.8 | 10.2 | 5.7 |

# 7 Cumulative impacts of the planned project (including existing, implemented and planned projects and activities)

## 7.1 Existing, implemented, and planned projects functionally unrelated to the planned project for which decisions on environmental conditions have been issued

On the basis of the information obtained from the Regional Directorate for Environmental Protection in Gdańsk and the communes of Choczewo and Krokowa, the projects for which the procedure to issue decisions on the environmental conditions is in progress, or for which such decisions have been already issued within the last 3 years, are listed in Table 7.1.

*Table 7.1. List of the projects for which the procedure to issue decisions on the environmental conditions is in progress, or for which such decisions have already been issued within the last 3 years [Source: internal materials]*

| Authority issuing the DEC | Project name, stage of the DEC procedure | Description of the project |
|---|---|---|
| Choczewo commune | Decision of 24 April 2019 (ref. no.: IKS.6220.01.2019.ZW) finding that there is no need to conduct an EIA for the project "Modernisation of the petrol station in Choczewo" and, at the same time, determining the environmental conditions for the said project. | The project concerns the extension and reconstruction of the existing petrol station involving:<br>• the underground multi-chamber tank;<br>• new pumps;<br>• new tank emptying station.<br>The planned modernisation of the station does not include LPG storage and distribution. The station is located in the north-eastern part of the village of Choczewo on the plots no. 100/13, 100/4, 100/5 within the precinct 006 Choczewo.<br>The project being implemented within the area of the village of Choczewo at a distance of approx. 3.5 km from the Baltica OWF CI. |
| RDEP in Gdańsk | Resolution of 19 July 2020 (ref. no.: RDOŚ-Gd-WOC.43.26.2020.MJ.8) approving the project implementation in terms of its impact on the Natura 2000 site *Białogóra* (PLH220003) for the project "Construction of the base station BT 44803 Białogóra including an antenna system, free-standing telecommunication cabinets, cable ducts and a power feeding line, on the plot no. 86 in Białogóra" | The project involves the construction and operation of the base station BT 44803 Białogóra to improve the quality and extend the range of services as well as to ensure the correct transmission within the network. The base station will be located in a rural area. There are no built-up areas in the immediate vicinity. The base station will consist of:<br>• controllers, transceivers and power supply devices;<br>• sector antennas mounted on a tower (5 pcs);<br>• radio link antennas (5 pcs);<br>• antenna line elements.<br>The project located on the plot no. 86 in Białogóra, approx. 5.5 km from the Baltica 2 OWF CI. |

Due to the different nature of the above-mentioned projects and the resulting impacts, no cumulative impacts with the Baltica OWF CI are anticipated.

On 25 May 2016, the General Directorate for Environmental Protection in Warsaw issued a notice (ref. no. DOOŚ-OA.4205.1.2015.24) informing the parties to the proceedings for issuing a DEC for the project involving the construction and operation of Poland's first nuclear power plant with a capacity of up to 3750 MWe in the area of the communes of Choczewo or Gniewino and Krokowa, on issuing by the General Directorate the Resolution of 25.05.2016 (ref. no. DOOŚ-OA.4205.1.2015.23) specifying the scope of the Environmental Impact Assessment Report.

The project can be implemented in the areas of the communes of Choczewo or Gniewino and Krokowa in the Pomorskie Voivodeship, at one of the two site alternatives selected at the EIA stage and approved at the stage of site selection for a nuclear facility, i.e. Lubiatowo-Kopalino or Żarnowiec [Figure 7.1, Figure 7.2].

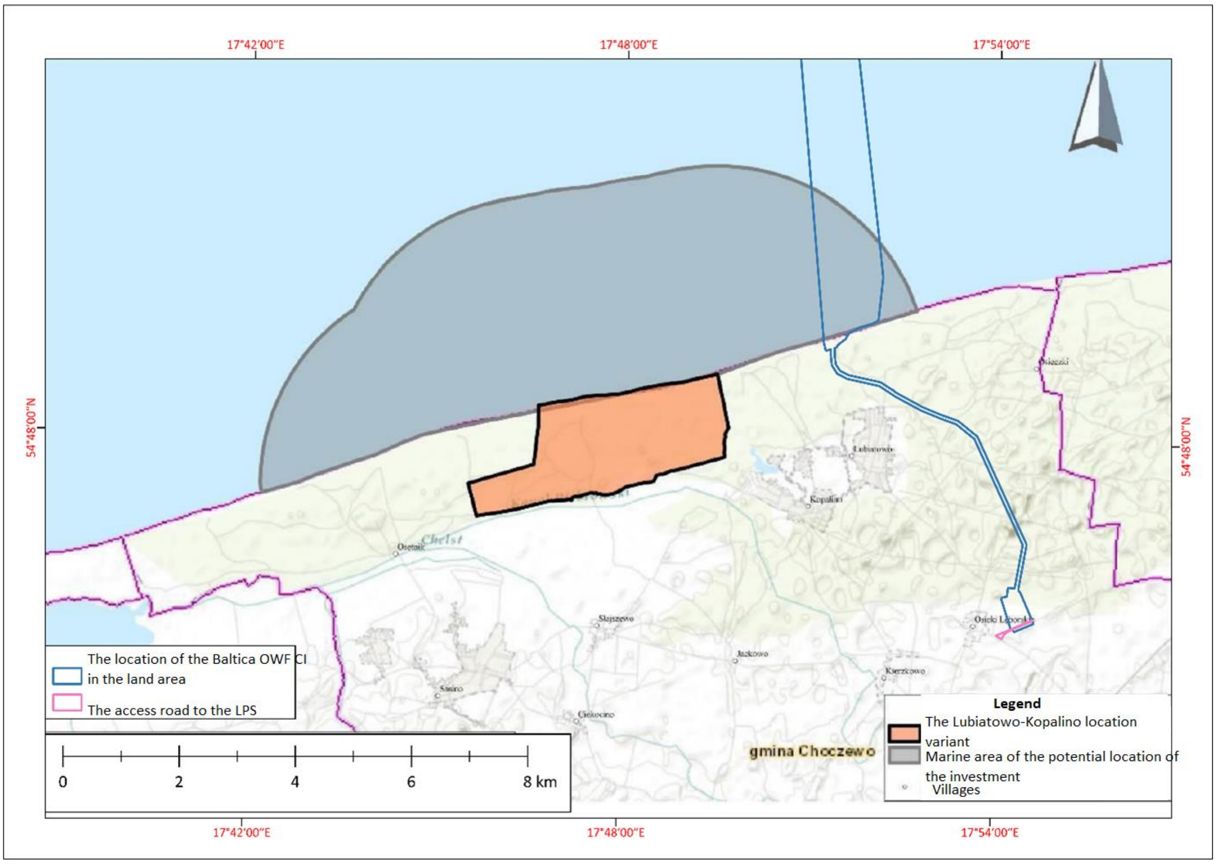



*Figure 7.1. Proposed sites for the Nuclear Power Plant (the Lubiatowo-Kopalino site alternative) and the Baltica OWF CI [Source: internal materials based on the Project Specification Sheet. PGE EJ 1 Sp. z o.o., 2015]*

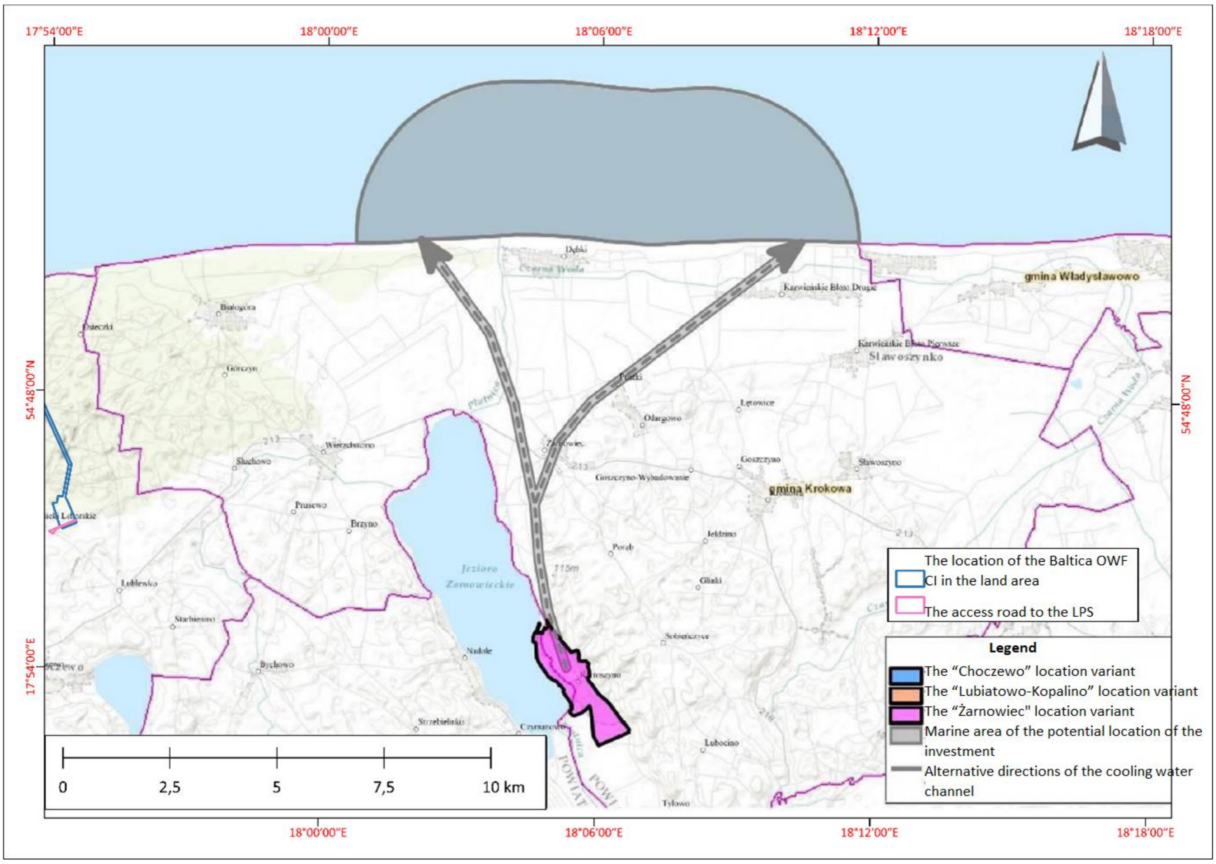



*Figure 7.2. Proposed sites for the Nuclear Power Plant (the Żarnowiec site alternative) and the Baltica OWF CI [Source: internal materials based on the Project Specification Sheet. PGE EJ 1 Sp. z o.o., 2015]*

As stated in the Project (Nuclear Power Plant) Specification Sheet, detailed layout proposals for infrastructure corridors shall be presented in the EIA report after the completion of environmental surveys and the planned local and regional consultations, whereas the final route of the corridors for the connection infrastructure can be determined after the Applicant has obtained the conditions for connection to the grid.

The following decisions were issued by the Director of the Maritime Office in Gdynia for the project in question (https://sipam.gov.pl/geoportal):

- Decision no. 6/19 of 8 August 2019 (ref. no.: INZ1.1.8105.12.5.2018.MGw) on the laying and maintenance of cables and pipelines for the purpose of the cooling system of the nuclear power plant in the area of the territorial sea for the Żarnowiec Site;
- Decision no. 7/19 of 8 August 2019 (ref. no.: INZ1.1.8105.13.5.2018.MGw) on the laying and maintenance of cables and pipelines for the purpose of the cooling system of the nuclear power plant in the area of the territorial sea for the Lubiatowo-Kopalino Site.

The Lubiatowo-Kopalino site alternative is located at a distance of slightly over 5 km north-west of the OnSS, whereas the Żarnowiec site alternative is located at a distance of approx. 11 km east of the OnSS. For the time being, it is impossible to predict whether and when the nuclear power plant will be built, which site alternative will be chosen, , nor how long the construction phase will last. If the Lubiatowo-Kopalino site alternative is selected, with the Nuclear Power Plant being built at the same time as the Baltica OWF CI, the accumulation of impacts may occur in relation to:

- climate and air quality – the accumulation of impacts related to the air pollutant emissions may result from the increased volume of traffic of the vehicles involved in the construction works and material transportation. It is assumed that owing to the considerable distance between the locations of both projects and good air circulation, the accumulation of impacts on the air and climate will not persist and will not cause the air quality nor local climate to deteriorate. These will be medium-term impacts of a regional scale;
- population and its living conditions – it may happen that the vehicles serving the construction of both projects will use the same access roads as the inhabitants of the adjacent areas. However, it should be noted that the Baltica OWF CI construction in the onshore part is planned to progress fairly quickly and is to be carried out section by section – the accumulation of impacts will be medium-term and local.

Possible cumulative impacts of the Nuclear Power Plant built at the Lubiatowo-Kopalino site in combination with the Baltica OWF CI would be limited to the construction phase, since the operation phase of the Baltica OWF CI proceeds practically automatically, being limited to maintenance work, which will take place once a year.

If the planned project is implemented simultaneously with the Nuclear Power Plant at the Lubiatowo-Kopalino site, the impacts associated with the construction phase might be related to physical transformations of the land surface, including its cover, land occupancy, increased vehicle traffic, emission of noise and vibration.

However, taking into account the process stage at which both planned projects are, it should not be expected that construction works will be carried out simultaneously; thus, the cumulative impacts will not occur.

## 7.2 Infrastructure-related planned projects

### 7.2.1 Formal conditions

At present, an extensive programme of offshore wind energy development by various developers is being implemented. Offshore wind farms are planned to be built by the subsidiaries of PGE S.A. (Elektrownia Wiatrowa Baltica-2 sp. z o.o., Elektrownia Wiatrowa Baltica-3 sp. z o.o., Elektrownia Wiatrowa Baltica-1 sp. z o.o.), Orlen S.A. (Baltic Power Sp. z o.o.) and OceanWinds Polska Sp. z o.o. The reserves for the next project of Tauron (so-called Baltex) are also safeguarded. Table 7.2 presents a list of decisions issued by the Director of the Maritime Office in Gdynia concerning the laying and maintenance, within the internal sea waters and territorial sea, of cables evacuating power from OWFs in this region of the Baltic Sea.

*Table 7.2. List of binding decisions issued by the Director of the Maritime Office in Gdynia [Source: data of the Maritime Office in Gdynia, https://sipam.gov.pl/geoportal]*

| Number/date of decision | Applicant | Subject of decision |
|---|---|---|
| 1/DS/20<br>06.11.2020 | Elektrownia Wiatrowa Baltica-2 Sp. z o.o. | Laying and maintenance, within the internal sea waters and territorial sea, of cables evacuating power from the project “Zespół Morskich Farm Wiatrowych o maksymalnej łącznej mocy 1500 MW oraz infrastruktura techniczna, pomiarowo-badawcza i serwisowa związana z etapem przygotowawczym, realizacyjnym i eksploatacyjnym” [literally: Offshore Wind Farms Complex with a maximum total power output of 1500 MW together with technical, research and measurement, and service facilities related to the preparation, construction and operation stages]. |

| Number/date of decision | Applicant | Subject of decision |
|---|---|---|
| 2/DS/20<br>06.11.2020 | Elektrownia Wiatrowa Baltica-3 Sp. z o.o. | Laying and maintenance, within the internal sea waters and territorial sea, of cables evacuating power from the project "Zespół Morskich Farm Wiatrowych o maksymalnej łącznej mocy 1050 MW oraz infrastruktura techniczna, pomiarowo-badawcza i serwisowa związana z etapem przygotowawczym, realizacyjnym i eksploatacyjnym" [literally: Offshore Wind Farms Complex with a maximum total power output of 1500 MW together with technical, research and measurement, and service facilities related to the preparation, construction and operation stages] |
| 5/20<br>28.09.2020 | Baltic Power Sp. z o.o. | Laying and maintenance of cables and pipelines within the internal sea waters and territorial sea for the project "Budowa przyłącza elektroenergetycznego Morskiej Farmy Wiatrowej Baltic Power do Krajowej Sieci Przesyłowej" [literally: Construction of the Baltic Power Offshore Wind Farm power connection to the National Power System] |
| 9/DS/20<br>25.01.2021 | Elektrownia Wiatrowa Baltica 1 Sp. z o.o. | Laying and maintenance of subsea cables within the internal sea waters and territorial sea for the project "Zespół Morskich Farm Wiatrowych Baltica – 1" [literally: Offshore Wind Farms Complex – Baltica 1] |

With the letter of 27 June 2019 (supplemented on 22 August 2019 and 14 October 2019, and corrected on 19 September 2019 and 20 April 2020), Elektrownia Wiatrowa Baltica-2 sp. z o.o. applied for a permit for laying and maintenance, within the internal sea waters and territorial sea, of cables evacuating power from the project "Zespół Morskich Farm Wiatrowych o maksymalnej łącznej mocy 1500 MW oraz infrastruktura techniczna, pomiarowo-badawcza i serwisowa związana z etapem przygotowawczym, realizacyjnym i eksploatacyjnym" [literally: Offshore Wind Farms Complex with a maximum total power output of 1500 MW together with technical, research and measurement, and service infrastructure related to the preparatory, construction and operation stages]. The Director of the Maritime Office issued a decision (no. 1/DS/20) on the location of the above-mentioned project in the letter of 6 November 2020 (ref.no. INZ5DS.8104.1.11.2020.AGB).

On 27 June 2019, Elektrownia Wiatrowa Baltica-3 sp. z o.o. applied for the permit for the laying and maintenance, within the internal sea waters and territorial sea, of cables transmitting electricity from the project "Zespół Morskich Farm Wiatrowych o maksymalnej łącznej mocy 1050 MW oraz infrastruktura techniczna, pomiarowo-badawcza i serwisowa związana z etapem przygotowawczym, realizacyjnym i eksploatacyjnym" [literally: Offshore Wind Farms Complex with a maximum total power output of 1500 MW together with technical, research and measurement, and service facilities related to the preparation, construction and operation stages]. The application was supplemented on 22 August 2019 and 14 October 2019, and corrected on 19 September 2019 and 20 April 2020. The Director of the Maritime Office issued a decision (no. 2/DS/20) on the location of the above-mentioned project in the letter of 6 November 2020 (ref. no.: INZ5DS.8104.2.11.2020.AGB).

The permits were issued for a period of 35 years. The proposed project will involve the laying and maintenance of high voltage (HV) or EHV AC or DC power cables including the necessary telecommunication and associated infrastructure, using the method involving burying cables in the seabed or laying cables on the seabed with additional protection, whereas, in the coastal zone, the directional drilling method is planned to be used. During the cable operation, inspections of the particularly vulnerable areas (e.g. crossings with the existing infrastructure) shall be carried out once a year, whereas a full inspection of the entire length of the cable lines shall be carried out not more than once every 5 years.

With the letter of 20 December 2019, corrected on 31 March 2021, Baltic Power Sp. z o.o. applied for a permit for laying and maintenance of cables for the project "Budowa przyłącza elektroenergetycznego Morskiej Farmy Wiatrowej Baltic Power do Krajowej Sieci Przesyłowej" [literally: "Construction of the Baltic Power Offshore Wind Farm power connection to the National Power System"]. The project covers the area of the internal sea waters and territorial sea [for the Exclusive Economic Zone, the decision approving the location of the cables was issued by the Minister of Maritime Economy and Inland Navigation in the letter of 7 July 2020 (ref. no. DGM.WZRMPP.3.430.24.2020.NZ.1) – Decision 1/K/20]. The Director of the Maritime Office issued a decision (no. 5/20) concerning the location of the above-mentioned project in the letter of 28 September 2020 (ref. no. INZ1.1.8104.10.13.2019.MGw).

The permit was issued for a period of 35 years. The planned project will involve the laying of high voltage (HV) or EHV AC or DC power cables including the necessary telecommunication and associated infrastructure. In the area of the territorial sea, the method involving burying cables in the seabed or laying cables on the seabed with additional protection is envisaged, whereas, in the coastal zone, the directional drilling method is planned to be used.

Before issuing the above-mentioned decisions, the Director of the Maritime Office in Gdynia issued on 23 November 2018 the decision (no. 5/18) repealing the previously binding decision of 31 July 2014 concerning the laying and maintenance of subsea cables comprising offshore infrastructure for power transmission – eastern part (MTI-E) in the area of the territorial sea of the Republic of Poland. The Applicant – Inwestycje Infrastrukturalne Sp. z o.o. in the letter of 29 June 2018 requested the previous decision to be repealed. The Applicant's aim was to safeguard the space for future OWF developers; however, due to the fact that various developers have commenced their work, and the route of the proposed power cables has been specified, the area covered by the previous decision will not be designated for further development within the given scope.

Furthermore, on 18 February 2021 procedures for issuing a decision on cable laying and maintenance for C-Wind Polska Sp. z o.o. were initiated. (ref. no.: INZ1.1.8104.9.2021.MGw) and B-Wind Polska Sp. z o.o. (ref. no.: INZ1.1.8104.10.2021.MGw).

### 7.2.2 Connection infrastructure for OWFs

On 1 April 2021, Baltic Power Sp. z o.o. applied for a decision on environmental conditions for the project "Infrastruktura Przyłączeniowa Morskiej Farmy Wiatrowej Baltic Power" [literally: Baltic Power Offshore Wind Farm Connection Infrastructure].

On 31 August 2021, C-Wind Polska Sp. z o.o. applied for a decision on environmental conditions for the project "Budowa infrastruktury przesyłowej energii elektrycznej z Morskiej Farmy Wiatrowej BC-Wind do Krajowego Systemu Elektroenergetycznego" [literally: "Construction of the power transmission infrastructure from the BC-Wind Offshore Wind Farm to the National Power System].

On 23 September 2021, Elektrownia Wiatrowa Baltica-2 Sp. z o.o. and Elektrownia Wiatrowa Baltica-3 Sp. z o.o. applied for a decision on the environmental conditions for the project "Infrastruktura Przyłączeniowa MFW Baltica B-2 i B-3" [literally: "Connection Infrastructure of the Baltica B-2 and B-3 OWFs"].

The offshore part of the Baltica OWF CI development area is located in the Exclusive Economic Zone, in the territorial sea and internal sea waters. East of the Baltica OWF CI area, it is planned to build the connection infrastructure for the Baltic Power OWF and the connection infrastructure for the BC-Wind OWF [Figure 7.3].

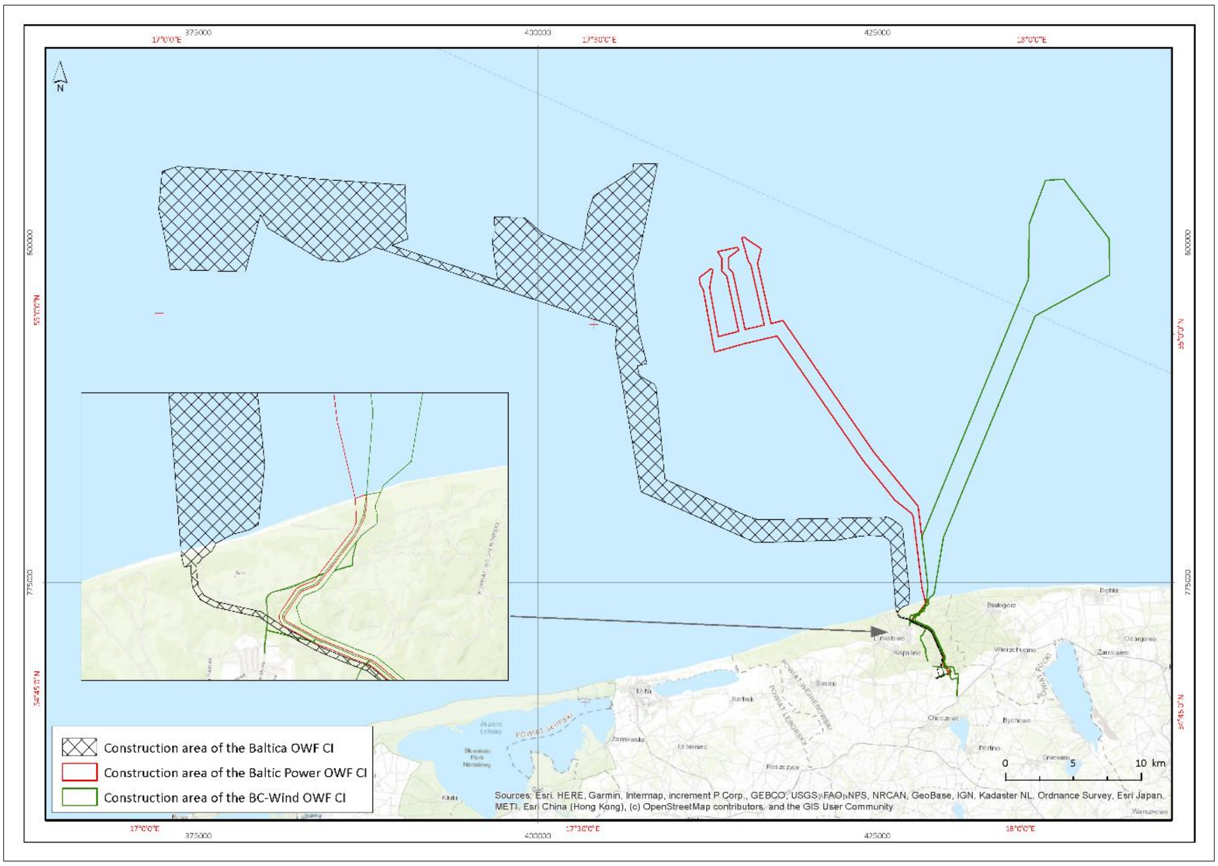



*Figure 7.3. Development areas for the Connection Infrastructure of the Baltica OWF, Baltic Power OWF and BC-Wind OWF [Source: internal materials]*

In the case of the Baltica OWF CI, the assumed length of a single cable line in the offshore area shall be up to 89 km, in the case of the Baltic Power OWF CI, it shall be up to 33 km, whereas in the case of the BC-Wind OWF CI, it shall be approximately 33 km. In the Exclusive Economic Zone, the routes of all three construction areas shall be located within individual offshore wind farms. In the territorial sea, their routes will converge. Approximately 7 km from the shoreline up to the drilling locations, these areas will run parallel to each other.

In the case of the onshore part, as agreed with the Choczewo Forest Inspectorate, the transmission infrastructure leading from the OWFs was designed to be routed through a shared cable bed area [Figure 7.4], lessening the negative environmental impacts to the maximum extent possible by:

- minimising the tree felling area thanks to routing the connection infrastructure of the OWF developers through a shared cable bed area;
- bypassing the environmentally valuable areas indicated by the Choczewo Forest Inspectorate at the stage of agreements;
- using the cable technology and horizontal directional drilling as the least environmentally damaging.

The connections of individual developers are at different project phases. Construction works for cable lines will be performed at different times. The construction of the Baltic Power OWF CI may be an exception. According to the information received from the Applicant, which results from the cooperation with the other developers, the construction of the Baltica OWF CI may coincide with the construction of the Baltic Power OWF CI.

The Baltica OWF CI development area is located in the northern part at a distance of approx. 1.8 km to the west of the Baltic Power OWF CI. South of the *Wydma Lubiatowska* dune, the projects use a shared corridor [Figure 7.4]. In this case, the accumulation of negative impacts related to the construction phase such as operation of machines and equipment used in construction work and their presence on the road between the villages of Osieki Lęborskie and Lubiatowo, may arise. It should be noted that it is acceptable to lay the cable lines in sections, which would reduce the likelihood of construction crews appearing simultaneously at the same sections.

The cable bed area is located in a forest area, far away from the road leading to the beach; therefore, the inconvenience caused by its development should not be experienced by forest users.

The section of the cycle route running east-west through the cable bed area will be temporarily out of use during the construction works carried out within it and in the immediate vicinity thereof; however, the Applicant proposes alternative solutions to maintain the route continuity.

In the drilling zone, it might be necessary to temporarily restrict access to the beach entrance; however, it should be noted that there are other entrances nearby; therefore, appropriate actions will be taken to ensure that other routes within the area of the Choczewo Forest District are accessible.

The southern part of the Ocean Winds OWF CI development area is adjacent to the east side of the BP OWF CI. As part of the project, there is a plan to build the following: approx. 33 km of subsea cable line within the waters of internal sea, territorial sea and exclusive economic zone, as well as 8.5 km of cable line, including a necessary service road and an onshore transformer substation (OTS), including a 1.5 km long access road in the Choczewo commune area.

All the proposed projects involve the construction of connections between individual onshore substations and their connection points at the substation owned by Polskie Sieci Energetyczne S.A.

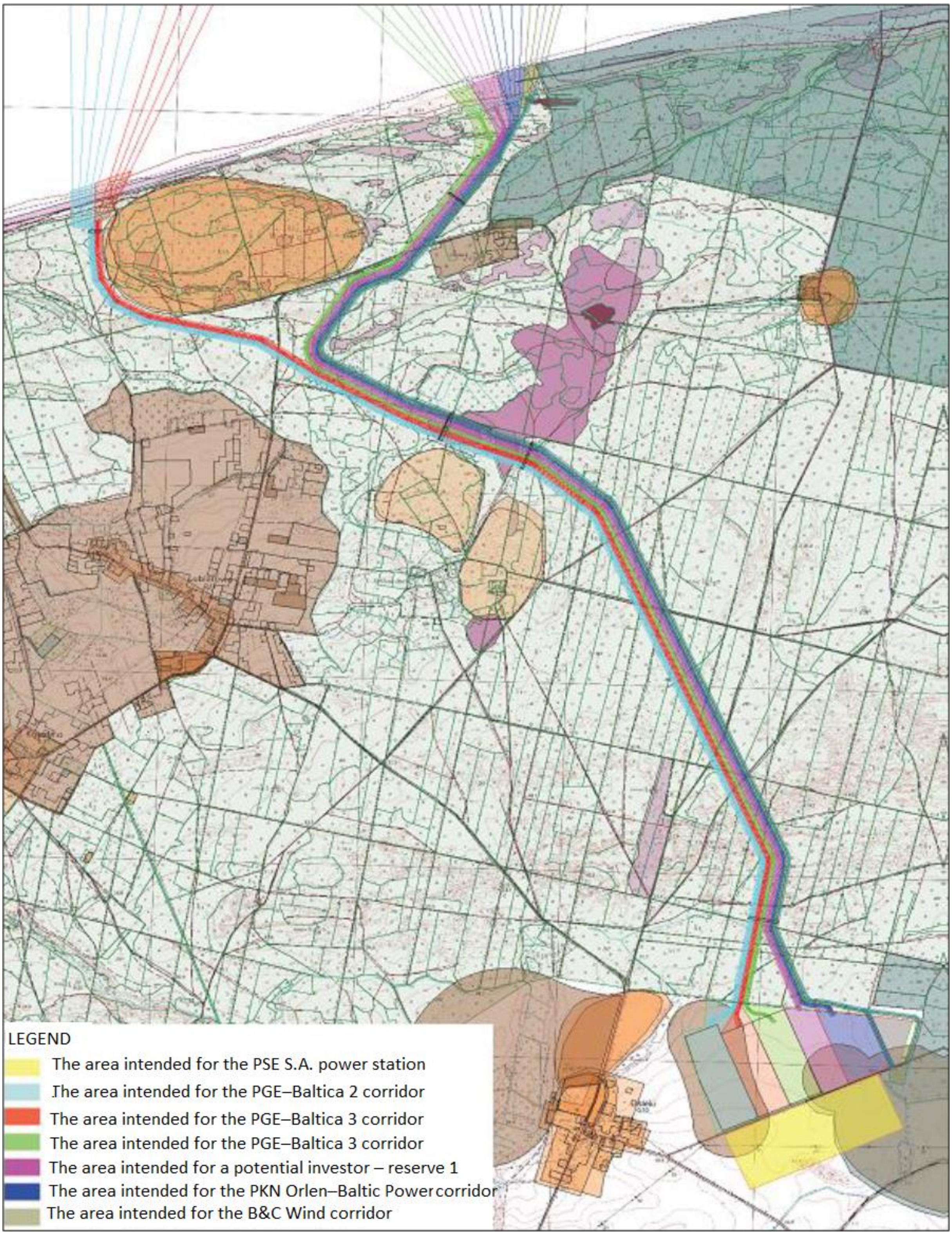



*Figure 7.4. Route of the cable bed area and substation sites in the Choczewo commune area [Source: Applicant's data]*

### 7.2.3 PSE substation

At its final section in the form of 400 kV busbar systems, the Baltica OWF CI enters the PSE substation (Choczewo Substation), which will be used for electric power transmission and distribution. This substation is located south of the substations of the Baltica OWF CI on an area of approx. 0.3 km$^2$, in part of the plot no. 25/3 (Kierzkowo precinct, Choczewo commune, Wejherowo district, Pomorskie voivodeship), on agricultural lands and tree- and shrub-covered arable lands.

The developer of the proposed project is the state-owned enterprise Polskie Sieci Elektroenergetyczne S.A. On 10.08.2021, an application was made for issuing a DEC for the project "Budowa stacji elektroenergetycznej 400 kV Choczewo" [literally: "Construction of the Choczewo 400 kV substation"].

The Choczewo Substation shall be equipped with a 400 kV switchyard constructed using AIS technology and the 3S+2SO arrangement. The busbar systems (tubular version) shall be divided into sections (section A and B). These sections shall be connected to each other by a longitudinal busbar coupler. Each section shall be equipped with a transverse busbar coupler, system earthing switches, bypass busbar couplers and voltage measurement bays. Two bypass busbars (tubular version) shall be installed. The linear bays for overhead terminals shall be equipped with anchor portals while cable line bays will have an enclosed cable termination station. Lightning protection shall be provided through the use of interception air rods, lightning masts and lightning rods installed on anchor portals. The station auxiliary system shall be based on power supply from transformers (0.4 kV), auxiliary transformers fed from an external MV network and an emergency power generator.

In the Choczewo Substation area, the following components shall be installed:

- 400 kV overhead switchyard constructed using the 3S+2SO arrangement;
- auxiliary building;
- guardhouse;
- power generator (on paved ground);
- internal road system, including parking sites and yards;
- cable ducts and conduits system;
- water supply system (supply from a water main and/or deep well);
- drainage system for buildings, roads, cable ducts etc.;
- water and sewer installations with a water storage/water storage and absorbent tank;
- fire water tanks with water connection points for firefighters;
- cesspool (sanitary sewerage system);
- exterior lighting;
- external fencing (made of concrete or panels) and regulatory fencing (interior – made of panels).

Furthermore, as part of the Choczewo Substation, auxiliary infrastructure such as utility connections and road exits shall be built.

In its immediate vicinity, the substations owned by the entities to be connected (OWF intermediary substations) will be located. These substations are in the development phases; therefore, due to the lack of data on the planned infrastructure, it is impossible to assess the cumulative impacts for the OnSS of the Baltica OWF CI.

## 7.3 Identification of potential cumulative impacts

In the vicinity of the offshore part of the Baltica OWF CI area, there are areas in which similar activities related to the laying of subsea power cables of other developers are planned. Therefore, the accumulation of underwater noise resulting from the construction works being conducted simultaneously within the areas of more than one of these projects may result in cumulative impacts, particularly in the zone up to approx. 7 km from the shoreline, where these areas are the closest to each other.

As regards the onshore part of the Baltica OWF CI, possible impact accumulations are related to noise generation as a result of machine and equipment operation during the construction phase and the noise generated as a result of electrical power equipment operation within the customer substations of other developers and the Choczewo Substation during their operation phase.

In addition, emissions to air from the combustion of fuels during the various development stages and electromagnetic field emission from all cable lines running at a considerable distance along the same route and leading to various customer substations were also analysed in terms of cumulative impacts.

The development of various customer substations in close vicinity to each other will entail greater impact on two components: birds – due to the risk of collisions with tall buildings, and landscape – due to the emergence of very large foreign elements in the hitherto agricultural landscape.

The forest clearance to be conducted within a shared cable bed area leading to individual customer substations should also be considered from the point of view of two categories of the cumulative impacts: habitat continuity interruption, thus, barriers to animal migration, and landscape transformations.

## 7.4 Assessment of cumulative impacts

### 7.4.1 Assessment of cumulative impacts for the offshore part of the Baltica OWF CI area

#### 7.4.1.1 Underwater noise

The noise impact range is relatively small for individual vessels; however, in the case of two or more noise sources, which results from simultaneous implementation of similar projects, an increase in the noise level may be substantial, especially in the area between them.

Although the noise generated by the vessels to be used for the purpose of construction and operation of the proposed projects increases the environmental noise, it has a small range, which is only significant within a few hundred metres of the sound source. However, the scale and scope of this impact increase with the number of vessels involved in the construction of all the planned cable connections, hence, the noise increases in a larger area and the impact duration is longer. The accumulation of underwater noise may result in this phenomenon extending to a larger sea area than in the case of the activities carried out by one developer.

Taking into account the specificities of the project construction phase, including in particular its linear nature, with the progress of work, the increased underwater noise levels will pertain to more sea areas around the vessels in operation, at the same time releasing the areas in which the cable has already been buried or laid on the seabed. For reasons of safety of underwater operations, the vessels used for cable laying and burying will have to operate at considerable distances from each other, which will additionally mitigate the possible accumulation of underwater noise.

Considering the above, including a significant possibility of marine mammals and fish avoiding sea areas characterised by a temporarily increased level of underwater noise, it can be assumed that this cumulative impact will be short-term (in the context of the entire southern part of the offshore connection infrastructure development areas), local, and its significance will be moderate at most.

## 7.4.2 Assessment of cumulative impacts for the onshore part of the Baltica OWF CI area

### 7.4.2.1 Noise at the implementation stage

In terms of the impact of the noise generated by machines and equipment when drilling, laying cables and building the substation during the construction phase, cumulative impacts may arise due to the work carried out by various developers. However, considering different development stages of the projects implemented by individual developers, possible deliveries of power cables and substation equipment, especially transformers, and the rapid pace of construction works, the situation when these projects are implemented simultaneously is unlikely to occur. Therefore, the actual noise accumulation at the construction stage will be a short-term, reversible and local phenomenon, and the significance of this impact will be moderate at most.

### 7.4.2.2 Noise at the operation stage

The primary objective of the analysis of the cumulative impact of noise emission conducted was to provide the most exact prediction of future acoustic conditions in the area described, taking into account the distribution of the substations registered as planned, as well as the distribution of the facilities which at the time of preparing this Report can be considered as potentially planned, whereas the parametrisation of their components was established on the basis of common knowledge and publicly available technical materials.

In view of the above, the analysis of the cumulative impact of noise emission was conducted on the basis of the data disclosed by the Developers implementing adjacent projects planned in the area in question, namely:

- Polskie Sieci Elektroenergetyczne S.A. company,
- Baltic Power S.A. company.

Moreover, the locations of the potentially feasible projects indicated in the route of the shared cable bed, the sites of which were envisaged between the Baltica-3 onshore transformer substation and the Baltic Power substation, were evaluated. The assumption on the locations of these facilities used corresponds to the location of the potential facilities built for the purpose of servicing offshore wind farms indicated in the Project Specification Sheet for the Construction of the Choczewo 400 kV substation (Figure 13, p. 66, PSE 05.08.2012). At the same time, the assumed location of the planned facilities is at present the most realistic and reasonable variant of their implementation, taking into account the location in the shared cable bed area, possible avoidance of conflicts with other planned projects and the proximity of the Choczewo 400 kV substation. In the opinion of the author of the acoustic analysis attached as Appendix 2 to this Report, the planned location of the above-mentioned facilities, according to the precautionary principle, matches the worst possible reasonable implementation variant in terms of acoustic impact, which should be seen in the light of the feasibility to meet the applicable environmental standards. Bearing in mind that at present it is impossible to obtain the detailed data necessary for the preparation of an acoustic model, guided by the precautionary principle, the number of emission sources and the noise power levels corresponding to their size and technical parameters were determined.

The computation results for the projected noise level emitted to the environment at monitoring points and at the facade are presented for daytime and night-time in Table 7.3.

*Table 7.3. Maximum cumulative noise levels in the environment during the construction and operation phases based on the Regulation of the Minister of the Environment [Source: internal materials]*

| Receptor | Type of land | Computed level | | Maximum level | | Exceedance |
|---|---|---|---|---|---|---|
| | | Day $L_{Aeq}$ (dB) | Night $L_{Aeq}$ (dB) | Day $L_{Aeq}$ (dB) | Night $L_{Aeq}$ (dB) | |
| R1 | The area with land development conditions for a single-family house | 40.1 | 39.4 | 50.0 | 40.0 | No |
| R2 | Undeveloped land. Potentially intended for residential development in the future | 41.1 | 39.9 | 50.0* | 40.0* | No |
| R3 | Undeveloped land. Potentially intended for residential development in the future | 41.0 | 39.9 | 50.0* | 40.0* | No |
| R4 | Undeveloped land. Potentially intended for residential development in the future | 41.9 | 38.6 | 50.0* | 40.0* | No |
| R5 | The facade of the residential building on plot no. 17/115, Kierzkowo precinct | 39.2 | 35.0 | 50.0 | 40.0 | No |
| R6 | Boundaries of plot 17/115 | 39.2 | 36.1 | 50.0 | 40.0 | No |
| R7 | Undeveloped land. Potentially intended for residential development in the future | 41.7 | 39.9 | 50.0* | 40.0* | No |

**The land is currently unprotected against noise*

The computations performed for the noise levels show that the night-time (40 dB) and daytime (50 dB) cumulative noise limits set out for single-family development will not be exceeded at any monitoring point at the boundary of the potential residential developments.

The noise sources within the areas of individual substations and the detailed computation results, also in graphical form – as ranges of cumulative noise impact of levels at 40 and 50 dB are presented in Appendix 2 to this Report.

#### 7.4.2.3 Emissions to air

In terms of the impact of the exhaust emissions produced by the engines of the machines used for laying the cables and the secondary emissions (the same applies to the decommissioning stage involving the removal of the lines from the ground), the cumulative impact is not very likely considering the rapid pace of construction works. For a conjunction (emission sources, receptor point), the total impact of the machines and secondary emission will not be significant for the air quality in the residential areas due to a very low impact potential during the works, resulting in particular from a small emission range, a considerable distance from the residential areas (from the point of view of air quality assessment) and a very advantageous cable bed layout in relation to Lubiatowo against the background of the wind directions prevailing in this area. The project variant selected does not affect the aforementioned assessment.

For these reasons, the impact of the emissions from the OnSS construction site on the air quality in the Osieki Lęborskie area is also unlikely. Due to the low frequency of easterly (E) and northeasterly winds blowing eastward (ENE), in the range of 7–8%, and the remoteness of the construction sites of the more distant substations as well as the dispersal of the construction works these combined sources will not affect the air quality in Osieki Lęborskie. The project implementation variant selected does not affect the aforementioned assessment.

At the operation stage, none of the potential sources of emissions to air (irrespective of the implementation variant) will cause a cumulative impact due to the following conditions:

- emissions from the power generators: the generators will be tested independently. Simultaneous testing is unlikely;
- emissions from vehicle traffic on the access road to the OnSS: they will be characterised by an insignificant, negligibly low range;
- emissions from vehicle traffic on service roads: as described above.

#### 7.4.2.4 Electromagnetic field emission

The values of the individual components of the EMF generated by other substations identified in places where the distribution of the EMF generated by the Baltica OWF CI busbar systems was modelled, are negligibly small due to a considerable distance between them. Therefore, they were not included in the model-based computations and their cumulative impact should not be expected.

The computations aimed at establishing the magnetic field distribution in the vicinity of the proposed shared cable bed area for all developers. The computations of the distribution of the magnetic field (H) generated by the cable lines supplying power to the 6 proposed customer substations, which form a shared cable bed consisting of 23 (APV) or 25 (RAV) cable lines, showed that in none of the cases analysed, the cumulative value of the magnetic field strength does not exceed the limit value (60 $A \cdot m^{-1}$) for places accessible to people specified in the applicable regulations. When analysing the maximum expected values of the resultant (cumulative) magnetic field strength at the heights specified (0.2; 1.0 and 2.0 MAGL), it can be noted that at the given heights, regardless of the variant (solution) selected, the difference is only slight. At the same time, it is evident that the highest value of the cumulative magnetic field strength is recorded at a height of 0.2 MAGL, which is explained by the smallest distance between the cable lines and the design point.

Considering that in each of the variants analysed, the cumulative value of the magnetic field strength is more than two times smaller than the limit value (60 $A \cdot m^{-1}$), from the point of view of the possible electromagnetic field effects on the environment, any of the solutions analysed can be selected.

#### 7.4.2.5 Bird collisions with tall structures

The scale of this phenomenon is difficult to predict and depends both on an instantaneous flight intensity, which can be very variable in time (both throughout a day and the entire migration season), and on the total length of the busbar systems as well as on the installation height of the conductors at individual customer substations. At the current stage, the collision height range of these busbar systems is unknown (the range between the minimum and maximum height of the conductor route). If they differ in the installation height of the conductors, the risk of collision increases significantly due to a wider collision zone. This risk will apply both to breeding and migratory birds; however, a considerably more significant negative impact will affect migratory species due to their worse orientation in a particular part of the area. The significance of this impact should be assessed as at least moderate, and the issue should be monitored as part of post-construction monitoring.

#### 7.4.2.6 Landscape transformations

The customer substations of individual developers and the Choczewo Substation will be located on lands currently used for agricultural purposes. It is an open area with a high exposure rate; however, it is characterised by low landscape diversity (relief, elements filling the space), which is rather monotonous, with no distinguishing features. In an open agricultural landscape devoid of natural obstacles, the technical infrastructure will be an exposed part of the landscape. A number of substations and busbar systems located in this area will be visible from a long distance. The visual and aesthetic perception of the proposed infrastructure will be adversely affected by its size – all customer substations and the Choczewo Substation will occupy the area of approx. 75 ha. Moreover, leaving a deforested area of the cable bed will have a substantial negative impact on the landscape. The visual and aesthetic perception of the forest clearance will be reinforced by relatively long straight sections of the approx. 150 m wide cable bed route stretching away to the horizon. The significance of this impact should be assessed as high. It can be partially mitigated by appropriate management of the cable bed, e.g. by introducing heath vegetation and ensuring a partial succession of vegetation within the cable bed area.

#### 7.4.2.7 Changes in functioning of the wildlife corridors

The forest clearance for the purpose of a shared cable bed leading to all customer substations will reinforce the barrier effect within the supra-regional Coastal Wildlife Corridor for species avoiding open areas. The significance of this impact should be assessed as moderate. It can be partially mitigated by appropriate management of the cable bed, e.g. by ensuring a partial succession of vegetation within the cable bed area, creating clusters of higher plants, leaving some stump wood and logs remaining from the felled trees, building stone piles, etc.

# 8 Transboundary impact

The shortest distance from the Baltica OWF CI construction area to the boundary of the Swedish exclusive economic zone is approximately 42 km, and approximately 118 km to the land border. Due to its location, scale, method of implementation and anticipated impacts, the Baltica OWF CI is not expected to generate transboundary environmental impacts at any stage.

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

The description and comparison of technical parameters of the two analysed variants of the Baltica OWF CI, i.e. the APV and RAV, are provided in Subsection 2.3. In view of the specific nature of the planned project, namely the integration of the power generated by the Baltica OWF into the NPS, the location of the planned project in both variants results from the location of the wind farm and the PSE onshore substation (Choczewo Substation). The location of the offshore part of the planned project in the APV is determined by the location decisions, namely decision no. 2/K/19 of 21 October 2019 and decision no. 3/K/19 of 28 October 2019 issued by the Minister of Maritime Economy and Inland Navigation, as well as decisions no. 1/DS/20 and 2/DS/20 of 6 November 2020 issued by the Director of the Maritime Office in Gdynia. The location of the onshore part of the Baltica OWF CI was determined on the basis of an analysis of pre-investment environmental survey results (bypassing the most valuable natural areas) as well as the location arrangements with the Choczewo Forest Inspectorate.

After an analysis of the possible variants of the project, discussed in Section 2.3, the Applicant concluded that the only project implementation variant possible to be included in the EIA is the technological variant that involves assuming a different number of cable lines implemented in the onshore area and the offshore area:

- APV – a maximum of 9 cable lines in the offshore and onshore areas;
- RAV – a maximum of 11 cable lines in the offshore and onshore areas.

There are significant differences between the APV and the RAV in terms of the environmental impact of the project.

The project variant selected for implementation (APV) has less environmental impact.

Implementation of 9 cable lines instead of 11 will result in lower environmental impact:

1) at the stage of construction / decommissioning, due to:

- shorter project implementation time and thus, shorter duration of environmental impacts at the stage of construction;
- reduced occupation of the seabed area for the cable lines;
- smaller volume of seabed sediments disturbed as a result of the works;
- smaller consumption of fuels and raw materials used for the project implementation;
- lower noise emission to the environment due to the smaller number of vessels, equipment and construction machines involved;
- lower water consumption for the drilling fluid used for a smaller number of drilling operations in the coastal zone;
- reduced demand for potable/household water as well as reduced volumes of sewage discharged, due to the smaller number of personnel working on the project;
- smaller amounts of waste generated;
- lower atmospheric emissions from the combustion of fuels used to propel vessels and devices involved in project implementation, due to lower demand for fuel;
- lower emissions of particulate matter into the atmosphere due to the smaller number of vehicles used in the construction phase;

2) at the stage of operation, due to:
- smaller number of activities resulting from cable lines maintenance and potential failures,
- less heat emission from the cable lines in the onshore part.

The boundary of the onshore construction area and the surface area of the planned tree clearance will be the same for both variants. In the case of the offshore area, the APV will be implemented over a smaller seabed area, which will result in a smaller volume of material excavated and smaller volumes of chemicals and suspended solids released into the water. The construction technologies as well as power transmission system operation and decommissioning methods are the same for both variants in the offshore and onshore parts alike. Also the types of impacts on environmental components and people are the same for both variants. In some cases, they will differ in terms of emission volumes, but this will not affect the assessment of impact significance.

Table 9.1 presents differences between the APV and the RAV in the offshore and onshore areas, relating to the different maximum number of cable lines.

*Table 9.1. Differences between the APV and the RAV relating to the different maximum number of cable lines [Source: internal materials]*

| Parameter | APV | RAV |
|---|---|---|
| Offshore area | | |
| Maximum seabed area occupied by construction and dismantling works [$km^2$] | 17.97 | 21.52 |
| Maximum volume of excavation in the offshore area [$m^3$] | 11 814 008 | 14 242 252 |
| Maximum volume of spoil resulting from drilling works in the offshore and onshore area [$m^3$] | 20 000 | 24 000 |
| Estimated time of cable line construction in the offshore area [days] | 1200 | 1500 |
| Onshore area | | |
| Maximum volume of excavation in the onshore area [$m^3$] | 1 178 500 | 1 310 500 |
| Cable line construction time in the onshore area [days] | 600 | 700 |

Due to the shorter implementation period of the project in the APV, the scale of potential social conflicts related to its implementation is expected to be smaller. The APV is also more favourable from the point of view of economic costs of project implementation.

In summary, the comparison of both variants, including, in particular, the potential impacts resulting therefrom, revealed that the implementation of the Baltica OWF CI according to the APV is the option least burdensome to the environment and other users of the area.

# 10 Comparison of the technological solutions proposed with the technological solutions meeting the requirements referred to in Article 143 of the Environmental Protection Law

Pursuant to Article 143 of the Act of 27 April 2001 – *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973, as amended), the technologies used in newly commissioned systems should meet the requirements which consider, in particular:

- the use of substances with a low hazard potential;
- effective generation and use of energy;
- ensuring rational consumption of water and other raw materials as well as consumables and fuels;
- the use of waste-free and low-waste technologies and possibility of waste recovery;
- indication of the type, range and size of emissions;
- the use of comparable processes and methods which have been effectively applied on industrial scale;
- scientific and technical progress.

According to Article 3 Section 6 of the *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973, as amended), "installation" shall mean:

- a stationary technical unit;
- a group of stationary technical units which are technologically linked together, being under the management of the same entity, and located in the area of the same plant;
- structures which are not technical units nor groups thereof, the operation of which may cause emission.

## 10.1 Use of substances with a low hazard potential

During the implementation and operation phases of the project, hazardous waste described in Subsection 2.2.3.5 may be produced. Such waste will be stored at designated sites in a manner which is selective and safe for people and the environment; subsequently, it will be transferred to authorised waste collectors, thus limiting the potential hazards. The OnSS operation may involve the leakage of electrical insulating oils into the ground and the release of SF6 insulating gas or refrigerants from the cooling system into the atmosphere.

## 10.2 Effective generation and use of energy

The planned project will not involve power generation but its transmission by means of underground cable lines as well as power processing and transformation for the NPS. Rational energy consumption will be ensured as part of the planned project. The OnSS power demand will be primarily met in-house by means of MV/LV transformers, with external back-up supply by means of MV line, as well as by means of an in-house power generator, in case of emergency. During the construction phase, electricity required to power the construction equipment will come from power generators, while during the operation phase, thanks to the use of modern technological solutions, electrical transmission losses will be reduced.

## 10.3 Ensuring rational consumption of water and other raw materials as well as consumables and fuels

The use of water, raw materials, consumables and fuels will be mostly related to the construction phase and possible dismantling, as well as to maintenance works. In the operation phase of the planned project, the need to use the above-mentioned resources will arise only from maintenance activities. As for the OnSS, it will not be intended for permanent staff presence.

## 10.4 Use of waste-free and low-waste technologies and possibility of waste recovery

During the construction phase and possible decommissioning phase, waste will be collected selectively at locations specially designated and adapted for this purpose, under conditions preventing the release of harmful substances into the environment. It will be ensured that they are collected by eligible entities responsible for waste management or reuse. The waste management will comply with the applicable Act of 14 December 2012 *on waste* (consolidated text: Journal of Laws of 2021, item 779, as amended). The operation of the underground power line in the offshore and onshore areas, the OnSS and the busbar systems will not generate any waste with the exception of minor amounts of waste related to maintenance works or removal of possible failures.

## 10.5 Type, range and size of emissions

During the operation phase, the planned project in the form of an underground cable line will be a source of heat and EMF emission, as described in detail in respective subsections. In the event of a failure, the OnSS will be a source of noise, EMF, heat and gas emissions into the atmosphere. The construction phase and possible decommissioning phase will result in noise emissions, exhaust emissions from vehicle engines, as well as waste and wastewater generation. These emissions will be short-term and local.

## 10.6 Use of comparable processes and methods which have been effectively applied on an industrial scale

The dynamic development of the cable networks has been observed worldwide. The primary objective of the cable line development is to ensure high reliability of transmission and compliance with the relevant standards as well as economic and environmental requirements. The above-mentioned tasks are implemented by:

- the introduction of conductive, insulating and structural materials characterised by enhanced operating parameters;
- modernisation and improvement of the technological parameters of production lines;
- conducting tests within the optimal range during the production cycle and thereafter, as well as after the cable line installation and during its operation;
- providing quality and reliability analyses of the cables on the basis of the statistical data and failure rates as well as the development of databases.

The selected technologies and materials to be used for the construction of the cable bed, the OnSS and busbar systems conform to the current EU standards and can be considered optimal for a project of this type – these technologies have been widely used in Poland, EU countries and in other parts of the world.

## 10.7 Scientific and technical progress

The solutions used during the project implementation will be best available techniques and technologies that are currently in use globally and are characterised by safety and high efficiency. All the work associated with the project implementation will be supervised by site managers experienced in construction of similar facilities, environmental specialists, expert construction and engineering supervision in accordance with the applicable provisions.

In view of the above, as part of the planned project, best available techniques (BAT) are to be applied as provided for in the Act of 27 April 2001 – *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973, as amended).

This catalogue of requirements refers to the newly launched industrial installations and equipment that are the source of environmental hazards. The OWF connection infrastructure, due to the technological characteristics of the construction, operation and decommissioning phases as well as the special conditions of operation in the marine and land environment, requires verification of these requirements at an early stage of project planning.

The structural elements of the Baltica OWF CI will be made of materials which are neutral to seawater and ground substrate (seabed) as well as to the soils, in which the power cables will be buried onshore. Resistance to erosion, corrosion or chemical compounds present in seawater, seabed sediment and soil is an essential prerequisite for failure-free operation of power cables.

The efficiency and safety of power transmission from the Baltica-2 and Baltica-3 OWFs to the NPS will be among the basic criteria used when selecting cable types and their offshore and onshore routing. The overriding criterion of energy efficiency is ensuring that energy waste in transmission installations is kept at the lowest possible level.

Consumption of water, consumables, raw materials and fuels will occur during the process of cable line laying as well as during the construction of the OnSS and the access road to the OnSS. Over approximately 30 years of operation, consumables and fuels will be used during maintenance activities.

Emissions and their range will mainly relate to the impacts resulting from the process of laying cables on the seabed and in the ground during the construction phase as well as during the construction of the OnSS and the access road to the OnSS. These impacts will not significantly affect either the marine or land environment. Moreover, no significant noise, electromagnetic field and thermal impacts are expected to occur during the operation phase.

The experiences related to the construction and operation of power cables both offshore and onshore enable the selection and implementation of the most efficient and proven solutions for power transmission from the Baltica-2 and Baltica-3 OWFs to the NPS, meeting the requirements of advanced technologies, resistant to the conditions of operation in the marine and land environments, while keeping the energy waste at the lowest possible level and affecting the natural environment to the smallest extent.

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

This section presents proposed mitigation measures for those elements of the offshore and onshore environment that require their application to mitigate or prevent the impacts identified and analysed in Section 6.

## OFFSHORE AREA

Below, there are suggestions of general actions aimed at limiting the negative impact of the Baltica OWF CI on the marine environment and a set of recommendations aimed at minimising the impacts on birds and marine mammals. In case of other environmental elements, which were the subject of the impact analysis (see Section 6), the need to apply measures minimising the negative impact of the planned project in each phase of its implementation was not identified.

**General recommendations:**

- constructing subsea cable lines in the shortest possible time, using state-of-the-art equipment and vessels.

**Seabirds:**

- intensifying the pace of construction works in the months of April–September, when the number of birds in this sea area is the lowest;
- limiting sources of strong light directed upwards at night; this mainly concerns the periods of bird migration. The Applicant declares that they will limit the light emission to the necessary level, resulting from the applicable regulations and work safety standards.

**Marine mammals:**

- commencing the works in the best possible weather conditions and with high quality equipment (particularly important in the case of vessels with DP) in order to reduce as much as possible the level of the noise generated.

## ONSHORE AREA

The implementation of the Baltica OWF CI will entail a variety of impacts on the environment, as described in Section 6 hereof. For most of them, it is possible to take relevant actions to minimise the impacts. These actions will be taken already at the stage of the project design. However, for some of them, mainly those relating to the physical removal of sites or their fragments as a result of forest clearance along the cable bed route, it is impossible to take any mitigation measures. However, it should be emphasised that the environmental, social and economic benefits resulting from the project implementation greatly outweigh potential detriments to the environment, which may occur – and may prove impossible to mitigate – as a consequence of its implementation. The implementation of the planned project will be carried out with the involvement of specialists from the relevant sectors in order to identify current hazards posed by the investment process to the environmental resources and to take ongoing measures to eliminate or limit these hazards.

Proposed actions aimed at minimising the environmental impact of the planned project, identified in the previous sections, are presented below:

1. Sealing the base in areas of permanent machinery parking and storage of materials in order to protect the groundwater against contamination with petroleum products.

2. Measures should be taken to prevent groundwater contamination with petroleum products that may seep into the rainwater and snowmelt from the land-sea drilling site.
3. Waste management in accordance with the applicable regulations.
4. Organised sewage management system including sealed septic tank systems for temporary storage and transport of sewage by vehicle to disposal sites.
5. Providing the construction site with measures for neutralising spills of substances harmful to the environment, including petroleum products. In the event of accidental pollution of the soil with the above-mentioned substances, it should be immediately collected and handed over for neutralisation to an entity authorised to perform such activity.
6. Ensuring proper operation and maintenance of construction machinery and using equipment with low exhaust emission levels.
7. Minimising, as far as possible, the noisiest processes and works, and planning all operations involving heavy equipment generating noise into the environment in a manner limiting nuisance to the surroundings.
8. Adhering to the principle of shutting down the engines of cars and construction machines during work breaks.
9. Reducing the duration of individual construction stages by planning the construction process accordingly.
10. Reducing the duration of drainage works to the minimum period necessary for the completion of the works.
11. Limiting the extent of soil replacement works to the necessary minimum.
12. Tidying up the project site after the completion of works.
13. Depositing and, after the completion of the works, reusing the layer of soil that must be removed due to the cable line installation and the necessary intervention in the ground.
14. Accounting for the geological structure of the area and technological conditions when selecting the trenchless cable line installation in the coastal zone.
15. Using emergency spill control solutions within the OnSS to mitigate the risks associated with hazardous substance storage or oil handling.
16. Fitting transformers and reactors with oil sumps with a capacity of at least 10% larger than the volume of oil contained in them.
17. Conducting periodic inspections of the technical condition of equipment at the OnSS site to detect any irregularities and prevent technical failures that could cause adverse environmental impacts.
18. In the event of a failure (e.g. oil or fuel spill), collecting the spill immediately using sorbent materials.
19. Maintaining proper condition of the drainage system within the OnSS.
20. After verifying the condition of the roads and before commencing construction works, the Applicant will prepare a Traffic Management Plan for the roads on which construction-related vehicle traffic will be routed, taking into account the need for reducing air emissions from construction-related vehicle traffic.
21. In the event of using the cable bed area for temporary traffic to service the construction of the project, organising transport in a manner that does not generate excessive emissions into the air, among others by adjusting the construction process, including the manner of delivery of materials and raw materials, to applicable air protection regulations.
22. During the construction works, the Contractor will keep existing roads clean so that they do not constitute a nuisance in terms of secondary emissions of dust into the air.
23. When transporting loose materials, including earth from excavations, outside the construction site, covers will be used, particularly during windy periods as well as in dry and rainless weather.

24. Laying cable lines in the area of archaeological site no. AZP 2-37/9 in accordance with arrangements made with the Voivodeship Heritage Conservation Officer. In consultation with the Choczewo Forestry Inspectorate, relocating or temporary relocating dead tree trunks and branches lying on the construction site to a nearby area not exposed to direct damage. In particular, relocating the one of five sites in Poland of the *Lentinus cyathiformis* found within the boundaries of the land-sea borehole zone. Securing anthills in the area of indirect impact of the project by fencing them off, or possibly relocating the anthills.
25. Setting up temporary fences to separate open excavations from animal habitats, especially amphibian habitats. This applies particularly to the works carried out during the period of increased migration of herpetofauna species (March–April and September–October) – using temporary fencing to separate the construction site within the OnSS from the amphibian wintering site situated in the adjacent forest to the north, and from the breeding sites situated in the Christmas tree plantation to the southwest of the OnSS.
26. If it is necessary to keep the excavation open for several days, securing the excavation (e.g. with small mesh nets, plastic film or amphibian fencing) to prevent animals from falling into the excavation. Regularly checking (1 inspection/day) open excavations to free animals. Before backfilling, the excavations should be inspected and if any animals are present, they should be allowed to leave the excavation. Personnel carrying out this work should be trained accordingly.
27. Tree clearing within the time limits specified in the applicable nature conservation legislation.
28. Removing stump wood and roots, as well as stones, tree logs, cants, etc. which serve as potential shelters for reptiles in the northern part of area 47 and the southern part of area 211 of the Choczewo Forest District, in a strip of land with a width of 25 m in both directions from the forest boundary should be carried out outside the period of reptile activity, namely between November and February; it does not apply to works related to failure removal.
29. Arranging the cable bed area in a manner creating hiding opportunities for animals, e.g. leaving the possibility of limited succession of vegetation, creating clumps of higher vegetation, leaving some stump wood and logs after tree felling, creating piles of stones. The final manner of the cable bed development and the type of vegetation introduced will be agreed with the Maritime Office in Gdynia and the Choczewo Forest Inspectorate.
30. Installing power line markers, e.g. flight diverters, on earth conductors to reduce avian collision, e.g. signal spirals, on lightning conductors to reduce avian collision, at least every 25 m apart per conductor.
31. Carrying out planned maintenance of cable lines (undergrowth clearance, mowing, etc.) between August and February.
32. Reducing LUA illumination to parameters compliant with building regulations as well as health and safety legislation.
33. Planting trees and climbing perennials and conducting ongoing maintenance near the fencing on the west side of the OnSS.

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

## OFFSHORE AREA

### 12.1 Proposal for the monitoring of the planned project impact

The results of the environmental surveys of the Baltica OWF CI development area as well as the identification of potential impacts have shown that the environmental resources in the project area are typical for the coastal waters of the southern part of the Baltic Sea and that such resources would not be affected by significant impacts. The project will have the greatest impact on the marine environment in the construction phase, mainly due to the disturbance of the seabed, which will result in the destruction of the animal and, to a lesser extent, sporadically recorded plant benthic communities within the strip of the cable line construction, as well as in the scaring of fish and marine mammals from the area of underwater operations. The restoration of benthic communities will begin directly after the completion of underwater operations. The qualitative and quantitative benthic resources will stabilise after a few days from the completion of the construction phase at the latest. The restoration time is likely to be much shorter as the zoobenthos species travelling on the seabed (including most mussel species) will relocate from the seabed areas adjacent to the construction area. Underwater operations will also generate underwater noise which will scare away fish and marine mammals. It is anticipated that due to the noise characteristics and its duration, the scaring of animals will have a local scale and will cease after the completion of such works. The traffic of vessels involved in construction works will also temporarily scare away the marine mammals and seabirds within a small area. It should be underlined that the Baltica OWF CI area is constantly used for navigation and fishing, thus, the presence of vessels involved in the project will not change the nature of this area and will not cause, with the exception of activities directly related to the interference in the seabed, the emergence of new environmental impacts in this part of the Baltic Sea. In the operation phase, the impact will be much smaller than during the construction phase and will result from cable line inspections involving non-invasive methods. In case of the decommissioning phase, two methods of its implementation are considered. The first method – preferred by the Applicant – will consist in deactivation of the Baltica OWF CI, without dismantling of its components. No environmental impacts will occur in this situation. The second method assumes a complete dismantling of the Baltica OWF CI, with environmental impacts very similar to those identified for the construction phase. On the basis of the previous experiences describing the response of the marine environment elements to the impacts generated by projects with characteristics similar to the project in question as well as due to the relatively small anticipated impact of the Baltica OWF CI on the marine environment in each phase of its implementation, it is proposed that no environmental monitoring be conducted to identify and assess the impact of the project on the marine environment. The information cited above indicate that such a monitoring is unjustified in the context of gaining new knowledge and will not contribute to improving the protection and status of the environment, because the scope of impacts identified, their influence on the elements of the environment as well as the receptors' response to the impacts are known and do not require further studies.

## 12.2 Information on the available results of other monitoring activities, which may be important for establishing responsibilities in this area

Reliable data is available from the State Environmental Monitoring (SEM) system managed by CIEP in accordance with the Water Law (Water Framework Directive) and the implementing regulations, i.e. the Regulation of the Minister of Infrastructure of 13 July 2021 *on the forms and methods of conducting the monitoring of surface and underground water bodies* (Journal of Laws of 2021, item 1576) (Journal of Laws of 2019, item 2147) and the Regulation of the Minister of Infrastructure of 25 June 2021 *on the classification of ecological status, ecological potential, chemical status and the method of classifying the status of surface water bodies as well as environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475).

The environmental monitoring of the Polish part of the Baltic Sea is carried out as part of the SEM. This monitoring includes the surveys of the following parameters:

- physico-chemical: temperature, salinity, oxygen concentration, Secchi disc visibility, content of nutrients, heavy metals and persistent organic pollutants;
- biological species: phytoplankton, zooplankton, phytobenthos, zoobenthos and wintering seabirds.

As part of the Marine Strategy Framework Directive, the level of harmful substances in the water and in marine organisms as well as the content of radionuclides in the water and in sediments are also monitored. In addition, ichthyofauna and optional microbiology surveys are carried out, as well as the surveys of hydrographic conditions, waste in the marine environment and underwater noise. The results of this monitoring are collected and stored in the Oceanographic Database at the Gdynia Maritime Branch of the IMWM-NRI and in the “ICHTIOFAUNA” database at the Chief Inspectorate for Environmental Protection in Warsaw.

### ONSHORE AREA

## 12.3 Proposal for the monitoring of the planned project impact

Among the identified impacts of the planned project on biotic resources, the most significant are those associated with the creation of new barriers on bird migration routes due to the operation of tall busbar structures and substation connections within the OnSS area. Avian collisions with overhead conductors may occur. The problem will be exacerbated by the presence of the busbar systems and substation equipment connections of four similar projects planned in close proximity to one another. Monitoring results could verify the effectiveness of the method of the busbar system marking used for impact mitigation.

The main objective of the monitoring is to determine the species and number of birds dying as a result of collision with and electrocution from power cables that are components of busbar systems. The highest mortality is expected during the migration period. Monitoring should be conducted on the basis of the following methodological assumptions:

- monitoring should be conducted in the first and third year after project commissioning;
- monitoring should cover the entire width of the busbar systems, including those running within the OnSS and over the OnSS access road; observations should also cover, if feasible, the widest possible area under the busbar systems included in the scope of the project located in the Choczewo Substation area;
- 3 inspections per month should be carried out in the period from March to April and from September to November, and one inspection per month in the remaining months (due to the

rate of disappearance of dead birds, each inspection should be carried out on two adjacent days; during each inspection day the entire area monitored should be covered);

- each inspection should be carried out using a GPS receiver along the designated routes, 5–10 m apart (depending on the type of vegetation), which will allow maintaining the same passage routes during subsequent inspections, with comparable results; the course of transects within the OnSS area should be agreed with the Applicant;
- birds should be recorded by species and, if possible, also by sex and age.

## 12.4 Information on the available results of other monitoring activities, which may be important for establishing responsibilities in this area

The State Environmental Monitoring system ensures the production and collection of data and information on the condition of natural elements in the following areas:

1) air quality;
2) water:
    a) surface water quality monitoring,
    b) groundwater quality monitoring,
    c) Baltic Sea monitoring;
3) soil and land;
4) acoustic environment;
5) electromagnetic fields;
6) ionising radiation;
7) nature:
    a) Monitoring of Birds of Poland (MBP),
    b) Monitoring of species and natural habitats,
    c) Forest monitoring,
    d) Integrated Monitoring of the Natural Environment.

Since 1 January 2019, the tasks of the SEM have been carried out exclusively by the Chief Inspector of Environmental Protection (CIEP).

“2020–2025 Strategic State Environmental Monitoring Programme” is the key document of the Polish state in the area of short- and medium-term surveys concerning the state of the environment. The “Strategic Programme...” covers tasks resulting from separate parliamentary acts, from the “2030 National Environmental Policy” and the State development strategy, including the “Strategy for Responsible Development until 2020 (with an outlook until 2030)”, as well as from international obligations, including the process of monitoring the UN Sustainable Development Goals.

The key task within the 2020–2025 SEM Programme will be to ensure the ongoing functioning and further development of thematic databases within the EKOINFONET Information System, by means of which data on the quality of individual environmental components is and will be collected, stored, processed and disseminated after being generated within the SEM.

The reports prepared by the Chief Inspector of Environmental Protection will be of various character – from overviews and issue-based reports to regional reports on the state of the environment.

The data concerning the state of the environment generated within the SEM is a source of information necessary both for the ongoing management of environmental resources, conducting assessments of the condition of particular environmental components, observing and analysing long-term trends of changes occurring in the environment, and carrying out multi-aspect integrated assessments of the state of the environment in relation to socio-economic changes.

# 13 Limited use area

Pursuant to Art. 135 of the Act of 27 April 2001 *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973, as amended), in situations when despite applying available technical, technological and organisational solutions the environmental quality standards cannot be met, a limited use area (LUA) is established outside the area of the plant. Establishment of an LUA is possible for the types of projects listed in the above mentioned act, i.e.: wastewater treatment plants, municipal waste landfills, composting plants, transport routes, airports, power lines and substations as well as radio-communication, radio-navigation and radio-location installations.

The lines and substations mentioned in Article 135 Section 1 will be implemented as part of the planned project; therefore, establishing an LUA would be possible on the basis of:

- the result of the environmental impact assessment of the project;
- the result of the environmental review;
- conclusions of the post-completion analysis.

The validity of establishing an LUA with respect to the planned Baltica OWF CI was examined by analysing whether the environmental quality standards cannot be met outside the area of the planned cable bed, customer substations and the 400 kV busbar systems. The operation phase of the planned project will involve the impacts of electromagnetic fields (EMF) and noise. Full assessment of impacts related to noise and electromagnetic field distribution is presented in section 6 and Appendices No. 2 and 3 to this Report.

The analysis of EMF and noise impacts presented in this Report showed that the environmental quality standards set out in the legislation for places accessible to the public will not be exceeded; therefore, there is no need to designate an LUA pursuant to the Environmental Protection Law.

# 14 Analysis of possible social conflicts related to the planned project, including the analysis of impacts on the local community

Social perception of the environmental and social impact of the transmission infrastructure is related to its location, impact on the landscape, impact on the acoustic climate and land use. The grounds for conflicts and public opposition to the construction of the offshore transmission infrastructure should also be sought in the assumed negative impact on the environment or its individual components. In the case of the project discussed, the public opposition may be caused by the impact of the planned investment on the landscape, as well as by a considerable allocation of agricultural areas for industrial infrastructure (location of substations supporting the OWF).

At the preliminary planning stage of the project related to the development of offshore wind farms, individual potential applicants created a “working group” responsible for contacts with local authorities, relevant administrative bodies, owners of the land where the project might be located, as well as contacts with the local community. The working group carried out extensive analyses of local conditions, identifying and characterising stakeholder groups associated with the project and possible risks regarding social conflicts. On this basis, extensive information and communication activities were planned, which are presented in the following section.

**PGE, the largest electricity producer in Poland, and the Danish company Ørsted, one of the global leaders in the offshore sector, will jointly build and operate the Baltica Offshore Wind Farm (OWF Baltica) with a total installed capacity of up to 2.5 GW, significantly supporting Poland's energy transformation and contributing to the development of the Polish economy. The project was divided into two stages: Baltica-2 and Baltica-3.**


The partners joined efforts to create a new chapter and a new quality on the Polish energy market. Once constructed, the Baltica Offshore Wind Farm will provide clean, reliable and affordable energy to power almost 4 million households every year for the next 30 years, which is comparable to a metropolitan area four times larger than the Tricity. Thanks to the Baltica OWF, the emission of 8 million tonnes of $CO_2$ will be avoided per year.

**8 mln**

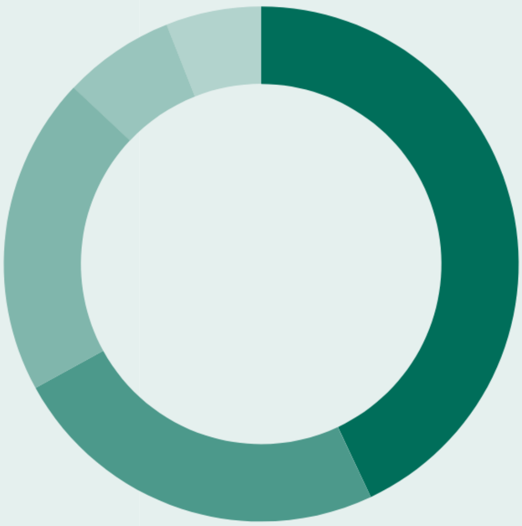
tonnes of annual $CO_2$ emission reduction

**4 mln**

households with green energy

## The biggest player of Polish emerging market

The Baltica 2 and 3 projects, jointly developed by PGE and Ørsted, represent more than 40% of the total awarded capacity in the first phase of development of the Polish offshore wind market. That means that by 2030, 5.9 GW of installed capacity will be installed in the Polish zone of the Baltic Sea. In accordance with the Polish Energy Policy, this capacity will increase to 11 GW by 2040.




BENEFITS

### For local community

Baltica Offshore Wind Farm is not only a project of great importance for the Polish energy sector but also a considerable boost for the entire Pomeranian region.

BENEFITS

### For industry

Baltica Offshore Wind construction and 30-year operation will empower domestic economy creating jobs in an innovative sector during the construction phase and beyond during operations.

Benefits of the Baltica OWF CI project implementation:

1. **Project compliant with national assumptions on the development of renewable energy sources**
   In the draft document entitled *Energy Policy of Poland until 2040*, intensification of projects focused on the development of offshore wind farms is indicated as crucial – in the context of meeting the objectives related to energy production from RES. Also in the National Energy and Climate Plan for the years 2021–2030, one of the objectives is the development and use of offshore wind energy potential by 2030.
2. **Improvement of the country's energy security**
   From the perspective of the country's energy security in the future, the development of diversified technologies, including wind energy, is assessed positively. Energy from wind does not depend on the availability of fossil fuels, the reserves of which are limited.
   In addition, the price of certificates representing the right to emit a tonne of $CO_2$ is growing rapidly year on year and even quarter on quarter. During 2021, these prices rose from EUR 33 per tonne of $CO_2$ to as much as EUR 90 by the end of the year. As history shows, the prices of carbon credits are likely to remain on a continuous upward trend.
3. **Increase in the country's energy independence**
   In the future, the development of wind energy can contribute to the country's energy independence, particularly with regard to its dependence on fossil fuel imports. Furthermore, the construction of a new energy source will reduce the need for electricity imports. In addition, offshore wind farms will provide a stable source of energy, ensuring higher energy security for the country, independent of external factors, such as the threat of COVID-19 pandemic, for example.
4. **New source of energy in the national power system**
   Offshore wind farms will supply power not only to the Pomerania region but will be a source of energy distributed nationwide – also southern Poland will benefit from this project. The construction of Baltica-2 and Baltica-3 will generate a total of 2.5 GW of power. Altogether, PGE power plants will be able to produce energy needed for the functioning of 3.9 million households per year, i.e. the equivalent of approx. 5.7% of the national demand for electricity.
5. **Development of offshore wind farms will contribute to improved quality and security of the onshore transmission system in Poland**
   Construction of a new energy source will require expansion of the existing energy transmission system, which is in line with the provisions of the Transmission System Development Plan until 2030, approved by the ERO in 2020.
6. **Improvement of the region's energy stability**
   The National Strategy of Regional Development until 2030 shows that due to outdated transmission and distribution networks, among others, losses arise during energy transmission. The problem is particularly noticeable in north-eastern Poland. Thanks to the construction of offshore wind farms and new transmission lines, the reliability of power supply in the region of north-eastern Poland will increase.
7. **Increase of the share of renewable energy sources in the national energy market**
   The project will make it possible to move closer to the European target set by 2030, i.e. 23% of energy originating from renewable sources (the 23% target is a conditional target and assumes that Poland will be granted additional EU funding; in 2019, these sources accounted for 15% of all energy in Poland). It is estimated that due to the construction of two wind

farms – Baltica-2 and Baltica-3 – energy from offshore wind farms may cover approx. 5.7% of the national energy demand.

8. **Utilisation of the offshore wind energy potential in the Baltic Sea**
   According to the assumptions of the draft *Energy Policy of Poland until 2040, the* potential of offshore wind farms will be as high as 11 GW, i.e. approximately 20% of the capacity installed today in the National Power System**.** The total potential energy capacity identified for the Baltic Sea by the European Commission (BEMIP report, 2019) exceeds 93 GW **,** which makes the Baltic Sea likely to become Europe's second sea area with the largest offshore wind energy potential, after the North Sea. The Baltic Sea is characterised by numerous favourable aspects in the context of developing this type of energy, including its relatively shallow depth, which facilitates the installation of wind turbines, low salinity, which slows down the corrosion of system components, and good wind conditions, which will allow for the efficient operation of offshore wind farms.
9. **New economic sector – new opportunities for cooperation**
   The undertaking involving the construction of offshore wind farms is not only a technical project but also a massive economic project. It provides an opportunity for many different entities, both public and private, to work together in new configurations, linking them on a national and regional **scale**.
10. **National economic development**
    Assuming the target of 6 GW of installed capacity, offshore wind energy may contribute PLN 60 billion to the GDP by 2030, providing PLN 15 billion in CIT and VAT taxes to state and local budgets . Due to the project scale and the extensive supply chain, new offshore wind farms will stimulate the development of enterprises and contribute to the creation of new jobs both in the Pomerania region and throughout the country. It is estimated that it will be up to several dozen thousand new jobs. OWF construction stimulate the development of the steel and shipbuilding industries in particular. The following industries and sectors will benefit therefrom: ports; shipyards; logistics; companies offering engineering, maintenance, logistics, and consulting services; construction services; cable production; maintenance and servicing of offshore installations; scientific services and education. Thanks to the project under discussion, Polish producers and suppliers of technologies related to offshore wind farms will be promoted on a global scale. In addition, OWF construction will engage competences and sectors involved in the onshore wind farm sector; therefore, it may also be a source of their development. Technologies used for OWFs are also similar to those used for conventional energy sources, e.g. gas energy; thus, also the sectors related to those will be potential beneficiaries.
11. **Economic development of the region**
    Offshore wind farm construction may be an impulse giving a new direction to the economic development of the region through, among others, increasing the importance of local seaports (Ustka) as a service and operational back-office for the developing offshore wind farm projects.
12. **Improved state of the environment and combating climate change**
    Compared with traditional energy sources, particularly with coal-fired power plants, wind energy does not cause air pollution as it does not emit toxic exhaust fumes. Wind energy is a zero-emission technology, which means that wind power plants do not emit greenhouse gases or particulate matter into the atmosphere during their operation. Additionally, wind energy neither contributes to soil degradation nor causes losses in the water cycle. Among energy technologies, wind power plants are often assessed as those that most effectively counteract climate change. It should also be noted that the Baltica-2 and Baltica-3 wind

farms already have an environmental decision issued for their offshore part, which shows that they have met the environmental requirements for this type of project.

13. **Minimisation of the negative impact of the project on the environment through joint action of independent investors**
    In order to mitigate the negative impact on the environment in the Choczewo commune, a cable landfall site was designated, where jointing chambers for offshore and onshore transmission cables from various wind farms (including those whose applicants are not yet known) will be constructed in a shared strip of land. In their design perspectives, potential and future applicants take into account further OWF projects, the construction of which will be planned on the Baltic Sea and the power will be evacuated through a shared cable bed area from the sea-land transition point to Choczewo Substation.
14. **Improvement of residents' health and life quality**
    By reducing air pollution from burning fossil fuels used for electricity generation and replacing it with energy from renewable sources, emissions of harmful substances are reduced, and respiratory diseases are prevented. According to the World Health Organisation, renewable energy is one of the best forms of electricity generation in terms of health.
15. **Public support for offshore wind farm construction**
    Studies by the Polish Wind Energy Association (2019) show that more than 80% of the public believes that energy from offshore wind farms helps fight climate change. More than three quarters of Poles believe that offshore wind farms are one of the best methods of energy production from a social point of view. Almost two-thirds of Poles choose offshore wind farms as a preferential source of energy for their households.
16. **Support of international environmental organisations for the development of wind farms**
    What is important is the support for such actions expressed by internationally-recognised environmental conservation organisations, such as the WWF.
17. **Project compliant with EU policies**
    The European Union sees significant potential in the development of offshore wind farms. According to a strategy published in November 2020, offshore energy will contribute to the achievement of the EU's climate targets by 2030 and will help meet the commitment to climate neutrality by 2050, as declared in the European Green Deal.
18. **Cooperation with a stable entity as part of a project planned for the next few years**
    PGE is a company with many years of experience in various types of projects throughout Poland, which gives hope for a fruitful and successful dialogue with local authorities. Moreover, what is important from the perspective of the planned financial proceeds, the schedule of the discussed project is intended for the next few years – electricity from the wind farms is to be generated most probably already at the turn of 2025 and 2026, and both wind farms are to be completed by 2030. In the future, the planned project will provide tax revenues to the commune's budget and, in comparison to the current budget, these will be real and noticeable forms of financing, enabling the commune's development as they will come from entities that represent stability and solvency in the energy market.
19. **Promotion of the commune as environmentally friendly and important in terms of the country's energy transition**
    Thanks to the implementation of the project related to offshore wind farm development, the communes situated within the area of this project will have a chance to promote themselves as "green" communes supporting the development of renewable energy sources, indicating that it is in their area that the most important elements of the power transmission

infrastructure from offshore wind farms to the National Power System are currently being constructed.

20. **Distribution of cables, substations and lines only after consultations**
Following the communication and dialogue with both representatives of the State Forests and the commune authorities, the applicants agreed on the preliminary route of the cable bed area from the cable landfall site to the place where the OnSS belonging to individual applicants will be constructed, and the place of connection to the Choczewo Substation.

21. **Minimisation of negative impact on seaside tourism**
From the perspective of tourists and beach users, the project will have no negative impacts. Cables from the offshore wind farms will be brought to the shore under the seabed, under the beach, and connected to the onshore cables in underground jointing chambers located in the landward area of the dune base. Further, the onshore cables will run from the jointing chambers to the OnSS as an underground line. The cable-laying works will take place without interference with the beach. The only element visible after the completion of the transmission infrastructure will be a deforested strip, approximately 68 metres wide, within which the cable lines will be laid underground for the purpose of power transmission from the OWF to the NPS. This area will still be managed by the State Forests, but its development will be partially restricted due to the embedded cable infrastructure. The issues of the final management of the area of the cable bed by using it as a place for e.g. heathlands, flower meadows, tourist paths or bicycle routes will be determined at the further stages of the cable bed area management concept by the State Forests.

22. **Minimisation of negative impacts on the coastal strip**
The variant selected for the routing of the cables connecting the wind farms with the onshore connection line is characterised by negligible interference with the natural environment. The designated route does not collide with the most valuable natural areas and does not interfere with the *Wydma Lubiatowska* dune area. The trenchless landfall variant was selected to avoid the loosening of the natural geological structure leading to beach erosion. At the same time, an optimal layout of the infrastructure will be achieved, remaining unnoticeable to tourists.

23. **Local conditions are crucial in determining the location of the project**
Local conditions were taken into account when designing the detailed route of the cable and line, as well as the locations of the transmission substations. A wide strip of land has already been designated for the cables connecting the offshore farms with the transmission substation, from several wind farms on a shared strip of land so as to minimise the space occupied and to mitigate the negative environmental impact of the infrastructure in the Choczewo commune. In addition, the authors of the project accounted for the provisions of local studies and plans, the locations of attractive tourist areas, as well as the distance between the planned infrastructure and existing buildings.

24. **Project carried out in a transparent manner**
Both the preparation for the project and its implementation will be conducted according to the highest standards. Ongoing communication for the project and a partnership dialogue will be ensured in order to respond to emerging questions and dispel possible doubts. Information materials will be prepared about the project, the schedule and the most important aspects from the perspective of local communities.

25. **Stability and experience of the applying entity**
PGE has an extensive portfolio of projects completed, in the course of which it has demonstrated great concern for the affairs of local communities. Ørsted A/S, recognised as the most sustainable energy company in the world in 2018, 2019, 2020, has similar

international experience due to its track record in energy transformation and implementation of projects in cooperation with local communities, including the residents of coastal communes and fishermen.

The Baltica OWF CI project is being implemented by Elektrownia Wiatrowa Baltica-2 sp. z o.o. and Elektrownia Wiatrowa Baltica-3 sp. z o.o. (hereinafter referred to as the Companies/Applicants), belonging to such entities as: PGE Capital Group – Polska Grupa Energetyczna S.A. and Ørsted A/S.

Undoubtedly, the above-mentioned Companies/Investors were interested in carrying out information and consultation activities at an early stage of the project design. The multi-stage model of conducting public communication allowed collecting comments and requests at the planning stage; they could then be considered and taken into account at the project preparation stage – before the actual commencement of the design work. This made it possible to propose optimal routes and locations in terms of planning, environmental, technical and social aspects, thus, taking into account local conditions.

- <u>Information and consultation activities carried out by Elektrownia Wiatrowa Baltica-2 sp. z o.o. and Elektrownia Wiatrowa Baltica-3 sp. z o.o.:</u>

1. Stage of working meetings with local authorities and planners

The purpose of the working meetings was primarily to obtain more detailed information than is generally available in the public domain. This relates first and foremost to the anticipated planning changes within commune areas, including the areas for which the commune has development plans. Such meetings made it possible to identify areas attractive in terms of residential settlement, nature and landscape, those valuable for local communities, etc. This stage helped to verify possible solutions for the location of the discussed Baltica OWF CI, worked out in consensus with landowners, main stakeholders and representatives of the local society (local authorities).

2. Stage of arrangements with other entities to be connected to the Choczewo Substation and with PSE

Cooperation in the working group with such entities as PSE and other entities implementing offshore wind farm connection infrastructure projects, which will also use the same PSE infrastructure in the future (the Choczewo Substation), enabled joint planning, coordination and execution of joint information and consultation activities. The cooperation allowed proposing a shared location of the PSE substation infrastructure and the substations of the offshore wind farm applicants to the commune authorities and the local community. It is worth noting that implementing all the substations in a single area will limit the interference of the aforementioned projects in space and will minimise its impact on both the environment and the landscape. The arrangements made between the applicants enabled much better and more transparent information and consultation activities. Representing the entities interested, the OWF applicants attended meetings with commune authorities as well as at direct meetings with the local community, trying to answer the questions as precisely as possible. In special situations, as in the case of Osieki Lęborskie, dedicated meetings were organised to explain the project specificity.

3. Stage of discussions with local authorities

Joint meetings with local authorities were organised, devoted to comprehensive presentation of all projects intended for the area of the communes, including Choczewo commune. During the meetings, the characteristics of the PSE substation project and other substations were presented in the context of connection infrastructure, along with the schedule and stages of the works planned. At this stage, the proposed location of the future infrastructure was also presented. The meeting dates were agreed with the local authorities, and their form depended on the individual needs of a given municipality. The applicants aimed to ensure that all commune councillors as well as village administrators from areas in the direct vicinity of the project were involved in the discussions. During these debates, one of the important and thoroughly discussed subjects was the communication and consultation activities planned by the Applicants with the local communities.

4. Information and consultation activities with the residents of areas adjacent to the planned projects and owners of properties potentially affected by the project

After the relevant agreements were made with commune councils, the proposed project locations, including the project discussed, were presented to residents, including the owners of properties at which the connection infrastructure facilities were planned. In the period May–June 2021, the Applicants conducted comprehensive face-to-face information and consultation meetings, despite the restrictions in force due to the COVID-19 pandemic. This required adapting the tools used to the existing conditions and epidemic constraints. Therefore, a formula was proposed for expert duty meetings to be held at facilities in the villages within the project area. The duty meetings were open to the public but in the information materials promoting the meetings it was recommended that stakeholders sign up for specific appointments. The Applicants provided participants of such consultations with personal protective equipment (disposable masks, gloves, disinfectant fluids).

Information about the dates and locations of the meetings was provided to:

- commune offices, for publication on the offices' websites, in commune bulletins, social media channels and community notice boards (posters),
- village administrators, for publication via village administrators’ communication channels, community notice boards (posters), direct distribution of information among residents,
- owners of properties potentially affected by the project – in writing to the mailing address,

via *pomorzedajemoc.pse.pl* website and through local media.

Expert duty meetings allow for face-to-face conversations with the representatives of the Applicants. The entire scope of projects necessary for power evacuation from the offshore wind farms was presented, followed by the scope covering a given commune and village, and finally the proposed location of the facility in relation to a stakeholder's place of residence or property was discussed.

During the meetings, the successive stages of administrative procedures leading to obtaining the construction permit were presented in an open and comprehensible manner.

5. Additional opportunity to discuss the Baltica OWF CI

Due to COVID-19 restrictions and recent technological changes, the companies allowed for additional individual meetings via teleconferences.

6. Working meetings with representatives of the local community in the Choczewo Commune

Since September 2021, recurring meetings have been organised in the Choczewo Commune, attended by the representatives of Applicants, municipal authorities and the local community (councillors and representatives of villages at which the project is planned). The purpose of the meetings is to maintain and further develop the dialogue with the local community, including the provision of information on the progress of work, information about successive steps taken by the Applicants, responding to any doubts and questions that may arise.

7. Acquisition of rights to properties by amicable means

Applicants have sought to acquire land rights for substation areas by reaching agreements with property owners.

8. Information points in commune offices, distribution of brochures and leaflets

Information materials prepared by the Applicants are available at the commune offices for all interested residents. The materials are available on specially adapted stands located at the main entrances to the offices.

LEAFLET:

https://pomorzedajemoc.pse.pl/wp-content/uploads/2020/09/Pomorzedajemoc_ulotka_oczyt.png

BROCHURE:

In addition to the digital edition, a jointly produced brochure could be downloaded
https://www.choczewo.com.pl/wp-content/uploads/2020/10/U%C5%BAr%C3%B3d%C5%82a-energii-Ba%C5%82tyku-Choczewo_informator.pdf

9. Active point of contact:
   – Infoline: 887 778 992, operating Monday through Friday, from 12:00 till 15:00
   – email: pgebaltica@gkpge.pl
   – website: https://baltica.energy/pl-pl

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10. Information in local and regional media

Through the cooperation with the media, the Applicants reached a broad range of the general public with the information about the project assumptions and schedule. Thanks to the local media, more people were notified about the information and consultation meetings in a given area than if only the commune's communication channels were used.

**INFORMATION AND EDUCATION ACTIVITIES:**

**The information and education activities conducted include:**

- Press announcements
- Open information meetings for the local community
- Information points
- Information and consultation points
- Publications in social media

BALTICA OWF CI – in the press:

1. On 29.10.2021, an article was published on the issuance by PSE Operator of the connection conditions for PGE Energia Odnawialna for the connection of the Baltica-3 offshore wind farm with a capacity of 1045.5 MW to the Choczewo Substation.

https://www.nadmorski24.pl/aktualnosci/10245-pge-uzyskala-warunki-przylaczenia-morskiej-farmy-wiatrowej.html

2. An article summarising the meetings in Choczewo held by PGE-PSE-Baltic Power was published in *Wieści Choczewskie*.

The newspaper can be downloaded from the commune website:

https://www.choczewo.com.pl/wp-content/uploads/2020/10/10_Pa%C5%BAdziernik_2020.pdf.

3. PLAŻA (BEACH) project

https://www.gkpge.pl/Fundacja/aktualnosci/ogolne/moc-atrakcji-nad-morzem-od-pge-w-ramach-projektu-plaza-pge-poznaj-moc-baltyckiego-wiatru

4. https://expresskaszubski.pl/pl/12_biznes/35096_morskie-farmy-wiatrowe-nowy-rozdzial-dla-baltyku.html
5. https://expresskaszubski.pl/pl/12_biznes/35232_10-faktow-o-morskich-farmach-wiatrowych.html
6. https://expresskaszubski.pl/pl/12_biznes/35418_baltycki-wiatr-szansa-dla-rozwoju-pomorza-i-polskiej-gospodarki.html
7. https://gp24.pl/10-zalet-morskich-farm-wiatrowych/ar/c15-15636442
8. https://gp24.pl/morskie-farmy-wiatrowe-gdzie-powstana-i-jakie-korzysci-przyniosa-mieszkancom/ar/c3-15663928
9. https://gp24.pl/morze-mozliwosci-czyli-baltyckie-farmy-wiatrowe-impulsem-dla-rozwoju-pomorza/ar/c3-15680795
10. https://www.choczewo.com.pl/wp-content/uploads/2021/06/Wie%C5%9Bci-Choczewskie.pdf

11. https://pomorska.pl/morskie-farmy-wiatrowe-napedza-transformacje-energetyczna-kraju/ar/c12-15699042?czy_podglad=t&hash_podglad=076bd3b50ae456be1acb2c9cca392167
12. https://pomorska.pl/czysty-wiatr-od-morza/ar/c12-15720820
13. https://pomorska.pl/program-offshore-grupy-pge-zielona-energia/ar/c3-15742372

## CHOCZEWO JUŻ NIEDŁUGO STANIE SIĘ WAŻNYM ELEMENTEM TRANSFORMACJI ENERGETYCZNEJ POLSKI

Inwestorzy związani z projektem budowy morskich farm wiatrowych, spotkali się z mieszkańcami gminy Choczewo. Celem rozmów było omówienie planowanych prac oraz wpływu przedsięwzięcia na otoczenie. Pierwszy prąd z wiatraków na Bałtyku popłynie już za kilka lat. Do 2040 roku na morzu powstaną turbiny o łącznej mocy nawet 11 GW. Niezbędna infrastruktura, pozwalająca przesłać zieloną energię z Pomorza do innych części kraju, zostanie wybudowana także w gminie Choczewo.

Spotkania informacyjne odbyły się na terenie sołectw, w których mogą być realizowane inwestycje związane z rozwojem morskiej energetyki wiatrowej. Zorganizowali je wspólnie przedstawiciele firm planujących budowę samych farm, czyli Baltic Power (część PKN ORLEN) i PGE Baltica (część Polskiej Grupy Energetycznej), oraz spółki odpowiedzialnej za przygotowanie stacji elektroenergetycznej i linii najwyższych napięć, czyli Polskie Sieci Elektroenergetyczne (PSE).

Gmina Choczewo, oprócz szerokich, czystych plaż i pięknych lasów, wyróżnia się także strategicznym położeniem blisko aglomeracji trójmiejskiej. Dlatego to właśnie tędy planowane jest doprowadzenie infrastruktury elektroenergetycznej, która połączy planowane na Bałtyku farmy wiatrowe z Krajowym Systemem Elektroenergetycznym.

Podczas spotkań rozmawiano o planach firm, niezbędnej transformacji energetycznej, a przede wszystkim o tym, jak mądrze zaplanować sieć elektroenergetyczną, aby do minimum ograniczyć jej wpływ na otoczenie.

Przedstawiciele firm energetycznych podkreślili, że planowane inwestycje są konieczne dla rozwijania czystej energetyki odnawialnej na morzu. Opowiedzieli o znaczeniu projektu dla Polski i regionu, o wstępnym harmonogramie, a także o obszarach, gdzie inwestycje mogą pojawić się na terenie gminy.

Spotkania w Łętowie, Zwartowie, Lublewie, Choczewku, Choczewie, Żelaźnie oraz Kopalinie odbyły się na przełomie września i października. Mieszkańcy byli o nich informowani poprzez plakaty, informacje na portalu społecznościowym używanym przez gminę oraz za pośrednictwem sołtysów.

Łącznie w rozmowach udział wzięło około 60 mieszkańców. Na każdym spotkaniu byli obecni eksperci z zakresu prawa, inżynierii i planistyki, którzy odpowiadali na pytania związane z projektem. W trakcie spotkań stosowano wszelkie środki ostrożności związane z sytuacją epidemiczną.

Spotkanie sołeckie inwestorów z mieszkańcami w Zwartowie.

Spółki zaangażowane w projekt, niezwykle istotny dla przyszłości Polski, dokładają wszelkich starań, by prowadzić go w sposób transparentny. Wszystkie informacje o przedsięwzięciu, mające wpływ na życie lokalnej społeczności, będą systematycznie przekazywane przedstawicielom samorządu, wójtowi, radnym oraz sołtysom, a także mieszkańcom podczas kolejnych spotkań informacyjno-konsultacyjnych.

### O INWESTORACH

**Polskie Sieci Elektroenergetyczne SA** to strategiczna spółka skarbu państwa, odpowiedzialna za utrzymanie ciągłości dostaw energii. Zajmuje się przesyłaniem energii elektrycznej siecią przesyłową do wszystkich regionów kraju. PSE są właścicielem ponad 14 700 kilometrów linii oraz 107 stacji elektroenergetycznych najwyższych napięć.

**Baltic Power** to spółka koncernu **PKN ORLEN** powołana specjalnie do projektów morskich farm wiatrowych. **Baltic Power** posiada koncesję na budowę morskiej farmy wiatrowej o mocy do 1,2 GW i łącznej powierzchni 131 km kw.

**PGE Baltica** to spółka należąca do **PGE Polskiej Grupy Energetycznej SA**, największego przedsiębiorstwa elektroenergetycznego i dostawcy energii elektrycznej oraz ciepła w Polsce. Firma została powołana do realizacji Programu Offshore Grupy Kapitałowej PGE zakładającego budowę trzech farm wiatrowych Baltica 1, Baltica 2 i Baltica 3 o łącznej mocy ok. 3,5 GW. Farmy Baltica 3 i Baltica 2 zlokalizowane będą ponad 25 km od brzegu na wysokości Łeby. Elektrownia wiatrowa Baltica 1 będzie zlokalizowana ponad 80 km od wybrzeża.

### KONTAKT

Wszelkie pytania lub sugestie dotyczące projektu prosimy zgłaszać na adresy firm:

Baltic Power: **wiatr@orlen.pl** wiadomości ws. morskich farm wiatrowych oraz przyłączy kablowych.

PGE Baltica: **pgebaltica@gkpge.pl**, wiadomości ws. morskich farm wiatrowych oraz przyłączy kablowych.

PSE: **pomorzedajemoc@pse.pl**, wiadomości ws. stacji elektroenergetycznej oraz linii przesyłowych najwyższych napięć.

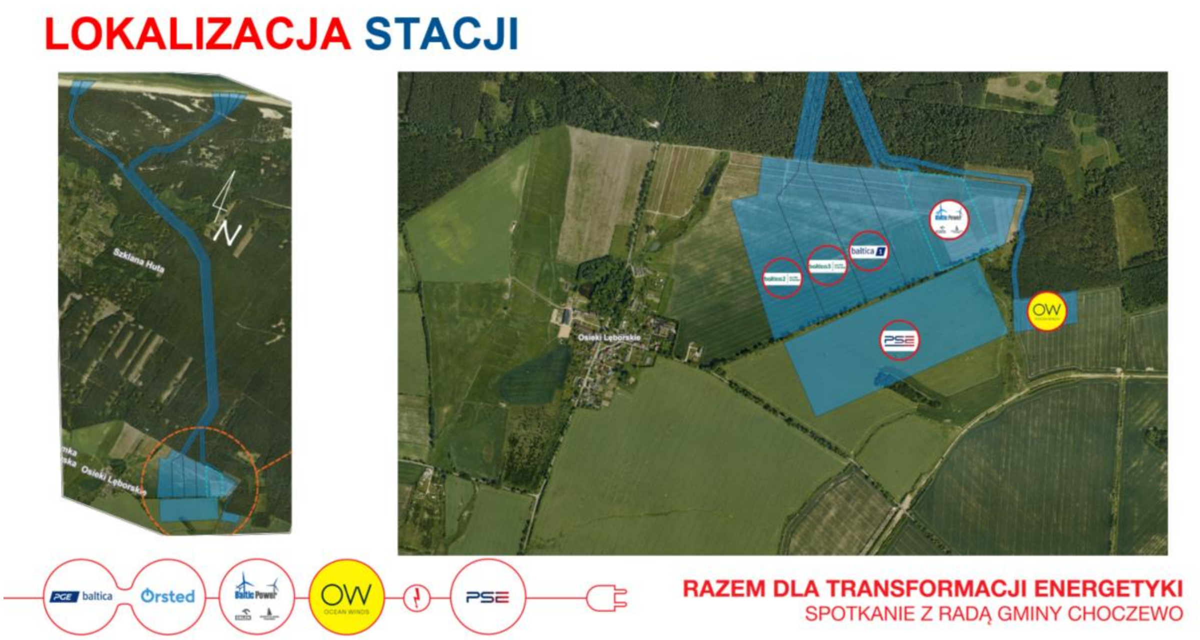
**COMMUNICATION ACTIVITIES ARE IMPLEMENTED THROUGH:**

1. Folders and brochures dedicated to the project.
   - The folder is distributed during individual meetings with the representatives of local authorities, village administrators, council and residents.
   - At information and consultation points.
2. Project website.

https://baltica.energy/
3. Social media
4. Meetings with the representatives of local authorities.
   - Providing information about the planned project, the schedule of works, as well as the activities planned.
   - Concerning the significance of the project – the importance of renewable energy sources, including wind energy.
5. Meetings with village administrators/representatives of local councils.
6. Information leaflets and posters.

Materials presented at information and communication meetings:






**Summary**

The analysis of the location of the planned project in relation to the existing and planned use of sea areas indicated that particularly fishermen may submit their concerns regarding the continuation of their activities in an unchanged manner. This situation may occur particularly in the case of establishing a safety zone for cable lines pursuant to an order issued by the Director of the Maritime Office in Gdynia, on the basis of the Act of 21 March 1991 *on maritime areas of the Republic of Poland and maritime administration* (consolidated text: Journal of Laws of 2020, item 2135, as amended). This conflict seems unlikely due to the low significance of the statistical rectangles in which the Baltica OWF CI project will be located in the overall fishing activities.

No social conflicts resulting from obstructions to shipping are anticipated, given the insignificant scale of these obstructions. The analysis of the potential impact of the project on natural elements of the offshore area does not indicate that more than moderate negative impacts might occur, which allows to believe that there will be no conflict in the context of nature conservation.

In the onshore area, the majority of the Baltica OWF CI area is located in forest areas within the Choczewo Forest District, at a distance from residential, commercial and tourism buildings. The OnSS and busbar systems will be constructed on a part of a plot that is currently an arable land.

The implementation of the Baltica OWF CI may result in conflicts with local communities due to:

- lack of precise and comprehensible information about the planned project;
- concerns regarding a decrease in the tourism value of the area in the vicinity of the planned project;
- concerns regarding a decrease in the value of the land neighbouring with the planned project;
- concerns regarding the impact of the planned project on human health and natural environment.

Possible social conflicts, which the Applicant is trying to prevent by collaborating with the local community, may concern:

- opposition to the location of the substation in the vicinity of Osieki Lęborskie, including:
    1. opposition due to changes in the surrounding landscape;
    2. concerns regarding negative impact of the substation on life and health of local residents;
    3. concerns regarding the modified character of the village, which may also affect the quality of life of its residents and possibly discourage tourists;
- opposition to clearing a large area of forest for the cable bed, including leaving the cable bed area without proper development;
- opposition from fishing organisations due to the restriction of fishing areas and destruction of fish breeding areas.

The analysis of the above-mentioned conflicts showed that the location of the project is the major factor that will be responsible for their occurrence and intensity. In the mitigation process initiated at the early design stage, it was assumed that the Baltica OWF CI should be located as far as possible from residential areas, areas extensively used for tourism and recreation, and outside areas characterised by exceptional natural values. Discussions and agreements with the authorities of Choczewo commune and Choczewo Forest Inspectorate helped determine the optimum location and conditions for the implementation of the Baltica OWF CI. These discussions were also attended by other entities (such as: Baltic Power company owned by Polski Koncern Naftowy – PKN Orlen, Polskie Sieci Elektroenergetyczne) involved in the development of projects aimed at power evacuation from OWFs and their connection to the NPS in the Choczewo commune.

In addition to the location itself, the methods of implementing individual phases of the project are important for the mitigation of conflicts. For example, limiting/minimising the negative impacts on areas used intensively for tourism and recreation, such as coastal beaches, will be ensured by using trenchless methods during the construction of cable lines.

In order to ensure comprehensive information about the planned project, the local community and authorities of the Choczewo commune were involved in the information process already at the initial design stage. Communication activities have been conducted jointly by both the Applicant (PGE Baltica) and the representatives of the transmission system operator (PSE S.A.), as well as other entities involved in the development of projects for the construction and operation of power transmission infrastructure, i.e. PKN Orlen (Baltic Power) and Ocean Winds (BC Wind). This has helped avoid a situation in which a number of entities carry out communication activities on individual projects which, from the perspective of the local community, constitute a broadly understood power infrastructure.

The proper public consultation stage is foreseen within the environmental impact assessment procedure, where the environmental report will be made available to the interested parties. It will be possible to submit comments and applications following the beginning of a 30-day procedure of public participation in the proceedings. The comments submitted during the public consultations should be addressed in the justification to the decision.

# 15 Indication of difficulties resulting from technical shortcomings or gaps in current knowledge encountered during the preparation of the report

When preparing the Environmental Impact Assessment Report for the Baltica OWF CI, no difficulties resulting from technical shortcomings were encountered.

The main difficulties encountered during the preparation of this EIA Report resulted from the lack of detailed data and information on other investment projects that will be carried out in the future in the vicinity of the Baltica OWF CI. On the basis of the publicly available data published on the governmental platform "Maritime Administration Spatial Information System" [Polish: *"System Informacji Przestrzennej Administracji Morskiej"*] (https://sipam.gov.pl/) and the analysis of the provisions of the MSPPMA (Journal of Laws of 2021, item 935), it can be determined that in the area of the proposed project, there are areas designated for the development of connection infrastructure for wind farms other than the Baltica OWF. In accordance with the MSPPMA, the possibility of locating, for example, connection infrastructure in the territorial sea shall be limited to sea subareas marked as "Technical Infrastructure" (symbol: I.) The MSPPMA provisions significantly hinder its development in the sea areas and sub-areas with other primary function, or even exclude it. Taking into consideration the number of planned OWFs proposed to be located in the vicinity of the Baltica OWF, it should be expected that in those subareas located between km 150 and 180 of the coast, from several to over a dozen kilometres of HV or EHV power cables will be laid over the coming years. The route of cables channelled through the corridor layout of the subareas indicated in the MSPPMA will be concentrated in the vicinity of the coast, where the possibility of laying infrastructure has been narrowed down to one common subarea designated as 40a.201.I, the southern boundary of which is between km 161 and 163 of the coastline. It is anticipated that the cable lines near the coast will run relatively close to one another, i.e. at a distance of at least several dozens of meters. Once the landfall operation is completed, the power cable route will be determined also by the directions of the spatial development of the Choczewo commune as well as the location of the power substation of Polskie Sieci Elektroenergetyczne S.A. (Choczewo substation). The cable bed area common for various projects may involve a cumulation of the environmental impacts resulting from the construction, operation and possible disassembly of some power lines. However, a proper analysis and assessment of the cumulative environmental impact is hampered by the lack of information on technical and technological parameters of the proposed projects and the duration of their implementation. Lack of this knowledge posed the biggest obstacle encountered when preparing this EIA Report. Some information was obtained from the environmental documentation submitted to the Regional Directorate for Environmental Protection in Gdańsk, and where no data was available, the information was based on technical knowledge. In order to make the assessment of cumulative impacts as reliable as possible, the worst-case scenario for the implementation of the above-mentioned projects and the time overlap of their development, operation and decommissioning were adopted (see section 7).

In the case of gaps in current knowledge, it should be noted that there are no data on the impact of EMF emitted by the LV lines on marine and terrestrial organisms within the range of its field.

The environmental impacts associated with the development, operation and decommissioning phases of the planned project are well recognised for this type of project, therefore, the formulation of potential environmental impacts and the formulation of mitigation measures was rather straightforward.

# 16 Summary of information on the project

The proposed project involving the development and operation of the Baltica OWF CI is located in the sea area of PMA and in the area of the Choczewo commune. The starting point of the project will be the lead-out of cable lines from the offshore substations (OSS) located in the Baltica OWF Area, and the end point will be the connection of the onshore substations (OnSS) with the Choczewo substation.

The location of the project development area in the offshore areas is determined by the Decisions 2/K/19 and 3/K/19 issued by the Minister of Maritime Economy and Inland Navigation and the Decisions 1/DS/20 and 2/DS/20 issued by the Director of the Maritime Office in Gdynia.

The area in which the Baltica OWF CI can be located, in offshore and onshore areas together, covers approx. 247 km$^2$, however, the infrastructure development area will cover a much smaller area in the offshore part.

The project will consist of the following main components:

- subsea extra high voltage alternating current power cable lines with fibre-optic cables inserted into special connection clamps in switchgears located on the OSS platforms, with internal connections between the OSSs;
- subsea cable line connections with accessories;
- onshore connections of subsea and onshore cable lines;
- onshore power cables with fibre-optic cable lines;
- onshore cable lines connections with accessories;
- onshore substations (OnSS) with infrastructure required for proper operation;
- busbar systems for connecting onshore substations (OnSS) with the NPS of the transmission system operator PSE S.A.;
- service roads between sea–land drilling chambers and OnSS;
- access road to substations.

An overview of the most important parameters of the Baltica OWF CI is provided in Table 16.1.

*Table 16.1. Overview of the most important parameters of the Baltica OWF CI in the Applicant Proposed Variant (APV) [Source: internal materials]*

| Parameter | Value/description |
|---|---|
| **OFFSHORE AREA AND COASTAL ZONE** | |
| Maximum number of cable lines | 9 |
| Number of power cables within a single cable line | 1 |
| Type of power cables | Aluminium or copper three-core AC cables containing optical fibres with a maximum of three fibre-optic cables |
| Power cable rated voltage range [kV] | 220 and/or 275 |
| Method of power cable laying in the offshore area | Buried in the seabed or laid on the seabed surface, secured |
| Power cable burial depth range outside the Baltica-2 and Baltica-3 areas [MBSB] | 0.5–3.5 |
| Power cable maximum burial depth within the Baltica-2 and Baltica-3 areas [MBSB] | 3.0 |

| Parameter | Value/description |
|---|---|
| Power cable maximum burial depth in special locations (e.g. sand extraction areas) [MBSB] | 6.0 |
| Maximum depth of laying cable lines crossing through the coastal zone [MBSB] | 20.0 |
| Power cable landfall method | Trenchless method |
| Maximum length of land–sea directional drilling [m] | 1700 |
| **ONSHORE AREA** | |
| Maximum number of cable lines | 9 |
| Number of power cables within a single cable line | 3 |
| Type of power cables | Single-phase cables with aluminium or copper cores containing optical fibres with a maximum of three fibre-optic cables |
| Power cable rated voltage range [kV] | 220 and/or 275 |
| Maximum cable bed area length [km] | 6.5 |
| Maximum length of each service road [km] | 6.5 |
| Maximum number of service roads | 3 |
| Method of power cable laying | Cables laid in a trench in a flat formation, using a trenchless method in a trefoil formation or cables laid in a trench with a bypass in a flat or trefoil formation |
| Average standard* depth of a trench for cable laying [m] | approx. 2 |
| Number of customer substations | 2 |
| Total surface area of a customer substation [ha] | 22 |
| Method of connecting customer substations with the Choczewo substation | 4 busbar systems |
| Estimated length of a single busbar system [m] | up to 190 |
| Conductor bundle voltage on busbar systems [kV] | 400 |
| Length of access road to the OnSS [m] | approx. 700 |
| Maximum width of access roadway to OnSS [m] | 6 |
| Maximum width of access roadside to OnSS [m] | 1 |
| Surface area of access roadway to OnSS [m$^2$] | approx. 4800 |
| Surface area of access roadside to OnSS [m$^2$] | approx. 1600 |
| Surface composition of access road to OnSS | Hardened, enhanced |

**except the intersections with other structures or terrain obstacles, where the trenching depth might increase*

The concept for the planned project was developed on the basis of information on the commonly used technological and technical solutions for the implementation of such projects. The information and data collected on the environment enabled the verification of the assumptions used in terms of minimising the impact on the natural environment and other users of the area in which the development of the Baltica OWF CI is planned.

It is assumed that once the operation phase is completed, two manners of decommissioning the Baltica OWF CI will be possible i.e. deactivating the transmission infrastructure or disassembling it. The Applicant also acknowledges the possibility of preserving the infrastructure once it is properly upgraded. The Applicant shall be responsible for selecting the course of action in compliance with applicable regulations.

The assessment of impacts indicated that in the offshore area of the proposed project, there will be no significant impacts at any stage of its implementation, whereas the majority of them will be negligible and, less often, of low significance in terms of environmental impact. In the case of the harbour porpoise, it was demonstrated that generation of underwater noise might generate moderate impact.

Table 16.2 presents the results of the assessment of the impact that the proposed project would have on the elements of the environment in individual phases of its implementation in the offshore area in the APV and RAV. Table 16.3 presents the results of the assessment of the impact that the proposed project would have on the components of the environment during individual phases of its implementation in the onshore area in the APV and RAV.

*Table 16.2. Results of the assessment of the proposed project impact on the components of the environment in individual phases of its implementation in the offshore area in the APV and RAV [Source: internal materials]*

| **Receptor** | **Construction phase** | **Operation phase** | **Decommissioning phase*** |
|---|---|---|---|
| Seabed geological structure, seabed relief and seabed sediments | Low (2)**<br>Negligible (1) | No impacts | Negligible (1) |
| Seawater and seabed sediment quality | Low (4)<br>Negligible (1) | Low (1) | Low (4)<br>Negligible (1) |
| Climate and air quality | Negligible (1) | Negligible (5) | Negligible (1) |
| Ambient noise | Low (1) | Negligible (1) | Low (1) |
| Electromagnetic field | No impacts | Negligible (1) | No impacts |
| Phytobenthos | Moderate (1)<br>Negligible (1) | Moderate (1) | Moderate (1)<br>Negligible (1) |
| Macrozoobenthos | Low (1)<br>Negligible (1) | Negligible (2) | Low (1)<br>Negligible (1) |
| Ichthyofauna | Low (2)<br>Negligible (3) | Low (2)<br>Negligible (1) | Low (2)<br>Negligible (3) |
| Marine mammals | Low (1)<br>Negligible (2) | Low (1)<br>Negligible (2) | Low (1)<br>Negligible (2) |
| Seabirds | Low (2)<br>Negligible (2) | No impacts | Low (2)<br>Negligible (2) |
| Natura 2000 sites | Low (2)<br>Negligible (3) | No impacts | Low (2)<br>Negligible (3) |
| Wildlife corridors | Low (1) | No impacts | Low (1) |
| Biodiversity | No impacts | No impacts | No impacts |
| Cultural values, monuments and archaeological sites and features | No impacts | No impacts | No impacts |
| Use and management of the sea area and tangible property | Low (2)<br>Negligible (1) | No impacts | Low (2)<br>Negligible (1) |
| Landscape, including the cultural landscape | No impact | No impacts | No impact |
| Population, health and living conditions | Low (2)<br>Negligible (1) | No impacts | Low (2)<br>Negligible (1) |

**The impacts for the worst-case scenario of the Baltica OWF CI decommissioning for a given component were indicated.*

***The number in brackets refers to the number of various impacts of the proposed project on a given component, for which a given impact significance was indicated in accordance with the methodology stated in subsection 1.5.*

*Table 16.3. Results of the assessment of the impact that the proposed project would have on the components of the environment during individual phases of its implementation in the onshore area in the APV and RAV [Source: internal materials]*

| Receptor | Construction phase | Operation phase | Decommissioning phase* |
|---|---|---|---|
| Geological structure | Low (1)** | No impact | Low (1) |
| Coastal zone | No impact | No impact | No impact |
| Soils | Moderate (1)<br>Low (2) | Moderate (2)<br>Negligible (1) | Moderate (1)<br>Low (2) |
| Access to raw materials and deposits | No impact | No impact | No impact |
| Quality of surface waters | Low (1) | No impacts | No impact |
| Hydrological conditions and groundwater | Low (1)<br>Negligible (1) | Low (1) | Low (1)<br>Negligible (1) |
| Climate and air quality | Moderate (4)<br>Negligible (9) | Negligible (4) | Moderate (4)<br>Negligible (9) |
| Ambient noise | Moderate (1)<br>Negligible (2) | Moderate (1) | Low (1) |
| Electromagnetic field | No impact | Negligible (2) | No impact |
| Fungi | Important (2)<br>Low (1)<br>Negligible (2) | Moderate (1)<br>Low (1) | Moderate (1)<br>Negligible (2) |
| Lichens | Moderate (1)<br>Low (2) | Moderate (1)<br>Low (1) | Moderate (1)<br>Low (2) |
| Mosses and liverworts | Important (1)<br>Low (1)<br>Negligible (2) | Moderate (1) | Low (1)<br>Negligible (2) |
| Vascular plants and natural habitats | Important (1)<br>Low (1)<br>Negligible (2) | Moderate (1)<br>Low (1) | Moderate (1)<br>Negligible (2) |
| Invertebrates | Moderate (1)<br>Low (2)<br>Negligible (3) | Low (1) | No impact |
| Herpetofauna | Moderate (2)<br>Low (1)<br>Negligible (2) | Low (2)<br>Negligible (1) | Low (1)<br>Negligible (1) |
| Birds | Important (2)<br>Low (2) | High (2)<br>Moderate (2)<br>Low (2) | Moderate (2)<br>Low (2) |
| Mammals | Important (1)<br>Low (2) | Important (2)<br>Low (1)<br>Negligible (1) | Moderate (1)<br>Low (2) |
| Other protected areas | Low (1) | Low (1) | Moderate (1) |
| Natura 2000 sites | No impacts | No impacts | No impacts |
| Wildlife corridors | Low (1) | Moderate (1) | No impacts |
| Biodiversity | Moderate (1) | Moderate (1) | Moderate (1) |
| Cultural values, monuments and archaeological sites and features | No impacts | No impacts | No impacts |

| **Receptor** | **Construction phase** | **Operation phase** | **Decommissioning phase*** |
|---|---|---|---|
| Use and management of land and tangible property | Moderate (1) | Moderate (1) | Moderate (1) |
| Landscape | Moderate (2) | Important (2) | Moderate (2) |
| Population | Moderate (1) | Important (1) | No impacts |

**The impacts for the worst-case scenario of the Baltica OWF CI decommissioning for a given component were indicated.*

***The number in brackets refers to the number of various impacts of the proposed project on a given component, for which a given impact significance was indicated in accordance with the methodology stated in section 1.5.*

For the purpose of avoiding, preventing or reducing the potential negative impacts identified for the Baltica OWF CI, the application of a range of mitigation measures was suggested, most of which refer to the impacts on the terrestrial environment components (Section 11).

# 17 Sources of information and materials used

Alloway B.J., Ayres D.C., Chemiczne podstawy zanieczyszczenia środowiska, Wydawnictwo Naukowe PWN, Warsaw 1999.

Andersson M.H., Offshore wind farms – ecological effects of noise and habitat alteration on fish, Doctoral dissertation, Stockholm University, 2011.

Andrulewicz E., Szymelfenig M., Urbański J., Węsławski J.M., Węsławski S., Morze Bałtyckie – o tym warto wiedzieć, Polski Klub Ekologiczny, Okręg Wschodnio-- Pomorski, Gdynia 2008: 84–93.

Argent D.G., Flebbe P.A., Fine sediment effects on brook trout eggs in laboratory streams, Fish. Res. 1999, 39: 253–262.

Auld A.H., Schubel J.R., Effects of suspended sediment on fish eggs and larvae. A laboratory assessment, Estuarine, Coastal and Shelf Science 1978, 6: 153–164.

BCTC – British Columbia Transmission Corporation, Application for an Environmental Assessment Certificate for the Vancouver Island Transmission Reinforcement Project, May 2006.

Barańska A., Opioła R., Kruk-Dowgiałło L. (eds.) 2018, Monitoring gatunków i siedlisk morskich w latach 2016–2018, Biuletyn Monitoringu Środowiska 18, Biblioteka Monitoringu Środowiska, Chief Inspectorate for Environmental Protection, Warsaw ISNN 1733–3385, p. 48

Bełdowski J., Klusek Z., Fabisiak J. et al., Chemical Munitions Search & Assessment – An evaluation of the dumped munitions problem in the Baltic Sea, Deep Sea Research Part II: Topical Studies in Oceanography, Volume 128, June 2016: 85–95.

Bełdowski. J., Potrykus J., Szubska M., Klusek Z., Anu L., Lehtonen K., Turja R., Fabisiak J., Michalak J., Olejnik A., Pączek B., Lang T., Fricke N., Bickmeyer U., Brenner M., Garnaga-Budrė G., Malejevas V., Popiel S., Östin A., Fidler J., 2014, CHEMSEA Findings – Results from the CHEMSEA project (chemical munitions search and assessment), the Institute of Oceanology of the Polish Academy of Sciences, p. 86.

Bergström L., Kautsky L., Malm T., Ohlsson H., Wahlberg M., Rosenberg R., Capetillo N.A., The effects of wind power on marine life. A synthesis, Report 6512, Swedish Environmental Protection Agency, Stockholm 2012.

Bergström L., Kautsky L., Malm T., Rosenberg R., Wahlberg M., Capetillo N.A., Wilhelmsson D., Effects of offshore wind farms on marine wildlife – a generalized impact assessment, Environmental Research Letters 2014, 9: 1–12.

Bergström L., Sundqvist F., Bergström U., Effects of an offshore wind farm on temporal and spatial patterns in the demersal fish community, Mar. Ecol. Prog. Ser. 2013, 485: 199–210.

Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry. Technical Report, Department for Business, Enterprise and Regulatory Reform (BERR) in association with the Department for Environment, Food and Rural Affairs (DEFRA), 2008: 1–159.

BirdLife International, Birds in the European Union: a status assessment, Wageningen, The Netherlands: BirdLife International, 2004.

Birklund J., Anholt Offshore Wind Farm. Benthic Fauna – Baseline Surveys and Impact assessment, Energinet.dk, 2009; available at: https://ens.dk/sites/ens.dk/files/Vindenergi/benthic_fauna_incl._app.pdf (accessed on: 19.04.2021).

Birklund J., Benthic communities and Environmental Impact Assessment of the planned Rodsand 2 Offshore Wind Farm, Final Report, January 2007.

Birklund J., Wijsman J.W.M., Aggregate extraction. A review on the effect on ecological functions. Report Z3297.10, SANDPIT Fifth Framework Project No. EVK3CT200100056, DHI Water & Environment; WL | Delft Hydraulics, 2005: 1–54.

Błeńska M., Osowiecki A., Brzeska P., Barańska A., Dziaduch D., Benthos Surveys in the Area of the Offshore Wind Farm "Bałtyk Środkowy III." Final report with survey results, Maritime Institute in Gdańsk, Gdańsk 2014.

Błeńska M., Osowiecki A., Brzeska P., Kruk-Dowgiałło L., Barańska A., Dziaduch D., Badania bentosu na obszarze Morskiej Infrastruktury Przyłączeniowej (MIP). Final report with survey results, 2015a.

Błeńska M., Osowiecki A., Brzeska P., Kruk-Dowgiałło L., Dziaduch D., Barańska A., Badania bentosu na obszarze morskiej farmy wiatrowej „Bałtyk Środkowy II." Final report with survey results, 2015b.

Bochert R., Zettler M.L., Long-term exposure of several marine benthic animals to static magnetic fields, Bioelectromagnetics 2004, 25: 498–502.

Bojakowska I., Kryteria zanieczyszczenia osadów wodnych, Przegląd Geologiczny 2001, 49 (3).

Bolałek J. (ed.), Fizyczne, biologiczne i chemiczne badania morskich osadów dennych, University of Gdańsk Publishing House, Gdańsk, 2010.

Bone Q., Marshall N.B., Blaxter J.H.S., Biology of Fishes, Springer Science+Business Media, B.V., 1995.

Borkowski T., Siłownie okrętowe, Notatki z wykładów część I [Notes from lectures Part 1], Maritime University in Szczecin, mimeo, 2009.

Bourg A., Loch J., Mobilization of heavy metals as a affected by pH and redox conditions, [in:] Biogeodynamics of pollutants in soils and sediments, Springer, 1995: 87–102.

Bouty C., Schafhirt S., Ziegler L., Muskulus M., Lifetime extension for large offshore wind farms: Is it enough to reassess fatigue for selected design positions?, Energy Procedia 2017, 137: 523–530.

Boynton W.R., Garber J.H., Summers R., Kemp W.M., Inputs, transformations and transport of nitrogen and phosphorus in Chesapeake Bay and selected tributaries, Estuaries 1995, 18 (1B): 285–314.

Brims Underwater Noise Assessment – Underwater Noise Assessment Report, SSE Renewables Developments (UK) Ltd. Document Number: L-100183-S00-REPT-001. Xodus Group, Chilworth, Southampton; available at: http://marine.gov.scot/datafiles/lot/Brims_Tidal/Supporting_Documents/Brims%20Underwater%20Noise%20Assessment%20Report.%20Xodus%20(2015).pdf.

BRISK – Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea, 2009–2012, 2012; available at: https://helcom.fi/helcom-at-work/projects/brisk/.

Brzeska P., Michałek-Pogorzelska M., Opioła R., Błeńska M., Kuliński M., Kruk-Dowgiałło L., Osowiecki A., Badania biologiczne progów podwodnych w Gdyni-Orłowie (trzecia seria), Expert opinion commissioned by the Maritime Office in Gdynia, No. 6482, Internal Publications of the MI in Gdańsk, Gdańsk 2009.

Brzeska-Roszczyk P., Kruk-Dowgiałło L., Natural valuation of the Polish marine areas (Baltic) based on phytobenthos, BMI 2018, 33 (1): 204–211.

Cameron, P., Berg, A., von Westernhagen, H., Malformations of embryos of spring spawning fishes in the southern North Sea, Int. Counc. Explor. Sea C.M. 1986/E:21.

Carman R., Carbon and nutrients, [in:] Perttila M. (ed.), Contaminants in the Baltic Sea sediments, Results of the ICES/HELCOM sediment baseline study, MERI – Report Series of Finish Institute of Marine Research no. 50, Helsinki 2003.

Carman R., Rahm L., Early diagenesis and chemical characteristics of interstitial water and sediments in the deep deposition bottoms of the Baltic Proper, J. Sea Res. 1996, 37: 25–47.

Carter L., Burnett D., Drew S., Marle G., Hagadorn L., Bartlett-McNeil D., Irvine N., Submarine Cables and the Oceans. Connecting the World, UNEP-WCMC Biodiversity Series No. 31, ICPC/UNEP/UNEP-WCMC, 2009.

Chapman D.W., Critical review of variables used to define effects of fines in redds of large salmonids, Trans. Am. Fish. Soc. 1988, 117: 1–21.

Chodkiewicz T., Kuczyński L., Sikora A., Chylarecki P., Neubauer G., Ławicki Ł., Stawarczyk T., Ocena liczebności populacji ptaków lęgowych w Polsce w latach 2008–2012, Ornis Polonica 2015, 56 (3): 149–189.

Chodkiewicz T., Meissner W., Chylarecki P., Neubauer G., Sikora A., Pietrasz K., Cenian Z., Betleja J., Kajtoch Ł., Lenkiewicz W., Ławicki Ł., Rohde Z., Rubacha S., Smyk B., Wieloch M., Wylegała P., Zielińska M., Zieliński P., Monitoring Ptaków Polski w latach 2015–2016, Biuletyn Monitoringu Przyrody 2016, 15, 1–86.

Ciechanowski M., Jakusz-Gostomska A., Żmihorski M., Empty in summer, crowded during migration? Structure of assemblage, distribution pattern and habitat use by bats (Chiroptera: Vespertilionidae) in a narrow, marine peninsula, Mammal Research 2015, 61 (1): 45–55.

Cieśliński S., Czyżewska K., Fabiszewski J., Red list of the lichens in Poland. Czerwona lista porostów w Polsce, [in:] Mirek Z., Zarzycki K., Wojewoda W., Szeląg Z. (eds.), Red list of plants and fungi in Poland. Czerwona lista roślin i grzybów Polski, W. Szafer Institute of Botany, Polish Academy of Sciences, Cracow 2006: 71–89.

Ciszewski P., Ringer Z., Wyniki badań nad biomasą roślinności osiadłej Zatoki Puckiej i Zatoki Gdańskiej przeprowadzonych metodą nurkowania. Part 1, NMFRI studies, Department of Oceanography, 1966 (typescript).

Cohen E., Grosslein M., Sissenwine M., Steimle F., A comparison of energy flow on Georges Bank in the North Sea, ICES CM 1980/L:64: 1–13.

Collier C.T., Anulacion B.F., Arkoosh M.R., Dietrich J.P., Incardona J.P., Johnson L., Ylitalo G.M., Myers M.S., Effects on Fish of Polycyclic Aromatic Hydrocarbons (PAHS) and Naphthenic Acid Exposures, Fish Physiology 2013, 33: 195–255.

Daan N., Bromley P.J., Hislop J.R.H., Nielsen N.A., Ecology of North Sea fish, Netherlands Journal of Sea Research 1990, 26 (2–4): 343–386.

Dadlez R., Przekroje geologiczne, utwory przedkenozoiczne, [in:] Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table X, Polish Geological Institute, Sopot–Warsaw 1995a.

Dadlez R., Szkic tektoniczny, [in:] Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table III, Polish Geological Institute, Sopot–Warsaw 1995b.

Danheim J., Bergstroöm, Birchenough S.N.R., Brzana R., Boon A.R., Coolen J.W.P., Dauvin J.C., De Mesel I., Derweduwen J., Gill A.B., Hutchison Z.L., Jackson A.C., Janas U., Martin G., Raoux A., Reubens J., Rostin L., Vanaverbeke J., Wilding T.A., Wilhelmsson D., Degraer S., Benthic effects of offshore renewables. Identification of knowledge gaps and urgently needed research, ICES Journal of Marine Science 2020, 77 (3): 1092–1108.

Davutluoglu O.I., Seckin G., Kalat D.G., Yilmaz T., Ersu C.B., Speciation and implications of heavy metal content in surface sediments of Akyatan Lagoon-Turkey. Desalination 2010, 206: 199–210.

Dąbrowska H., Kopko O., Turja R., Lehtonen K.K., Góra A., Polak-Juszczak L., Warzocha J., Kholodkevich S., Sediment contaminants and contaminant levels and biomarkers in caged mussels (Mytilus trossulus) in the southern Baltic Sea, Marine Environmental Research 2013, 84: 1–9.

De Backer A., Buyse J., Hostens K., A decade of soft sediment epibenthos and fish monitoring at the Belgian offshore wind farm area. Chapter 7, [in:] Degraer S., Brabant R., Rumes B., Vigin L. (eds.), Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea. Empirical Evidence Inspiring Priority Monitoring, Research and Management, Series 'Memoirs on the Marine Environment', Brussels, Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management, 2020: 79–114.

de Groot S.J., The consequences of marine gravel dredging of spawning of herring, Clupea harengus, Journal of Fish Biology 1980, 16: 605–611.

Dembska G., Metale śladowe w osadach Portu Gdańskiego. PhD Thesis, Faculty of Biology, Oceanography and Geography of the University of Gdańsk, Gdańsk 2003.

Dembska G., Sapota G., Galer-Tatarowicz K., Littwin M., Zegarowski Ł., Aftanas B., Rudowski S., Makurat K., Wnuk K., Ciesielski P., Gajewski L., Nowak K., Edut J., Cichowska D., Wróblewski R., Szefler K., Koszałka J., Badania warunków fizyczno-chemicznych osadów na obszarze MFW Bałtyk Środkowy II. Final Report with Survey Results, Gdańsk 2015.

Dethlefsen V., Cameron P., Berg A., von Westernhagen H., Malformations of embryos of spring spawning fishes in the southern North Sea, Int. Counc. Explor. Sea C.M. 1986/E:21.

Diederichs A., Brandt M., Nehls G., Does sand extraction near Sylt affect harbour porpoises?, Impacts of Human Activities. Wadden Sea Ecosystem No. 26, 2010: 199–203.

DNVGL-RP-0360, Edition March 2016, Subsea power cables in shallow water.

DNVGL-RP-F107, Edition September 2019, Risk assessment of pipeline protection.

DNVGL-ST-0359, Edition June 2016, Subsea power cables for wind power plants.

Dojlido J.R., Chemia wód powierzchniowych, Wydawnictwo Ekonomia i Środowisko, Białystok 1995.

DONG, Danish Offshore Wind – Key Environmental Issues, DONG Energy, Vattenfall, The Danish Energy Authority and The Danish Forest and Nature Agency, November 2006.

Durinck J., Skov H., Jensen F.P., Pihl S., Important marine areas for wintering birds in the Baltic Sea, Ornis Consult Report, Copenhagen 1994.

Dushkina L.A., Biologia morskikh sel'dej w rannem ontogezeze, Akademia Nauk SSSR, MOSKVA izd. "NAUKA" 1988: 1–192.

Dyndo M., Wiśniewska D.M., Rojano-Doñate L., Madsen P.T., Harbour porpoises react to low levels of high frequency vessel noise, Scientific Reports 2015, 5: 11083.

EMEP/EEA air pollutant emission inventory guidebook 2019, Technical guidance to prepare national emission inventories, EEA Report No. 13/2019.

Krzymiński W., Kraśniewski W., Zalewska T., Danowska B. (eds.), Aktualizacja wstępnej oceny stanu środowiska wód morskich, Chief Inspectorate for Environmental Protection, Warsaw 2018.

Emu Ltd., Subsea Cable Decommissioning – A Limited Environmental Appraisal. Report commissioned by British Telecommunications plc, Cable & Wireless and AT&T, Report no. 04/J/01/06/0648/0415, 2004.

Engell-Sørensen K., Possible effects of the offshore windfarm at Vindeby on the outcome of fishing. The possible effects of electromagnetic fields, Report to SEAS, Denmark, 2002.

Engell-Sørensen K., Skyt P.H., Evaluation of the effect of sediment spill from offshore wind farm construction on marine fish, Report to SEAS, Denmark, 2001.

European Environment Agency (EEA), Air pollution from electricity-generating large combustion plants. An assessment of the theoretical emission reduction of $SO_2$ and $NO_X$ through implementation of BAT as set in the BREFs, EEA Technical report No. 4, 2008; available at: https://www.eea.europa.eu/publications/technical_report_2008_4.

Falkowska L., Bolałek J., Łysiak-Pastuszak E., Analiza chemiczna wody morskiej 2. Pierwiastki biogeniczne N, P, Si, Fe, University of Gdańsk Publishing House, Gdańsk, 1999.

Fałtynowicz W., Kukwa M., Czerwona lista porostów zagrożonych na Pomorzu Gdańskim, [in:] Czyżewska K. (ed.), Zagrożenia porostów w Polsce, Monogr. Bot. 2003, 91: 63–77.

Feger E.W., Pattern in the development of a marine community, Limnol. Oceanogr. 1971, 16: 241–253.

Feistel R., Günter N., Wasmund N. (eds.), State and evolution of the Baltic Sea, 1952–2005. A detailed 50-year survey of meteorology and climate, physics, chemistry, biology, and marine environment, Wiley-Interscience, A John Wiley & Sons, INC., 2008.

Fernandes P., Collette B., Heessen H., Hyperoplus lanceolatus, The IUCN Red List of Threatened Species, 2014: e.T18155982A44739208; available at: https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17027A6734992.en (accessed on: 6.06.2017).

Fiałkowski W., Kittel W., Widelnice (Plecoptera), Katalog Fauny Polski, part XVI, notebook 3, Museum and Institute of Zoology PAS, Warsaw 2002.

Fisher C., Slater M., Effects of electromagnetic field on marine species. A literature review, No. 0905-00-001. Oregon Wave Energy Trust (OWET), 2010.

Fisher T.R., Harding L.W., Stanley D.W., Ward L.G., Phytoplankton, nutrients, and turbidity in the Chesapeake, Delaware, and Hudson estuaries, Estuarine Coastal and Shelf Science 1988, 27: 61–93.

Fissel D.B., Jiang J., Three-dimensional numerical modeling of sediment transport for coastal engineering projects in British Columbia, Canada, OCEANS'11 MTS/IEEE KONA, Waikoloa, HI, USA, 2011.

Florin A., Keskin Ç., Lorance P., Herrera J., Agonus cataphractus, The IUCN Red List of Threatened Species, 2014a: e.T18227168A44721374; available at: https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17027A6734992.en (accessed on: 6.06.2017).

Florin A., Lorance P., Keskin Ç., Herrera J., Liparis, The IUCN Red List of Threatened Species, 2014b: e.T154644A45128592; available at: https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17027A6734992.en (accessed on: 6.06.2017).

Folegot T., Clorennec D., Chavanne R., Gallou R., Mapping of ambient noise for BIAS. Quiet-Oceans technical report QO.20130203.01.RAP.001.01B, Brest, France, December 2016.

Formicki K., Winnicki A., Reactions of fish embryos an, larvae to constant magnetic fields. Italian J. Zool. 1998, 65: 479–482.

Freyhof J., 2014, Pleuronectes platessa, The IUCN Red List of Threatened Species, 2014: e.T135690A50018800; available at: https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17027A6734992.en (accessed on: 6.06.2017).

Freyhof J., Kottelat M., The IUCN Red List of Threatened Species: Cottus aturi, 2008; available at: http://www.iucnredlist.org.

Fröstner U., Inorganic pollutants, particularly heavy metals in estuaries, Chemistry and Biochemistry of Estuaries 1980, 10: 307–348.

G+. Good practice guideline, The safe management of small service vessels used in the offshore wind industry, 2nd Edition, January 2018, G+ Global Offshore Wind Health & Safety Organisation.

Galer K., Makuch B., Wolska L., Namieśnik J., Toksyczne związki organiczne w osadach dennych: problemy związane z przygotowaniem próbek i analizą, Chem. i Inż. Ekol. 1997, 4 (3): 285.

Gawlikowska E., Seifert K., Bojakowska I., Piaseczna A., Kwecko P., Tomassi-Morawiec H., Król J., Explanations to the geoenvironmental map of Poland, 1:50 000, Choczewo Sheet (4), Polish Geological Institute – National Research Institute, Warsaw 2009.

Gdaniec-Pietryka M., Mechlińska A., Wolska L., Gałuszka A., Namieśnik J., Remobilization of polychlorinated biphenyls from sediment and its consequences for their transport in river waters, Environ. Monit. Assess. 2013, 185: 4449–4459.

Gdaniec-Pietryka M., Specjacja fizyczna i mobilność analitów z grupy wielopierścieniowych węglowodorów aromatycznych i polichlorowanych bifenyli na granicy faz osad denny-woda. PhD Thesis, Gdańsk University of Technology, Gdańsk 2008.

General Directorate of Environmental Protection (GDEP), Standard Data Form (SDF) for Natura 2000 site – Przybrzeżne wody Bałtyku (PLB990002).

Gill A.B., Huang Y., Gloyne-Philips I., Metcalf J., Quayle V., Spencer J., Wearmouth V., COWRIE 2.0 Electromagnetic Fields (EMF). Phase 2. EMF-sensitive fish response to EM emissions from sub-sea electricity cables of the type used by the offshore renewable energy industry, Commissioned by COWRIE Ltd (project reference COWRIE-EMF-1-06), 2009.

Głowaciński Z. (ed.), Czerwona lista zwierząt ginących i zagrożonych w Polsce, Polish Academy of Sciences, Institute of Nature Conservation, Cracow 2002.

Głowaciński Z. (ed.), Polska czerwona księga zwierząt. Kręgowce, Państwowe Wydawnictwo Rolnicze i Leśne, Warsaw 2001.

Głowaciński Z., Rafiński J. (eds.), Atlas płazów i gadów Polski. Status – rozmieszczenie – ochrona, Biblioteka Monitoringu Środowiska, Warsaw–Cracow 2003.

Gregory R.S., Northcote T.G., Surface, planktonic, and benthic foraging by juvenile chinook salmon (*Oncorhynchus tshawytscha*) in turbid laboratory conditions, Can. J. Fish. Aquat. Sci. 1993, 50: 233–240.

Griffin F.J., DiMarco T., Menard K., Newman J.A., Smith E.H., Vines C.A., Cherr G.N., Larval Pacific Herring (*Clupea pallasi*) Survival in Suspended Sediment, Estuaries and Coasts 2012, 35: 1229–1236.

Griffin F.J., Smith E.H., Vines C.A., Cherr G.N., Impacts of suspended sediments on fertilization, embryonic development, and early larval life stages of the pacific herring, Clupea pallasi, Biol Bull 2009, 216 (2): 175–187.

Gudelis W.K., Jemielianow J.M. (eds.), Geologia Morza Bałtyckiego, Wydawnictwa Geologiczne, Warsaw 1982.

Gutteter-Grudziński J.M., Studium efektywności odolejania okrętowych wód zęzowych z wykorzystaniem sekcji hydrocyklonów i koalescencyjnych przegród porowatych, Maritime Institute in Szczecin, 2012.

Hammar L., Andersson S., Rosenberg R., Adapting offshore wind power foundations to local environment, Report 5828, The Swedish Environmental Protection Agency, 2008.

Hammar L., Perry D., Gullström M., Offshore Wind Power for Marine Conservation, Open Journal of Marine Science 2016, 6: 66–78.

Hammar L., Wikström A., Molander S., Assessing ecological risks of offshore wind power on Kattegat cod, Renewable Energy 2014, 66: 414–424.

Hansen P.D., von Westernhagen H., Rosenthal H., Chlorinated hydrocarbons and hatching success in Baltic herring spawners, Mar. Environ. Res. 1985, 15: 59–76.

HELCOM, Biodiversity in the Baltic Sea – An integrated thematic assessment on biodiversity and nature conservation in the Baltic Sea, Balt. Sea Environ. Proc. No. 116B, Helsinki Commission – Baltic Marine Environment Protection Commission, Helsinki 2009.

HELCOM Environment of The Baltic Sea area 1994–1998, Baltic Sea Environ. Proceed. No. 82B, Helsinki Commission, Helsinki 2002.

HELCOM, Guidelines for the Baltic Monitoring Programme for the Third Stage. Part D. Biological Determinants, Baltic Sea Environment Proceedings BMEPC, Helsinki 1988.

HELCOM, HELCOM Guidelines for the Disposal of Dredged Material at Sea – Adopted in June 2007.

Herdson D., Priede I., Clupea harengus, The IUCN Red List of Threatened Species, 2010: e.T155123A4717767; available at: https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17027A6734992.en (accessed on: 6.06.2017).

Hermannsen L., Beedholm K., Tougaard J., Madsen P.T., High frequency components of ship noise in shallow water with a discussion of implications for harbor porpoises (*Phocoena phocoena*), The Journal of the Acoustical Society of America 2014, 136 (4): 1640–1653.

Hornsea Offshore Wind Farm. Project Two – Environmental Statement. Volume 5 – Offshore Annexes, Annex 5.1.6 – Cable Burial Plume Assessment, 2015.

ICES, Effects of Extraction of Marine Sediments on Fisheries. Cooperative Research Report No. 182, International Council for the Exploration of the Sea, Copenhagen 1992.

ICES, Effects of extraction of Marine Sediments on the Marine Ecosystem – Report of the Working Group on the Effects of Extraction of Marine Sediments on the Marine Ecosystem, ICES Cooperative Research Report No. 247, International Council for the Exploration of the Sea, Copenhagen 2001: 1–80.

IMCA, IMCA M 149 Issue 12, Common Marine Inspection Document, May 2021.

IMCA, IMCA M 189 Issue 5, Common Marine Inspection Document for Small Workboats, May 2021.

IMO, MSC-MEPC.2/Circ.12/Rev.2, Revised Guidelines For Formal Safety Assessment (FSA) For use in the IMO Rule-Making Process, 2019.

Explanatory Notes to the Natura 2000 Standard Data Form, Version 2012.1, General Directorate for Environmental Protection, 2012: 1–46.

Iwamoto T., McEachran J.D., Moore J., Russell B., Polanco Fernandez A., Enchelyopus cimbrius, The IUCN Red List of Threatened Species, 2015: e.T15522054A15603465; available at: https://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T15522054A15603465.en (accessed on: 6.06.2017).

Jacquin L, Petitjean Q., Côte J., Laffaille P., Jean S., Effects of Pollution on Fish Behavior, Personality, and Cognition. Some Research Perspectives, Front. Ecol. Evol. 2020, 8: 86.

JASCO Research Ltd, Vancouver Island Transmission Reinforcement Project. Atmospheric and Underwater Acoustics Assessment, Report prepared for British Columbia Transmission Corporation, 2006: 1–49.

Jensen B., Klaustrup M., Skov H., EIA Report Fish Horns Rev 2 Offshore Wind Farm, 2006.

Jędrzejewski W., Nowak S., Stachura K., Skierczyński M., Mysłajek R.W., Niedziałkowski K., Jędrzejewska B., Wójcik J.M., Zalewska H., Pilot M., Górny M., Kurek R.T., Ślusarczyk R., Projekt korytarzy ekologicznych łączących Europejską Sieć Natura 2000 w Polsce, Mammal Research Institute, Polish Academy of Sciences, Białowieża 2011.

Johnston D.W., Wildish D.J., Avoidance of dredge spoil by herring (Clupea harengus harengus), Bulletin of Environmental Contamination and Toxicology 1981, 26: 307–314.

Juszczyk W., Płazy i gady krajowe, PWN, Warsaw 1987.

Kaptur G., Bałtyk cierpi – ratujmy go wszyscy, Czas Morza 1999, 2 (12): 23–27.

Kautsky H., Martin G., Snoejis-Leijonmalm P., Phytobenthic zone [in:] Biological Oceanography of the Baltic Sea, Snoejis-Leijonmalm P., Schubert H., Radziejewska T. (eds.), Springer, 2017: 387–455.

Kaźmierczakowa R., Bloch-Orłowska J., Celka Z., Cwener A., Dajdok Z., Michalska-Hejduk D., Pawlikowski P., Szczęśniak E., Ziarnek K., Polska czerwona lista paprotników i roślin kwiatowych.

Polish red list of pteridophytes and flowering plants, Institute of Nature Conservation PAS, Cracow 2016.

Kerckhof F., Rumes B., Degraer S., About “mytilisation” and “slimeification”. A decade of succession of the fouling assemblages on wind turbines off the Belgian coast, [in:] Degraer S., Brabant R., Rumes B., Vigin L. (eds.), Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea. Marking a Decade of Monitoring, Research and Innovation, Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management Section, Brussels 2019: 73–84.

Kiørboe T., Frantsen E., Jensen C., Nohr O., Effects of suspended sediment on development and hatching of herring (Clupea harengus) eggs, Estuarine and Coastal Shelf Science 1981, 13: 107–111.

Kjelland M.E., Woodley C.M., Swannack T.M., Smith D.L., A review of the potential effects of suspended sediment on fishes. Potential dredging-related physiological, behavioral, and transgenerational implication, Environment Systems and Decisions 2015, 35: 334–350.

Klama H., Czerwona lista wątrobowców i glewików w Polsce, [in:] Mirek Z., Zarzycki K., Wojewoda W., Szeląg Z., Czerwona lista roślin i grzybów Polski, W. Szafer Institute of Botany, Polish Academy of Sciences, Cracow 2006: 21–34.

Knobloch T., Bełdowski J., Böttcher C., Söderström M., Rühl N.-P., Sternheim J., Chemical munitions dumped in the Baltic Sea. Report of the ad hoc expert group to update and review the existing information on dumped chemical munitions in the Baltic Sea (HELCOM MUNI), Baltic Sea Environmental Proceedings, HELCOM, 2013, p. 129.

Koehler A., The gender-specific risk to liver toxicity and cancer of flounder (Platichthys flesus (L.)) at the German Wadden Sea coast, Aquat. Toxicol. 2004, 70 (4): 257–276.

Köller J.A., Koppel J., Peters W. (ed.), Offshore wind energy. Research on environmental impacts, Springer Verlag, Berlin Heidelberg 2006.

Kramarska R., Krzywiec P., Dadlez R., Mapa geologiczna dna Bałtyku bez utworów czwartorzędowych, 1:500 000, Polish Geological Institute – National Research Institute, Gdańsk–Warsaw 1999.

Kramarska R., Osady na głębokości 1 m poniżej powierzchni dna, [in:] Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table XXI, Polish Geological Institute, Sopot–Warsaw 1995 a.

Kramarska R., Osady powierzchni dna, [in:] Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table XXV, Polish Geological Institute, Sopot–Warsaw 1995b.

Kramarska R., Przekroje geologiczne (I), [in:] Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table XIX, Polish Geological Institute, Sopot–Warsaw 1995c.

Krost P., Goerres M., Sandow V., Wildlife corridors under water: an approach to preserve marine biodiversity in heavily modified water bodies, Journal of Coastal Conservation 2017, 22: 87–104.

Kruk-Dowgiałło L., Brzeska P., Opioła R., Kuliński M., Makroglony i okrytozalążkowe, [in]: Przewodniki metodyczne do badań terenowych i analiz laboratoryjnych elementów biologicznych wód przejściowych i przybrzeżnych, Biblioteka Monitoringu Środowiska, Warsaw 2010: 33–63.

Kruk-Dowgiałło L., Brzeska P., Wpływ prac czerpalnych na florę denna Zatoki Puckiej i propozycje działań naprawczych, [in:] Program rekultywacji wyrobisk w Zatoce Puckiej. Przyrodnicze podstawy i uwarunkowania, Edited by Lidia Kruk-Dowgiałło and Radosław Opioła, Published by the Maritime Institute in Gdańsk 2009: 187–208.

Kruk-Dowgiałło L., Kramarska R., Gajewski J. (eds.), Natural Habitats of the Polish Zone of the Baltic Sea. Vol. 1: The Słupsk Bank Boulder Area, Maritime Institute in Gdańsk, Polish Geological Institute – National Research Institute, Gdańsk 2011.

Kruk-Dowgiałło L., Michałek M., Boniecka H., Typiak M., Mioskowska M, Błeńska M., Kuczyński T., Lemieszek A., Rutkowski P., Pieckiel P., Brzeska-Roszczyk P., Gajda A., Świstun K., Meissner W., Tarała A., Gorczyca M., Pępek B., Prognoza oddziaływania na środowisko projektu planu zagospodarowania przestrzennego morskich wód wewnętrznych, morza terytorialnego i wyłącznej strefy ekonomicznej w skali 1: 200,000, written on commission of the Maritime Office in Gdynia, Internal publications of the MI in Gdańsk no. 7289, Gdańsk 2019.

Krzemieniewski M., Teodorowicz M., Debowski M., Pesta J., Effects of a constant magnetic field on water quality and rearing of European sheatfish *Silurus glanis* L. larvae. Aquacult. Res. 2004, 35: 568–573.

Krzymiński W. (ed.), Wstępna ocena stanu środowiska wód morskich polskiej strefy Morza Bałtyckiego, Report for the European Commission, Chief Inspectorate for Environmental Protection, 2013.

Kurek R.T., Poradnik projektowania przejść dla zwierząt i działań ograniczających śmiertelność fauny przy drogach, General Directorate for Environmental Protection, Department of Environmental Impact Assessment, 2010.

Kvellestad A., Planned submarine disposal of mining waste in the Førde Fjord of Norway – underestimation and undercommunication of harmful effects of suspended industry-created particles on fish, Oslo, 01.12.2015; available at: https://fjordaksjonen.org/onewebmedia/Kvellestad%202015%20Engebo%20mining%20project%20EIA%20-%20effects%20of%20suspended%20particles%20on%20fish.pdf.

Ladich F., Fay R.R., Auditory evoked potential audiometry in fish, Reviews in Fish Biology and Fisheries 2013, 23: 317–364.

Langhamer O., Artificial reef effect in relation to offshore renewable energy conversion. State of the art, The Scientific World Journal 2012, (1): 1–8.

Leonhard S., EIA report. Benthic communities, Horns Rev 2 Offshore Wind Farm, 2006.

Lerchl A., Zachmann A., Ali M.A., Reiter, R.J., The effect of pulsing fields on pineal melatonin synthesis in a teleost fish (brook trout, Salvelinus fontinalis), Neuroscience Letters 1998, 256: 171–173.

Lidzbarski M., Mapa Hydrogeologiczna Polski skala 1:50 000, Sheet 4 – Choczewo, Polish Geological Institute, 2000.

Lidzbarski M., Objaśnienia do mapy hydrogeologicznej Polski w skali 1:50 000, Choczewo Sheet (0004), Polish Geological Institute, Warsaw 2000.

Lindén O., The influence of crude oil and mixtures of crude oil/dispersants on the ontogenic development of the Baltic herring, Clupea harengus membras L. Ambio 1976, 5: 136–140.

Lorenc H. (ed.), Atlas klimatu Polski, IMWM, Warsaw 2005.

Łabuz T. A., 2005, Brzegi wydmowe polskiego wybrzeża Bałtyku (Dune shores of Polish Baltic coast), Czasopismo Geograficzne 76 (1–2): 19–47.

Mańkowski W., Rumek A., Sukcesja obrastania przedmiotów podwodnych przez rośliny i zwierzęta w cyklach rocznych, Stud. i Mat. Ocean. 1975, 9: 15–46.

Marino A.A., Becker R.O., Biological effects of extremely low frequency electric and magnetic fields. A review, Physiological Chemistry and Physics 1977, 9 (2): 131–147.

Markowski R., Buliński M., Ginące i zagrożone rośliny naczyniowe Pomorza Gdańskiego, Acta Bot. Cassub., Monograph 2004, 1:

Meissner K., Schabelon H., Bellebaum J., Sordyl H., Impacts of Submarine Cables on the Marine Environment. A Literature Review, Report by Institute of Applied Ecology (IfAÖ), Report for German Federal Agency for Nature Conservation (BfN), 2006.

Meissner K., Sordyl H., Literature Review of Offshore Wind Farms with Regard to Benthic Communities and Habitats, [in:] Zucco C., Wende W., Merck T., Köchling I., Köppel J. (eds.), Ecological Research on Offshore Wind Farms. International Exchange of Experiences. Part B: Literature Review of Ecological Impacts, BfN Skripten 186. Bundesamt für Naturschutz (BfN), Bonn 2006: 1–46.

Meissner W., Przybrzeżne wody Bałtyku, [in:] Ostoje ptaków o znaczeniu międzynarodowym w Polsce, Wilk T. (ed.), Jujka M., Krogulec J., Chylarecki P., OTOP, Marki 2010: 531–532.

Meissner W., Ptaki jako ofiary zanieczyszczeń mórz ropą i jej pochodnymi, Wiadomości Ekologiczne 2005, 51: 17–34.

Meissner W., Ptaki morskie, [in:] Sikora A., Chylarecki P., Meissner W., Neubauer G. (eds.), Monitoring ptaków wodno-błotnych w okresie wędrówek. Poradnik metodyczny, GDEP, Warsaw 2011a, pp. 93–102.

Meissner W., Sezonowe zmiany liczebności i rozmieszczenia lodówki *Clangula hyemalis*, markaczki *Melanitta nigra* i uhli *M. fusca* w rejonie Przylądka Rozewie, Ornis Polonica 2010, 51: 275–284.

Merck T., Assessment of the environmental impacts of cables, OSPAR Commission, Germany, 2009.

Messieh S.N., Wildish S.N., Peterson R.H., Possible Impact from Dredging and Spoil Disposal on the Miramichi Bay Herring Fishery, Canadian Technical Report of Fishery and Aquatic Science No. 1008, Minister of Supply and Services Canada, St. Andrews 1981: 1–37.

MGN 515 (M), Special Purpose Ships (SPS) Code – Application to Offshore Vessels, Marine Guidance Note, MCA.

Michałek M., Osowiecki A., Barańska A., Wróblewski R., Gajewski L., Rydzkowski P., Kośmicki A., Strzelecki D., Meissner W., Mioskowska M., Pieckiel P., Kuczyński T., Pardus J, Tarała A., Environmental documentation, i.e. text description, tables, graphical and cartographic representations and data constituting the basis for the formulation of the draft protection plan for the marine area of the Natura 2000 site the Słupsk Bank PLC990001, Internal publications of the MI in Gdańsk no. 7347, Gdańsk 2020.

Mieńko W., Kowalski K., Siemion D., Błażuk J., Inwentaryzacja i waloryzacja przyrodnicza gminy Choczewo, Biuro Dokumentacji i Ochrony Przyrody, Gdańsk 1995.

Miętus M., Sztobryn M., Stan środowiska polskiej strefy przybrzeżnej Bałtyku w latach 1986–2005, Institute of Meteorology and Water Management, National Research Institute, Warsaw 2011.

Ministry of Environment, Polish National Strategy for Adaptation to Climate Change by 2020 with the perspective by 2030, Warsaw 2013.

Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Polish Geological Institute, Sopot–Warsaw 1995.

Moore P.G., Inorganic particulate suspensions in the sea and their effects on marine animals, Oceanogr. Mar. Biol. Ann. Rev. 1977, 15: 225–363.

Munroe T.A., Platichthys flesus, The IUCN Red List of Threatened Species, 2010: e.T135717A4191586; available at: http://dx.doi.org/10.2305/IUCN.UK.2010-4.RLTS.T135717A4191586.en (accessed on: 6.06.2017).

Najbar B., Gniewosz plamisty *Coronella austriaca*, [in:] Makomaska-Juchiewicz M., Baran P. (ed.), Monitoring gatunków zwierząt. Przewodnik metodyczny, Part III, CIEP, Warsaw 2012: 516–539.

NatureServe, *Gasterosteus aculeatus*, The IUCN Red List of Threatened Species, 2015: e.T8951A76576912; available at: http://dx.doi.org/10.2305/IUCN.UK.2015-1.RLTS.T8951A76576912.en (accessed on: 6.06.2017).

Nedwell J., Howell D., A review of offshore windfarm related underwater noise sources, Report No. 544 R 0308, Report commissioned by COWRIE, Subacoustech Ltd, Southampton 2004.

Nedwell J.R., Brooker A.G., Barham R.J., Assessment of underwater noise during the installation of export power cables at the Beatrice Offshore Wind Farm, Subacoustech Environmental Report No. E318R0106, 17.

Newcombe C.P., MacDonald D.D., Effects of suspended sediments on aquatic ecosystems, North American Journal of Fisheries Management 1991, 11: 72–82.

Normandeau Associates Inc., Exponent Inc., Tricas T., Gill A., Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species. Final Report, OCS Study BOEMRE 2011-09. U.S. Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement. Pacific OCS Region, Camarillo 2011.

Nowak J., Hac B., Malottki A., Niemkiewicz M., Jacob K., Jażdżewski M., Sitarz M., Spacjer R., Cichowska D., Szyłejko W., Wysocki P., Wykonanie projektu i budowa działającego urządzenia do poboru prób biologicznych z obiektów stałych zalegających na dnie morza, Research supported by the Polish Ministry of Science and Higher Education throughout the statutory funds, Internal Publications of the Maritime Institute no. 7140A, 2017.

O'Neil P., Chemia środowiska, PWN Publishing House, Warsaw–Wrocław 1998.

Öhman M.C., Sigray P., Westerberg H., Offshore windmills and the effects of electromagnetic fields on fish, Ambio 2007, 36: 630–633.

Opioła R., Barańska A., Kruk-Dowgiałło L., Dziaduch D., Michałek M., Brzeska-Roszczyk P., Pieckiel P., Łysiak-Pastuszak E., Osowiecki A., Olenycz M., Zaboroś I., Mioskowska M., Kuczyński T., Dembska G., Pazikowska-Sapota G., Galer-Tatarowicz K., Flasińska A., Nowogrodzka K., Cichowska A., Radke B., Dziarkowski T., Boniecka H., Gawlik W., Gajda A., Bajkiewicz-Grabowska E., Markowski M., Kozłowski K., Malinga M., Świstun K., Aninowska M., Yalçin G., Thomsen F., Mroczek K., Pyra A. Pilotażowe wdrożenie monitoringu gatunków i siedlisk morskich w latach 2015–2018. Report on activities performed during stage 4, Internal Publications of the Maritime Institute in Gdańsk no. 7232, 2018, pp. 336.

Orbicon, Horns Rev 3 Offshore Wind Farm – HR3-TR-025. Fish Ecology, Technical report no. 5, Energinet.dk, 2014.

Osowiecki A., Kruk-Dowgiałło L. (eds), Różnorodność biologiczna przybrzeżnego głazowiska Rowy przy Słowińskim Parku Narodowym [Biodiversity of the Rowy boulder area at the Słowiński National Park], Publishing House of the Maritime Institute in Gdańsk, Gdańsk 2006.

OSPAR Commission, Assessment of the environmental impact of offshore wind-farms, OSPAR Biodiversity Series, Publication Number: 385/2008: 1–34.

OSPAR Commission, Guidelines on Best Environmental Practice (BEP) in Cable Laying and Operation. Agreement 2012-2, OSPAR 12/22/1, Annex 14.

OSPAR Commission, Overview of the impacts of anthropogenic underwater sound in the marine environment, Publication Number: 441/2009: 1–109.

Otremba Z., Andrulewicz E., Physical fields during construction and operation of wind farms by example of Polish maritime areas, Polish Maritime Research 2014, 21, 4 (84): 113–122.

Paczyński B., Sadurski A. (eds.), Hydrogeologia regionalna Polski, Polish Geological Institute, Warsaw 2007.

Parkman R.H., Curtis C.D., Vaughan D.J., Metal fixation and mobilization in sediments of the Afon Goch Estuary – Dulas Bay, Anglesy, Appl. Geochem. 1996, 11: 203–210.

Partridge G.J., Michael R.J., Direct and indirect effects of simulated calcareous dredge material on eggs and larvae of pink snapper Pagrus auratus, Journal of Fish Biology 2010, 77 (1): 227–240.

Petersen J.K., Malm T., Offshore windmill farms: threats to or possibilities for the marine environment, Ambio 2009, 35: 75–80.

Pęcherzewski K., Zawartość i rozmieszczenie substancji organicznych azotu i fosforu w osadach dennych Południowego Bałtyku, Scientific Papers of the Faculty of Biology and Life Sciences of the University of Gdańsk, Oceanography 1972, 1: 29.

Pędzisz K., Awaryjność linii kablowych średniego napięcia. Przegląd Elektrotechniczny – Konferencje 2007, 5 (3): 180–183.

Phua C., van den Akker S., Baretta J., van Dalfsen M., Ecological Effects of Sand Extraction in the North Sea. Report, 2004: 1–22.

Pikies R., Morfogeneza dna, [in:] Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table XXIV, Polish Geological Institute, Sopot–Warsaw 1995.

Plan Gospodarki Niskoemisyjnej dla gminy Choczewo, Fundacja Poszanowania Energii, Gdańsk 2015.

Pliński M., Jóźwiak T., The distribution of water vegetation on the Polish coast of the Baltic Sea in 1996–2000, Oceanol. and Hydrobiol. Stud. 2004, XXXIII (2): 29–40.

SEM 2002–2019. Data of the State Environmental Monitoring regarding phytobenthos occurrence in the Polish Maritime Areas.

SEM 2010–2019. Data of the State Environmental Monitoring regarding phytobenthos – macroalgae on the stony seabed in the Polish Maritime Areas.

Polak-Juszczak L., Trace metals in flounder, *Platichthys flesus* (Linnaeus, 1758), and sediments from the Baltic Sea and the Portuguese Atlantic coast, Environ. Sci. Pollut. Res. 2013, 20: 7424–7432.

Poléo A.B.S., Johannessen H.F., Harboe M.J., High voltage direct current (HVDC) sea cables and sea electrodes. Effects on marine life, Department of Biology, University of Oslo, Oslo, 2001: 1–50.

Popper A., Hawkins A., Fay R., Mann D., Bartol S., Carlson T., Sound exposure guidelines for fishes and sea turtles: a technical report prepared by ANSI-accredited standards committee S3/SC1 and registered with ANSI, Springer Briefs in Oceanography 2, 2014.

Popper A.N., Hawkins A.D., An overview of fish bioacoustics and the impacts of anthropogenic sounds on fishes, J. Fish. Biol. 2019, 94: 692–713.

Popper A.N., Hawkins A.D., The importance of particle motion to fishes and invertebrates, The Journal of the Acoustical Society of America 2018, 143: 470–486.

Posford Duvivier Environment, Hill M.I., Guidelines on the impact of aggregate extraction on European Marine Sites, Countryside Council for Wales (UK Marine SACs Project), 2001.

Ramsing N., Gundersen J., Seawater and gases. Tabulated physical parameters of interest to people working with microsensors in marine system, UNISENSE, 2012.

Report on the State of the Environment in the Pomeranian Voivodeship in 2018, VIEP, Gdańsk 2020,

Environmental Impact Assessment Report for the project „Rozbudowa stacji elektroenergetycznej 220/110 kV Bydgoszcz Zachód wraz z likwidacją kolizji istniejącej linii 220 kV".

Rellini M., Torchia G., Rellini G., Seasonal Variation of Fish Assemblages in the Loano Artificial Reef (Ligurian Sea Northwestern-Mediterranean), Bull. Mar. Sci. 1994, 55 (2–3): 401–417.

Reszko M., Performance of environmental surveys with the preparation of the Environmental Impact Assessment Report and obtaining the Decision on Environmental Conditions for the project consisting in the construction of a wind farm on the Baltic Sea together with its offshore and onshore connection infrastructure, Expert study – the Action Plan on Counteracting Threats and Contamination from Oil Spills, Maritime Institute in Gdańsk (the Leader) in consortium with MEWO S.A., 2017.

Reubens J., Braeckman U., Vanaverbeke J., Van Colen C., Degraer S., Vincx M., Aggregation at windmill artificial reefs: CPUE of Atlantic cod (*Gadus morhua*) and pouting (*Trisopterus luscus*) at different habitats in the Belgian part of the North Sea, Fisheries Research 2013, 139: 28–34.

Reubens J., Degraer S., Vincx M., Aggregation and feeding behaviour of pouting (*Trisopterus luscus*) at wind turbines in the Belgian part of the North Sea, Fisheries Research 2011, 108: 223–227.

Richardson W.J., Malme C.I., Green Jr C.R., Thomson D.H., Marine mammals and noise, Academic Press, San Diego, California, USA 1995.

Rönbäck P., Westerberg H., Sedimenteffekter på pelagiska fiskägg och gulesäckslarver, Fiskeriverket, Kustlaboratoriet, Frölunda 1996.

Rostin L., Martin G., Herkul K., Environmental concerns related to the construction of offshore wind parks: Baltic Sea case, WIT Transactions on Ecology and the Environment, 2013.

Rotnicka J., Transport eoliczny na plaży morza bezpływowego: natężenie, uwarunkowania i wpływ na tworzenie wydm przednich (na przykładzie bariery łebskiej), Bogucki – Wydawnictwo Naukowe, Poznań 2013.

Rotnicki K., Holoceńskie ingresje i regresje Bałtyku na polskim wybrzeżu środkowym w świetle badań Niziny Gardnieńsko-Łebskiej, Polish Geological Society, AMU, 2005, 14: 27–44.

Rotnicki K., Identyfikacja, wiek i przyczyny holoceńskich ingresji i regresji Bałtyku na polskim wybrzeżu środkowym, Publication of the Słowiński National Park, Smołdzino 2009.

Rybacki M., Żaba wodna Pelophylax esculentus (*Rana esculenta*), [in:] Makomaska-Juchiewicz M., Baran P. (ed.), Monitoring gatunków zwierząt. Przewodnik metodyczny, Part III, CIEP, Warsaw 2012: 481–494.

SAMBAH, Final report for LIFE+ project SAMBAH LIFE08 NAT/S/000261 covering the project activities from 01.01.2010 to 30.09.2015, 2016.

Sapota M.R., Bałazy P., Mirny Z., Modification in the nest guarding strategy – one of the reasons of the round goby (Neogobius melanostomus) invasion success in the Gulf of Gdańsk?, Oceanological and Hydrobiological Studies 2014, 43: 21–28.

Schiewer U. (ed.), Ecology of Baltic Coastal Waters, Ecological Studies 197, 2008.

Schreiber M., Gellermann M., Gerdes G., Rehfeldt K., Maßnahmen zur Vermeidung und Verminderung negativer ökologischer Auswirkungen bei der Netzanbindung und – integration von Offshore-Windparks, Gutachten im Auftrag des BMU, FKZ 0327530, Final report, 2004.

Siepak J. (ed.), Analiza specjacyjna metali w próbkach wód i osadów dennych, Publishing House of AMU, Poznań 1998.

Sikora A., Chylarecki P., Meissner W., Neubauer G. (eds.), Monitoring ptaków wodno-błotnych w okresie wędrówek. Poradnik metodyczny, GDEP, Warsaw 2011.

Sissenwine M.P., Cohen E.B., Grosslein M.D., Structure of the Georges Bank ecosystem, Rapports et Procès-Verbaux des Réunions – Conseil International pour l'Exploration de la Mer 1984, 183: 243–254.

Sitkiewicz P., Rudowski S., Wróblewski R., Dworniczak J., New insights into the nearshore bar internal structure using high resolution sub-bottom profiling: the Vistula Spit case study, Marine Environmental Research 419, 2020.

Skov H., Heinänen S., Žydelis R., Bellebaum J., Bzoma S., Dagys M., Durinck J., Garthe S., Grishanov G., Hario M., Kieckbusch J. J., Kube J., Kuresoo A., Larsson K., Luigujoe L., Meissner W., Nehls H. W., Nilsson L., Petersen I. K., Roos M. M., Pihl S., Sonntag N., Stock A., Stipniece A., Waterbird Populations and Pressures in the Baltic Sea, Nordic Council of Ministers, Copenhagen 2011.

Sobel J., Gadus morhua, The IUCN Red List of Threatened Species, 1996: e.T8784A12931575; available at: http://dx.doi.org/10.2305/IUCN.UK.1996.RLTS.T8784A12931575.en.

Stenberg C., Støttrup J., van Deurs M., Berg C., Dinesen G., Mosegaard H., Grome T., Leonhard S., Long-term effects of an offshore wind farm in the North Sea on fish communities, Marine Ecology Progress Series 2015, 528: 257–265.

Stiller J., Rakowska A., Grzybowski A., Oddziaływanie linii kablowych najwyższych napięć prądu przemiennego (AC) na środowisko, Institute of Electrical Power Engineering, Poznan University of Technology, Poznań 2006.

Stone R.B., Pratt H.L., Parker R.O., Davis G.E., A comparison of fish populations on an artificial and natural reef in the Florida Keys, Mar. Fish. Rev. 1979, 41 (9): 1–11.

Struhsaker J.W., Effects of benzene (a toxic component of petroleum) on spawning Pacific herring, Clupea harengus palassi, U.S. Nat. Mar. Fish. Serv. Fish. Bull. 1977, 75: 43–49.

Sutton S.J., Lewin P.L., Swingler S.G., Review of global HVDC subsea cable projects and the application of sea electrodes, Electrical Power and Energy Systems 2017, 87: 121–135.

Sveegaard S, Teilmann J, Galatius A., Abundance survey of harbour porpoises in Kattegat, Belt Seas and the Western Baltic, July 2012, Note from DCE – Danish Centre for Environment and Energy, 2013: 1–11.

Szlinder-Richert J., Usydus Z., Drgas A., Persistent organic pollutants in sediment from the southern Baltic. Risk assessment, Journal of Environmental Monitoring 2012, 14: 2100–2107.

Szuba M., Kowalczyk R., Lenart W., Mikuła J., Szmigielski S., Teresiak Z., Tyszecki A., Linie i stacje elektroenergetyczne w środowisku człowieka. Informator, 4th Edition, Biuro Konsultingowo-Inżynierskie „EKO-MARK", Warsaw 2008, 177.

Taormina B., Bald J., Want A., Thouzeau G., Lejart M., Desroy N., Carlier A., A review of potential impacts of submarine power cables on the marine environment. Knowledge gaps, recommendations and future directions, Renewable and Sustainable Energy Reviews 2018, 96: 380–391.

Tęgowski J., Folegot T., Koza R., Trzcińska K., Pawliczka I., Zdroik J., Skóra K. (BIAS), Ship traffic noise distribution in the Polish Baltic Waters – results of BIAS EU project, 10th EAA International Symposium on Hydroacoustics, XXXIII Symposium on Hydroacoustics, May 17–20, 2016, Jastrzębia Góra, Poland 2016; available at: https://biasproject.files.wordpress.com/2017/02/j_tc499gowski_symposiononhydroacoustics2016_2.pdf.

Thomas L., Burt L., SAMBAH Statistical methods and results, SAMBAH Conference Kolmården, 8 December 2014, CREEM, University of St Andrews.

Thomsen F., Lüdemann K., Kafemann R., Piper W., Effects of offshore wind farm noise on marine mammals and fish, Biola, Hamburg, Germany on behalf of COWRIE Ltd., 2006.

Tomiałojć L., Stawarczyk T., Awifauna Polski. Rozmieszczenie, liczebność i zmiany, PTPP „pro Natura", Wrocław 2003.

Tougaard J., Hermannsen L., Pajala J., Andersson M., Folegot T., Clorennec D., Sigray P. (BIAS), Three different ways to approach Good Environmental Status (GES) with respect to man-made underwater noise. Effects of Noise on Aquatic Life, Dublin, July 2016; available at: https://biasproject.wordpress.com/downloads/presentations/.

Tous P., Sidibé A., Mbye E., de Morais L., Camara Y.H., Adeofe T.A., Monroe T., Camara K., Cissoko K., Djiman R., Sagna A., Sylla M., Carpenter K.E., *Engraulis encrasicolus*, The IUCN Red List of Threatened Species, 2015: e.T198568A15546291; available at: http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T198568A15546291.en (accessed on: 6.06.2017).

Trzeciak A., Wstęp do chemii nieorganicznej środowiska, Publishing House of the University of Wrocław, Wrocław 1995.

Turner C.H., Ebert E.E., Given R.R., Fish Bulletin 146. Man-Made Reef Ecology, State of California, The Resources Agency Department of Fish and Game, San Diego 1969: 1–221.

URS Corporation, Draft environmental impact report for the proposed TransBay Cable Project, vol. 1, section 1.0–11.0, Appendix A, 2006.

Usero J., Gamero M., Morillo J., Gracia I., Comparative study of three sequential extraction procedures for metals in marine sediments, Environmental International 1998, 24 (4): 487–496.

Uścinowicz S., Geochemia osadów powierzchniowych Morza Bałtyckiego, Polish Geological Institute – National Research Institute, Warsaw 2011.

Uścinowicz S., Miąższość plejstocenu, [in]: Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table XIII, Polish Geological Institute, Sopot–Warsaw 1995 a.

Uścinowicz S., Miąższość holocenu, [in]: Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table XXIII, Polish Geological Institute, Sopot–Warsaw 1995b.

Uścinowicz S., Miąższość plejstocenu, [in]: Mojski J.E. (ed.), Atlas geologiczny Południowego Bałtyku 1:500 000, Table XIV, Polish Geological Institute, Sopot–Warsaw 1995c.

Uścinowicz S., The Baltic Sea Continental Shelf, [in]: Chiocci F., Chivas A. (eds.), Continental Shelves of the World. Their Evolution During the Last Glacio-Eustatic Cycle, The Geological Society of London, 2014.

Uścinowicz S., Zachowicz J., Mapa geologiczna dna Bałtyku w skali 1:200 000, sheets: Łeba (11), Słupsk (5), Polish Geological Institute, Wydawnictwa Geologiczne, 1991a.

Uścinowicz S., Zachowicz J., Objaśnienia do mapy geologicznej dna Bałtyku w skali 1:200 000, sheets: Łeba, Słupsk, Polish Geological Institute, 1991b.

Utne-Palm A.C., Effects of larvae ontogeny, turbidity, and turbulence on prey attack rate and swimming activity of Atlantic herring larvae, Journal of Experimental Marine Biology and Ecology 2004, 310: 147–161.

Van der Graaf S., Ainslie M., André M., Brensing K., Dalen J., Dekeling R. Report of the Technical Subgroup on Underwater noise and other forms of energy, European Marine Strategy Framework Directive – Good Environmental Status, 2012.

Veldhuizen P., Meijer B., Truijens J., Vree D., Gockel P., Lammers L., Track S., 2009 Polenergia Offshore Wind Developments for projects Middle Baltic II and Middle Baltic III: High Level Technical Design Options Study, Amersfoort: Royal HaskoningDHV – Enhancing Society Together, 2014.

Vethaak A.D., Wester P.W., Diseases of flounder *Platichthys flesus* in Dutch coastal and estuarine waters, with particular reference to environmental stress factors. II. Liver histopathology, Dis. Aquat. Org. 1996, 26: 99–116.

Wandzel T., Babka okrągła *Neogobius melanostomus* (Pallas, 1811) – nowy komponent ichtiocenozy południowego Bałtyku. Rola w ekosystemie i rybołówstwie, Monograph, National Marine Fisheries Research Institute, Gdynia 2003: 1–76.

Wedemeyer G.A., McLeay D.J., Goodyear C.P., Assessing the tolerance of fish and fish populations to environmental stress: the problems and methods of monitoring [in:] Cairns V.W., Hodson P.V., Nriagu J.O. (ed.), Containment effects on fisheries, John Wiley & Sons, Inc., New York 1984.

Weiner J., Życie i ewolucja biosfery, PWN Publishing House, Warsaw 2005.

Westerberg H., Begout-Anras M.L., Orientation of silver eel (*Anguilla anguilla*) in a disturbed geomagnetic field, [in:] Moore A., Russel I. (ed.), Advances in fish telemetry, Proceedings of the Third Conference on Fish Telemetry in Europe held in Norwich, England, 20–25 June, Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Lowestoft, 2000.

Westerberg H., Rännbäek P., Frimansson H., Effects of suspended sediments on cod egg and larvae and on the behaviour of adult herring and cod, International Council for the Exploration of the Sea, CM 1996/E:26: 1–13.

Westin D.T., Olney C.E., Rogers B.A., Effects of Parental and Dietary Organochlorines on Survival and Body Burdens of Striped Bass Larvae, Transactions of the American Fisheries Society 1985, 114 (1): 137–145.

Wiącek J., Polak M., Kucharczyk K., Zgorzałek S., Wpływ hałasu drogowego na ptaki, Budownictwo i Architektura 2014, 13 (1): 75–86.

Wibig J., Jakusik E. (eds.), Warunki klimatyczne i oceanograficzne w Polsce i na Bałtyku Południowym: spodziewane zmiany i wytyczne do opracowania strategii adaptacyjnych w gospodarce krajowej, Institute of Meteorology and Water Management – National Research Institute, Warsaw 2012.

Wilk T., Chodkiewicz T., Sikora A., Chylarecki P., Kuczyński L., Czerwona lista ptaków Polski, OTOP, Marki 2020.

Wilson J.C., Elliott M., Cutts N.D., Mander L., Mendao V., Perez-Dominguez R., Phelps A., Coastal and offshore wind energy generation. Is it environmentally benign?, Energies 2010, 3: 1383–1422.

Wiśniewski S., Dembska G., Grynkiewicz M., Sapota G., Aftanas B., Badania form fosforu w osadach powierzchniowych strefy brzegowej Zatoki Gdańskiej i osadach dennych kanałów portowych Gdańska i Gdyni, Ekologia i Technika 2006, XIV (supl.): 113–116.

Witt G., Occurrence and transport of polycyclic aromatic hydrocarbons in the water of the Baltic Sea, Marine Chemistry 2002, 79: 49–66.

Wojewoda W., Ławrynowicz M., Red list of the macrofungi in Poland, (Czerwona lista grzybów wielkoowocnikowych w Polsce) [in:] Mirek Z. et al. (eds.), Red list of plants and fungi in Poland (Czerwona lista roślin i grzybów Polski), W. Szafer Institute of Botany, Polish Academy of Sciences, Cracow 2006: 53–70.

Wojewoda W., Morphology of some rare and threatened Polish Basidiomycota, Acta Mycol. 2003, 38 (1/2): 3–20.

Woodruff D., Schultz I., Marshall K., Ward J., Cullinan V., Effects of Electromagnetic Fields on Fish and Invertebrates. Task 2.1.3: Effects on Aquatic Organisms Fiscal Year 2011 Progress Report, Environmental Effects of Marine and Hydrokinetic Energy, PNNL-20813 Final, Pacific Northwest National Laboratory, Richland 2012.

Worzyk T., Submarine Power Cables. Design, Installation, Repair, Environmental Aspects, Springer-Verlag, Berlin Heidelberg 2009: 1–296.

Woś A., Regiony klimatyczne Polski w świetle występowania różnych typów pogody, Notebooks of the Institute of Geography and Spatial Organization, no. 20, Publishing House of the IGSO of PAS, Warsaw 1993.

Zalewska T., Jakusik E., Łysiak-Pastuszak E., Krzymiński W. (ed.), Bałtyk Południowy w 2011 r., Institute of Meteorology and Water Management National Research Institute, Warsaw 2012.

Zawadzka D., Ciach M., Figarski T., Kajtoch Ł., Rejt Ł. (eds.), Materiały do wyznaczania i określania stanu zachowania siedlisk ptasich w obszarach specjalnej ochrony ptaków Natura 2000, GDEP, Warsaw 2013.

Zawadzka-Kahlau E., Morfodynamika brzegów wydmowych południowego Bałtyku, Publishing House of the University of Gdańsk, Gdańsk, 2013.

Zawadzka-Kahlau E., Tendencje rozwojowe polskich brzegów Bałtyku południowego, Gdańskie Towarzystwo Naukowe, Gdańsk 1999.

Zucco C., Wende W., Merck T., Köchling I., Köppel J. (eds.), Ecological research on offshore wind farms. International exchange of experiences (Project No. 804 46 001). Part B: Literature review of ecological impacts, BfN-Skripten 186, Bundesamt für Naturschutz (BfN), Bonn 2006: 1–284.

Żarnowiec J., Stebel A., Ochyra R., Threatened moss species in the Polish Carpathians in the light of a new Red-list of mosses in Poland, [in:] Stebel A., Ochyra R. (eds.), Bryological studies in the Western Carpathians, Sorus, Poznań 2004: 9–28.

Żuchowicz-Wodnikowska I., Czyżewski K., Metody określania emisji i imisji hałasu przemysłowego w środowisku, Manual – Building Research Institute (ITB) no. 338/2008, Warsaw 2008.

**Legal acts**

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 *on ambient air quality and cleaner air for Europe*

Directive 2012/33/EU of the European Parliament and of the Council of 21 November 2012 *amending Directive 1999/32/EC of the Council on the content of sulphur in marine fuels* (OJ L 327, 27.11.2012, p. 1)

Regulation (EU) 2015/757 of the European Parliament and the Council of 29 April 2015 *on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC* (OJ L 123, 19.05.2015, p. 55).

Regulation (EU) 2018/1999 of the European Parliament and the Council of 11 December 2018 *on the Governance of the Energy Union and Climate Action* (OJ L 328, 21.12.2018, p.1)

Commission Delegated Regulation (EU) 2016/2071 of 22 September 2016 *amending Regulation (EU) 2015/757 of the European Parliament and of the Council as regards the methods for monitoring carbon dioxide emissions and the rules for monitoring other relevant information* (OJ L 320, 26.11.2016, p. 1)

Commission Delegated Regulation (EU) 2016/2072 of 22 September 2016 *on the verification activities and accreditation of verifiers pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport* (OJ L 320, 26.11.2016, p. 5)

Commission Implementing Regulation (EU) 2016/1927 of 4 November 2016 *on templates for monitoring plans, emissions reports and documents of compliance pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on monitoring, reporting and verification of carbon dioxide emissions from maritime transport* (OJ L 299, 05.11.2016, p. 1)

Commission Implementing Regulation (EU) 2016/1928 of 4 November 2016 *on determination of cargo carried for categories of ships other than passenger, ro-ro and container ships pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport* (OJ L 299, 05.11.2016, p.22)

Regulation of the Minister of Infrastructure of 21 December 2002 *on waste and cargo residues management plans for ports* (Journal of Laws of 2002, No. 236, item 1989, as amended)

Regulation of the Minister of the Environment of 11 March 2005 *on establishing the list of game species* (Journal of Laws of 2005, No. 45, item 433, as amended)

Regulation of the Minister of Economy of 21 December 2005 *on the essential requirements regarding the noise emission to the environment by equipment for use outdoors* (Journal of Laws of 2005, No. 263, item 2202, as amended)

Regulation of the Minister of Transport and Construction of 26 January 2006 *on the procedure for issuing permits for sea disposal of dredged material and for dumping waste or other substances at sea* (Journal of Laws of 2006, No. 22, item 166)

Regulation of the Minister of Maritime Economy of 23 October 2006 *on the technical conditions of use and the detailed scope of inspection of marine hydro-engineering structures* (Journal of Laws of 2006, No. 206, item 1516)

Regulation of the Minister of the Environment of 14 June 2007 *on permissible noise levels in the environment* (consolidated text: Journal of Laws of 2014, item 112)

Regulation of the Minister of Internal Affairs and Administration of 24 July 2009 *on firefighting water supply and fire roads* (Journal of Laws of 2009, No. 124, item 1030)

Regulation of the Minister of the Environment of 26 January 2010 *on reference values for certain substances in the air* (Journal of Laws of 2010, No. 16, item 87).

Regulation of the Minister of the Environment of 12 January 2011 *on special protection areas for birds* (Journal of Laws of 2011, No. 25, item 133, as amended)

Regulation of the Minister of the Environment of 9 October 2014 *on the protection of plant species* (Journal of Laws of 2014, item 1409)

Regulation of the Minister of the Environment of 9 October 2014 *on the protection of species of fungi* (Journal of Laws of 2014, item 1408).

Regulation of the Minister of the Environment of 11 May 2015 *on the recovery of waste outside the installations and facilities* (Journal of Laws of 2015, item 796)

Regulation of the Minister of the Environment of 1 July 2015 *on the geological documentation of mineral deposits, excluding hydrocarbon deposits* (Journal of Laws of 2015, item 987)

Regulation of the Minister of Infrastructure and Development of 7 October 2015 *on the requirements for sulphur content in marine fuel, including the method of its determination* (Journal of Laws of 2015, item 1665, as amended)

Regulation of the Minister of Economy of 9 October 2015 *on the quality requirements for liquid fuels* (Journal of Laws of 2015, item 1680, as amended)

Regulation of the Minister of Infrastructure and Development of 20 October 2015 *on the inspections, surveys and international certification in the scope of prevention of marine pollution from ships* (Journal of Laws of 2015, item 1806)

Regulation of the Minister of Development of 29 January 2016 *on the types and quantities of hazardous substances present in industrial plants which determine the plant classification as a plant with an increased or high risk of a serious industrial accident* (Journal of Laws of 2016, item 138)

Regulation of the Minister of the Environment of 1 September 2016 *on the method of assessment of ground surface contamination* (Journal of Laws of 2016, item 1395)

Regulation of the Council of Ministers of 18 October 2016 *on the Vistula River Basin Management Plan* (Journal of Laws of 2016, item 1911).

Regulation of the Minister of the Environment of 16 December 2016 *on the protection of animal species* (Journal of Laws of 2016, item 2183, as amended).

Regulation of the Council of Ministers of 8 August 2017 *on the organisation and methods of combating threats and pollution at sea* (Journal of Laws of 2017, item 1631, as amended)

Regulation of the Council of Ministers of 11 December 2017 *on the adoption of The National Marine Waters Protection Programme* (Journal of Laws of 2017, item 2469)

Regulation of the Minister of Maritime Economy and Inland Navigation of 4 October 2018 *on the development of flood hazard maps and flood risk maps* (Journal of Laws of 2018, item 2031)

Regulation of the Council of Ministers of 10 September 2019 *on projects that may have a significant impact on the environment* (Journal of Laws of 2019, item 1839)

Regulation of the Minister of Health of 17 December 2019 *on the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2019, item 2448)

Regulation of the Minister of Climate of 2 January 2020 *on waste catalogue* (Journal of Laws of 2020, item 10)

Regulation of the Minister of Climate of 17 February 2020 *on methods of checking compliance with the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2020, item 258)

Regulation of the Minister of Infrastructure of 25 February 2021 *on the adoption of the update of the set of environmental objectives for marine waters* (Journal of Laws of 2021, item 569)

Regulation of the Council of Ministers of 14 April 2021 *on the adoption of the Spatial Development Plan for internal sea waters, territorial sea and the exclusive economic zone, at a scale 1:200 000* (Journal of Laws of 2021, item 935)

Regulation of the Minister of Infrastructure of 25 June 2021 *on the classification of ecological status, ecological potential and chemical status and the method of classification of the status of surface water bodies and the environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475)

Regulation of the Minister of Infrastructure of 13 July 2021 *on the forms and methods of conducting the monitoring of surface and underground water bodies* (Journal of Laws of 2021, item 1576)

Regulation of the Minister of Climate and Environment of 7 September 2021 *on the requirements for conducting emission measurements* (Journal of Laws of 2021, item 1710)

Act of 21 March 1991 *on the marine areas of the Republic of Poland and maritime administration* (consolidated text: Journal of Laws of 2020, item 2135, as amended)

Act of 7 July 1994 – *Construction Law* (consolidated text: Journal of Laws of 2020, item 1333, as amended)

Act of 16 March 1995 *on prevention of maritime pollution from ships* (consolidated text: Journal of Laws of 2020, item 1955)

Act of 21 August 1997 *on real estate management* (consolidated text: Journal of Laws of 2021, item 1889)

Act of 27 April 2001 *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973, as amended)

Act of 28 March 2003 *on the establishment of the long-term programme "Sea Coast Protection Programme"* (consolidated text: Journal of Laws of 2003, item 678)

Act of 27 March 2003 *on spatial planning and development* (consolidated text: Journal of Laws of 2021, item 741, as amended)

Act of 23 July 2003 *on the protection and care of monuments* (Journal of Laws of 2014, item 710, as amended)

Nature Conservation Act of 16 April 2004 (consolidated text: Journal of Laws of 2021, item 1098, as amended)

Act of 25 August 2006 *on the fuel quality monitoring and control system* (consolidated text: Journal of Laws of 2021, item 133, as amended)

Act of 6 December 2006 *on the principles governing the conduct of development policy* (consolidated text: Journal of Laws of 2021, item 1057)

Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessments* (consolidated text: Journal of Laws of 2021, item 247, as amended)

Act of 9 June 2011 – *Geological and Mining Law* (consolidated text: Journal of Laws of 2021, item 1420)

Waste Act of 14 December 2012 (consolidated text: Journal of Laws of 2021, item 779, as amended)

Act of 15 May 2015 *on substances that deplete the ozone layer and on some fluorinated greenhouse gases* (consolidated text: Journal of Laws of 2020, item 2065)

Act of 24 July 2015 *on the preparation and implementation of strategic transmission network projects* (consolidated text: Journal of Laws of 2021, item 428, as amended)

Water Law Act of 20 July 2017 (consolidated text: Journal of Laws of 2021, item 624, as amended)

Act of 17 December 2020 *on promoting energy production in offshore wind farms* (consolidated text: Journal of Laws of 2021, item 234, as amended)

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## 21.1 Introduction

### 21.1.1 Preface

This document constitutes the Environmental Impact Assessment Report for the Connection Infrastructure of the Baltica-2 and Baltica-3 Offshore Wind Farms (hereinafter referred to as: the Baltica OWF CI). The Applicant planning the implementation of the Baltica OWF CI is Elektrownia Wiatrowa Baltica-2 sp. z o.o. and Elektrownia Wiatrowa Baltica-3 sp. z o.o., which are the companies of the PGE Capital Group – Polska Grupa Energetyczna S.A. and Ørsted A/S.

The planned project – Baltica OWF CI – is located in the offshore area within the exclusive economic zone and territorial sea as well as the onshore territory of the Republic of Poland. The location of the project was agreed under the decisions issued by the Director of the Maritime Office in Gdynia and the Minister of Maritime Economy and Inland Navigation.

The purpose of the Baltica OWF CI implementation is to connect the Baltica OWF to the National Power System (NPS).

Table 21.1 summarises the basic parameters of the planned project in the Applicant Proposed Variant (hereinafter referred to as: APV).

*Table 21.1. Basic parameters of the Connection Infrastructure of the Baltica Offshore Wind Farm in the Applicant Proposed Variant [Source: internal materials]*

| Parameter | Value/description |
|---|---|
| **OFFSHORE AREA AND COASTAL ZONE** | |
| Maximum number of cable lines | 9 |
| Number of power cables within a single cable line | 1 |
| Type of power cables | Aluminium or copper three-core AC cables containing optical fibres with a maximum of three fibre-optic cables |
| Power cable rated voltage range [kV] | 220 and/or 275 |
| Method of power cable laying in the offshore area | Buried in the seabed or laid on the seabed surface, secured |
| Power cable burial depth range outside the Baltica-2 and Baltica-3 area [MBSB] | 0.5–3.5 |
| Power cable maximum burial depth within the Baltica-2 and Baltica-3 area [MBSB] | 3.0 |
| Power cable maximum burial depth in special locations (e.g. sand extraction area) [MBSB] | 6.0 |
| Maximum cable laying depth for the lines crossing through the coastal zone [MBSB] | 20.0 |
| Power cable landfall method | Trenchless method |
| Maximum length of land-sea directional drilling [m] | 1700 |
| **ONSHORE AREA** | |
| Maximum number of cable lines | 9 |
| Number of power cables within a single cable line | 3 |
| Type of power cables | Single-phase cables with aluminium or copper cores containing optical fibres with a maximum of three |

| Parameter | Value/description |
|---|---|
| | fibre-optic cables |
| Power cable rated voltage range [kV] | 220 and/or 275 |
| Maximum cable bed area length [km] | 6.5 |
| Maximum length of each service road [km] | 6.5 |
| Maximum number of service roads | 3 |
| Method of power cable laying | Cables laid in a flat formation, using a trenchless method in a trefoil formation or cables laid in a trench with a bypass in a flat or trefoil formation |
| Average standard* depth of a trench for cable laying [m] | approx. 2 |
| Number of customer substations | 2 |
| Total surface area of a customer substation [ha] | 22 |
| Method of connecting customer substations with the Choczewo Substation | 4 busbar systems |
| Estimated length of a single busbar system [m] | up to 190 |
| Conductor bundle voltage on busbar systems [kV] | 400 |
| Length of access road to the OnSS [m] | approx. 700 |
| Maximum width of access roadway to the OnSS [m] | 6 |
| Maximum width of access roadside to the OnSS [m] | 1 |
| Surface area of access roadway to the OnSS [$m^2$] | approx. 4800 |
| Surface area of access roadside to the OnSS [$m^2$] | approx. 1600 |
| Type of pavement of access road to OnSS | Hardened, enhanced |

**except intersections with other structures or terrain obstacles, where the trenching depth might increase*

### 21.1.2 Project classification

The classification of the Baltica OWF CI in terms of possible environmental impacts was adopted with reference to the provisions of the Regulation of the Council of Ministers of 10 September 2019 *on projects that may have a significant impact on the environment* (Journal of Laws of 2019, item 1839). The project is classified as potentially having a significant environmental impact on the basis of:

- §3 section 1 point 54(b) of the Regulation, i.e. ***"industrial development, including photovoltaic system or warehouse development, including the accompanying infrastructure, with a development surface area not smaller than 1 ha in the areas other than those referred to in (a)."***;
- §3 section 1 point 62 of the Regulation, i.e. "***roads with hard surface with a total length of the project exceeding 1 km other than those listed in §2 section 1 points 31 and 32 or bridge structures in the course of road with hard surface, excluding reconstruction of roads or bridge structures, used for the maintenance of power substations and located outside the areas under forms of nature protection, discussed in Article 6 section 1 points 1–5, 8 and 9 of the Act of 16 April 2004 – Nature Conservation Act."***

The Baltica OWF CI is a public purpose investment in accordance with Article 6 of the Act of 21 August 1997 *on real estate management* (consolidated text: Journal of Laws of 2021, item 1889) and Article 2 point 5 of the Act of 27 March 2003 *on spatial planning and development* (consolidated text: Journal of Laws of 2021, item 741, as amended).

In accordance with Article 3(a) of the Act of 24 July 2015 *on the preparation and implementation of strategic transmission network projects* (consolidated text: Journal of Laws of 2021, item 428, as amended), the Baltica OWF CI is a strategic project in the scope of transmission networks. Such projects, in accordance with Article 80 section 2 of the Act of 3 October 2008 *on the provision of information on the environment and environmental protection, public participation in environmental protection and on environmental impact assessment* (consolidated text: Journal of Laws of 2021, item 247) (hereinafter referred to as the EIA Act) are not subject to the requirement of ascertainment, by the authority issuing the decision on environmental conditions, of conformity of project location with the findings of the local spatial development plan, if such plan had been established.

### 21.1.3 Report basis

The Environmental Impact Assessment Report for the Baltica OWF CI (hereinafter referred to as the EIA Report) was prepared as part of the environmental impact assessment of the project which constitutes a part of the proceedings for issuing a decision on environmental conditions specified in the EIA Act.

The detailed scope of the EIA Report was determined by the Regional Director for Environmental Protection in Gdańsk on 25 October 2021.

The main sources of information, on the basis of which the EIA Report was prepared, were the Applicant's project documentation, the results of environmental surveys carried out in the years 2016–2018 for the onshore and offshore parts and the results of supplementary surveys carried out in 2021 in the offshore part, as well as environmental impact assessment reports or other documents for the projects completed, implemented or planned, located nearest to the planned project.

### 21.1.4 Findings of strategic and planning documents

The strategic and planning documents were analysed in the context of including in the EIA Report the requirements, recommendations and guidelines for the project contained in them.

#### 21.1.4.1 International and EU documents

Among the documents, initiatives and agreements of international and EU rank, the following were analysed:

- VASAB (Vision and Strategies Around the Baltic Sea);
- Directive 2014/89/EU of the European Parliament and of the Council establishing a framework for maritime spatial planning;
- Marine Strategy Framework Directive (MSFD);
- 1992 Convention for the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention);
- The Convention on the Protection of Migratory Species of Wild Animals – CMS Convention;
- European Green Deal;
- EU strategy on adaptation to climate change.

#### 21.1.4.2 Documents at the national and regional level

- Maritime Policy of the Republic of Poland until 2020 (with an outlook to 2030);
- Coastline protection programme;
- National Spatial Development Concept 2030;
- Maritime Spatial Plan of Polish Maritime Areas;
- Energy Policy of Poland Until 2040;

- Long-term National Development Strategy Third Wave of Modernity;
- Strategy for Responsible Development for the period up to 2020 (including the perspective up to 2030);
- National Energy and Climate Plan for the years 2021–2030 (NECP PL);
- PRSP 2018−2027 Development Plan for meeting the current and future electricity demand for 2018–2027;
- National Program for Low-Emission Economy Development;
- The Study of Conditions for the Maritime Spatial Plan of Polish Maritime Areas;
- Vistula River Basin Management Plan;
- 2030 Pomorskie Voivodeship Development Strategy;
- 2030 Pomorskie Voivodeship Spatial Development Plan;
- Pomorskie Voivodeship Environmental Protection Plan for the years 2018–2021 with an outlook to 2025;
- Study of Conditions and Directions of Spatial Development of the Choczewo Commune;
- Local Spatial Development Plan of the Choczewo commune;
- Choczewo Commune Development Strategy;
- Draft Assumptions for the Heat, Electrical Energy and Fuel Gas Supply Plan for the Choczewo Commune;
- Low-emission Economy Plan for the Choczewo Commune;
- Environmental Protection Plan for Choczewo Commune for the years 2019–2022 with an outlook to 2025.

#### 21.1.4.3 Summary of findings of strategic and planning documents

The Baltica OWF CI will enable power evacuation from the Baltica OWF and its integration into the NPS. For that reason, the planned project is in line with the environmental objectives indicated in the above-mentioned strategic and planning documents developed and applicable at international, national and regional levels.

### 21.1.5 Methodology of the environmental impact assessment conducted

When preparing the EIA Report, the following was primarily analysed:

- technical and technological aspects of the planned project affecting the type and size of the impact on individual environmental components;
- environmental, spatial and social conditions of the planned project;
- possibility of preparing different project variants (locational, technical and technological);
- type, size and significance of potential environmental impacts;
- possibility of avoiding and reducing adverse environmental impacts;
- need to record possible future environmental changes as a result of the project implementation (scope of post-implementation monitoring).

The main and first stage of the Baltica OWF CI environmental impact analysis was to determine the activities that could affect individual environmental components resulting from the construction, operation and decommissioning stages of the planned project as well as the environmental components (receptors) affected by such activities. At the second stage of the assessment, the correlations between the sources of potential impacts and individual receptors were identified on the basis of literature and experts' experience.

The impacts identified were assigned features in four categories:

- type (direct, indirect, secondary);
- scope (transboundary, regional, local);
- duration (permanent, long-term, medium-term, short-term, momentary);
- permanence (irreversible, reversible).

Assigning points to individual features allowed evaluating individual impacts on a five-point scale: negligible impact, low impact, moderate impact, important impact and significant impact. Next, the sensitivity of receptors (environmental components) to individual impacts was assessed in cases of possible interaction between an impact and a receptor as well as the receptors' significance and role in the environment, including their conservation status. As a result, the resistance and significance of the receptors contributed to the determination of a receptor sensitivity, which was also determined, using the expert method, on a five-point scale: irrelevant, low, moderate, high and very high.

The relationships between the scale of the impact and the receptor sensitivity indicating the significance of the impact are shown in Table 21.2.

*Table 21.2. Matrix defining the significance of the impact in relation to the impact scale and the receptor sensitivity [Source: internal materials]*

| **Impact significance** | | **Receptor sensitivity** | | | | |
|---|---|---|---|---|---|---|
| | | **Irrelevant** | **Low** | **Moderate** | **High** | **Very high** |
| Scale (size) of impact | Irrelevant | Negligible | Negligible | Negligible | Negligible | Low |
| | Low | Negligible | Negligible | Low | Low | Moderate |
| | Moderate | Negligible | Low | Low | Moderate | Moderate |
| | High | Negligible | Low | Moderate | Important | Significant |
| | Very high | Low | Moderate | Moderate | Significant | Significant |

A separate category, not subject to assessment with regard to impact characteristics, are cumulative impacts occurring in combination with the impacts resulting from other current and/or planned projects, concerning the same subjects of impact. They were identified regardless of their characteristics and assessment.

## 21.2 Description of the planned project

### 21.2.1 General characteristics of the planned project

#### 21.2.1.1 Subject and scope of the project

This project involves the construction and operation of the Baltica OWF CI. The purpose of the project implementation is to evacuate the power generated by the Baltica Offshore Wind Farm to the National Power System. The Baltica OWF infrastructure is not part of the Baltica OWF CI – it was covered by a separate procedure concerning an environmental impact assessment completed with the issuance of a decision on environmental conditions.

The Baltica OWF will be connected with customer substations using cable lines routed along a common cable bed area, from which electricity will be send via busbar systems with a rated voltage of 400 kV to the designed Choczewo Substation.

The project will consist of the following main components:

- extra high voltage alternating current subsea electrical power lines with fibre-optic cables;
- submarine cable line connections with accessories;

- onshore connections of subsea and onshore cable lines (individual cable lines will be interconnected in underground “chambers” located within the borehole construction site area);
- underground power cables with fibre-optic cable lines;
- connections of underground cable lines including accessories;
- onshore substations (customer OnSS);
- busbar systems;
- service roads between sea–land drilling chambers and OnSS;
- access road to substations.

#### 21.2.1.2 Project location and the sea and land area occupied by the project

The construction and operation area of the Baltica OWF CI is located within the maritime area of the Republic of Poland, including in the exclusive economic zone, in the territorial sea and internal sea waters as well as onshore, in the Choczewo commune area (Wejherowo district, Pomorskie Voivodeship).

OnSS and busbar systems will be located in a part of a plot that is currently an arable land. The access road to the above-mentioned substation will be located in a plot that is currently a road plot (plot ref. no. 21, Kierzkowo precinct) and partially in the plot with arable land (plot ref. no. 25/4, Kierzkowo precinct). Almost the entire cable line (with the exception of the technical belt managed by the Maritime Office in Gdynia) is routed across the land areas managed by the Choczewo Forest Inspectorate, Szklana Huta Forestry.

Since, in the same part of the Baltic Sea, projects of other operators are also being implemented and will be connected to the planned Substation in Choczewo, in agreement with the Choczewo Forest Inspectorate, a common draft route of the connection infrastructure across the land areas managed by the Inspectorate was prepared to ensure the minimisation of the negative environmental impacts of cable lines belonging to different operators, through:

- minimising the tree felling surface area as a result of routing the connection infrastructure of various Applicants within a single, common cable bed area;
- bypassing the environmentally valuable areas indicated by the Choczewo Forest Inspectorate at the stage of agreements;
- use of a cable technology.

#### 21.2.1.3 Stages of the project implementation

The Applicant envisages that the construction of the Baltica OWF CI may be a continuous process or may be divided into stages. The Applicant plans that the construction of the Baltica OWF CI in the onshore and offshore areas will be carried out independently as separate stages significantly different in terms of construction technology and implementation method.

### 21.2.2 Description of technological solutions

#### 21.2.2.1 Description of the production process

Transmission of electric power by the Baltica OWF CI will be carried out using extra high voltage AC cable lines with an operating voltage of 220 and/or 275 kV, routed along a common cable bed area. Export cables will connect the Baltica OWF with two customer OnSS which in turn will be connected with the PSE substation (Choczewo Substation) with four busbar systems with the conductor bundle voltage of 400 kV. The demand for raw materials and energy, as in the case of other power installations, will be related to the construction process of individual Baltica OWF CI components. The operation of the transmission infrastructure shall not require providing energy from the combustion of fuels and the use of other raw materials for its proper functioning. It is expected that at normal operation, the consumption of fuel and other raw materials will be generated only by inspections and possible repairs. At this stage of project implementation, the Applicant has adopted two possible solutions for the decommissioning of the Baltica OWF CI: a deactivation of the transmission infrastructure or dismantling by removal of the transmission infrastructure elements. The Applicant also accepts preserving infrastructure once it is properly modernised. The procedure will be selected in accordance with the provisions in place after the project operation is completed.

### 21.2.2.2 Description of the technological solutions for individual elements of the project

#### 21.2.2.2.1 Construction phase

**OFFSHORE AREA**

In the offshore area, the elements of the Baltica OWF CI will include:

- subsea extra high voltage alternating current power cable lines with fibre-optic cables inserted into special connection clamps in switchgears located on the OSS platforms, with internal connections between the OSSs;
- subsea cable line connections with accessories.

##### 21.2.2.2.1.1 Cable lines in the offshore area and the coastal zone

###### 21.2.2.2.1.1.1 Subsea power cables

The construction of a maximum of nine cable lines is planned, evacuating power from the Baltica OWF to the shore. Each line will consist of a single three-core extra high voltage AC cable with three aluminium or copper cores within a single cable, with an operating rated voltage of 220 and/or 275 kV with a maximum of three fibre-optic cables. Cables of the parameters indicated above will be also used within the Baltica OWF to connect the OSSs.

###### 21.2.2.2.1.1.2 Technologies of cable line laying in the offshore area

The commonly used technologies of power cable line construction in the offshore area are:

- cable laying on the seabed followed by its burial in the seabed;
- simultaneous cable laying and burial in the seabed;
- construction of a trench in the seabed, cable laying, and its subsequent burial.

The differences between individual technological variants of the cable line construction include:

- types of vessels used for cable laying and burial;
- differences in the progress of cable laying;
- duration of weather windows;
- necessity to use specialist vessels providing protections for the cable lines laid;
- seabed specification;
- uses of maritime space;
- environmental requirements.

Depending on the subsea cable line construction technology adopted, it is possible to use up to 10 vessels of different types and uses simultaneously for every cable line. Due to the limited possibilities of carrying construction works in the sea area (taking into account environmental aspects, weather constraints), it is foreseen to optimise the works to be short-term and local. Therefore, the installation of cable lines will require continuous work until the entire planned process section has been laid. The number of vessels involved in construction works will change depending on the intensity of works carried out along a particular section of a cable bed area. The foreseen number of vessels operating simultaneously at sea during cable line laying will be between 2 and 7. It is expected that vessels of various sizes, carrying various tasks, will be involved in the process. The largest of them, specialist vessels used for transport and laying of power cables on the seabed, i.e. Cable Laying Vessels, can measure up to 200 m in length.

Seabed clearance, prior to cable-laying, may be necessary along some sections of the cable line routes. The cable line route will be prepared well in advance in accordance with the requirements developed at the designing stage. Clearance works may be carried out using a specialist plough and/or grab, mechanical dredger or jetting equipment.

When laying cable lines in the seabed or on its surface, various types of machinery and equipment which bury the cable in the seabed are used to construct a cable trench of an appropriate depth:

- jetting equipment with heavy-duty seawater pumping systems. This equipment uses seawater which is pumped under pressure into the sediment and washes away a trench the route of which coincides with the trajectory of the equipment. They are also used to bury a cable previously laid on the seabed into soft sediments such as silt or loose and medium-grained sand;
- equipment for laying subsea cables which can be used for simultaneous cable laying and burial, burial of a cable previously laid on the seabed as well as construction of a trench before cable laying in the harder sediment, such as till or compact fine-grained sand;
- cable ploughs which allow simultaneous cable laying and burial in the seabed sediment. Thanks to this, they are commonly used to optimise costs and work time.

In the offshore area, it is expected that cable lines will be laid below the seabed. Such a solution minimises the possibility of cable damage during operation and reduces their environmental impact resulting from the electromagnetic field and heat emissions. Power cables from the OSS to the land-sea directional drilling are planned to be laid at a depth from approx. 0.5 to 3.5 MBSB (depth range preferred by the Applicant), however, within the Baltica-2 and Baltica-3 areas and between the OSS, it is planned to lay them at a depth of up to 3 MBSB. In the areas which in the future can be designated for the extraction of aggregates, cables can be buried at greater depths, i.e. up to 6 MBSB. The estimated volume of excavations in the offshore area will be maximally 11 814 008 $m^3$, including for export cables 11 114 028 $m^3$, and for internal connections between OnSSs maximally 699 980 $m^3$. The estimated volume of excavations for internal connections between OnSSs will be maximally approx. 268 726 $m^3$.

In exceptional situations, if cable burial is impossible, they will be laid on the seabed surface. This is compliant with the administrative decisions issued by the Director of the Maritime Office in Gdynia, the Ministry of Maritime Economy and Inland Navigation as well as the provisions of the MSPPMA. These will be exceptional and sporadic cases. Along such sections, cables will be secured with permanent artificial constructions (e.g. rock embankments, rock bags, mattresses from concrete blocks).

###### 21.2.2.2.1.1.3 Spatial scope of the cable line construction in the offshore area

OnSS locations will mark the beginning of the offshore cable line route and its end will be marked by the onshore connection of offshore cable lines with onshore cable lines. The maximum length of a single cable line will not exceed 89 km. Cable lines will be laid at a distance of 150 m from one another, however, in the Baltica-2 and Baltica-3 areas, the distances between individual cable lines will vary depending on the location of the OnSS. It is predicted that the width of belts covered by works directly interfering with the seabed for each cable line will be approx. 16 m, and along the route sections where seabed clearance of stones and boulders will be carried out – 25 m. Moreover, within the area of the Baltica-2 and Baltica-3, internal connections will be made between OnSSs, the joint maximum length of which will be approx. 62 km. Therefore, the expected seabed surface covered by the works interfering with the seabed will be 17.97 km$^2$ at maximum.

###### 21.2.2.2.1.1.4 Construction rate for cable lines in the offshore area

The works will be carried out linearly in compliance with the schedule of work. The time required for the implementation of the offshore part of the cable bed area is estimated at approx. 1200 days.

##### 21.2.2.2.1.2 Cable line landfalls

###### 21.2.2.2.1.2.1 Characteristics of power cables in the coastal zone

Cables laid in the coastal zone have the same characteristics as the offshore cables.

###### 21.2.2.2.1.2.2 Technologies of cable line laying in the coastal area

From the sea side, the horizontal drilling exit/entry will be located at the zone with a depth between 13 and 5 m. Landwards, the cable lines will be laid below the seabed using a trenchless method (in accordance with the decisions of the Director of the Maritime Office in Gdynia) and in this way brought ashore. Horizontal drilling will be carried out within the depth range from 2 to 20 MBGL or MBSB. Horizontal drilling exit in the offshore area will be located beyond the sandbank zone and at a distance not smaller than 700 m from the line marked by the seaward dune baseline. The maximum length of a single borehole in the offshore and onshore areas will be 1700 m. The construction of 9 drilling sections is planned. The estimated maximum volume of the material excavated as a result of drilling will be approx. 12 100 m$^3$. This amount results from the necessity to prepare, for example, drilling chambers and includes the material excavated during drilling. The trenchless method used will involve constructing a parabolic borehole underground of a precisely controlled trajectory. The feasible trenchless methods are Horizontal Direct Drilling, (hereinafter: HDD), Direct Pipe or microtunnelling. The final selection of the trenchless method and the sea-land drilling parameters will be made at a later stage of the project implementation on the basis of the results of specialist surveys of the seabed, nearshore zone and land in the cable landfall location as well as on the basis of the feasible technological solutions.

###### 21.2.2.2.1.2.3 Spatial scope of the cable line construction in the coastal zone

It is estimated that the surface area of the construction site back-up facilities for the coastal zone trenchless crossing will be approx. 1.85 ha on land. This is the total surface area within which machine parks will be moved as a result of the subsequent boreholes being constructed. A construction site, machine park and a location for collecting materials necessary to conduct drilling will be organised within the area. The subsea cables will be connected to the onshore cables in cable connection chambers.

**ONSHORE AREA**

In the onshore area, the elements of the Baltica OWF CI will include:

- onshore connections of subsea and underground cable lines;
- underground power cables with fibre-optic cable lines;
- connections of underground cable lines including accessories;

- onshore substations (OnSS) with infrastructure required for proper operation;
- busbar systems for connecting onshore substations (OnSS) with the NPS of the transmission system operator PSE S.A.;
- service roads between sea–land drilling chambers and OnSS;
- access road to substations.

###### 21.2.2.2.1.3 Cable lines in the onshore area

###### 21.2.2.2.1.3.1 Onshore power cables

The onshore area of the connection will consist of cables designed and intended for laying in the ground. Single-phase cables with aluminium or copper cores will be used. Each cable line (with the assumed maximum of 9) will be equipped maximally with three fibre-optic cables including the necessary accessories. The rated voltage range will be 220 and/or 275 kV.

###### 21.2.2.2.1.3.2 Technologies of cable line laying in the onshore area

Along most of the route in the onshore area, the cables will be laid in an open trench in a flat formation. Trenches will be constructed using mechanical equipment (diggers); in special cases, for example, in the location of the existing infrastructure, also manually. Due to the distances between individual cable lines, trenches can be constructed separately for every cable line or jointly depending on the terrain topography. The assumed depth of the trenches will be approx. 2 m, apart from the intersections with other structures or terrain obstacles, where the trenching depth may be greater locally. The estimated maximum volume of excavations in the onshore area will be approx. 1 178 500 $m^3$.

Also, trenchless methods will be used when laying cable lines in the locations of archaeological sites, intersections with hardened roads and weak soils.

The trenchless methods that can be used along the onshore line routes are analogous to those described in Section 21.2.2.2.1.2. Moreover, for short crossings, it is possible to apply pneumatic moling of steel pipes open from the front and non-directional drilling with hydraulic moling of pipes.

In case a water course is crossed, a trenchless method or a traditional technology with the so-called bypass will be used, which involves redirecting water to a temporary corridor constructed.

Cables will be laid in a trefoil formation. To prevent damage, the cables will be laid in thick-walled protective pipes made of steel or high-density polyethylene (HDPE).

###### 21.2.2.2.1.3.3 Spatial scope of the cable line construction in the onshore area

The beginning of the onshore cable line routes is marked by the location of the openings for the offshore cables landfall constructed using a trenchless method, whereas, the end is marked by customer OnSSs. The maximum length of a single cable line will be 6.5 km. In the case of drilling, the length of the service roads will be reduced by the length of the drilling. The distance between cable lines in the onshore area will be approx. 5 m. The width of the cable bed area will vary from 62–68 m along the cable route to 200 m for sections carried out in the area designated for substations.

The total surface area of the construction site back-up facilities on shore for the linear part from the drilling chambers to the OnSS is estimated at approx. 0.8 ha. The back-up facilities will move along with the progress of subsequent work stages.

For the purposes of the Baltica OWF CI construction, technological roads with a maximum width of up to 8.0 m will be delineated. Currently, it is not possible to specify specific routes of the technological roads. The designer prefers to use the cable bed area for the purposes of temporary communication; however, they also permit for the solution involving the use of the existing roads.

For the operation purposes, maximally 3 service roads will be used along the entire length of cable lines. The width of service roads will be approx. 8 m, and the maximum length of each road will be 6.5 km (in the case of drilling, the length of the service roads will be reduced by the length of the drilling). The estimated length of service roads will be approx. 156 000 $m^2$. The service roads are planned to be hardened.

###### 21.2.2.2.1.3.4 Construction rate for cable lines in the onshore area

It has been assumed that the onshore works will be carried out simultaneously to the offshore works and they will be completed within the timeframe needed for the completion of the entire project. The time needed for the completion of the onshore works is estimated at 600 days. Works will be carried out simultaneously along at least two remote sections. Along a single section, two cable lines will be laid in parallel.

###### 21.2.2.2.1.4 Customer substations

The construction of two 400/220 kV and/or 400/275 kV OnSSs is planned as part of the Baltica OWF CI implementation. A voltage level of 400 kV is necessary to connect the substation to the NPS. The expected surface area of both substations will be approx. 22 ha.

Each OnSS will consist of infrastructure buildings, with interior extra high voltage 220/275/400 kV switchgears, medium voltage (MV) switchgears, electrical equipment (incl.: transformers, internal switchgears and busbar systems) as well as auxiliary systems and equipment installed.

The maximum height of the OnSS infrastructure buildings can reach up to approx. 18 m.

###### 21.2.2.2.1.5 Busbar systems to the National Power System

The onshore substations will be connected to the National Power System via four busbar systems with a length of 190 m each. Their rated voltage will be 400 kV. The total height of a busbar system may be approx. 37 m. Steel and aluminium wires are to be used as phase conductors for the busbar systems. For a single phase, a three-conductor bundle will be used, configured as a triangle with its vertex directed downwards and a side length of 40 cm. Solutions at the busbar system connections in a quadrilateral four-conductor bundle arrangement are permitted. Phase conductors inside the span (at the lowest point), will be suspended minimum 13 m above the ground level. The distance between phase conductors inside the span will be from approx. 6 to approx. 8 m. Two separate steel and aluminium wires are to be used as ground wires.

###### 21.2.2.2.1.6 Access road to substations

Access to the substation will be provided via an access road with a length of approx. 700 m, connected with a road exit to the existing poviat road no. 1432G Osieki Lęborskie – Lublewko with a bituminous pavement. The access road will have an enhanced, hardened roadway with a maximum width of 6 m and a hardened, unenhanced roadside with a maximum width of 1 m each. Additionally, within the road exit to the poviat road from the access road, a single-side hardened, enhanced roadside was used with a width of 4 m to enable the exit of oversized vehicles.

##### 21.2.2.2.2 Operation phase

**OFFSHORE AREA**

In the operation phase, planned and unplanned inspections of the transmission infrastructure will be carried out. The schedule of planned inspections, depending on the location of the service base, will allow for the transit and return times as well as the estimated number of effective working hours. At this stage of the project progress, it is impossible to indicate a precise number of vessels that will take part in inspections and maintenance works, however, it is expected that this will be at least two vessels of a relatively small size. In the case of a cable line failure, a repair or replacement of the damaged cable section may be necessary. This will result in a periodical, increased traffic of vessels in the location of failure.

**ONSHORE AREA**

The operation phase of the underground cable line is a maintenance-free process. Due to the necessity to provide access to the underground cable infrastructure, trees will be felled without the possibility of replanting in an area of up to 39.5 ha. Replanting after the completion of the construction phase, in the context of several decades of the operation of cable lines, will also involve the risk of cable damaging by the developing tree root systems. As in the offshore area, also in the onshore area, it is planned to conduct inspections of the transmission system and the customer substation in accordance with the schedule of inspections, which will be developed at a later stage of the project implementation.

##### 21.2.2.2.3 Decommissioning phase

Two possible solutions are foreseen for the decommissioning of the Baltica OWF CI: a deactivation of the transmission infrastructure or dismantling by removal of the transmission infrastructure elements. The Applicant also accepts preserving infrastructure once it is properly modernised. The procedure will be selected in accordance with the provisions in place after the project operation is completed.

It is estimated that the disassembly of the Baltica OWF CI elements will take up to 3 years and will require the use of the same type of vessels, vehicles or equipment which will be used in the construction phase, with the exception of tools used for the preliminary clearance of the seabed before the laying of cable lines.

#### 21.2.2.3 Expected amounts of emission and waste as well as the water, raw materials, fuels, energy and other materials used

##### 21.2.2.3.1 Emissions to air

In the construction, operation and possible decommissioning phases (if a decision is made to disassembly the project elements after the operation is completed), the vehicles, construction machinery and power generators onshore as well as vessels at sea will generate flue gases emitted to the atmosphere. It is expected that flue gases emitted by vessels, vehicles and machinery will not result in a significant pollution of the atmospheric air and will quickly disperse in the atmosphere. In the operation phase, the amount of pollution emitted to the air will be significantly lower due to a small scope of operations planned for that phase. At the project operation stage, flue gas emission will be generated from two emergency power generators, which will be activated periodically for testing purposes.

##### 21.2.2.3.2 Noise emissions

**OFFSHORE AREA**

In the construction, operation and possible decommissioning phases carried out as the disassembly of the Baltica OWF CI, the operation of vessel combustion engines and underwater equipment will generate noise to the atmosphere and, particularly relevant for the offshore area, underwater noise. Its intensity and frequency will result from the type of machinery and equipment, which will be used during construction and possible decommissioning of the Baltica OWF CI. In the operation phase, the noise levels will be significantly lower due to a small scope of the operations planned for that phase.

**ONSHORE AREA**

In the Baltica OWF CI construction and possible decommissioning phases, one of the significant impacts will be the noise generated by the construction machinery. It is assumed that loud works will be carried out during daylight hours (between 6:00 a.m. and 10:00 p.m.). With the exception of possible works related to the excavation drainage, the construction of boreholes and concrete works (for example, foundation pouring, construction of water tanks for firefighting purposes, station buildings and others), which cannot be interrupted for reasons related to the process course.

The main sources of noise in the project operation phase will be power transformers and reactors. Harmonic and cooling water pumping filters will be of secondary importance. Moreover, for the purposes of emergency power supply, a power generator is provided, which will be activated for testing purposes once a month during daytime for approximately one hour. The corona discharge and surface discharges on the elements of the electrical insulation system may also be a potential source of noise in the OnSS area, especially during high air humidity (snowfall, rainfall, drizzle).

#### 21.2.2.3.3 Waste and waste management

In the construction and possible decommissioning phases of the connection infrastructure, various types of waste will be generated as a result of the vessels, vehicles, machinery and equipment operation, which are used for the construction and disassembly of the cable lines. In the operation phase, waste will be generated by vessels carrying out maintenance operation at sea, and on land, waste will be generated as a result of the OnSS operation and maintenance services.

All waste generated during the works related to the construction, operation and possible disassembly of the elements of the project will be stored selectively. Hazardous waste will be collected in designated locations adjusted for that purpose and in conditions preventing the release of harmful substances into the environment and protected from access by third parties. It will be stored in sealed and specially labelled packaging. The excavated soil and earth masses will be used for trench backfilling and land levelling.

Waste generated during the construction, operation and possible decommissioning phases, both offshore and onshore, will be consistently collected, segregated and safely stored. Subsequently, the waste will be transferred to or collected by waste recycling or disposal entities. The observance of regulations regarding waste handling and the application of the highest standards of performance for the implementation of the Baltica OWF CI, including the adoption of principles preventing excessive waste generation, allows excluding the possibility of the waste generated during the implementation of the Baltica OWF CI adversely affecting the environment in its vicinity.

#### 21.2.2.3.4 Power, raw material and water demand

##### 21.2.2.3.4.1 Water use

###### 21.2.2.3.4.1.1 Personnel everyday needs

In the construction and possible decommissioning phases, at sea, the demand for water for the everyday needs of the personnel working aboard vessels will be 36 $m^3$/day. After use, the water will be stored in waste water tanks and handed over for treatment at the next port call or disposed of in accordance with the MARPOL regulations. In the operation phase, the water consumption will be much lower, only for the everyday needs of the crew of the vessels carrying out the cable line inspections. In the construction phase of the Baltica OWF CI onshore area, works will be carried out by approx. 700 persons, which at an average water consumption by a single employer equalling 60l/person results in a water demand equal to 42 $m^3$/day. In the operation phase, water demand will result from the functioning of the OnSS and the maintenance work conducted. It is predicted that water demand for the personnel everyday needs will be 300 $dm^3$/day. Within the immediate vicinity of the planned OnSSs, there is no existing water supply system of appropriate parameters to meet the anticipated demand. Water supply is foreseen from the water supply system, if developed, or from an individual water intake. Water distribution within the station area will be carried out by means of a designed internal water supply system.

###### 21.2.2.3.4.1.2 Technological processes

Seawater will be used to bury cables in the seabed using pressurised equipment. The device will collect the water from the environment and inject it under pressure into the surface layer of the seabed sediment, in order to loosen its structure, which will enable cable laying. During this process, neither the chemical composition of the water nor its temperature shall be changed. The entire water collected shall be returned to the environment. Depending on the device used, it is expected that the water flow may reach from approx. 800 to approx. 5000 $m^3$/h. Water will be utilised during construction works carried out using trenchless methods. It is predicted that the water demand for the purposes of preparing a drilling fluid for all boreholes will be approx. 80 000 $m^3$. For the purposes of preparing a drilling fluid, depending on the local conditions, it is predicted that water can be drawn from a bore well, from the water supply system or that water can be delivered by barrel trucks. The method of supplying water for drilling will in each case depend on the decision of the drilling contractor and their internal economic calculations.

###### 21.2.2.3.4.1.3 Firefighting

Two sets of water storage tanks are envisaged for fire protection purposes. The first one with a capacity of 100 $m^3$, used as a reservoir for fire water pumping stations for the protection of transformer stations, refilled from the water intake each time after the functional test of the sprinkler system. The second one with a capacity of 200 $m^3$, used as a reservoir for external firefighting purposes, refilled by tanker trucks only after a firefighting operation. At the designing stage, the indicated capacities will be verified by an expert on fire protections.

##### 21.2.2.3.4.2 Use of raw and other materials

The Baltica OWF CI construction will mainly involve an assembly of prefabricated components delivered to the site from production facilities. The demand for raw and other materials for the entire project will result mainly from the installation of casing pipes (HDPR or steel), laying of cable lines and the construction of an access road to the OnSS – mineral-asphalt mixture or concrete paving blocks (approx. 1800 Mg) and aggregate, cement-sand ballast (approx. 10 000 Mg).

#### 21.2.2.3.4.3 Use of fuels and energy

Fuels will be consumed by ships, vehicles, helicopters and equipment involved in both the construction and operation phases of the plant and its possible decommissioning. The largest vessels – Cable Laying Vessels, which will be involved in the construction phase works, consume on average 2500–5000 $kg·h^{-1}$ of fuel oil. In the operation phase, the inspections will be carried out by smaller vessels, which consume on average 50–200 $kg·h^{-1}$.

In the onshore area, the machinery involved in the construction of the OnSS will consume approx. 4912 kg of fuel oil per day. For one land-sea drilling operation, the machines will consume around 4516.6 kg of fuel oil per day. The construction of the cable line will require consuming approx. 157.5 kb of fuel oil per day, and the construction of an access road to the OnSS – approx. 665.2 kg of fuel oil per day. The same amounts should be adopted for the possible decommissioning of the Baltica OWF CI.

At the stage of the project onshore part operation, energy consumption will be related to maintenance work enabling the operation of the cable lines and the substation. In the scope of onshore works, energy consumption is estimated at a level of 10–50 kWh depending on the type of maintenance works within a period of 3 working days. The OnSS demand in terms of auxiliary needs will amount to 8 MW at maximum.

### 21.2.2.3.5 Emission of electromagnetic field (EMF) by power cables

In the case of cable lines, only the magnetic component of the electromagnetic field will be introduced to the environment (the electric component is shielded by the cable return wire). This emission will not exceed the permissible values specified in the Regulation of the Minister of Health of 17 December 2019 *on the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2019, item 2448).

The busbar system generates electromagnetic field during operation. Due to the correctly selected suspension height of the busbar system elements and the distance from the buildings, all requirements will be met with regard to the impact limits, thus:

- for electric field, the value of 10 $kV·m^{-1}$ will not be exceeded for the locations accessible to the public;
- for magnetic field, the value of 60 $A·m^{-1}$ will not be exceeded for the locations accessible to the public.

The intensity of the electric field in the vicinity of a line depends primarily on the distance between the phase conductors and the ground, and it reaches its highest values at the point where the distance between the phase conductors and the ground is the smallest. The electric field intensity decreases with the distance from the line axis.

In the OnSS area and in the immediate vicinity of the electromagnetic infrastructure equipment work space, electromagnetic field values corresponding to the intermediate protection, danger or hazardous zones may occur.

In the area surrounding the substations with an upper voltage of 400, 220 and 110 kV, no electric fields with intensity exceeding 1 $kV·m^{-1}$ (the value permissible for areas intended for residential development). Exceptions usually include the locations in the vicinity of the high-voltage overhead lines entering a substation, where within the area up to the first support structure, fields with strengths not exceeding a few $kV·m^{-1}$ are identified quite often.

##### 21.2.2.3.6 Heat dissipation of power cables

Losses in current transmission result in the cable temperature increase. After the ambient temperature value is exceeded, the transfer of heat from the cable to the surrounding environment begins. An accurate theoretical quantification of the emitted heat is practically impossible because of the following phenomena: heat radiation, conduction and convection subject to different physical laws. The heating of sediments may lead to a change in the taxonomic composition of the benthos living on and in the seabed in the immediate vicinity of the cables. In compliance with the Guidelines on Best Environmental Practice (BEP) in Cable Laying and Operation adopted by the Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention'), the increase in sediment temperature connected to the generation of heat in power cables should be determined on the basis of the sediment type (their thermal conductivity) as well as the type of power network (size and type of loads, thermal characteristics).

### 21.2.3 Project variants considered

The analysis of the alternative solutions of the Baltica OWF CI implementation was carried out in the scope of:

- method of implementation of the project objective;
- determination of the project location;
- determination of technological solutions of the project necessary to be included in the construction design, significant from the point of view of environmental protection;
- determination of project functioning methods that are essential from the point of view of environmental protection.

After an analysis of the possible variants of the project, the Applicant concluded that the only project implementation variant possible to be included in the environmental impact assessment is the technological variant which involves assuming a different number of cable lines implemented in the onshore area and the offshore area:

- APV – a maximum of 9 cable lines in the offshore and onshore areas;
- RAV – a maximum of 11 cable lines in the offshore and onshore areas.

### 21.2.4 Risk of major accidents or natural and construction disasters

#### 21.2.4.1 Types of accidents resulting in environmental contamination

The planned project, Baltica OWF CI, will not be a place of storage of hazardous substances determining the project classification as a plant with an increased or high risk of a serious industrial accident indicated in the Regulation of the Minister of Development of 29 January 2016 *on the types and quantities of hazardous substances present in the industrial plants, which determine the plant classification as a plant with an increased or high risk of a serious industrial accident* (Journal of Laws of 2016, item 138).

In the construction and possible decommissioning phases of the Baltica OWF CI, the potential threats to the marine environment of the greatest significance will be emergency situations, which will lead to spills of petroleum products, mainly fuel, hydraulic, transformer and lubricating oils from vessels. To a lesser extent, the marine environment may incidentally be endangered by an accidental release of hazardous substances or materials containing hazardous substances, if used. The same threats were identified for the operation phase; however, the probability and effect will be lower due to the much smaller predicted vessel involvement in this phase of the project implementation – relatively small service vessels performing periodic or interim maintenance work.

###### 21.2.4.1.1 Spill of petroleum products during normal operation of vessels and in an emergency situation

During normal operation of vessels, machinery and equipment in the offshore and onshore areas, small spills of petroleum substances, i.e. fuel oils, lubricants and petrol, may occur. In the offshore area, the spills of petroleum products can be classified in the following way: small spill (tier 1), medium spill (tier 2) and catastrophic spill (tier 3). In most cases, the released petroleum products cause tier 1 spills. The number of potential leaks is proportional to the number of vessels used to carry out the project implementation, its operation or decommissioning. Assuming the worst-case scenario and the release of several hundred cubic metres of diesel fuel into the marine environment, and also taking into account its type, behaviour in seawater, the time of oil dispersion and drift, it is estimated that the range of pollution will not exceed 5 to 20 km from the Baltica OWF CI area.

##### 21.2.4.2 Other types of releases

###### 21.2.4.2.1 Release of municipal waste or domestic sewage

During the construction and possible decommissioning of cable lines, waste and sewage generated on vessels can be accidentally released into the sea, e.g. during a collection by another vessel and in the case of a breakdown, causing local increase of nutrient concentration and the deterioration of water and sediment quality. No releases of municipal waste or domestic sewage are expected on land. They will be managed in compliance with the binding regulations.

###### 21.2.4.2.2 Gas emissions to the atmosphere

A failure of the OnSS may result in emissions of gases, which are used as refrigerants in air conditioning systems. In the case of gas-insulated switchgears (GIS) insulated with SF6, an emergency situation involving the release of gas to the atmosphere cannot be excluded.

###### 21.2.4.2.3 Contamination of water and seabed sediments with antifouling agents

Biocidal substances (e.g. copper compounds, mercury compounds, organotin compounds) that are used to protect vessel hulls against fouling can penetrate into the water and eventually be retained in the sediment. It should be assumed that emissions of these compounds will be insignificant. Currently, the usage of tributyltin (TBT) (the most harmful substance) in antifouling paints is prohibited. However, the presence of these compounds cannot be excluded in the protective coatings of older vessels.

###### 21.2.4.2.4 Release of contaminants from anthropogenic objects on the seabed

Disturbance of hazardous man-made objects (e.g. post-war duds, UXOs, and containers with chemical weapons) deposited on the seabed or under a sediment layer within the Baltica OWF CI development area would cause a release of the pollutants contained inside and the contamination of the marine environment.

Before the commencement of the construction, the Applicant will conduct surveys on the presence of duds and UXOs on the seabed. In case any chemical warfare agents/UXOs are found during these surveys, the Applicant shall notify the relevant authorities and institutions of that, and shall comply with their instructions. In order to determine the way of dealing with such finds, the Applicant will prepare a plan for handling dangerous objects, both from the point of view of operational work at sea (for example, rules for conducting works in the vicinity of potentially hazardous objects) and from the point of view of possible removal or avoidance of such objects. The basic assumption of the plan for dealing with dangerous objects is to avoid threats to human life and health and to avoid the spread of contaminants from such objects.

The Applicant uses a risk management platform suggested by the ORDTEK company (https://ordtek.com/services/marine-based-projects/). In compliance with the document, before the actual work on the seabed is commenced, an ALARP (as low as reasonably practicable) certificate should be obtained for the possibility of contact with the UXOs or chemical warfare agents deposited in or on the seabed. The risk management in this respect involves taking coordinated action in a sequence consisting of 5 stages:

1. Desk study provides an estimation of the risks associated with UXOs and CWAs.

   The study is aimed at reviewing the geophysical and geotechnical information in the context of the occurrence of UXOs and chemical warfare agents. Additionally, it should include the historical and current knowledge on the possible presence of UXOs and CWAs, including in particular the information on the natural environment, which may point to the possible burying or movement of UXOs and CWAs within the area of potential operations. The risks identified should be catalogued together with the assessment of the probability of their occurrence and an assessment of potential consequences.

2. Strategy for counteracting risks associated with UXOs and CWAs.

   The preparation of the counteracting strategy is intended to determine the scope of actions necessary to minimise the risks associated with UXOs and CWAs and reduce them to the ALARP level. That stage is used to find the level of risk which can be accepted with economically justifiable minimisation measures.

3. Geophysical surveys on the presence of UXOs and CWAs.

   If identified as necessary in the counteracting strategy, special geophysical surveys can be carried out aimed at detecting UXOs and CWAs. They can be carried out in the areas known to be required for the purposes of the project implemented and for which an increased risk of the UXOs and CWAs occurrence was identified. These can include high-resolution magnetometer, bathymetric and sonar surveys as well as visual inspections.

4. Identification of possible UXOs and CWAs.

   On the basis of all the information collected, the location of possible occurrence of UXOs is selected. The selected locations are compared with the complete set of information that served as the basis for the conclusion of the possible occurrence of UXOs and CWAs. In the case it is impossible to select any potential locations for the presence of UXOs and CWAs on the basis of the data available, the next step is taken, which is the issuance of the ALARP certificate. In the case such locations are selected, they are subject to further actions.

5. Actions minimising the risks associated with UXOs and CWAs

   There are many possible ways in which the risk associated with UXOs and CWAs can be minimised. The main action at the stage of linear project planning may be the change of the project route to bypass hazardous locations. Another way to reduce the risk may be to decide to physically remove the hazardous objects either by detonation at the location or by relocation and elimination elsewhere. Such actions will be undertaken in compliance with the binding regulations and contracted to specialised and legally authorised companies. Such entities have their own procedures in place which are aimed at ensuring safety during such operations. Minimisation actions may lead to the need to repeat some previous operations (e.g. if a project needs to be routed beyond the area surveyed).

After the completion of all the above-mentioned stages, the ALARP certificate is issued for individual operations connected to the work on the seabed, for example, for geotechnical or installation works. The ALARP certificate relates to specific operations in particular locations and is subject to external audits to confirm that the risks associated with UXOs and CWAs have been reduced to the acceptable level.

Despite best efforts, at the procedure stages described above, it cannot be excluded that UXOs and CWAs may be encountered in the area of the seabed activities. In this case, it is essential that the seabed survey personnel is aware of the possible hazards, trained for such events and equipped with resources and measures to mitigate the effects of contact with UXOs and CWAs. In practice, this comes down to training personnel in hazard recognition, equipping them with personal protective and countermeasure equipment, providing emergency support of UXO and CWA specialists, as well as access to specialist medical care in the event of contamination or detonation.

#### 21.2.4.3 Environmental threats

##### 21.2.4.3.1 Construction and decommissioning phase

The following events posing risk to the environment in the construction and possible decommissioning phases have been selected, which can become the source of negative environmental impacts:

- spill of petroleum products as a result of vessel collision in an emergency situation;
- spill of oils from the equipment used to bury cables in the seabed;
- accidental release of municipal waste or domestic sewage;
- accidental release of chemicals;
- contamination of water and seabed sediments with antifouling agents.

As a direct result of emergency situations and incidents, the abiotic environment, especially seawater and to a lesser extent, seabed sediments can become contaminated. On the other hand, these events can also indirectly affect living organisms, those inhabiting or otherwise using the seabed, water column and the surface of the sea.

The collision of ships and the resulting release of hazardous substances into the environment (especially petroleum product) is a factor which can cause increased mortality and diseases of marine organisms, including those that are subject to protection in such areas.

In the onshore area, during the phase of construction and possible decommissioning of the Baltica OWF CI elements, the potential accidents may be related to the incidental pollution of soil caused by hazardous substances originating from the leakages from vehicles and equipment involved in the construction works, which may lead to local soil contamination.

The Applicant assumes that the most probable form of the decommissioning phase will be the deactivation of the Baltica OWF CI. Following the end of operation, the power cables will remain buried in the seabed sediment and soil. The disassembly of the OnSS and busbar systems is not planned. In such a case, no environmental hazards will occur.

##### 21.2.4.3.2 Operation phase

During operation, threats to the marine environment may result from the contamination of water and, to a lesser extent, sediments with:

- petroleum products;
- antifouling agents;

- accidentally released municipal waste and domestic sewage;
- accidentally released chemicals.

The impacts caused by the occurrence of emergency situations during the operation phase are partially identical to those which may occur during the construction phase. Only the aspect regarding the accidental release of chemicals and waste is slightly different. Periodic inspection of the cable lines will be carried out during their operation. The possibility of small quantities of waste or operating fluids being accidentally released into the sea cannot be excluded.

In the case of the OnSS failure, an emission of gasses to the atmosphere may occur (flue gases from the power generator activated in emergency situations, leaks of cooling agent from the cooling system or leaks of SF6 insulating gas if a gas-insulated switchgear is used). There is also a risk of leakage of electrolytes, fire extinguishing agents and the power generator fuel. The hazardous substance which will be used within the area of the substation is transformer oil. In total, all transformer units may contain up to approx. 1550 Mg of transformer oil.

OnSSs will be classified as plants with increased or high risk of a serious industrial accident.

#### 21.2.4.4 Failure prevention

The prevention of breakdowns constitutes the whole range of activities related to the protection of human life and health, the natural environment and property, as well as the reputation of all participants in the processes related to the construction, operation and possible decommissioning of the Baltica OWF CI. The highest risk of a failure resulting in a serious threat to the environment concerns the works performed in the offshore area. In order to eliminate or minimise such risks various actions will be taken, including among others:

- reporting the start and completion of works to the maritime administration;
- use of procedures for the storage and transport of substances that may cause sea pollution – will be applied as part of the implementation of the maritime pollution prevention plans drawn up in accordance with the requirements of the Act of 16 March 1995 *on prevention of maritime pollution from ships* (consolidated text: Journal of Laws of 2020, item 1955);
- use of ongoing communication between the various vessels navigating in the area and between the vessels and the services responsible for navigational safety;
- specification of the maximum speed permitted for vessels carrying out the work of the implementation stage;
- providing regular notifications to other vessels navigating in the area of the risks associated with the work from the use of equipment and materials, as well as from the wave action caused by the use of large vessels;
- use of appropriate navigational markings in the locations of work related to cable laying;
- conducting ongoing inspections of machinery and equipment in order to detect possible spills at an early stage.

The likelihood of a major accident in the onshore area of the Baltica OWF CI is lower than in the offshore section. In the event of a need to remove an accidental oil spillage from vehicles and equipment, construction and maintenance crews will be equipped with sorbents to absorb petroleum products, and construction workers will be required to remove any small spills they notice on a regular basis. The used sorbents will be collected and handed over for recovery or neutralisation by specialised companies.

It is not expected that the OnSS equipment containing oil will cause a spill of oil to the environment or soil and surface water contamination, since it will be equipped with oil sumps to collect possible leaks.

Preventive measures that can be used to minimise the risk of a failure occurring on land include:

- application of procedures aimed at limiting the consequences by locating the site of the failure and controlling it as quickly as possible in order to secure the uninterrupted operation of the substation;
- during construction works, conducting on-going inspections of machinery and equipment to ensure early detection of possible leaks;
- during the substation operation, a periodic inspection of the technical condition of equipment to detect irregularities and prevent technical failures that could cause adverse environmental impacts;
- use of leak-proof oil sumps under transformers within the substation area. Oil sumps for such equipment will have appropriate dimensions to ensure that entire spill is collected and a volume reserve of at least 10% of the volume of oil collected in the units;
- application of a detection system for SF6 gas losses.

#### 21.2.4.5 Design, technology and organisational security expected to be applied by the Applicant

Design, technological and organisational security mainly relies on carrying out navigational risk assessments and developing prevention plans against emergency situations. Additionally, the Minister of Maritime Economy and Inland Waterways and the Director of the Maritime Office in Gdynia have bound the Applicant in the location decisions to fulfil a series of conditions and requirements for the project implementation, the majority of which refer to the protection of people and the environment from the negative impacts of the project.

#### 21.2.4.6 Potential causes of breakdowns including extreme situations and the risk of natural and construction disasters

In the case of the offshore area, the greatest potential risks will occur during the construction and possible decommissioning phases; however, the risk of a disaster is minimal due to the fact that the planning of offshore operations always takes into account weather conditions and the possibility to change the work schedules. Every offshore operation has its limitations in terms of visibility, wind speed, sea state or ambient temperatures. Adverse weather conditions such as too strong wind or too high waves can only result in the extension of the construction cycle and an increased demand for energy – fuel consumption. Extreme situations that would result in serious damage to the cable lines or to the vessels involved in the construction and maintenance work are not expected to occur during the construction and operation phases.

The Baltica OWF CI is situated beyond the extent of landslides and areas prone to mass movements according to the “Register of Landslides and Areas Prone to Mass Movements of the Earth” (Polish Geological Institute, 2011) and the Landslide Counteracting System SOPO.

In compliance with the flood risk map prepared pursuant to the Regulation of the Minister of Maritime Economy and Inland Navigation of 4 October 2018 (Journal of Laws of 2018, item 2031), the Baltica OWF CI is located outside the fluvial flood risk areas. The only area at risk of flooding from the sea is the strip of the beach up to the dune base, i.e. the area where the cable lines are landed using a trenchless method well below the ground surface. As a result, it can be ruled out that the Baltica OWF CI will be at risk of failures caused by flooding.

Within the meaning of Article 73 of the *Construction Law* of 7 July 1994 (Journal of Laws 2020, item 1333, as amended), a construction disaster is understood as an unintentional, sudden destruction of a civil structure or its part, as well as structural elements of scaffolding, elements of forming devices, sheet piling and excavation lining. Construction disaster occurrence is improbable with reference to cable lines, which in the offshore and onshore areas will be buried in the ground beyond landslide and flood hazard areas, which could expose the cables buried. The occurrence of a construction disaster with reference to small buildings and equipment of the OnSS as well as relatively short busbar systems (up to 190 m each) is predicted as minimal. The equipment and buildings will be erected in an area that is not at risk of landslides and flooding, non-urban, flat, not overgrown with trees and shrubs, with the best standards of construction and OHS observed. The equipment and building erection designs will also include protective measures against extreme weather phenomena such as hurricane force winds, storms and hailstorms that could endanger their construction and operation.

#### 21.2.4.7 Risk of major accidents and natural or constructional disasters, taking into account the substances and technologies applied, including the risk related to climate change

The risk of a major failure, natural or construction disasters in the context of the construction, operation and possible decommissioning of the Baltica OWF CI will be minimal. The Applicant intends to use the state-of-the-art technologies to ensure high reliability of electricity transmission and to comply with the relevant environmental and economic standards and requirements.

The most significant risk may be related to the spills of petroleum products at sea, which can adversely affect the marine and coastal environment. The probability of such an event is, however, minimal and equals approx. 1/10 000 years (a 1/200 chance probability of such an event within 50 years).

The effects of climate change observed in recent decades are manifested in particular by an increase in temperature as well as in the frequency and severity of extreme events. Impacts of climate change in the coastal zone primarily include an increase in the frequency, intensity and duration of storms. An increase in the frequency of storm floods and more frequent flooding of low-lying areas, as well as the degradation of the coastal cliffs and sea shore, which will entail a strong pressure on the infrastructure located in these areas, are very important effects of the climate change. This was also an important premise for the Applicant with regard to landing of the offshore cable lines using a trenchless method in order not to disturb the coastal zone and the beach, which are subject to the strongest hydrodynamic influence, and to locate the offshore cable landfall in the onshore area to reduce the risk of drilling chambers damage.

### 21.2.5 Relations between the parameters of the project and its impacts

Various impacts on the environmental components are related to the individual parameters of the project. In some cases, a particular parameter of the project generates various types of impacts and vice versa – a particular impact may result from several different project parameters. For example, the depth of cable burial in the seabed generates the impacts connected to heat, electromagnetic field and underwater noise emissions, and also causes disruptions of the seabed and resuspension of contaminants in the water depth. On the other hand, underwater noise is connected to the construction method of cable lines and the depth of cable burial, vessel traffic as well as the performance of directional drilling.

## 21.3 Environmental conditions

### OFFSHORE AREA

### 21.3.1 Location, seabed topography

The Baltica OWF CI development area begins within the area of the northern slope of the Słupsk Bank, and runs landwards across the Stilo Bank area until the coastline near the 162.5 km of the seashore (according to the Maritime Office shoreline chainage). It covers the seabed with a depth from approx. 0 m to 50 MBSL. The northern part of the Baltica OWF CI covers a seabed with a varied relief. A significant part is an area of kame terrace plains. The seabed is slightly undulated, there are slight height differences associated with the presence of sand formations and outcrops of older sediments. In the central part of the northern fragment of the Baltica OWF CI, the seabed has an abrasive-accumulative platform character. The seabed surface is level. Landwards, the Baltica OWF CI route runs across a seabed area with an abrasive-accumulative plain character with the seabed fragments of an accumulation platform character – sandy seabed areas with an even, slightly undulated surface in places with traces of the sandy material movement eastwards. The shallowest section of the Baltica OWF CI route is the sandbank zone. It covers a strip of sandy seabed with a width of 1200–1300 m, stretching from the shore into the sea, up to a depth of approximately 12–13 m. Within this strip, three sandbanks have developed. The sandbank zone is subject to intensive changes within a storm cycle.

### 21.3.2 Geological structure, seabed sediments, raw materials and deposits

#### 21.3.2.1 Geological structure, geotechnical conditions

Within the area analysed, the crystalline bedrock is located at a depth of about 2600 to 3000 m. The sedimentary cover is made up of Cambrian, Ordovician, Silurian, and Permian formations, and in the southern part of the area, Mesozoic sediments. The Quaternary formations with an average thickness of 20–30 m are deposited directly on the Paleogene and Neogene deposits. The exception is the last, southern section of the Baltica OWF CI. In this area, in the Pleistocene deposits, a depression of subglacial valley character was identified with a depth of more than 100 m. The valley can be filled with fluvioglacial sediment, with a high ratio of sand and glaciolacustrine sediments. In the vicinity of the valley, just below a thin layer of modern marine sands, at a depth of 10–15 MBSB, glacial deposits in the form of tills, sands and gravels can occur. The Quaternary formations are mainly glacial and fluvioglacial deposits, silt and clay sediments, gravel and sands with gravel as well as fine- and medium-grained sands with the greatest thickness within the area of the foreshore slope and sandbank zone.

#### 21.3.2.2 Seabed sediments and their quality

Almost the entire seabed surface of the Baltica OWF CI development area is covered with a discontinuous layer of fine- and medium-grained sands. In places, accumulations of multi-grained sediments, boulder clusters and cohesive sediment outcrops, glacial tills and glacio-lacustrine sediments, occur on the surface. The seabed surface is flat, undulated in places. Locally, in the sandbank zone, gyttja can be found, therefore, the presence of peat and lacustrine sediments cannot be ruled out in this zone. The seabed sediments from the Baltica OWF CI area belong to the inorganic deposits with an organic matter content (LOI) of less than 10%. In the sediments, no exceedance of the permissible concentration values for metals, polycyclic aromatic hydrocarbon sums (PAHs), and polychlorinated biphenyls (PCBs) was identified. The content of total nitrogen both in summer and winter was below the limit of quantification of the method applied, i.e. 100 $mg \cdot kg^{-1}$ DW. The content of total phosphorus does not exceed the values typical for the sediments of the Southern Baltic. The sediments in the area are also characterised by a low activity of the radioactive isotope of caesium $^{137}Cs$, typical for sandy sediments.

#### 21.3.2.3 Raw materials and deposits

In the Baltica OWF CI area, no accumulations of fine and medium sands as well as gravels which could constitute a mineral deposit, were recognised. The area is not adjacent nor situated within a concession for exploration, prospecting and production of crude oil and natural gas.

### 21.3.3 Seawater quality

The results of tests of individual chemical parameters of water in the Baltica OWF CI area, such as pH level, 5-day biochemical oxygen demand ($BOD_5$), TOC, nutrients, PCBs, PAHs, mineral oil, cyanides, metals, phenols, caesium, and strontium, did not essentially deviate from the values typical for the waters of the Southern Baltic. Also, no exceedance of the limit values for PAHs (anthracene, fluoranthene, naphthalene, benzo(a)pyrene, benzo(b)fluoranthene and benzo(k)fluoranthene) was found in terms of the water quality class. Moreover, no exceedances were found regarding the limit values of such indicators as cadmium, lead, mercury and nickel. Comparing the results obtained for the indicators of the waters surveyed with the limit values specified in the Regulation of the Minister of Infrastructure of 25 June 2021 *on the classification of ecological status, ecological potential, chemical status and the method of classifying the status of surface water bodies as well as environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475), the physico-chemical elements analysed in the Baltica OWF CI area surveyed can be classified as having water quality class 1 (very good status) due to the concentrations of dissolved oxygen near the seabed, total phosphorus and total organic carbon (TOC), free and bound cyanides, phenols, mineral oil index, as well as metals (As, Cr (VI), Cu). The average concentration of inorganic nitrogen compounds (nitrates and DIN, the average concentration of which in water was 0.07 $mg \cdot dm^{-3}$) and the pH value contribute to the classification of this area as water quality class 2. On the other hand, due to the total nitrogen and phosphate phosphorus content with the average concentration in the water column of 0.30 $mg \cdot dm^{-3}$ and 0.026 $mg \cdot dm^{-3}$, respectively, the waters tested do not reach a good status. However, in the case of total nitrogen, the exceedance is slight and oscillates around the limit value set for water quality class 2 (<0.30 $mg \cdot dm^{-3}$).

### 21.3.4 Climatic conditions and air quality

#### 21.3.4.1 Climate and the risk related to climate change

The area of the Southern Baltic is located in the humid temperate climate zone with the influence of the Atlantic climate due to prevailing oceanic winds. The climate specific for the coast and the adjacent sea areas can be classified as a coastal strip climate with small air temperature amplitudes, high humidity, mild winters, cooler summers and strong winds. Winds from the west and south-west directions prevail. In the open sea areas, climatic conditions are characterised by smaller air temperature amplitudes and mean wind velocities higher than in the adjacent land areas. On the basis of climate change forecasts for Poland, it was concluded that the climate change observed and projected will have a negative impact on the functioning of coastal zones. An adverse influence of the periodic sea level rises is predicted, resulting mainly from the increase in frequency and intensity of heavy storms. In the case of the Baltic Sea, this refers to a possible increase in the number, intensity and duration of storms, with an increase in the irregularity of their occurrence, i.e. after long periods of relative calm, series of rapidly succeeding storms of considerable force may occur. An additional factor that accelerates the process of coastal erosion is the warming of winters, as a result of which, a reduction in the ice cover, which protects the beaches from storm surges, and thereby, safeguards them against coastal erosion, should be expected. An increase in the frequency of storm floods and more frequent flooding of low-lying areas, as well as the degradation of the coastal cliffs and sea shore, which will exert a strong pressure on the infrastructure located in these areas, are very important effects of the climate change. Due to the increase in the average water temperature and an increased inflow of biogenic pollutants into the sea (nitrogen and phosphorus compounds), a negative phenomenon that will occur will be the progressive eutrophication, especially on the water surface (algae blooms).

#### 21.3.4.2 Meteorological conditions

In the Baltic Sea area, where the planned project is located, winds from the south-western direction prevail. The measurement results indicated an average wind speed of 7.22 $m \cdot s^{-1}$, and the maximum of 20.90 $m \cdot s^{-1}$. Air temperature ranged from approx. -6.4°C in the winter to approx. 23°C in the summer. Atmospheric pressure was between 979 and 1043 hPa. The relative humidity was characterised by high variability, oscillating between 50% and 100% (88% on average).

#### 21.3.4.3 Air quality

Due to the lack of information on the parameters of air purity within the development area of the Baltica OWF CI, the assessment of air quality in the near-water atmosphere layer is compared with the information obtained as a result of the surveys carried out by the Inspection for Environmental Protection as part of the State Environmental Monitoring for the nearest coastal station (Łeba). The measurements of the sulphur dioxide, nitrogen dioxide and ozone at the Łeba coastal station indicated that the air quality class for that area was A. The results from 2020 indicated a slight decrease in the concentration of the gases analysed in the air compared to the values recorded in the 2011–2020 decade. A similar air quality is characteristic of the sea coastal areas, all the more, these sea areas are located away from onshore sulphur dioxide and nitrogen dioxide emission sources. Those substances are emitted only by vessels, the traffic intensity of which is relatively low. The offshore areas surveyed are free from any terrain obstacles impeding the spread of these substances. Therefore, the average concentrations of the above-mentioned compounds in the air should have lower values.

### 21.3.5 Ambient noise

To determine the initial level of ambient noise, noise monitoring was conducted using a SM2M sound recorder deployed in the northern part of the Baltica OWF CI area. The results of ambient noise surveys indicate that the ambient noise levels are characteristic of the shallow waters of the Baltic Sea. Seasonal differences in noise levels at stations and between them have been found. For all stations, the average sound pressure level was the highest in winter, and the spring and summer levels were significantly lower. Those results are compliant with the information from the BIAS project. This is most likely caused by seasonally specific sound propagation conditions in the sea and higher noise levels caused by atmospheric factors in the winter and autumn months. The most important source of man-made low-frequency noise is the traffic of vessels. The intensity and frequency of noise generated by vessels depends largely on the size and speed of the vessel, with large, slow moving vessels generating lower frequency noise, and small, fast vessels generating noise with higher energy at higher frequencies.

### 21.3.6 Electromagnetic field

There are no natural or artificial sources of electromagnetic radiation in the area of the planned Baltica OWF CI project. The existing 450 kV DC Sweden-Poland transmission system is located several kilometres from the location of the planned project. Changes in natural electric fields do not have a direct impact on living organisms as well as human well-being. Natural magnetic fields show differences depending on the geographical location. They have a significant impact on some living organisms. Electromagnetic fields created by the flow of electric current can change the natural migration behaviour of marine mammals, they can also be a source of thermal energy introduced into the sea. However, these factors are difficult to measure and in compliance with the Update of the preliminary environmental assessment of the marine waters status (CIEP, 2018), are not currently monitored in Poland. Some animals, such as dolphins, birds and certain species of insects, in underwater migration or long-distance flights are guided by the position of the magnetic poles. These abilities to recognise the direction of the Earth's natural magnetic field can be disturbed as a result of a very strong intensity of a constant magnetic field of 1–50 Tesla.

## 21.3.7 Description of the natural environment components and protected areas

### 21.3.7.1 Biotic elements in the maritime area

#### 21.3.7.1.1 Phytobenthos

The surveys showed only a trace presence of phytobenthos in the south-western part of the Baltica OWF CI. Those were individual specimens of small size, very sparsely distributed on the seabed. The seabed covered with macroalgae was less than 1%. It was found that the Baltica OWF CI area is not a favourable area for phytobenthos. In the Baltica OWF CI, macroalgae were represented by 2 species which had been so far recorded in the Southern Baltic. Those were brown algae *Desmarestia viridis* and red algae *Vertebrata fucoides*. No protected species were found.

#### 21.3.7.1.2 Macrozoobenthos

On the soft bottom (sand and gravel), 31 taxa of macrozoobenthos were identified. Species, which are typical of shallow and medium deep seabed (up to 50 MBSL) of the Southern Baltic open waters dominated. Among the most common species, three species of bristle worms were found − *Marenzelleria* sp., *Pygospio elegans* and *Bylgides sarsi*, the bivalves *Limecola balthica* and *Mytilus trossulus*, oligochaetes and a representative of the Malacostraca class − *Diastylis rathkei*. No protected or rare zoobenthos species were found. In terms of abundance, the polychaete *Pygospio elegans* dominated, and in biomass – the bivalve Baltic clam *Limecola balthica*. On the hard bottom, 17 macrozoobenthos taxa were found. The taxa most common at the hard bottom stations were: the polychaete *Bylgides sarsi* and the species typical of the Southern Baltic periphyton fauna: *Mytilus trossulus*, *Amphibalanus improvisus* and *Einhornia crustulenta*. The qualitative and quantitative composition was typical of the Southern Baltic waters. In the Baltica OWF CI area, the quality status of the macrozoobenthos communities from the soft bottom was assessed as moderate (3 out of five water quality classes of ecological quality according to the Regulation of the Minister for Infrastructure of 25 June 2021 *on the classification of ecological status, ecological potential and chemical status and the method of classification of the status of surface water bodies and the environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475). The assessment of the hard bottom indicated a high degree of value for that habitat, because the status of the zoobenthos communities was determined as “very good” (ecological quality class 1).

#### 21.3.7.1.3 Ichthyofauna

In the Baltica OWF CI area, above the 30 m isobath, ichthyoplankton was moderately diversified in terms of taxa (12 taxa). The greatest number of taxa was observed in the late spring and summer months (8), while the lowest number was recorded in the autumn (5). The ichthyoplankton abundance varied over a wide range throughout the year. In terms of abundance, larvae and juvenile specimens of gobies dominated. 30 ichthyofauna taxa was confirmed in the area. Permanent fish communities include cod, flatfish, herring, sprat, shorthorn sculpin, three-spined stickleback, lumpfish, and viviparous eelpout. Out of all commercial fish species, the presence of herring, sprat and cod was confirmed. In the case of cod, smaller individuals were caught in coastal waters, and larger in the northern, deepest part of the area. The area is a migration destination for flounder, sprat and a periodic habitat for inland freshwater migrating species such as perch, zander, roach, smelt and common bleak.

##### 21.3.7.1.4 Marine mammals

Within the Baltic Sea, there are four species of marine mammals: three seal species – grey, harbour and ringed and also one cetacean – harbour porpoise. In the Polish Maritime Areas, the grey seal, less often the harbour seal and the harbour porpoise are observed. The only location with regular occurrence of seals at the Polish coat is the Vistula Cut estuary in the Gulf of Gdańsk. The surveys conducted within the area of the planned project indicate that that sea area is characterised by a sporadic presence of marine mammals.

##### 21.3.7.1.5 Seabirds

The results of three-month observations of the marine avifauna in the period from the beginning of March 2016 until the end of March 2017, indicated that the northern part of the Baltica OWF CI area is not a location of very high concentrations of seabirds. Within the observation period, the presence of 12 seabird species was confirmed in the survey area. Among them there are three species mentioned in Annex I of the EU Birds Directive: the black-throated diver, the red-throated diver, and the little gull. However, their abundance was really low. The most abundant species encountered in the survey area was the long-tailed duck, which is a typical phenomenon for the Baltic Sea areas located at a distance from the shoreline.

In the Baltica OWF CI area, the velvet scoter was observed sporadically, and instead the common murre and the razorbill, two species which feed mainly on pelagic fish (sprat and herring), appeared there in great numbers. Probably, that area is an important area of their concentration due to a rich food supply. High, as for the Polish Baltic Sea area, abundance of razorbills and common murres indicates that the sea area surveyed is of great significance for both species.

#### 21.3.7.2 Protected areas, including Natura 2000 sites

The Baltica OWF CI area is situated partially with the boundaries of the Natura 2000 site *Przybrzeżne wody Bałtyku* (PLB990002). The southern part of the construction area with a length of approx. 24 km crosses the eastern part of this area. The main function of the area is to provide protection for birds wintering in the Baltic Sea coastal zone, mainly for the long-tailed duck, velvet scoter, common scoter, black guillemot, razorbill, and divers. Approximately 12% of the velvet scoter, 2% of the common scoter and 35% of the long-tailed duck wintering in the Polish maritime areas gather within the area. In the short-term, high abundances of gulls may be recorded in the area, mainly the European herring gull. It is a phenomenon of synanthropic origin – gulls will appear in large numbers over the sea area when they accompany fishing boats in search for easily accessible food source. 6 bird species are subject to protection in this area: the razorbill, black guillemot, long-tailed duck, European herring gull, velvet scoter and common scoter. In the SDF of the area, two threats were indicated: "Other urbanisation, industrial and similar activities" (code E06), and: "No threats and pressures" (code X). The impact labelled "No threats and pressures" was also indicated in the SDF of the area as a positive impact.

#### 21.3.7.3 Wildlife corridors

For the Southern Baltic area, no wildlife corridors have been indicated so far. According to the general classification of the migration system of aquatic and wetland birds in Eurasia, Poland, including its marine areas, is located within two large flyways: the East Atlantic and the Mediterranean/Black Sea flyways. Within the Baltica OWF CI area, there are marine mammals which travel in search of food, with no preference for any specific routes. In the Baltica OWF CI development area, there are no natural or man-made obstacles that could prevent or impede migrations. Also, the implementation of the project will not give rise to such obstacles.

#### 21.3.7.4 Biodiversity

##### 21.3.7.4.1 Phytobenthos

As a result of the surveys conducted in the Baltica OWF CI area no phytobenthos communities were recorded. Macroalgae specimens were sparse and were represented by 2 taxa: brown algae *Desmarestia viridis* and red algae *Vertebrata fucoides*.

##### 21.3.7.4.2 Macrozoobenthos

Within the Baltica OWF CI area, two types of habitats can be found: soft bottom on a surface covered by sands of various grain sizes and gravels as well as hard bottom formed as a result of the accumulation of pebbles and boulders. On the soft bottom, 31 species and higher taxonomic units of macrozoobenthos belonging to the classes of Hydrozoa, Priapulida, Polychaeta, Oligochaeta, Hexanauplia, Malacostraca, Bivalvia and Gymnolaemata, were found. Taxa, which are typical for the shallow and mid-deep seabed (up to 50 MBSL) of the Southern Baltic open waters prevailed in terms of frequency. On the hard bottom, 17 zoobenthos taxa were found, among which the following were the most popular: the polychaete *Bylgides sarsi* and the typical species of the periphyton fauna the bay mussel *Mytilus trossulus*, the bay barnacle *Amphibalanus improvisus* and *Einhornia crustulenta*.

##### 21.3.7.4.3 Ichthyofauna

In terms of the species composition, the Baltica OWF CI area is typical of the Southern Baltic, with a clear predominance of cod and flounder in demersal catches, as well as herring and sprat in pelagic catches. In total, 31 fish species were found. In the case of ichthyoplankton, roe of a single species was caught – sprat – and larvae of 12 fish taxa – gobies, sprat, flounder, herring, ammodytids, shorthorn sculpin, rock gunnel, common seasnail, cod, straightnose pipefish, fourbeard rockling and turbot.

##### 21.3.7.4.4 Marine mammals

The Baltica OWF CI area is a sea area characterised by a sporadic occurrence of marine mammals. This is confirmed both by the results of surveys carried out as part of international projects as well as results of surveys carried out for the purposes of this EIA Report.

##### 21.3.7.4.5 Seabirds

The northern part of the Baltica OWF CI area is characterised by a low abundance of waterbirds that use this area as feeding or resting grounds. During surveys, the highest abundance was recorded for the long-tailed duck, which is a typical phenomenon in this part of the Baltic Sea.

#### 21.3.7.5 Environmental valorisation of the sea area

The abiotic conditions for the Baltica OWF CI offshore area are typical of the southern part of the PMA. The qualitative and quantitative resources of benthic organisms, determined mainly by the abiotic conditions, also do not deviate from those identified in other parts of that sea area. Also, no rich and unique resources of ichthyofauna, marine mammals and birds or the presence of habitats that would indicate an important role of the area of the planned project for the existence and development of their species were found. In view of the above, the natural values of the Baltic OWF CI offshore area were assessed as moderate.

### 21.3.8 Cultural values, monuments and archaeological sites and objects

The Baltica OWF CI area does not have any cultural values and no monuments nor archaeological sites and objects were identified within its boundaries. The three ship wrecks located within the area are not objects of cultural heritage. Before the commencement of the construction, the Applicant shall conduct detailed surveys in the scope of the presence of duds and UXOs on the seabed. In case any chemical warfare agents/UXOs are found, the Applicant shall notify the relevant authorities and institutions and shall comply with their instructions.

### 21.3.9 Use and management of the water area and tangible property

The sea area, in which the Baltic OWF CI will be situated, plays various functions resulting from the previous human activity and the natural and environmental resources occurring in it. In compliance with the MSPPMA, the offshore part of the Baltica OWF CI area is located with the following sea areas and subareas:

1. sea area POM.45.E, including a sea subarea: 45.201.I;
2. sea area POM.16.Pw, including a sea subarea: 16.201.I and 16.926.B;
3. sea area POM.34.T, including a sea subarea: 34.926.B, 34.201.I and 34.628.C;
4. sea area POM.54.T, including a sea subarea: 54.201.I;
5. sea area POM.41a.P, including a sea subarea: 41a.201.I and 41a.926.B;
6. sea area POM.40a.C, including a sea subarea: 40a.201.I and 40a.800.S.

The provisions of the MSPPMA indicate that the Baltica OWF CI project can be carried out with the assumed technology within the boundaries of the above-described sea areas and subareas. Sea area POM.54.T is an exception, in which the laying of the technical infrastructure was limited to the subareas established for that particular purpose. Exceptions can only be made for environmental, technological, economic or national security reasons. The Baltica OWF CI with its scope covers only a small part of the area POM.54.T outside subarea 54.202.I. As regards the offshore area outside the OWF area, the route of the project does not reach beyond the area indicated in the location decisions issued by the Minister of Maritime Economy and Inland Navigation and the Director of the Maritime Office in Słupsk. The decisions were not invalidated by the entry of MSPPMA into force on 22 May 2021. The most important forms of the use of the maritime space in the Baltica OWF CI area are described in Sections 21.3.9.1–21.3.9.4.

#### 21.3.9.1 Maritime transport

The Baltica OWF CI area is located in the offshore area, which is intensively used for shipping. In the section from the boundary of the territorial sea up to a distance of about 10 km from the shore, it crosses one of the most important in the Baltic Sea, the customary transport route, leading, among other, to the seaports in Gdynia and Gdańsk. The traffic of vessels in the sea area analysed is supervised by the Traffic Separation Scheme TSS Słupska Bank. The Baltica OWF CI area runs across the eastern part of that system. In addition to transport vessels travelling to and from sea ports, also other vessels such as fishing vessels which conduct catches in this sea area or sail to other fisheries, and small recreational units (e.g. sailing yachts) appear in the Baltica OWF CI area.

#### 21.3.9.2 Fishery

The Baltica OWF CI is located in the area of six statistical rectangles O6, N7, O7, L8, M8, and N8. In the years 2016–2020, in those statistical rectangles, fishing was carried out by 41 to 74 fishing vessels. The fishing effort of fishing boats decreased in those years. In 2016, the total fishing effort (measured as the number of fishing days) was 1088, and in 2020, only 234 days, which is a 78% decrease. The cause for this was the reduced fishing capacity of cod, especially in shallow waters. The total volume of fish catches in the statistical rectangles area in 2020 amounted to approx. 70 t, which constituted 0.1% of the total volume of Polish Baltic catches carried out by the Polish Baltic fisheries that year. The average multi annual share of catches from the area of the six rectangles in the general Baltic catches (in terms of volume and value) in the years 2016–2020 was 0.2% and 0.6%, respectively. The main fish species caught in the area of the six rectangles analysed in 2016–2020 were cod and flounder, corresponding to 59% and 19% of the total catches volume and 67% and 9% of the caught fish value. The remaining part of the catches was herring, a 19% and 6% share in the volume and value of catches respectively.

#### 21.3.9.3 National defence

The Baltica OWF CI area is located partially within the following sea areas: 16.926.B, 34.926.B and 41a.926.B, which were delineated for the fairways of the Polish Navy. The Baltica OWF CI area is not located in the zones permanently or periodically closed for navigation and fishery.

#### 21.3.9.4 Natural resource deposits, exploration and drilling concessions

The Baltica OWF CI development area within the territorial sea runs across the areas of prospective occurrence of sands for supplying the seashore Łeba 1.

### 21.3.10 Landscape, including the cultural landscape

The Baltica OWF CI construction area lies within the PMA, the exclusive economic zone, the territorial sea and internal sea waters, and stretches from the shore up to the distance of approximately 29 km away from the shore. In the natural marine landscape of the sea area, commercial ships moving along the customary shipping route to and from the ports of Gdynia and Gdańsk, as well as other smaller vessels, e.g. recreational and fishing boats constitute the permanent structural element of anthropogenic origin. In the future, the northern part of the sea area will be developed with the wind turbines of the Baltica-2 and Batica-3 OWFs. Also, there will be other OWFs in its region. The seashore in the cable landfall area is made of a sandy beach, several dozen meters wide.

### 21.3.11 Population and living conditions of people

The presence of people in the Baltica OWF CI offshore development area is only temporary, resulting from the current use of the basin (shipping and fishery). The Baltica OWF CI development area crosses at a distance of 10 km from the shore the customary shipping route to and from the ports of Gdynia and Gdańsk. It is also located within the boundaries of six statistical rectangles: O6, N7, O7, L8, M8 and N8, where fishing activities are conducted.

## ONSHORE AREA

### 21.3.12 Location, topography of the area

The onshore area of the Baltica OWF CI is located entirely within the boundaries of a rural commune Choczewo, and its north-eastern part, in the Wejherowo district, Pomorskie Voivodeship. The OnSS and busbar systems will be located in the western part of plot no. 17/129 (Kierzkowo precinct), which is not an arable land. Almost the entire cable line (with the exception of the technical belt managed by the Maritime Office in Gdynia) is routed across land areas managed by the Choczewo Forest District Inspectorate, Szklana Huta Forestry. The project area is situated at the boundary between two mesoregions – the Słowińskie Coast to the north, where an approx. 3.5 km section of the connection runs, and the Żarnowiecka Upland to the south, where an approx. 2.5 km section of the connection and the OnSS are located. Both mesoregions are part of the Koszalin Coastland, which in turn is a part of the Southern Baltic Coasts subprovince. The diversity of mesoregions can be seen in the vegetation, soil cover, hydrographic network, and above all, in the relief and absolute altitudes. In the Słowińskie Coast, the area of the planned project covers only 0.421 km$^2$ in the eastern part of the region. The landscape there is shaped mainly by a fragment of a coastal pine forest to the south and a stretch of a coastal dune strip with a terrain culmination in the form of the Wydma Lubiatowska dune. The absolute altitudes within the boundaries of the project area in the Słowińskie Coast reach from 0 MASL near the shoreline up to 33 MASL in the forest area in the southern part of the region. The width of the beach within the project area is approx. 70–80 m, while the strip of coastal dunes in the Słowińskie Coast reaches approx. 1 km inland at maximum. Further from the shoreline, there is a pine forest, which covers most of the Słowińskie Coast within the boundaries of the project area. In the vicinity of the project, the town of Lubiatowo with the village Szklana Huta constitute the settlement network in the Słowińskie Coast. The Baltica OWF CI area covers 0.425 km$^2$ of the Żarnowiecka Upland region in its northern part. Within the project area, it reaches absolute altitudes from 33 MASL in the area of pine forests up to 46 MASL near the OnSS. The project area within the Upland is covered by a strip of pine forest with a width of approx. 2 km, located along the boundary with the Słowińskie Coast, and by an arable land situated in the location of the planned OnSSs.

### 21.3.13 Geological structure, coastal zone, soils, and marine aggregates and deposits

#### 21.3.13.1 Geological structure, geotechnical conditions

The Baltica OWF CI area is situated at the edge of the East-European platform within the so-called Łeba Elevation covering the eastern part of the Koszalin Coastland. The sediment cover there is made of rocks of wide lithological diversity and stratigraphic range from the Eocambrian to the Quaternary, with a total thickness of up to approx. 3000 m. The thickness of the Cenozoic surface cover reaches usually from approx. 120 to approx. 240 m. Its floor usually consists of Eocene silts, mudstones and clays as well as Oligocene sands, silts and clays deposited on them, with a total thickness ranging from several dozen to 130 m. The Paleogene sediments occur usually up to a depth of approx. 150 MBGL. The Neogene is represented by Miocene sediments which formed in the terrestrial environment (mainly sands, clays and silts), however, their share in the geological profile is small – locally up to several metres thick. Above, the Quaternary sediments, of various lithology and origin, are deposited. Those are mainly Pleistocene glacial and fluvioglacial sediments which formed during subsequent glaciations. The surface cover consists usually of Holocene sediments of fluvial and aeolian origin with a thickness of up to 10 m. The surface sediments in the Baltica OWF CI area are mainly alluvial sands of floodplains, glacial till residuals on fluvioglacial sands and gravels as well as aeolian sands on alluvial sands of valley bottoms and plains.

#### 21.3.13.2 Topography and dynamics of the coastal zone

##### 21.3.13.2.1 Beach

There are sandy beaches in the Baltica OWF CI area as well as along almost the entire length of the Polish sea coast. They are made of sands accumulated by sea water, mainly fine sands with a dominant fraction of grains with a diameter smaller than 0.25 mm, a smaller share of, medium and coarse sands and an admixture of pebbles. Within the area of sandy beaches, depending on the conditions of the wave motion and the wind regime, many accumulation microforms may occur, such as micro cliffs, ripple marks (so-called wrinkles or wave bars), deflation pavements (rock detritus uncovered from under the sand layer), shore embankments with inflow slope or micro lagoons. The upper zone of the beach is the area of sand accumulation. In the upper zone of the beach, the succession of the European beachgrass *Ammophila arenaria*, which initiates the formation of the foredune dike. The shore abrasion which leads to the disturbance and shifting of the dune base may occur only in the storm season. In the autumn-winter seasons, when the greatest number of storm accumulations is recorded, very often an exchange of the material forming the beach takes place as well as a significant remodelling of the beach surface. The beach in the Choczewo commune, in the location of the Baltica OWF CI route, has a width of approx. 70–80 m. The width of the sand layer in this region is between 0.5 to approx. 1.5 m at the foot of the dune dike.

#### 21.3.13.2.2 Shore dynamics

The development of the sandy cover which forms the beach is of a dynamic character, which is the result of the continuous influence of the sea and wind. The main manifestation of that process is the continuous exchange of detritus within the beach area. In the Słowińskie Coast, the beach sections where accumulation processes of sea sands prevail over erosion process (accumulation zones), as well as those sections where erosion dominates over accumulation (abrasion zones), can be found.

As scientific research has shown, dynamics of the geological processes have caused an increase or reduction in the width of the beach ranging from 30–40 m to 80–100 m within 25 years. Such changes are quite regular and, in spatial terms, cause alternating zones of abrasion and accumulation to shift eastwards at a speed of up to several tens of metres per year. The direction of this type of changes results directly from the dominant wind directions as well as littoral currents in the Southern Baltic. Individual zones, of both abrasion and accumulation character differ in the beach width, which results from, among others, the variable course of the shoreline with regard to the mentioned wind directions and sea currents. An approx. 3 km beach section east of Lubiatowo is an example of an accumulation zone, the width of which reaches approx. from 40–50 to approx. 100 m. The designed Baltica OWF CI intersects the shoreline more or less in the middle of the length of this zone.

#### 21.3.13.2.3 Areas of active aeolian processes

The beach as well as the strip of coastal dunes are areas of continuous intensive aeolian processes. Those processes are facilitated by the morphology of the coast and the material forming the beach and dunes. The beach is an element of the terrain relief connecting its underwater and overwater parts, subject to simultaneous strong influence of the sea and winds, shaped both by the erosion and accumulation processes. The beaches in the Słowińskie Coast have been shaped by deflation, which means that their morphology is mainly the result of the wind influence. The tiniest fractions of the sandy material are subject to constant blowing. As a result, the beaches have a flat shape and their surface is compact and hard. Fine sands (below 0.25 mm) and also medium sands (0.25–0.5 mm) are predominant. Deflation is favoured by the pattern of strong winds in this part of the Polish coast. The second, counting from the shoreline, area of the most intensive aeolian processes is the strip of coastal dunes. Their development depends on the shore dynamics, but also on the beach width, material thickness, and the shore exposure to the prevailing wind directions, thanks to which the sediment is transported and subsequently accumulated in the form of sandy bars. The relief of the dunes formed depends on the strength and directions of the most common winds (wind effectiveness) as well as the land relief and development, which are decisive in terms of the sand accumulation effectiveness. On the other hand, the main factor causing dune shore erosion is the storm wave motion – the formation of wave ridges flooding the beach and destroying dunes.

### 21.3.13.3 Soils

The Baltica OWF CI area is developed and used mainly as forest land and agricultural land. The agricultural areas are dominated by leached brown soils and acid brown soils, while, in the forest areas, mainly proper podzolic soils, brunic podzols and podzolic arenosols are encountered. The soils formed on strong loamy sands and light loamy sands, below which mainly light till is present. In terms of quality class of the agricultural areas, both higher-class soils (IIIa and IIIb) and lower-class soils (IVa, IVb and V) can be found there. The soils of complex 4 have the largest share in the total area of arable soils – very good rye complex. The analysis of monitoring surveys at the measurement and control point situated in the area of the planned project shows that permissible concentrations of metals for the areas of subgroups II-1, in accordance with the Regulation of the Minister of the Environment of 1 September 2016 *on the method of assessment of ground surface contamination* (Journal of Laws of 2016, item 1395).

#### 21.3.13.4 Raw materials and deposits

Within the boundaries of the Baltica OWF CI area and its immediate vicinity, there are no mineral resource deposits nor mining areas or sites. The entire area of the planned project is located within an active concession area "Żarnowiec" covered by a binding concession for prospection and exploration of hydrocarbons: crude oil and natural gas in the Cambrian, Ordovician, and Silurian formations. The scope of geological works of the prospecting phase will include, among others, drilling 2 boreholes up to a maximum depth of 5000 m within the entire area covered by the concession. At present, no exact locations for the drilling are known, they will be indicated in the geological works design.

### 21.3.14 Surface waters and their quality

The Baltica OWF CI area is located in the Vistula River basin, in the water area of the Lower Vistula, within the Baltic Coast rivers water catchment area. Within the area of the planned project, two drainage ditches are located which dry out in summer. There is a local system of mid-forest depressions which periodically fill in with water, within the area, which is connected to the Bezimienna Stream valley. They are severely overdried during the summer.

Two surface water bodies are included in the project area:

- immediate catchment area of the sea CWDW1801;
- River Water Body: the Chełst River to its outlet into Lake Sarbsko RW200017476925.

For the above-mentioned RWBs, no status was specified due to a lack of surveys carried out on the status/ecological potential assessment within their areas. The environmental targets for them should be adopted as for the "adjacent" surface water bodies, which are the recipients of surface run-off from these areas. In this context, these will be the river water bodies: the Chełst River to its outlet into Lake Sarbsko RW200017476925 (hereinafter referred to as: RWB Chełst) and the Piaśnica River from where it flows out of Lake Żarnowieckie to where the Białogórska Struga joins it RW200023477289 (hereinafter: RWB Piaśnica). In accordance with the quality assessment of the river surface waters and dammed reservoirs, the general quality of the RWB Chełst and RWB Piaśnica was determined as "bad." The main threat to the quality of surface waters within the Baltica OWF CI area are municipal sewage untreated or insufficiently treated. In accordance with the flood hazard map, the planned project is located outside the area with a probability of flooding once every 10, 100 and 500 years, however, the work site will be located within a technical belt, which is an area at particular risk of coastal flooding.

### 21.3.15 Hydrogeological conditions and groundwater

The Baltica OWF CI is located in the north-eastern part of the Eastern Pomerania Region (part of the Baltic Sea coast and coastal region province), where the presence of ground water is connected to the presence of Quaternary and Tertiary formations. Two usable aquifers were distinguished in the area of the planned project: the Quaternary and Tertiary horizon. The planned project is located with the boundaries of two units: GWB 13 (PLGW240013) in the northern and central part of the area and GWB 11 (PLGW240011) in its southern part. The status assessment for 2012 for both GWBs indicated good chemical, quantitative and general statuses. The results of surveys from 2015, indicated a good chemical status of both GWBs (no exceedance of quality class 2 standard). Neither of the GWBs is at risk of the environmental objectives not being met. For both GWBs, "maintaining good chemical status, maintaining good quantitative status" were adopted as environmental objectives. The Baltica OWF CI area is not located at any Main Groundwater Basin, nor within the protection zones of such basins. Therefore, no restrictions connected to the protection of groundwater resources are in place there. The nearest municipal groundwater intake is located in Lubiatowo, approx. 2 km west of the Baltica OWF CI boundary.

### 21.3.16 Climatic conditions and air quality

#### 21.3.16.1 Climate and the risk related to climate change

The Baltica OWF CI is located within the Baltic Coast zone, which forms a strip with a width from several to a few dozen kilometres along the southern Baltic Sea coasts. This is a climatic region shaped by the strong influence of the Baltic Sea and Atlantic air masses. Mild winters and relatively cool summers are characteristic for that region. There are also relatively long transitional periods between summer and winter and a distinctly cooler spring than autumn there. Since the second half of the previous century, the climate of Poland has undergone significant changes. They involved an increase in the average air temperature, increase in cloud cover in summer and decrease in winter, spring and autumn, increase of water vapour content in the air with a decrease in relative humidity. The amount of precipitation has remained at a similar level. The scenarios of climate change indicate that the average annual air temperature in Poland in the period until 2030 will not change significantly with reference to the value from the reference period. However, the maximum temperatures will increase, especially in the winter periods. An increase in the amount of precipitation should also be expected, which will be connected to the intensification of cyclonic circulation in the region of the Baltic Sea basin and/or over the eastern part of the continent. Climate change increases the probability of the sea levels rising systematically. Based on the analysis of satellite images, the trend of water level increase in the Baltic Sea equals 0.33 cm/year with a standard deviation of 0.08 cm. The most crucial and noticeable effect of climate warming due to the location of the project will be an increase in the strength, frequency and duration of storm surges. Due to the forecast increase of the average ocean level, including the Baltic Sea level, an increased risk of flooding of the coastal zone and intensive destruction of the shores (erosion) during strong storms is predicted. Among other negative factors, the possible increased irregularity of storms is mentioned, which additionally inhibits the natural regeneration of shores and as a result of warmer winters, the reduction of the Baltic Sea ice cover which is the natural protection of the shore against sea erosion.

#### 21.3.16.2 Meteorological conditions

##### 21.3.16.2.1 Wind velocity and direction

Continental polar and marine polar air masses reach the area of the planned project. The wind associated with continental polar air masses reaches usually smaller speeds, while the wind associated with marine polar air masses (from the North Atlantic) is usually a strong wind. In the area of the planned project, the wind rose is very much dominated by the western and southern directions. The area located directly in the near-shore zone is characterised by dynamic wind conditions. This area is dominated by the wind from the WSW direction, reaching speeds of over 20 $m \cdot s^{-1}$. In the autumn-winter period, winds of greater force than in the remaining part of the year are noted. The majority of storms at sea are observed in that period. In other periods, the wind is weaker, moderate. Strong winds occur sporadically during this period, usually accompanying the weather phenomena such as storms. The wind speed and direction are similar both in the offshore and onshore areas within the coastal zone of the area discussed. Average wind speed is 7 $m \cdot s^{-1}$.

##### 21.3.16.2.2 Air temperature

The average annual air temperature in the region is 7–8°C. The annual temperature pattern is regular over the entire area. The average annual air temperature amplitude over the entire area is below 19°C. The lowest average annual air temperature amplitude occurs in the narrow coastal zone, where its values reach approx. 17.5°C. The coldest month is January with an average air temperature from 0°C to -2°C. On the other hand, July is the hottest month with average air temperature of 17–18°C. The number of frosty days, with the minimum temperature below 0°C, is less than 30 days and is the lowest in Poland. The average number of cloudless days, i.e. with cloud cover below 20%, is 30 days. The number of days with daily average total cloud cover equal to or greater than 80% is from 120 to 140 days per year. The annual sums of insolation within that area are between 1500–1600 hours. In June and July, the average insolation can reach up to 9 hours per day. The average duration of thermal summer is 60–70 days, whereas, the average duration of thermal winter is 50–80 days. Within the area of the planned project, one of the lowest pressure values in Poland occur, which is the result of the location near the route of very active low-pressure systems in winter.

##### 21.3.16.2.3 Precipitation

The Choczewo commune is characterised by the greatest average sum of atmospheric precipitation within the Łeba River catchment area. The average annual precipitation in this area is between 650 to 700 mm and is higher than the average precipitation sum in Poland. Most of the precipitation falls in the warm half of the year and amounts to 350–500 mm, whereas, the smallest amount of precipitation is recorded in the winter half of the year and amounts to 200–250 mm. The duration of snow cover is from 40 to 70 days.

#### 21.3.16.3 Air quality

Within the area of the planned project, the air quality is very good, with no risk of the permissible values being exceeded, in particular for the air quality standards. There are no large industrial plants that could emit significant amount of dust and gas pollution, which positively affects the state of atmospheric air quality.

### 21.3.17 Ambient noise

The permissible level of noise emitted to the environment is not established for the forest, industrial or agricultural areas, whereas, it is specified for the areas of a protected nature, the function of which involves the presence of humans.

In the area intended for the location of the OnSS, the provisions of the local spatial development plan "Wiatraki w Osiekach" are binding, which was adopted by Resolution No. XIV/145/2008 of the Choczewo Commune Council of 19 March 2008. There are no acoustically protected areas within the boundaries of the plan.

For the remaining areas surrounding the designed OnSS, no local spatial development plan has been adopted specifying the use of land in the vicinity of the substation, thus, indicating areas protected from noise. At a distance of approx. 100 m from the OnSS, decisions on land development conditions have been issued for the development of mainly residential buildings. Also, the geodetic division of plots conducted west of the OnSS, indicate the planned use of agricultural land for residential development.

Those plots are currently undeveloped; however, it was decided that in the near future this could change. As a result, the decision was made that the areas located west of the planned OnSS, divided into small plots, would be treated as prospective residential development areas, thus, as an area subject to acoustic protection. For those areas, the following normative (permissible) noise levels have been adopted: 50 dB – daytime (6:00 a.m. to 10:00 p.m.) and 40 dB – night time (10:00 p.m. to 6:00 a.m.).

### 21.3.18 Electromagnetic field emission (EMF)

The analyses of the magnetic field distribution indicated that the permissible value of the intensity of that field would not exceed, in the altitude range from 0.2 to 2.0 MAGL, the permissible value (60 $A \cdot m^{-1}$), specified in the Regulation of the Minister of Health of 17 December 2019 *on the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2019, item 2448) for places accessible to people.

The calculations of the electric and magnetic field distribution, which were conducted for the smallest distance of phase conductors (wires), constituting the busbar systems (13.0 m), from the ground, indicated that the intensity of the electric field below the complex of busbar systems, identified at an altitude of 2.0 MAGL, would not exceed the value of 3.9 $kV \cdot m^{-1}$, therefore, would be significantly lower than the permissible value (10 $kV \cdot m^{-1}$) established in the Regulation of the Minister of Climate of 17 February 2020 *on methods of checking compliance with the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2020, item 258) for places accessible to people.

The calculations of the magnetic field distribution indicated that its intensity below the complex of busbar systems, identified at an altitude of 2.0 MAGL at the most unfavourable working conditions of the busbar systems, would not exceed the value of 22.5 $A \cdot m^{-1}$, thus, would be significantly smaller than the permissible value (60 $A \cdot m^{-1}$) established in the Regulation of the Minister of Health of 17 December 2019 *on the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2019, item 2448) for places accessible to people.

### 21.3.19 Description of the natural environment components and protected areas

The description of the natural environment components is presented in relation to the direct (within the boundaries of the Baltica OWF CI area) and indirect impact zones, the range of which was specified individually for every component described.

The valorisation took into consideration the population size or resource size of the species, conservation assessment of the species, conservation status, international, national and local threat category and the frequency of occurrence in Poland and in the Gdańsk Pomerania. In the case of some organism groups, due to the lack of detailed information on the occurrence of many taxa, the list of species under legal protection did not include those which are actually rare and/or endangered in Poland. As a result, for the purposes of the Baltica OWF CI impact area valorisation, also rare and/or endangered species were included, regardless of their conservation status. In the case of habitat patches, also their representativeness was considered, in accordance with the guidelines for filling the SDF for a Natura 2000 site as well as the habitat conservation status. The valorisation allowed determining resources that were of exceptional, high, moderate, low and insignificant nature value. An additional element determining the valorisation of components was the assessment of the conservation status of resources habitats and the assessment of the conservation perspective of resources sites.

#### 21.3.19.1 Biotic elements in the onshore area

##### 21.3.19.1.1 Forests

In the forest area, which intersects the Baltica OWF CI area, Scots pine is the dominant species (95.57%). The remaining area is overgrown with alder (2.43%), beech (1.21%) and spruce (0.79%).

Forests of lower age class (up to 60 years) occupy approx. half of the surface area of the planned project and are used commercially. A significant share (approx. 27%) is of tree stands older than 100 years located mainly in the northern part of the planned project. They play protective functions, soil-protective and water-protective to a lesser extent. A small fragment of the forest has a research function.

###### 21.3.19.1.2 Fungi

Within the Baltica OWF CI impact area, the presence of 14 protected, endangered and rare species of macroscopic fungi was confirmed, identified at 15 plots in total. The remaining fungi species found in the area, were classified as insignificant resources. Those are species widely spread in Poland, with numerous populations both nationally and regionally. This means that they find numerous, favourable habitats for growth and reproduction, and their plots show no symptoms of natural or human threats. Two species – dune brittlestem and *Neolentinus cyathiformis* – were specified as having high nature value, and eight species as having moderate nature value. Within the direct impact range, a single plot of dune brittlestem and *Neolentinus cyathiformis* can be found. The status of all habitats influenced by the Baltica OWF CI was determined as appropriate. Also, the conservation prospects for most plots are not endangered, with the exception of the jellied bolete endangered by trampling and silky sheath endangered by the felling of hosts (trees).

###### 21.3.19.1.3 Lichens

Within the Baltica OWF CI impact area, the presence of 27 protected, endangered and rare species of lichen was confirmed, identified at 97 plots in total. Within the direct impact range, there are single plots of three species – sulphured crimson dot lichen, *Pertusaria flavida* and covered lichen. Four species – eagle's claws lichen, sulphured crimson dot lichen, covered lichen and *Pertusaria flavida* – were determined as having high nature value, and eights species as having moderate nature value. The status of habitats and conservation prospects of the plots of all species influenced by the Baltica OWF CI was determined as appropriate.

###### 21.3.19.1.4 Mosses and liverworts

Within the Baltica OWF CI impact area, the presence of 12 protected, endangered and rare species of mosses and liverworts was confirmed, identified at 13 plots in total. Within the range of direct impact, there are single plots of 7 species – broom forkmoss, wavy broom moss, red-stemmed feathermoss, neat feather-moss, mountain fern moss, knight's plume moss, and white pincushion-moss. All species were determined as having low value or insignificant. The status of habitats and conservation prospects of the plots of all species influenced by the project was determined as appropriate.

###### 21.3.19.1.5 Vascular plants

Within the Baltica OWF CI impact area, the presence of 7 protected, endangered and rare species of vascular plants was confirmed, identified at 9 plots in total. Within the range of direct impact, there are single plots of 6 species – cross-leaved heath, creeping lady's-tresses, sweetgale, sand sedge, black crowberry, and marsh Labrador tea. Two species – cross-leaved heath and sweetgale – were determined as resources of moderate value. The status of habitats and conservation prospects of the plots of almost all species influenced by the project was determined as appropriate. With the exception of one plot of sand sedge. Due to the conducted planting of beech, the species will probably yield from that plot in the future.

#### 21.3.19.1.6 Natural habitats

Within the Baltica OWF CI impact area, the presence of 4 types of natural habitats was confirmed, including one priority habitat – *2130 Fixed coastal dunes with herbaceous vegetation ("grey dunes"). Within the direct impact zone, there are 3 patches of natural habitats – 2180 and 9110. The habitat Fixed coastal dunes with herbaceous vegetation ("grey dunes") (*2130) was specified as a very valuable resource. Within the area of the planned project and its vicinity, they are adjacent to white dunes (habitat 2120), covering the older dunes along the seashore. They are typically developed in terms of species composition and community structure (representativeness A and A/B). Their conservation status and conservation prospects are satisfactory. The patches of the natural habitat 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes", *Elymo-Ammophiletum*) grow mainly on the first dune embankment that runs along the seashore. Their representativeness is high; however, the conservation status was specified as locally unsatisfactory due to the dune embankment stabilisation methods applied (branches scattered across the dune embankments and fascine fences). Habitat 2180 creates a complex of well-developed patches of coastal coniferous forests. The representativeness of those patches was assessed as high due to the presence of species characteristic for the complex (first of all, a significant share of the black crowberry *Empetrum nigrum*), appropriate structure, and also the natural renewal of typical species. The relatively small surface areas of coastal coniferous forests are transformed, mostly due to human pressure (compaction and trampling of undergrowth, pollution). The patches of the coastal coniferous forest within the boundaries of the Baltica OWF CI are characterised by a proper conservation status and proper conservation prospects. The patches of acidophilous beech forests (habitat 9110) are within the complex of pine forests between the town of Lubiatowo and the village of Osieki Lęborskie. The patches are well-developed and are characterised by a poor layer of herbaceous plants, but a well-developed moss layer which is typical of the *Luzulo pilosae-Fagetum* community. However, they are characterised by insufficient dead wood resources. The conservation prospects for beech forests were assessed as appropriate.

#### 21.3.19.1.7 Invertebrates

Within the Baltica OWF CI impact area, the presence of plots of only 2 protected, endangered and rare species of invertebrates was confirmed, identified at 12 plots in total. Within the range of direct impact, plots of 2 species can be found – *Formica polyctena* and *Nemoura dubitans*. Both species were determined as a resource of insignificant value. The conservation status of species plots was assessed as appropriate.

#### 21.3.19.1.8 Ichthyofauna

Due to a lack of watercourses and water reservoirs within the Baltica OWF CI impact zone or mid-forest depressions permanently filled with water, within the Baltica OWF CI there is no ichthyofauna present.

#### 21.3.19.1.9 Herpetofauna

Within the Baltica OWF CI impact area, the presence of 11 protected, endangered and rare species of amphibians and reptiles was confirmed, identified at 18 sites in total. Within the range of direct impact, sites of 7 reptile species can be found – slow worm, sand lizard, common European adder, and viviparous lizard. Within the range of direct impacts, no amphibian species were identified. One reptile species was determined as having high nature value. The conservation status of all amphibian and reptile sites was assessed as appropriate.

##### 21.3.19.1.10 Birds

Within the Baltica OWF CI impact area, the presence of 18 rare and moderately abundant bird species was confirmed, including 17 species under strict protection. Within the range of direct impact, sites of 12 species can be found: black woodpecker, hawk, red kite, Eurasian curlew, European nightjar, woodlark, rough-legged buzzard, common quail, tawny owl, European golden plover, and stock dove. Among common birds, 64 bird species were identified. 30% of the individuals recorded were the 2 most abundant species in Poland – skylark and common chaffinch. The common chaffinch belongs to the most common species – it was recorded at 86% of observation points. The area planned for the location of the OnSS was surveyed in terms of the location of bird concentration in the migration and wintering periods. During individual controls, from 1 to 14 individuals belonging to 6 species were found there. Among breeding birds, 5 species were determined as very valuable resources – red kite, common kingfisher, European nightjar, Eurasian woodcock, and common crane. Among birds occurring outside the breeding season, all species were determined as an insignificant resource. The conservation status of all breeding species and those occurring in the survey area outside the breeding season was assessed as appropriate.

##### 21.3.19.1.11 Mammals

Within the Baltica OWF CI impact area, the presence of at least 30 mammal species other than bats (including 1 species under strict protection and 13 species under partial protection) as well as 10 species and 3 groups of bats (all species under strict protection) was confirmed. Within the direct impact area, the presence of Eurasian beaver and otter was confirmed. Among the mammals found within the Baltic OWF CI impact area, most of them were assessed as insignificant, with the exception of wolf which was assessed as having low nature value. No breeding colonies and wintering roots of bats were found within the Baltica OWF CI area nor in its immediate vicinity.

#### 21.3.19.2 Protected areas, including Natura 2000 sites

Almost the entire onshore area of the planned project with the exception of the extreme southern part, in which the OnSS and the 6.5 km long busbar system to connect to the Choczewo Substation are planned to be located, is within the boundaries of the Coastal Protected Landscape Area. The area of substations is located in the immediate vicinity of the buffer zone of the Polish Coastal Landscape Park. Along the route of the onshore Baltic OWF CI area, there are no other forms of natural protected areas or nature monuments. No Natura 2000 sites are located along the onshore route of the Baltica OWF CI. The nearest Natura 2000 site, i.e. *Białogóra* PLH220003, is located at a distance of approx. 1.3 km from the Baltica OWF CI onshore area.

#### 21.3.19.3 Wildlife corridors

The location area of the planned project intersects longitudinally the wildlife corridor KPn-20C *Pobrzeże Kaszubskie* [Kashubian Coast]. The routes of corridors delineated in Poland are specified in detail in the Pomorskie Voivodeship Spatial Development Plan (Resolution No. 318/XXX/16). The location area of the planned project intersects longitudinally the Coastal Wildlife Corridor of supra-regional importance running along the Hel Peninsula and the Baltic Sea coast within the boundaries of the Puck, Wejherowo, Lębork and Słupsk poviats.

#### 21.3.19.4 Biodiversity

The Baltica OWF CI runs across areas of high diversity of habitats and the associated plant, fungi and animal species. The area is also valuable in terms of biodiversity because the planned project is located in the coastal zone; thus, there are many species of Atlantic character, which are encountered in the Gdańsk Pomerania quite commonly, however, in the scale of the entire country are rare or very rare. Also, some of the natural habitats (2120, *2130 and 2180) are encountered only in this part of the country. They are typically developed in terms of species composition and community structure.

### 21.3.20 Cultural values, monuments and archaeological sites and objects

None of the immovable monuments is located within the boundaries of the planned project area. A single archaeological site listed in the register of historical monuments (AZP 2-37/9) is in conflict with the Baltica OWF CI. The existence of 10 barrows was verified within the site and the cable connection route was delineated in a manner enabling bypassing the barrows inventoried.

### 21.3.21 Use and management of land and tangible property

The greater part of the Baltica OWF CI, covering almost the entire cable line, is planned to be located in forest areas, managed by the Choczewo Forest District Inspectorate, Szklana Huta Forestry. Only the land intended for the location of the OnSS and busbar systems is currently an agricultural area. The access to the above-mentioned station will be obtained from the district road no. 1432G (Osieki Lęborskie – Lublewko) via a new road planned in the plots with arable land. Along the route of the Baltica OWF CI, there is no tangible property nor existing residential or industrial developments. The Study of Conditions and Directions of Spatial Development of the Choczewo Commune is binding within the area of the planned project. The intended land use specified in the Study is compliant with the status quo – along the entire cable line, forest areas are marked, whereas, in the location of the planned OnSS and busbar systems, arable soils class I–IV are indicated.

Moreover, in the areas intended for the location of the OnSS, the provisions of the local spatial development plan “Wiatraki w Osiekach” [Wind Turbines in Osieki] are in place. The land covered by the Baltica OWF CI (plots no. 17/129, 21, 25/4, 25/5, Kierzkowo precinct) includes: “R” – agricultural areas with two electricity generating units of the wind turbine “3EW” and “4EW” (located in the area intended for the construction of the OnSS), “KDW” – internal roads, and “KD” – public access roads to those units. Around the “EW” electricity generating units, development lines have been marked that cannot be crossed.

### 21.3.22 Landscape, including the cultural landscape

The Baltica OWF CI area runs across a terrain with diversified landscape characterised by high value. This refers to both the cultural landscape, agricultural production space as well as the landscape of valuable natural resources. The variability of the landscape spatial structure is evident from the shoreline southwards, starting with dunes, through coastal accumulation plains with pine forest, and ending with a moraine upland. The entire Baltica OWF CI area situated within a forest complex as well as beaches and dunes of the coastal zone is within the boundaries of the Coastal Protected Landscape Area. No distinct landscape dominants are present. The values of the cultural landscape stem from a historical network of roads with avenue tree plantings (especially the scenic roads in the exposed agricultural landscape provide a number of openings for viewing points) as well as centuries-old traditional spatial arrangements of villages integrated harmoniously into the local landscape by shaping the green surroundings of the buildings.

### 21.3.23 Population and living conditions of people

The nearest residential buildings are located at a distance of approx. 360–380 m west of the planned project. These areas belong administratively to the village of Lubiatowo (in the case of the cable bed area) and to the village of Osieki Lęborskie (in the case of the OnSS). In accordance with the data of the Central Statistical Office of Poland, the population of the Choczewo commune was 5539 people. Due to the nature of the town of Lubiatowo, which at present plays the role of a holiday village (where summer bungalows, camping sites, agritourism farms can be found), it should be assumed that in the summer, the number of inhabitants may increase even several times.

## 21.4 Modelling performed for the purposes of the project impact assessment

### 21.4.1 Modelling of noise propagation in the atmosphere

Calculation of acoustic field distribution from noise sources related to the designed installation was performed with Cadna A 4.6.155 software, which enables forecasting in accordance with Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 *relating to the assessment and management of environmental noise*, and in accordance with the method specified in the Polish Standard PN ISO 9613-2:2002 ISO 9613-2: “Acoustics - Abatement of sound propagation outdoors. Part 2. General method of calculation”.

### 21.4.2 Modelling of the distribution of electric and magnetic components of the electromagnetic field

For the planned overhead busbar systems connecting the OnSS with the planned Choczewo Substation and for the cable lines transmitting electricity from the OWF to the above-mentioned OnSS, the distribution of electric and magnetic field strengths, including the maximum value of each field component, is determined by computational methods. The same method is used to determine the width of the area in the vicinity of overhead busbar systems, in which the electric field intensity may exceed the value admissible for the areas designated for residential development (1 $kV \cdot m^{-1}$). Calculations of magnetic field distribution were performed by identifying the value of the above-mentioned quantity at the heights of 0.2, 1.0 and 2.0 MAGL in accordance with the recommendation indicated in the Regulation of the Minister of Climate of 17 February 2020 *on methods of checking compliance with the permissible levels of electromagnetic fields in the environment* (Journal of Laws of 2020, item 258). Calculations of the magnetic and electric field intensity distribution in the surroundings of the designed cable line and in the vicinity of the overhead busbar systems were carried out.

### 21.4.3 Modelling of thermal impact of cable lines

The computational model was developed on the basis of the so-called image method and Kennelly formula assuming the existence of two linear heat sources, i.e. the actual source representing the power loss due to phase conductor resistance and dielectric losses in the primary insulation of a power line, and its symmetrical representation with regard to the Earth's surface, with identical power value as the actual source adopted with a negative sign. It is assumed that for a homogeneous centre, the thermal resistance of soil is constant in the entire semi-infinite environment and does not depend on the distribution of the temperature field in the ground. The superposition principle was applied to temperature fields originating from individual cable lines of the system in question in order to map thermal interaction and estimate the cumulative impact from all the cable lines of the system in question. The thermal calculations were made on the basis of an equivalent circuit consisting of a system of series-connected thermal resistances. Design assumptions for soil conditions are compliant with the IEC 60287-3-1 standard for Poland.

## 21.5 Description of the environmental impacts predicted in the case the project is not implemented, taking into account the available information on the environment and scientific knowledge

The implementation of the Baltica OWF CI will be associated with various impacts on the onshore and offshore environment. Taking a direct approach, the abandonment of the project will eliminate the anticipated impacts and no impacts on biotic and abiotic elements of the environment will occur. They will also be excluded from the range of cumulative impacts, reducing their overall scale, range and environmental impact. The abandonment of the Baltica OWF CI implementation will also result in the absence of restrictions on the availability of these areas to the existing and potentially new users [navigation, fisheries, tourism and possible production of hydrocarbons (crude oil and natural gas extracted below the seabed)]. The Baltica OWF CI was designed to include the power generated by the Baltica OWF into the NPS. Therefore, abandoning the construction of the Baltica OWF CI would also entail abandoning the construction of the Baltica OWF. An important premise for the implementation of the project is the potential avoidance of emissions of hazardous substances to the atmosphere. Assuming the capacity factor of 45% and operating period of 25 years, the Baltica-2 OWF with a capacity of 1500 MW and Baltica-3 with a capacity of 1050 MW can generate 284.81 TWh/1025.33 PJ of electricity, thus helping avoid the emission of over 102 million Mg $CO_2$, over 1381 thousand Mg $SO_2$, approximately 187 thousand Mg of nitrogen oxides and more than 1.5 million Mg of particulate matter from lignite-fired power plants.

## 21.6 Project impact identification and assessment

### 21.6.1 Applicant Proposed Variant (APV)

#### OFFSHORE AREA

#### 21.6.1.1 Construction phase

##### 21.6.1.1.1 Impact on geological structure, seabed relief, seabed sediments and access to raw materials and deposits

Table 21.3 presents the identified impacts on geological structure, seabed relief and seabed sediments along with an assessment of their scale and significance.

*Table 21.3. Assessment of the impact significance on geological structure, seabed relief and seabed sediments [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Changes in the seabed relief | Low | Moderate | Low |
| Changes in the seabed level | Low | Moderate | Low |
| Pits forming in the seabed at vessel anchoring locations | Low | Irrelevant | Negligible |

##### 21.6.1.1.2 Impact on the quality of seawater and seabed sediments

Table 21.4 presents the identified impacts on the quality of seawater and seabed sediments along with an assessment of their scale and significance.

*Table 21.4. Assessment of the impact significance on the quality of seawater and seabed sediments [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Release of pollutants and nutrients from sediments into the water column | Low | Moderate | Low |
| Release of pollutants and nutrients from sediments into the water column | Low | Moderate | Low |
| Contamination of water and seabed sediments by accidental release of municipal waste or domestic sewage from ships | Low | Low | Negligible |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Contamination of water and seabed sediments with accidentally released chemicals and waste | Low | Moderate | Low |

#### 21.6.1.1.3 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

Table 21.5 presents the identified impacts on climatic conditions and air quality of the marine environment along with an assessment of their scale and significance.

*Table 21.5. Assessment of the impact significance on climatic conditions and air quality of the marine environment [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Exhaust emissions | Low | Low | Negligible |

#### 21.6.1.1.4 Impact on ambient noise

Table 21.6 presents the identified impacts on ambient noise along with an assessment of their scale and significance.

*Table 21.6. Assessment of the impact significance on ambient noise [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Noise generated by ships and equipment | Moderate | Low | Low |

#### 21.6.1.1.5 Impact on nature and protected areas

##### 21.6.1.1.5.1 Impact on biotic elements in the offshore area

###### 21.6.1.1.5.1.1 Phytobenthos

Table 21.7 presents the identified impacts on phytobenthos along with an assessment of their scale and significance.

*Table 21.7. Assessment of the impact significance on phytobenthos [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Habitat disturbance due to a change in substrate structure | High | Moderate | Moderate |
| Redistribution of pollutants from sediments into the water column | Low | Irrelevant | Negligible |

###### 21.6.1.1.5.1.2 Macrozoobenthos

Table 21.8 presents the identified impacts on macrozoobenthos along with an assessment of their scale and significance.

*Table 21.8. Assessment of the impact significance on macrozoobenthos [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Destruction due to the disturbance of the seabed sediment structure | Moderate | Moderate | Low |
| Redistribution of pollutants from sediments into the water column | Low | Irrelevant | Negligible |

#### 21.6.1.1.5.1.3 Ichthyofauna

Table 21.9 presents the identified impacts on ichthyofauna along with an assessment of their scale and significance.

*Table 21.9. Assessment of the impact significance on marine ichthyofauna [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Behavioural changes due to noise and vibration emissions | Low | Moderate – cod, herring, sprat, sand goby, common goby, twaite shad | Low |
| | | Low – flounder, common seasnail, straightnose pipefish | Negligible |
| Change in the habitat structure | Moderate | Low – cod, herring, flounder, common seasnail, sand goby, common goby, straightnose pipefish | Low |
| | | Irrelevant – sprat, twaite shad | Negligible |
| Change in chemical parameters of the habitat | Low | Low | Negligible |

#### 21.6.1.1.5.1.4 Marine mammals

Table 21.10 presents the identified impacts on marine mammals along with an assessment of their scale and significance.

*Table 21.10. Assessment of the impact significance on marine mammals [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Behavioural changes due to increased underwater noise emissions | Moderate | High | Low |
| Change in chemical parameters of the habitat | Low | Low | Negligible |
| Change in food supply | Low | Low | Negligible |

#### 21.6.1.1.5.1.5 Seabirds

Table 21.11 presents the identified impacts on seabirds along with an assessment of their scale and significance.

*Table 21.11. Assessment of the impact significance on seabirds [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Bird disturbance due to vessel traffic | Low | Low | Negligible |
| Disturbance of fish that constitute food for piscivorous birds (the razorbill, the common guillemot) due to noise and vibration from vessels and equipment | Irrelevant | Irrelevant | Negligible |
| Reduction of feeding areas of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to destruction of benthic communities | Moderate | Moderate | Low |
| Disturbance of feeding activity of piscivorous birds (the razorbill, the common guillemot) and benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) due to water turbidity and sediment re-suspension | Low | Moderate | Low |

###### 21.6.1.1.5.2 Impact on protected areas

###### 21.6.1.1.5.2.1 Impact on protected areas other than Natura 2000 sites

In the offshore area of the planned project location and in the range of its potential impact there are no territorial forms of protection other than the areas of the Natura 2000 European ecological network. Therefore, no activities related to the construction of the Baltica OWF CI will cause any impact on such areas.

###### 21.6.1.1.5.2.2 Impact on Natura 2000 protected sites

Table 21.12 presents the identified impacts on seabirds subject to protection within the *Przybrzeżne wody Bałtyku* (PLB990002) Natura 2000 site along with an assessment of their scale and significance.

*Table 21.12. Assessment of the impact significance on seabirds subject to protection within the Przybrzeżne wody Bałtyku (PLB990002) Natura 2000 site [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance due to vessel traffic – the long-tailed duck, the velvet scoter, the common scoter and the European herring gull | Low | Low | Negligible |
| Disturbance of fish that constitute food for piscivorous bird species (the razorbill) due to noise and vibration | Low | Irrelevant | Negligible |
| Reduction of feeding areas of benthivorous birds (the velvet scoter, the long-tailed duck, the common scoter) and piscivorous birds (the razorbill) due to destruction of benthic communities | Low | Moderate | Low |
| Water turbidity and disturbance of feeding activity of benthivorous birds (the velvet scoter) due to sediment re-suspension | Low | Moderate | Low |

###### 21.6.1.1.5.3 Impact on wildlife corridors

Table 21.13 presents the identified impacts on wildlife corridors along with an assessment of their scale and significance.

*Table 21.13. Assessment of the impact significance on animals moving within the area and in the region of the Baltica OWF CI [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance to animal migration due to works in the offshore area | Moderate | Low | Low |

#### 21.6.1.1.5.4 Impact on biodiversity

##### 21.6.1.1.5.4.1 Phytobenthos

The phytobenthos biodiversity, defined as the taxonomic composition of individual groups of organisms subject to analysis, is typical for the survey area. Impacts on macroalgal species diversity will be analogous to those found for phytobenthos.

##### 21.6.1.1.5.4.2 Macrozoobenthos

The implementation of the planned Baltica OWF CI will not result in significant changes in the characteristics of seabed habitats (habitat diversity), which are the habitats of macrozoobenthos communities, along the route of the linear project. On the soft bottom, the power cables will be buried in the sediment and covered by an *in situ* sediment layer. On a hard bottom, the solutions applied to protect the cables, namely concrete mattresses, riprap or concrete protective structures, will constitute as favourable substrate for the settlement of periphyton organisms as the surface of pebbles and boulders naturally occurring there, despite lacking natural character and being newly introduced elements. In both types of habitats identified in the area of the planned Baltica OWF CI project, the function of the habitat will be restored within 3–4 years after the completion of the works, which corresponds to the life span of the longest living bivalve species. As the basic characteristics of the soft-bottom habitat and the hard-bottom habitat will not be altered, no changes in the taxonomic diversity of macrozoobenthos are anticipated.

##### 21.6.1.1.5.4.3 Ichthyofauna

During the construction phase, the number of fish taxa occurring in the Baltica OWF CI area is expected to decrease. It can be assumed that it will result from the avoidance of the area during cable laying works. The noise associated with the process (increased ship traffic, operation of cable laying equipment) may deter particularly the fish with a low response threshold such as the clupeids and cod. However, the negative impact of this factor will be local and short-term, directly related to the area where the works are conducted at a given time. Habitat alteration associated with the destruction of some of the benthic organisms may result in a reduction of the food supply for benthivorous fish and consequently in the abandonment of the area by benthivorous fish. However, it seems that this effect will be limited only to the construction zone. Therefore, it can be assumed that the effect of the works will be a temporary decrease in the number of fish species occurring in a spatially limited area.

##### 21.6.1.1.5.4.4 Marine mammals

A potential negative impact of the project that may affect marine mammals in the context of biodiversity is the temporary exclusion of the construction area from use due to deterioration of habitat conditions, primarily as a result of noise generated by ships and construction equipment. Given the local and short-term nature of this impact, the lack of evidence that the area is of significant importance to individual marine mammal species, their sporadic occurrence and the possibility of using other areas with similar environmental conditions, this impact was assessed as negligible. After the cessation of works in the area, the conditions existing before the disturbance will be restored within a relatively short period of time, allowing the same species of marine mammals to use the area.

###### 21.6.1.1.5.4.5 Seabirds

In the case of the construction phase, no impacts were identified that could result in a change of the species structure of seabirds occurring in the area of the planned project. There will be a short-term and local disturbance of waterbirds, which will cease after the completion of the construction works. Environmental changes determining limited accessibility to the food supply, which could theoretically determine long-term changes in distribution of piscivorous and benthivorous seabirds, will also occur in the immediate area of the underwater works and in the case of piscivorous species, they will cease upon completion of the works. In conclusion, the impacts identified for the construction phase are not expected to affect the seabird biodiversity within the Baltica OWF CI area.

##### 21.6.1.1.6 Impact on cultural values, monuments and archaeological sites and objects

No shipwrecks of historical significance have been identified in the offshore part of the Baltica OWF CI area. Consequently, the Baltica OWF CI will have no impact on cultural values, monuments and archaeological sites and objects during the construction phase.

##### 21.6.1.1.7 Impact on the use and management of the sea area and tangible property

Table 21.14 presents the identified impacts on fishing and shipping activities along with an assessment of their scale and significance.

*Table 21.14. Assessment of the impact significance on fishing activities [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Impact of shipping and fishing vessel traffic | Moderate | Moderate | Low |
| Impact on fishing activities due to the establishment of a protection zone | Moderate | Low | Low |
| Impact on shipping due to the establishment of a safety zone | Moderate | Irrelevant | Negligible |

The construction of the cable lines is not expected to generate impacts on other forms of sea area development during the Baltica OWF CI construction phase.

##### 21.6.1.1.8 Impact on landscape, including the cultural landscape

Considering the manner of implementation of the planned project and the current use of the area, there will be no impact on the landscape, including the cultural landscape, during the construction phase of the Baltica OWF CI.

##### 21.6.1.1.9 Impact on population, human health and living conditions

The impacts on population will result from the impact activities previously carried out in the area of the Baltica OWF CI construction, i.e. fishing and shipping, and their significance will be identical to the significance of the impacts determined for these two uses of the sea area in question. No other impacts on population, human health and living conditions are expected to occur during the construction phase.

#### 21.6.1.2 Operation phase

##### 21.6.1.2.1 Impact on geological structure, seabed sediments, access to raw materials and deposits

Table 21.15 presents the identified impacts on geological structure, seabed relief and seabed sediments along with an assessment of their scale and significance.

*Table 21.15. Assessment of the impact significance on geological structure, seabed relief and seabed sediments [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Local changes in seabed relief | Low | Irrelevant | Negligible |

##### 21.6.1.2.2 Impact on the quality of seawater and seabed sediments

Table 21.16 presents the identified impacts on the quality of water and seabed sediments along with an assessment of their scale and significance.

*Table 21.16. Assessment of the impact significance on the quality of water and seabed sediments [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Contamination of water and seabed sediments with oil derivatives during normal operation | Moderate | Moderate | Low |

Heat emission from the cable lines, following their burial in the seabed sediment, will not generate impacts on the marine environment.

##### 21.6.1.2.3 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

Table 21.17 presents the identified impacts on climate and air quality of the marine environment along with an assessment of their scale and significance.

*Table 21.17. Assessment of the impact significance on climate conditions and air quality of the marine environment [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Greenhouse gas emissions | Irrelevant | Low | Negligible |
| Change in physical parameters of the near-water atmosphere layer | Irrelevant | Irrelevant | Negligible |
| Change in dynamic conditions of the sea | Irrelevant | Irrelevant | Negligible |
| Change in hydro-physical conditions of the sea | Low | Irrelevant | Negligible |
| Air quality | Irrelevant | Low | Negligible |

##### 21.6.1.2.4 Impact on ambient noise

Operating transmission infrastructure buried in the seabed or laid and secured on the seabed does not generate noise. The only source of noise at the stage of operation of the planned project will be the noise resulting from the presence of vessels used for maintenance works and potential repairs. The assumed intensity of these activities is considerably lower than at the stage of cable line construction. Therefore, the impact of the planned project on the ambient noise during the operation stage will be negligible.

##### 21.6.1.2.5 Impact on the electromagnetic field

The impact of underwater cables buried in the seabed on the electromagnetic field is negligible.

##### 21.6.1.2.6 Impact on nature and protected areas

###### 21.6.1.2.6.1 Oddziaływanie na elementy biotyczne na obszarze m Impact on biotic elements in the offshore area orskim

###### 21.6.1.2.6.1.1 Phytobenthos

Table 21.18 presents the identified impacts on phytobenthos along with an assessment of their scale and significance.

*Table 21.18. Assessment of the impact significance on phytobenthos [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Creation of new habitats for phytobenthos | Moderate | High | Moderate |

###### 21.6.1.2.6.1.2 Macrozoobenthos

Table 21.19 presents the identified impacts on macrozoobenthos along with an assessment of their scale and significance.

*Table 21.19. Assessment of the impact significance on macrozoobenthos [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Presence of artificial hard substrate | High | Irrelevant | Negligible |
| Heat and electromagnetic field emissions | High | Irrelevant | Negligible |

###### 21.6.1.2.6.1.3 Ichthyofauna

Table 21.20 presents the identified impacts on marine ichthyofauna along with an assessment of their scale and significance.

*Table 21.20. Assessment of the impact significance on marine ichthyofauna [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Noise and vibration emissions | Moderate | Low | Low |
| Electromagnetic field impact | Moderate | Irrelevant | Negligible |
| Habitat change | Moderate | Moderate – cod, herring, flounder, common seasnail, sand goby, common goby, straightnose pipefish | Low |
| | | Low – sprat, twaite shad | Low |

###### 21.6.1.2.6.1.4 Marine mammals

A potential negative impact of the project in the operation phase, which may affect marine mammals, is the disturbance from the noise generated by ships and underwater equipment used during system maintenance or repair works. However, due to the local and short-term nature of this impact, the lack of evidence as to the importance of this area for particular marine mammal species and the sporadic occurrence of such species in the project area, this impact will be no greater than during the construction phase.

###### 21.6.1.2.6.1.5 Seabirds

During the operation phase, no impacts that could significantly affect seabirds will occur. Periodic inspections of subsea cables will be carried out by at least two relatively small vessels. The necessity of conducting possible repairs of subsea cables may occur almost exclusively in emergency situations and is very unlikely due various types of cable line protections: their durable design, burial in the seabed sediment or proper protection if they are laid on the seabed, as well as a special avoidance zone for cable lines established by the Director of the Maritime Office in Gdynia.

Periodic inspections of the cable lines will only involve bird scaring in the vicinity of vessels. In this part of the sea, vessel traffic is intense due to the presence of the shipping route of cargo vessels. Therefore, a short-term presence of a single vessel will not contribute to a noticeable increase in bird disturbance in the Baltica OWF CI area, particularly in the context of the already intense shipping use of the sea area in which the project is located. After the construction phase is finished, the restoration of macrozoobenthos complexes, constituting a possible food supply for benthivorous birds, will begin. At the operation stage, all the impacts identified for the construction phase will cease.

The operation of the cable lines may have a positive impact on seabirds. The establishment of a protection zone for the cable lines may involve restrictions on some forms of commercial fishing within its boundaries and consequently reduce the by-catch of birds – mainly ducks diving into the fishing nets. At this stage, it is impossible to determine the scale of this impact, and as a result it was not assessed.

Summarising the above information, it should be assumed that during the operation phase there will be no negative impacts on birds which could manifest in a noticeable or measurable manner.

###### 21.6.1.2.6.2 Impact on protected areas

###### 21.6.1.2.6.2.1 Impact on protected areas other than Natura 2000 sites

In the offshore area of the planned project location and in the range of its potential impact there are no territorial forms of protection other than the areas of the Natura 2000 European ecological network. Therefore, no activities related to the operation of the Baltica OWF CI will cause any impact on such areas.

###### 21.6.1.2.6.2.2 Impact on Natura 2000 protected sites

During the operational phase, there will be no negative impacts on birds subject to protection in the *Przybrzeżne Wody Bałtyku* site (PLB990002), which could manifest in a noticeable or measurable manner.

No impacts on the integrity of the site or on the connections with other Natura 2000 sites are anticipated.

###### 21.6.1.2.6.3 Impact on wildlife corridors

During the operation of the Baltica OWF CI, the scope and significance of environmental impacts will be much smaller compared to the construction phase. No impacts that could adversely affect the movement of animals within and near the Baltica OWF CI area are anticipated.

###### 21.6.1.2.6.4 Impact on biodiversity

###### 21.6.1.2.6.4.1 Phytobenthos

The phytobenthos biodiversity, defined as the taxonomic composition of individual groups of organisms subject to analysis, is typical for the survey area. Impacts on macroalgal species diversity will be analogous to those found for phytobenthos.

###### 21.6.1.2.6.4.2 Macrozoobenthos

The operation phase of the Baltica OWF CI will not lead to any changes in biodiversity – neither in terms of habitat nor taxonomic aspects.

###### 21.6.1.2.6.4.3 Ichthyofauna

The assessment of impacts occurring during the operation phase (noise and vibration, EMF, habitat change, release of harmful substances) indicates that they will not be significant. In the case of the first two impacts, the technical solutions proposed by the Applicant should reduce their occurrence to a minimum. At the current stage of the project, no cable laying is anticipated on the seabed and no protective solutions are expected to be required to provide a substrate suitable for the formation of an artificial reef (habitat change). Therefore, it can be assumed that the operation phase will have no impact on biodiversity.

###### 21.6.1.2.6.4.4 Marine mammals

During the operation phase of the Baltica OWF CI, there will be no disturbance in the marine mammal habitat preventing its use by these animals. Therefore, it will not affect the biodiversity in the context of marine mammals.

###### 21.6.1.2.6.4.5 Seabirds

During the operation phase, there will be no impacts that could affect the biodiversity of birds.

##### 21.6.1.2.7 Impact on cultural values, monuments and archaeological sites and objects

No shipwrecks of historical significance have been identified in the offshore part of the Baltica OWF CI area. Consequently, there will be no impacts on cultural values, monuments and archaeological sites and objects in the offshore area during the operation phase.

##### 21.6.1.2.8 Impact on the use and management of the sea area and tangible property

During the operation phase, the impact on the use and management of the sea area will only result from the establishment of cable line protection zones by the Director of Maritime Office in Gdynia, within which the use of bottom fishing gear will be prohibited. The significance of this impact will be low according to the assessment performed for the construction phase, as it will not cease upon completion of this phase and will persist at least until the end of the operation phase.

Impacts on other forms of use and management of the sea area and tangible property are not anticipated.

##### 21.6.1.2.9 Impact on landscape, including the cultural landscape

During its operation phase, the Baltica OWF CI will not generate any impacts on the landscape, including the cultural landscape. Considering the anticipated method of implementation of these works, most of the impacts identified and their significance will be identical to those identified for the construction phase.

##### 21.6.1.2.10 Impact on population, human health and living conditions

Restrictions on the public will result from the establishment of cable line protection zones by the Director of the Maritime Office in Gdynia, in which bottom fishing gear will be prohibited. This will affect fisheries, for which the significance of this impact was assessed as low. The same assessment was made for the significance of the prohibition on bottom fishing within the cable protection zones for the population, namely fishermen who will be affected by this restriction. No other impacts on the population, human health and living conditions are anticipated during the operation phase.

#### 21.6.1.3 Decommissioning phase

The impacts identified for the decommissioning phase and analysed below concern the dismantling after the discontinuation of the Baltica OWF CI operation, which is the least probable method of implementing this phase. However, it is associated with the greatest environmental impacts.

##### 21.6.1.3.1 Impact on geological structure, seabed sediments, access to raw materials and deposits

Table 21.21 presents the identified impacts on geological structure, seabed relief and seabed sediments along with an assessment of their scale and significance.

*Table 21.21. Assessment of the impact significance on geological structure, seabed relief and seabed sediments [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Local changes in seabed relief | Low | Irrelevant | Negligible |

##### 21.6.1.3.2 Impact on the quality of seawater and seabed sediments

In the case of possible decommissioning of the Baltica OWF CI, it is expected that impacts of the same significance as those identified for the construction phase will occur.

##### 21.6.1.3.3 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

In the case of possible decommissioning of the Baltica OWF CI, it is expected that impacts of the same significance as those identified for the construction phase will occur.

##### 21.6.1.3.4 Impact on ambient noise

For the dismantling of offshore cable lines, the same impacts as the ones identified for the construction phase are expected to occur.

##### 21.6.1.3.5 Impact on the electromagnetic field

At the stage of decommissioning of the Baltica OWF CI, inactivation of subsea cables and their possible removal will take place. Therefore, there will be no sources generating electromagnetic field and affecting the natural electromagnetic field.

#### 21.6.1.3.6 Impact on nature and protected areas

##### 21.6.1.3.6.1 Impact on biotic elements in the offshore area

###### 21.6.1.3.6.1.1 Phytobenthos

In the case of possible decommissioning of the Baltica OWF CI, impacts on phytobenthos and their significance are expected to be the same as in the construction phase.

###### 21.6.1.3.6.1.2 Macrozoobenthos

In the case of possible decommissioning of the Baltica OWF CI, impacts on macrozoobenthos and their significance are expected to be the same as during the construction phase.

###### 21.6.1.3.6.1.3 Ichthyofauna

In the case of potential decommissioning of the Baltica OWF CI, impacts on ichthyofauna and their significance are expected to be the same as during the construction phase.

###### 21.6.1.3.6.1.4 Marine mammals

If the infrastructure of the Baltica OWF CI is deactivated and not dismantled during the decommissioning phase, there will be no impacts on marine mammals. However, if a decision is made to completely dismantle the Baltica OWF CI infrastructure after the operation phase, the impacts on marine mammals are expected to be of the same nature and significance as those identified for the construction phase.

###### 21.6.1.3.6.1.5 Seabirds

If the infrastructure of the Baltica OWF CI is deactivated and not dismantled during the decommissioning phase, there will be no impacts on seabirds. However, if a decision is made to completely dismantle the Baltica OWF CI infrastructure after the operation phase, the impacts on seabirds are expected to be of the same nature and significance as those identified for the construction phase.

##### 21.6.1.3.6.2 Impact on protected areas

###### 21.6.1.3.6.2.1 Impact on protected areas other than Natura 2000 sites

In the offshore area of the planned project location and in the range of its potential impact there are no territorial forms of protection other than the areas of the Natura 2000 European ecological network. Therefore, no activities related to the possible decommissioning of the Baltica OWF CI will cause any impact on such areas.

###### 21.6.1.3.6.2.2 Impact on Natura 2000 protected sites

In the case of possible decommissioning of the Baltica OWF CI infrastructure, technologies and equipment similar to those used during the construction phase are expected to be used. Therefore, the potential impacts on seabirds subject to protection within the Natura 2000 site will be the same as those identified for the construction phase.

##### 21.6.1.3.6.3 Impact on wildlife corridors

In the case of possible decommissioning of the Baltica OWF CI infrastructure, technologies and equipment similar to those used during the construction phase are expected to be used. Therefore, the potential impacts on animals moving within the Baltica OWF CI area and its vicinity will be the same as those identified for the construction phase.

No impacts on the integrity of the site or on the connections with other Natura 2000 sites are anticipated.

###### 21.6.1.3.6.4 Impact on biodiversity

###### 21.6.1.3.6.4.1 Phytobenthos

In the case of the Baltica OWF CI area, the removal of cables together with the artificial reef is not likely to have a significant impact on the phytobenthos diversity in the Baltica OWF CI area, as due to the trace amounts on the seabed also periphytic flora is unlikely to occur in abundance. After the dismantling, the environmental conditions prevailing in the seabed area before the construction of the project will be restored.

###### 21.6.1.3.6.4.2 Macrozoobenthos

In the case of the Baltica OWF CI decommissioning, the same disturbance factors will occur as during the construction phase. However, considering the characteristics of seabed habitats in the Baltica OWF CI area, as well as the characteristics of macrozoobenthos species inhabiting these habitats, no negative changes in biodiversity of the area should be expected as a result of works conducted during the Baltica OWF CI decommissioning phase.

###### 21.6.1.3.6.4.3 Ichthyofauna

The process of dismantling the connection line elements will involve similar impacts as in the case of the construction phase.

###### 21.6.1.3.6.4.4 Marine mammals

During the decommissioning phase of the Baltica OWF CI, no activities that could affect the marine mammal biodiversity are anticipated.

###### 21.6.1.3.6.4.5 Seabirds

In the case of the Baltica OWF CI deactivation, there will be no impacts that could affect the biodiversity of birds. In the case of decommissioning by dismantling, the impacts will most likely be the same as in the construction phase and will cease after the completion of this phase. Their scale and intensity are not expected to affect bird biodiversity.

##### 21.6.1.3.7 Impact on cultural values, monuments and archaeological sites and objects

No objects of historical significance have been identified in the offshore part of the Baltica OWF CI area. Therefore, no impact on cultural values, monuments and archaeological sites and objects will occur during the decommissioning phase.

##### 21.6.1.3.8 Impact on the use and management of the sea area and tangible property

In the case of cable line dismantling, minor impacts on shipping are anticipated due to the need for vessel course correction in order to avoid vessels involved in possible dismantling works. The significance of this impact will be the same as the significance assessed for the construction phase, i.e. negligible. The decommissioning of the Baltica OWF CI will involve the removal of cable line protection zones and the cessation of impacts on fisheries.

In the second scenario, i.e. the deactivation of the Baltica OWF CI without its dismantling, there will be no impacts on shipping but the impacts on fisheries will possibly remain, if the cable line protection zones are not removed. The significance of the impact will be the same as for the operation phase, i.e. low. No other impacts on the use and management of the sea area and tangible property will occur.

##### 21.6.1.3.9 Impact on landscape, including the cultural landscape

The possible dismantling of the cable lines in the decommissioning phase is expected to be carried out by vessels with parameters similar to those involved in the construction works. Therefore, it should be assumed that there will be no impact on the landscape, including cultural landscape, during the decommissioning phase either.

##### 21.6.1.3.10 Impact on population, human health and living conditions

In the case of dismantling of the Baltica OWF CI, impacts occurring during the decommissioning phase will result from the impacts identified for the use and management of the sea area within the Baltica OWF CI area. In this case, there will be negligible impacts on population due to minor restrictions on shipping activities. If the decommissioning phase involves deactivation of the cable lines and maintenance of safety zones, impacts on people will occur due to restrictions on fishing, which were assessed as low.

## ONSHORE AREA

#### 21.6.1.4 Construction phase

##### 21.6.1.4.1 Impact on geological structure, coastal zone, soils, and access to raw materials and deposits

###### 21.6.1.4.1.1 Impact on geological structure

Table 21.22 presents the identified impacts on geological structure along with an assessment of their scale and significance.

*Table 21.22. Assessment of the impact significance on geological structure [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance of sediment layers by drilling through the coastal zone and the removal of the spoil | Moderate | Moderate | Low |

###### 21.6.1.4.1.2 Impact on the topography and dynamics of the coastal zone

No direct impact of the project on the topography and dynamics of the coastal zone is expected.

###### 21.6.1.4.1.3 Impact on soils

Table 21.23 presents the identified impacts on soils along with an assessment of their scale and significance.

*Table 21.23. Assessment of the impact significance on soils [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Alteration to the water regime as a result of excavation drainage | Low | High | Low |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Soil degradation | Moderate | High | Moderate |
| Risk of contamination of the ground-water environment | Low | Moderate | Low |

##### 21.6.1.4.1.4 Impact on the access to raw materials and deposits

At present, in the area of the planned project and in its nearest surroundings, no mineral deposits or mining areas and sites have been documented and therefore, the project will not affect access to raw materials and deposits.

#### 21.6.1.4.2 Impact on the quality of surface waters

Table 21.24 presents the identified impacts on surface waters along with an assessment of their scale and significance.

*Table 21.24. Assessment of the impact significance on surface waters [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Contamination of surface waters | Low | Moderate | Low |

#### 21.6.1.4.3 Impact on hydrogeological conditions and groundwater

Table 21.25 presents the identified impacts on hydrogeological conditions and groundwater along with an assessment of their scale and significance.

*Table 21.25. Assessment of the impact significance on hydrogeological conditions and groundwater [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Groundwater contamination | Low | Moderate | Low |
| Water abstraction for technological or domestic use | Low | Low | Negligible |

#### 21.6.1.4.4 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

Table 21.26 presents the identified impacts on air quality in residential development area along with an assessment of their scale and significance.

*Table 21.26. Assessment of the impact significance on air quality in residential development area [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| **Fuel combustion in machinery engines** | | | |
| Air pollution due to the operation of construction equipment on the OnSS construction site | Low | Irrelevant | Negligible |
| Air pollution due to the operation of construction equipment along the cable bed area | Low | Irrelevant | Negligible |
| Air pollution due to the operation of construction | Low | Irrelevant | Negligible |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| equipment crossing the coastal zone | | | |
| Air pollution as a result of possible truck traffic through Lubiatowo and Osieki Lęborskie | Low | Very high | Moderate |
| **Transfer of soil material** | | | |
| Air pollution by dust from cable line installation | Low | Irrelevant | Negligible |
| Air pollution by dust from OnSS construction | Low | Irrelevant | Negligible |
| **Vehicle traffic on paved roads (surface emissions)** | | | |
| Air pollution by dust during machinery traffic on access roads in the immediate vicinity of residential areas | Low | Very high | Moderate |
| Air pollution by dust during machinery traffic on access roads in the remaining area | Low | Irrelevant | Negligible |
| **Vehicle traffic on unpaved roads (surface emissions)** | | | |
| Air pollution by dust during machinery traffic on access roads in the immediate vicinity of residential areas | Low | Very high | Moderate |
| Air pollution by dust during transport of large quantities of materials/equipment from the OnSS to the shoreline drilling site along the cable bed area | Low | Very high | Moderate |
| Air pollution by dust during machinery traffic on access roads in the remaining area | Low | Irrelevant | Negligible |
| **Wind erosion of soil surface** | | | |
| Air pollution by dust from the cable bed area | Low | Irrelevant | Negligible |
| Air pollution by dust from the OnSS area | Low | Irrelevant | Negligible |

#### 21.6.1.4.5 Impact on ambient noise

Table 21.27 presents the identified impacts on ambient noise along with an assessment of their scale and significance.

*Table 21.27. Assessment of the impact significance on ambient noise [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Noise emitted by construction equipment | Low | Irrelevant | Negligible |
| Noise emitted by transport on access roads in the immediate vicinity of residential areas | Low | Very high | Moderate |
| Noise emitted by transport on access roads in the remaining area | Low | Irrelevant | Negligible |

#### 21.6.1.4.6 Impact on the electromagnetic field

In the Baltica OWF CI construction phase, there will be no emission of electromagnetic field, as it concerns devices which are energised, i.e. in operation.

#### 21.6.1.4.7 Impact on nature and protected areas

##### 21.6.1.4.7.1 Impact on biotic elements in the onshore area

###### 21.6.1.4.7.1.1 Fungi

Table 21.28 presents the identified impacts on fungi along with an assessment of their scale and significance.

*Table 21.28. Assessment of the impact significance on fungi [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of habitats of fungi species | High | High | Important |
| Removal of dead wood, which is a substrate for fungi, from the site | High | High | Important |
| Overdrying of species habitats caused by drainage during construction works | Low | Moderate | Low |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

###### 21.6.1.4.7.1.2 Lichens

Table 21.29 presents the identified impacts on lichens along with an assessment of their scale and significance.

*Table 21.29. Assessment of the impact significance on lichens [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of habitats of species growing on trees and soil | High | Moderate | Moderate |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Moderate | Low |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Moderate | Low |

###### 21.6.1.4.7.1.3 Mosses and liverworts

Table 21.30 presents the identified impacts on mosses and liverworts along with an assessment of their scale and significance.

*Table 21.30. Assessment of the impact significance on mosses and liverworts [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of species habitats | High | High | Important |
| Overdrying of species habitats caused by drainage during construction works | Low | Moderate | Low |
| Air pollution caused by exhaust emissions from construction | Low | Low | Negligible |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| machinery and vehicles as well as transport of materials and people | | | |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

### 21.6.1.4.7.1.4 Vascular plants and natural habitats

Table 21.31 presents the identified impacts on vascular plants and natural habitats along with an assessment of their scale and significance.

*Table 21.31. Assessment of the impact significance on vascular plants and natural habitats [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of species habitats and natural habitats | High | High | Important |
| Overdrying of species habitats caused by drainage during construction works | Low | Moderate | Low |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

### 21.6.1.4.7.1.5 Invertebrates

Table 21.32 presents the identified impacts on invertebrates along with an assessment of their scale and significance.

*Table 21.32. Assessment of the impact significance on invertebrates [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of habitat | High | Moderate | Moderate |
| Habitat fragmentation | Low | Moderate | Low |
| Physical loss of habitats of species connected by trophic relationships | Low | Moderate | Low |
| Disturbance to the structure of the environment (transformation of the surrounding land, presence of people, machinery, etc.) | Low | Low | Negligible |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

#### 21.6.1.4.7.1.6 Herpetofauna

Table 21.33 presents the identified impacts on herpetofauna along with an assessment of their scale and significance.

*Table 21.33. Assessment of the impact significance on herpetofauna [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Entrapment of amphibians and reptiles in excavations at the construction site | Low | Very high | Moderate |
| Collisions of construction equipment with amphibians during their migration from and to wintering grounds | Low | High | Low |
| Destruction of a reptile site in an ecotone habitat at the forest edge by the OnSS | High | Moderate | Moderate |
| Destruction of a reptile site in an ecotone habitat at the forest-dune edge by the drilling site in the nearshore zone | Low | Irrelevant | Negligible |
| Vibration due to the use of heavy equipment in reptile habitats | Low | Low | Negligible |

#### 21.6.1.4.7.1.7 Birds

Table 21.34 presents the identified impacts on birds along with an assessment of their scale and significance.

*Table 21.34. Assessment of the impact significance on birds [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of habitat or its fragment (rare and moderately abundant breeding species) | High | High | Important |
| Physical loss of habitat or its fragment (common breeding species) | High | Low | Low |
| Destruction of nests and broods during tree felling | High | High | Important |
| Disturbance (presence of people, operation of machinery, lighting) | Low | Moderate | Low |

#### 21.6.1.4.7.1.8 Mammals

Table 21.35 presents the identified impacts on mammals along with an assessment of their scale and significance.

*Table 21.35. Assessment of the impact significance on mammals [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Destruction of habitats | High | High | Important |
| Unintentional killing of animals during construction works | Low | High | Low |
| Disturbance caused by works involving equipment generating noise and vibration as well as by the lighting of the construction site and presence of people | Low | High | Low |

###### 21.6.1.4.7.2 Impact on protected areas

###### 21.6.1.4.7.2.1 Impact on protected areas other than Natura 2000 sites

Individual impacts and their effects at the implementation stage were assessed with reference to particular environmental components. The overall significance of the impacts of the construction phase of the planned project on the Coastal Protected Landscape Area was assessed as moderate.

###### 21.6.1.4.7.2.2 Impact on Natura 2000 sites

The nearest Natura 2000 site, i.e. Białogóra PLH220003, is located at a distance of approximately 1.3 km from the boundary of the Baltica OWF CI site. Considering the distance, no impacts are expected on the subjects of protection in the area and their conservation status or on the integrity of the area and the connections with other Natura 2000 sites during the Baltica OWF CI construction phase.

###### 21.6.1.4.7.3 Impact on wildlife corridors

Table 21.36 presents the identified impacts on wildlife corridors along with an assessment of their scale and significance.

*Table 21.36. Assessment of the impact significance on wildlife corridors [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Reduction of the functionality of the Coastal Wildlife Corridor | Moderate | Moderate | Low |

###### 21.6.1.4.7.4 Impact on biodiversity

The individual impacts and their effects during the construction phase were assessed with respect to the individual components of the biotic environment. The overall significance of the impacts of the construction phase of the planned project on biodiversity was assessed as moderate.

##### 21.6.1.4.8 Impact on cultural values, monuments and archaeological sites and objects

No impact of the project on archaeological sites is anticipated.

##### 21.6.1.4.9 Impact on the use and development of the land area and tangible goods

Table 21.37 presents the identified impacts on land use and development along with an assessment of their scale and significance.

*Table 21.37. Assessment of the impact significance on land use and development [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Tree felling and shrub clearance for the purpose of cable bed area preparation | High | Moderate | Moderate |

##### 21.6.1.4.10 Impact on landscape, including the cultural landscape

Table 21.38 presents the identified impacts on the landscape along with an assessment of their scale and significance.

*Table 21.38. Assessment of the impact significance on the landscape [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Negative visual impacts related to construction works | Moderate | High | Moderate |
| Deterioration of visual quality and landscape structure | Moderate | High | Moderate |

###### 21.6.1.4.11 Impact on population, human health and living conditions

During the project construction works, impacts on human health may occur. In this context, the aerosanitary conditions and the acoustic climate in the project surroundings are of key significance. These impacts will be related mainly to vehicle traffic, exhaust emissions, dust from roads as well as noise. However, they will be limited to the project area and will occur with varied intensity during the period of works and will cease thereafter. Given the dispersed nature of emissions from the construction site and prevailing wind directions from the west, the probability of occurrence of emission-related impact from the planned project on the atmospheric air in the area of the nearest buildings in Osieki Lęborskie and Lubiatowo is low. Emissions from the project construction sites will have a marginal impact on the air quality in the inhabited areas. The nuisance related to the impact of the road transport of construction materials, equipment and people, i.e. air pollution (exhaust fumes and dust from roads), noise and ground vibrations will be limited spatially (road surroundings) and temporally (the period of construction works).

##### 21.6.1.5 Operation phase

###### 21.6.1.5.1 Impact on geological structure, coastal zone, soils, and access to raw materials and deposits

###### 21.6.1.5.1.1 Impact on geological structure

In the operation phase of the planned project, no impacts which may adversely affect the geological structure are anticipated.

###### 21.6.1.5.1.2 Impact on the topography and dynamics of the coastal zone

In the operation phase of the Baltica OWF CI, there will be no impacts on the topography and dynamics of the coastal zone.

###### 21.6.1.5.1.3 Impact on soils y

Table 21.39 presents the identified impacts on soils along with an assessment of their scale and significance.

*Table 21.39. Assessment of the impact significance on soils [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Exclusion of land from existing use | Moderate | High | Moderate |
| Soil drying in the cable bed area | High | Moderate | Moderate |
| Risk of soil contamination due to accidental release of hazardous substances from the OnSS site | Irrelevant | Moderate | Negligible |

##### 21.6.1.5.1.4 Impact on the access to raw materials and deposits

In the operation phase, the Baltica OWF CI will not hinder access to the currently documented deposits of raw materials, but it should be noted that the currently conducted exploration works for hydrocarbon deposits, which also include the area of the planned project, may reveal the existence of a deposit. Unfortunately, such impact cannot be assessed at this stage, as the exploration works will continue until 2024. However, since the subject of the planned project mainly covers linear infrastructure (cable line connection), it can be assumed that it will not constitute a significant obstacle in access to potential deposits of raw materials. It should also be noted that the probability of deposit occurrence within the Baltica OWF CI area is low, taking into account the fact that the area of the planned project covers only 0.85 $km^2$, or approximately 0.07%, of the area covered by the "Żarnowiec" exploration license, which totals 1196.31 $km^2$.

#### 21.6.1.5.2 Impact on the quality of surface waters

The planned project is not expected to have any impact on surface water quality during normal operation of the system.

#### 21.6.1.5.3 Impact on hydrogeological conditions and groundwater

Table 21.40 presents the identified impacts on hydrogeological conditions and groundwater along with an assessment of their scale and significance.

*Table 21.40. Assessment of the impact significance on hydrogeological conditions and groundwater [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Water abstraction for technological or domestic use | High | Low | Low |

#### 21.6.1.5.4 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

Table 21.41 presents the identified impacts on air quality along with an assessment of their scale and significance.

*Table 21.41. Assessment of the impact significance on air quality [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| **Fuel combustion in machinery engines** | | | |
| Air pollution from power generator tests at the OnSS | Low | Low | Negligible |
| Air pollution from service vehicle traffic | Low | Irrelevant | Negligible |
| **Vehicle traffic on paved roads (surface emissions)** | | | |
| Air pollution by dust from vehicle traffic on the access road to the OnSS | Low | Irrelevant | Negligible |
| **Vehicle traffic on unpaved roads (surface emissions)** | | | |
| Air pollution by dust from service vehicle traffic on service roads | Low | Irrelevant | Negligible |

##### 21.6.1.5.5 Impact on ambient noise

###### 21.6.1.5.5.1 Noise levels permissible in the environment

The types of areas subject to acoustic protection are defined in the Environmental Protection Law, whereas permissible levels of noise emitted to the environment by specific groups of noise sources are set out in the Regulation of the Minister of the Environment on permissible noise levels in the environment. The noise sources planned within the project should be included in the group of “other noise source objects and activities”. For the purpose of such systems, the permissible $L_{Aeq}$ value was set out at 50 dB during daytime and $L_{Aeq}$ of 40 dB for night-time, to be maintained in the following area categories:

- single family housing areas;
- development areas with buildings related to permanent or temporary stay of children and adolescents;
- nursing home areas;
- hospital areas in cities.

###### 21.6.1.5.5.2 Audible noise sources in the area of the planned substation

In order to determine the impact of noise emitted to the environment by a substation it is necessary to determine the level of noise emissions in the vicinity of the facility. This analysis should acknowledge that it will be a facility at which the significant noise sources will operate, shaping the acoustic climate in the immediate surroundings.

- It was assumed that all the equipment at the substation will operate simultaneously and without interruption (around the clock), i.e. at the maximum sound power level, which means the most unfavourable conditions in terms of environmental impact. As a precautionary measure, the calculations account for emergency diesel generators that will be activated for test purposes approximately once per month for approximately 1 hour. Although each unit will most likely be tested on a different day, the model assumes a worst-case situation when the generators located at Baltica-2 and Baltica-3 OnSS are tested simultaneously.

###### 21.6.1.5.5.3 Results of the noise level calculation results

The results of calculations of predicted levels of noise emitted to the environment were conducted for 7 monitoring points, including one located by the elevation of an existing building. The calculations conducted for the noise levels show that the night-time (40 dB) and daytime (50 dB) noise limits set out for single-family development will not be exceeded at any monitoring point at the boundary of the existing and potential residential developments.

Table 21.42 presents the identified noise impacts on existing and potential residential development areas along with an assessment of their scale and significance.

*Table 21.42. Assessment of the impact significance on existing and potential residential development areas [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Noise impacts from the OnSS area on existing and potential residential development areas | High | Moderate | Moderate |

#### 21.6.1.5.6 Electromagnetic field impact

##### 21.6.1.5.6.1 Underground cable lines

Calculations of the distribution of the magnetic field generated by the cable lines in the cable bed area supplying power to the OnSS have shown that in each of the solutions adopted – assuming the maximum load current of each cable line for the purpose of calculations – the value of the field intensity will not exceed the permissible value set out in the regulations for places accessible to people, within the height range from 0.2 to 2.0 MAGL.

##### 21.6.1.5.6.2 Busbar system

The calculations of electric and magnetic field distribution carried out for the shortest distance of the phase conductors (cables) forming the busbar systems (h = 13.0 m) from the ground showed that the total electric field strength under the four busbar systems – identified at the height of 2.0 MAGL – will not exceed the values of 3.9 $kV \cdot m^{-1}$ for the busbar configuration A and 4.2 $\cdot m^{-1}$ for the busbar configuration B. Thus, irrespective of the configuration, the maximum electric field strength will be significantly lower than the regulatory limit value for places accessible to people.

Table 21.43 presents the identified noise impacts on existing and potential residential development areas along with an assessment of their scale and significance.

*Table 21.43. Assessment of the electromagnetic field impact significance on existing and potential residential development areas [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Magnetic field impacts in the vicinity of the cable bed area | High | Irrelevant | Negligible |
| Electric and magnetic field impacts in the vicinity of busbar systems | High | Irrelevant | Negligible |

#### 21.6.1.5.7 Impact on nature and protected areas

##### 21.6.1.5.7.1 Impact on biotic elements in the onshore area

###### 21.6.1.5.7.1.1 Fungi

Table 21.44 presents the identified impacts on fungi along with an assessment of their scale and significance.

*Table 21.44. Assessment of the impact significance on fungi [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Physical loss of habitat or its fragment due to maintenance works | High | Low | Low |
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | High | Moderate | Moderate |

###### 21.6.1.5.7.1.2 Lichens

Table 21.45 presents the identified impacts on lichens along with an assessment of their scale and significance.

*Table 21.45. Assessment of the impact significance on lichens [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | High | Moderate | Moderate |
| Physical loss of habitat or its fragment due to maintenance works | High | Low | Low |

### 21.6.1.5.7.1.3 Mosses and liverworts

Table 21.46 presents the identified impacts on mosses and liverworts along with an assessment of their scale and significance.

*Table 21.46. Assessment of the impact significance on mosses and liverworts [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | High | Moderate | Moderate |

### 21.6.1.5.7.1.4 Vascular plants and natural habitats

Table 21.47 presents the identified impacts on vascular plants and natural habitats along with an assessment of their scale and significance.

*Table 21.47. Assessment of the impact significance on vascular plants and natural habitats [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Change of light and moisture conditions in the forest zone directly adjacent to the cable bed area | High | Moderate | Moderate |
| Spread of invasive species as a result of leaving the project area in a deforested condition and using service roads | Moderate | Moderate | Low |

### 21.6.1.5.7.1.5 Invertebrates

Table 21.48 presents the identified impacts on invertebrates along with an assessment of their scale and significance.

*Table 21.48. Assessment of the impact significance on invertebrates [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance to the structure of the environment (presence of people, displacement, disturbance) | Moderate | Low | Low |

### 21.6.1.5.7.1.6 Herpetofauna

Table 21.49 presents the identified impacts on herpetofauna along with an assessment of their scale and significance.

*Table 21.49. Assessment of the impact significance on herpetofauna [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Amphibian habitat fragmentation in the wintering area | Moderate | Moderate | Low |
| Collision of service vehicles with amphibians during their migration from and to wintering grounds | Low | Low | Negligible |
| Amphibian habitat fragmentation in ecotone habitats (at the forest edge by the OnSS and near the drilling site in the nearshore zone) | Moderate | Moderate | Low |

##### 21.6.1.5.7.1.7 Birds

Table 21.50 presents the identified impacts on birds along with an assessment of their scale and significance.

*Table 21.50. Assessment of the impact significance on birds [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Habitat fragmentation for “forest interior” species | High | High | Important |
| Disturbance (presence of people and vehicles during maintenance works and potential use by tourists) | Low | Moderate | Low |
| Collision with tall structures | High | Moderate | Moderate |
| Electrocution | High | Moderate | Moderate |
| Noise (operation of substation equipment) | High | High | Important |
| Destruction of nests and broods during cable line maintenance works (mowing/vegetation clearing) | Low | High | Low |

##### 21.6.1.5.7.1.8 Mammals

Table 21.51 presents the identified impacts on mammals along with an assessment of their scale and significance.

*Table 21.51. Assessment of the impact significance on mammals [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Habitat fragmentation | High | High | Important |
| Lighting of buildings and infrastructure elements | High | High | Important |
| Noise from substation equipment operation | High | Low | Low |
| Collisions with vehicles, unintentional killing and disturbance of animals | Low | Low | Negligible |

#### 21.6.1.5.7.2 Impact on protected areas

##### 21.6.1.5.7.2.1 Impact on protected areas other than Natura 2000 sites

During the operation phase, a fairly wide (62–68 m) deforested area occupied by up to three service roads will be visible in the landscape subject to protection within the Coastal Protected Landscape

Area. An additional anthropogenic element will be 9 cable joint bays connecting the offshore and onshore cables. The individual impacts and their effects during the operation phase were assessed with respect to the individual components of the environment. The overall significance of the impacts of the planned project on the Coastal Protected Landscape Area was assessed as moderate. The OnSS and 400 kV overhead lines are located outside the boundary of the Coastal Protected Landscape Area.

###### 21.6.1.5.7.2.2 Impact on Natura 2000 sites

During project operation, there will be no impacts that could directly affect the Natura 2000 sites. Although the functionality of the Coastal Wildlife Corridor connecting the *Białogóra* PLH220003 and *Mierzeja Sarbska* PLH220018 Natura 2000 sites will be disrupted as a result of forest clearing for the purpose of the cable bed implementation, this corridor is not considered significant for the subjects of protection of these Natura 2000 sites. As a result of an appropriate management of the cable bed area, the coherence and integrity of the Natura 2000 network will not be compromised.

###### 21.6.1.5.7.3 Impact on wildlife corridors

Table 21.52 presents the identified impacts on wildlife corridors along with an assessment of their scale and significance.

*Table 21.52. Assessment of the impact significance on wildlife corridors [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Reduction of the functionality of the Coastal Wildlife Corridor | High | Moderate | Moderate |

###### 21.6.1.5.7.4 Impact on biodiversity

The appearance of a new type of land use (open areas above the cable bed) will considerably change the local biodiversity and may even contribute to its enrichment with species preferring open areas. The use of service roads within the cable bed area for purposes other than cable line maintenance will favour the spread of synanthropic species. Individual impacts and their effects at the operation stage were assessed with reference to particular environmental components. The overall impact of the operation phase of the planned project on biodiversity was assessed as moderate.

##### 21.6.1.5.8 Impact on cultural values, monuments and archaeological sites and objects

No negative impact of the planned project on historical features (immovable monuments and archaeological sites) is predicted at the stage of project operation. The enclosed structures and technical infrastructure in the OnSS area may disturb visual perception of historical buildings of Osieki Lęborskie village [according to the provisions of the Study of Conditions and Directions of Spatial Development: protection should be extended to “spatial layout and complexes (protection of the public square and structures)”].

##### 21.6.1.5.9 Impact on the use and development of the land area and tangible goods

Table 21.53 presents the identified impacts on land use and development along with an assessment of their scale and significance.

*Table 21.53. Assessment of the impact significance on land use and development [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Change in land development within the Baltica OWF CI boundaries | High | Moderate | Moderate |

##### 21.6.1.5.10 Impact on landscape, including the cultural landscape

Table 21.54 presents the identified impacts on landscape, including the cultural landscape along with an assessment of their scale and significance.

*Table 21.54. Assessment of the impact significance on landscape, including the cultural landscape [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Presence of disharmonious anthropogenic dominant landscape features | High | High | Important |
| Negative visual and aesthetic perception of the wide, straight, deforested cable bed area | High | High | Important |

##### 21.6.1.5.11 Impact on population, human health and living conditions

Operation of the project involves the emission of electromagnetic field. Neither the intensity of the magnetic component from the cable bed area, regardless of the project variant, nor the electric component under 4 busbar systems will exceed the permissible value set out in the regulations for places accessible to people. The impact of electromagnetic field may affect, only to a small extent, employees performing service work at the OnSS. During the operation phase of the planned project, no other significant sources of exhaust emissions are anticipated. Exhaust emissions will be generated by two emergency generators that will be activated periodically for testing purposes – once per month for one hour – and possibly by service vehicles. The planned project will not generate negative impacts on people. The implementation of the project will alter the landscape of the plot of land on which the OnSS and the cable bed will be implemented. The substation equipment and busbar systems will constitute a dominant feature in the hitherto agricultural landscape. Plantings along the western boundary of the OnSS will conceal the substation equipment, making them less visible to the residents of the existing and planned residential areas of Osieki Lęborskie. Operation of the facility will have a positive impact on the economic situation of the commune, which will also be noted by its residents.

#### 21.6.1.6 Decommissioning phase

##### 21.6.1.6.1 Impact on geological structure, coastal zone, soils, and access to raw materials and deposits

###### 21.6.1.6.1.1 Impact on geological structure

Negative impacts of the planned project on geological structure at the stage of decommissioning will be possible only in the variant involving the removal of underground transmission cables and it will be identical to the project impact at the stage of construction. It should be taken into account that the interference into geological structures will involve the geological layers already transformed (during the construction phase).

###### 21.6.1.6.1.2 Impact on the topography and dynamics of the coastal zone

In the event of decommissioning of the cable connection located under the coastal zone area, its dismantling will be carried out by gradual pulling of the cable ashore from the entry/exit point. The borehole will be located outside the coastal zone; therefore, no negative impact of the project is expected at this stage.

###### 21.6.1.6.1.3 Impact on soils

Two possible solutions for the project decommissioning are assumed, namely deactivation of the infrastructure or its complete removal.

In case of the first solution, the cable lines in the onshore part will be de-energised and deactivated after the operation period. Their dismantling is not expected; therefore, there will be no direct interference in the ground structures during this phase of the project. The onshore substations, due to their nature and functionality, will not be subject to decommissioning either; therefore, no impacts on soils are anticipated for this solution.

In the case of the dismantling of the Baltic OWF CI, the decommissioning phase will be similar to the construction phase in terms of technologies, equipment and workload applied. Therefore, the main source of pollution may be the works related to cable line dismantling and demolition works in the OnSS area resulting in transformation of soil surface due to mechanical deformation and destruction of soil structure, as well as possible contamination of the ground surface and deeper layers due to accidental leakage of substances from tanks, machinery, equipment, vehicles and waste or packaging. The impact at the decommissioning stage will be short-term and if all mitigating measures are applied by the Contractor, no significant long-term impacts on the soil environment are anticipated at this stage.

###### 21.6.1.6.1.4 Impact on the access to raw materials and deposits

Due to ongoing exploration works, which cover also the area of the Baltica OWF CI, there is a probability of obstructions in access to the potential deposits in the event of deactivation of the OnSS at the stage of project decommissioning. On the other hand, in the event of the second solution for the project decommissioning, in which the removal of the cable installation and the OnSS infrastructure is planned, the decommissioning will have a positive impact on the access to potential deposits by making the previously occupied areas available.

###### 21.6.1.6.2 Impact on the quality of surface waters

In the case of a possible decommissioning of the Baltica OWF CI by dismantling, the impacts on surface water quality will be identical to those identified for the construction phase. In the case of the OnSS deactivation at the stage of project decommissioning, no impacts on surface waters are anticipated.

###### 21.6.1.6.3 Impact on hydrogeological conditions and groundwater

In the case of a possible decommissioning of the Baltica OWF CI by dismantling, the impacts on hydrogeological conditions and groundwater will be identical to those identified for the construction phase. In the case of the OnSS deactivation at the stage of project decommissioning, no impacts on hydrogeological conditions and groundwater are anticipated.

###### 21.6.1.6.4 Impact on climate, including greenhouse gas emissions and impacts relevant for adaptation to climate change, impact on atmospheric air (air quality)

The decommissioning variant of the planned project, which assumes shutdown of the entire installation, will not generate any impacts on the atmospheric air. In the case of the Baltica OWF CI dismantling, the emissions will be caused by fuel combustion in machinery engines, transfer of soil material, machine traffic and wind erosion. The emissions will not affect the air quality in the adjacent inhabited areas.

###### 21.6.1.6.5 Impact on ambient noise

Table 21.55 presents the identified noise impacts along with an assessment of their scale and significance.

*Table 21.55. Assessment of the noise impact significance [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Noise emitted by construction equipment | Low | High | Low |

###### 21.6.1.6.6 Impact on the electromagnetic field

In the Baltica OWF CI decommissioning phase, there will be no emission of electromagnetic field, as it concerns devices which are energised, i.e. in operation.

###### 21.6.1.6.7 Impact on nature and protected areas

###### 21.6.1.6.7.1 Impact on biotic elements in the onshore area

###### 21.6.1.6.7.1.1 Fungi

Table 21.56 presents the identified impacts on fungi along with an assessment of their scale and significance.

*Table 21.56. Assessment of the impact significance on fungi [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Physical loss of habitats of fungi species | High | Moderate | Moderate |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

###### 21.6.1.6.7.1.2 Lichens

Table 21.57 presents the identified impacts on lichens along with an assessment of their scale and significance.

*Table 21.57. Assessment of the impact significance on lichens [Source: internal materials]*

| **Impact** | **Impact scale** | **Receptor sensitivity** | **Impact significance** |
|---|---|---|---|
| Physical loss of habitats of species growing on trees and soil | High | Moderate | Moderate |

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Moderate | Low |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Moderate | Low |

### 21.6.1.6.7.1.3 Mosses and liverworts

Table 21.58 presents the identified impacts on mosses and liverworts along with an assessment of their scale and significance.

*Table 21.58. Assessment of the impact significance on mosses and liverworts [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of species habitats | High | Low | Low |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

### 21.6.1.6.7.1.4 Vascular plants and natural habitats

Table 21.59 presents the identified impacts on vascular plants and natural habitats along with an assessment of their scale and significance.

*Table 21.59. Assessment of the impact significance on vascular plants and natural habitats [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Physical loss of species habitats | High | Moderate | Moderate |
| Air pollution caused by exhaust emissions from construction machinery and vehicles as well as transport of materials and people | Low | Low | Negligible |
| Air pollution caused by dust emissions from construction works and erosion of exposed soil | Low | Low | Negligible |

### 21.6.1.6.7.1.5 Invertebrates

During the operation period, the OWF CI area will be used by various species of invertebrates. However, it is difficult to predict whether the area will only be visited by individuals in search of food, or some fragment will qualify as a site. It was, therefore, concluded that during the project decommissioning by dismantling and deactivation no impact on protected and/or endangered species of invertebrates is anticipated.

#### 21.6.1.6.7.1.6 Herpetofauna

Table 21.60 presents the identified impacts on herpetofauna along with an assessment of their scale and significance.

*Table 21.60. Assessment of the impact significance on herpetofauna [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Collision on service roads with amphibians during their migration from and to wintering grounds (within the wintering area) | Low | High | Low |
| Vibration due to the use of heavy equipment in reptile habitats (at the forest edge by the OnSS and near the drilling site in the nearshore zone) | Low | Low | Negligible |

#### 21.6.1.6.7.1.7 Birds

Table 21.61 presents the identified impacts on birds along with an assessment of their scale and significance.

*Table 21.61. Assessment of the impact significance on birds [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Disturbance (presence of people and vehicles during dismantling works) | Low | High | Low |
| Physical loss of habitats developed during the operation phase | High | Moderate | Moderate |
| Destruction of nests and broods during dismantling works as well as tree felling and shrub clearance | Low | High | Low |
| Collision with tall structures | High | Moderate | Moderate |

#### 21.6.1.6.7.1.8 Mammals

Table 21.62 presents the identified impacts on mammals along with an assessment of their scale and significance.

*Table 21.62. Assessment of the impact significance on mammals [Source: internal materials]*

| Impact | Impact scale | Receptor sensitivity | Impact significance |
|---|---|---|---|
| Destruction of habitats | High | Moderate | Moderate |
| Unintentional killing of animals during dismantling works | Low | High | Low |
| Disturbance caused by works involving equipment generating noise and vibration as well as by the lighting of the construction site and presence of people | Low | High | Low |

###### 21.6.1.6.7.2 Impact on protected areas

###### 21.6.1.6.7.2.1 Impact on protected areas other than Natura 2000 sites

In the case of the Baltica OWF CI decommissioning by dismantling, there will be similar impacts on the Coastal Protected Landscape Area as during the construction (except for permanent tree felling in a part of the forest). If the OWF Baltica CI is decommissioned by deactivation, this project stage is expected to have no impact on most groups except for birds, in the case of which collisions with tall structures of busbar systems and substation facilities will still occur. In both variants of the decommissioning phase, the cable bed area will most likely be afforested; restoration to agricultural use will occur within the OnSS area in the dismantling variant. The impact of the decommissioning phase related to the dismantling of the planned project on the Coastal Protected Landscape Area was assessed to be moderate.

###### 21.6.1.6.7.2.2 Impact on Natura 2000 sites

In the case the Baltica OWF CI decommissioning both by dismantling and deactivation, there will be no direct or indirect impacts on Natura 2000 sites. After decommissioning, the cable bed area will most likely be afforested, which will result in the restoration of habitat continuity and restoration of proper functioning of the Coastal Wildlife Corridor connecting the *Białogóra* PLH220003 and *Mierzeja Sarbska* PLH220018 Natura 2000 sites.

###### 21.6.1.6.7.3 Impact on wildlife corridors

In the case of the Baltica OWF CI decommissioning by dismantling, disturbance of animals will occur by working machinery, human presence and lighting of the construction sites in the area covered by the works. It is assumed that the dismantling will be conducted in several sections distant from one another, which will not restrict the spreading of animals across other sections of the cable bed are not covered by the works; therefore, there will be no significant restrictions in the free movement of animals. After completion of the dismantling, the cable bed area will most probably be afforested and the OnSS area will be returned to agricultural use, which will result in the restoration of habitat continuity and restoration of corridor functions. In the case of the Baltica OWF CI decommissioning by deactivation, the cable bed area will most likely be afforested as soon as the decision on this method of decommissioning is taken. In this case, the restoration of the Coastal Wildlife Corridor functionality will be faster and no negative impacts of the decommissioning of the planned project on the corridor should be expected. In either variant of the Baltica OWF CI decommissioning, no negative impacts of the planned project decommissioning on this corridor should be anticipated.

###### 21.6.1.6.7.4 Impact on biodiversity

Individual types of impacts and their consequences during possible decommissioning of the Baltica OWF CI were assessed with respect to the individual components of the biotic environment. The overall significance of the impacts of the decommissioning phase of the planned project on biodiversity was assessed as moderate.

##### 21.6.1.6.8 Impact on cultural values, monuments and archaeological sites and objects

Assuming the variant of removal of the transmission infrastructure, the impact related to the potential decommissioning of the planned project will be associated with the operation of heavy mechanical equipment, as well as transport and management of debris and demolition materials. The works are expected to cover the same area as in the case of the project implementation. In the case of implementation of the connection within the boundaries of the archaeological site no. AZP 2-37/9 (listed in the register of historical monuments) involving trenchless drilling, the dismantling of cable lines will be carried out by pulling them out without disturbing the top layer of the ground, which may contain artefacts. However, in the case of the cable line dismantling by excavation after archaeological surveys have been carried out, the interference will affect an area that has already been surveyed and subsequently transformed. Therefore, no impact of the project on archaeological sites is expected at the stage of its decommissioning.

###### 21.6.1.6.9 Impact on the use and development of the land area and tangible goods

In the case of possible decommissioning of the Baltica OWF CI, the impacts will be the same as those identified for the construction phase.

###### 21.6.1.6.10 Impact on landscape, including the cultural landscape

In the case of the Baltica OWF CI decommissioning without dismantling of its components, the impacts and their significance on the landscape will be identical to those identified for the operation phase. On the other hand, if the decommissioning phase assumes dismantling of the cable line infrastructure, the OnSS and busbar systems, the impacts on the landscape will be the same as in the construction phase.

###### 21.6.1.6.11 Impact on population, human health and living conditions

At the stage of the Baltica OWF CI decommissioning by dismantling, the same impacts on human health will occur as at the stage of construction, due to traffic, exhaust emissions, dust from roads as well as noise. In the case of the Baltica OWF decommissioning by deactivation, there will be no negative impacts on human health.

### 21.6.2 Rational Alternative Variant (RAV)

Compared with the Applicant Proposed Variant, the Rational Alternative Variant differs in the maximum number of cable lines planned to be constructed in the offshore and onshore areas. In the offshore area, this will be directly related to the potentially larger area of the seabed covered by underwater works and the volumes of seabed sediments disturbed during the construction of the cable lines. In the case of the onshore section, the width of the cable bed crossing the forest area will be the same as for the APV, i.e. between 62 and 68 m. Similarly, there will be no changes to the location and size of the OnSS nor to the location and parameters of the access road to the OnSS. These potential differences are not expected to affect the assessment of the impact scale. Taking into account the same sensitivity of the receptors (environmental components affected by the impacts), it can be assumed that the impacts of the Baltica OWF CI in the RAV will be the same as in the APV.

## 21.7 Cumulative impacts of the planned project (taking into account the existing, being implemented and planned projects and activities)

### 21.7.1 Existing, implemented and planned projects functionally unrelated to the planned project, with the decision on environmental conditions

At present, the Regional Directorate for Environmental Protection in Gdańsk is conducting its procedures on decisions on environmental conditions issued for the extension and redevelopment of the existing fuel station in Choczewo, and for the construction and operation of a cellular base station in Białogóra. Due to the different nature of the above-mentioned projects and the resulting impacts, no cumulative impacts of these projects with the Baltica OWF CI are anticipated.

The General Directorate for Environmental Protection in Warsaw is conducting a procedure aimed at issuing the decision on environmental conditions for a project consisting in the construction and operation of the first Polish Nuclear Power Plant. The Lubiatowo-Kopalino variant is located just over 5 km to the north-west of the OnSS. If this option is approved, there may be a cumulation of impacts at the implementation stage of both projects. However, taking into account the stage at which both planned projects are processed, it should not be expected that construction works will be performed simultaneously and thus, that cumulative impacts will occur at that stage of both projects.

### 21.7.2 Infrastructure-related planned projects

#### 21.7.2.1 Formal conditions

At present, an extensive programme of offshore wind energy development by various developers is being implemented. Apart from the Baltica-2 and Baltica-3 OWFs, decisions regarding the laying and maintenance of seabed cables in the area of internal sea waters and territorial sea were also obtained by the Baltica-1 OWF (subsidiary of PGE S.A.) and the Baltic Power OWF (Applicant: Orlen S.A.). A procedure for issuing the decision on cable laying and maintenance for the BC-Wind OWF (Applicant: C-Wind Polska Sp. z o.o.) was initiated.

#### 21.7.2.2 Connection infrastructure for OWFs

In 2021, applications for the issuance of the environmental decision were submitted for the connection infrastructure of the Baltic Power OWF and BC-Wind OWF as well as Baltica-2 and Baltica-3. In their offshore part, both projects are located to the east of the Baltica-2 and Baltica-3 OWF CI. In the onshore part, a considerable section of the transmission infrastructure is routed in the same cable bed area. The connections of individual investors are at different development stages. Construction of the Baltica OWF CI may overlap with the construction of the Baltic Power OWF CI and therefore there may be a cumulation of negative impacts associated with the construction phase of both these projects.

#### 21.7.2.3 PSE Substation

To the south of the Baltica OWF substations, and the substations of other developers, a Choczewo Substation will be located – a project of Polskie Sieci Elektroenergetyczne S.A. intended for power transmission and distribution from all the substations of the individual developers. In 2021, the Applicant submitted an application for the decision on environmental conditions for this project.

### 21.7.3 Identification of potential cumulative impacts

Conducting similar activities related to subsea power cable laying by individual applicants may lead to the accumulation of underwater noise from simultaneous construction works, particularly in the zone up to approx. 7 km from the shoreline, where these areas are situated closest to one another.

As regards the Baltica OWF CI, the possible issues relating to cumulative impacts concern:

1) at the stage of implementation:
    a) noise from the operation of machinery and equipment,
    b) emissions to air from the combustion of fuels due to the operation of machinery and equipment,
2) at the stage of operation:
    a) noise from the operation of electrical power equipment within customer substations of individual developers and the Choczewo Substation,
    b) electromagnetic field emissions from all cable lines running along the same route at a considerable distance,
    c) bird collisions with tall structures,

d) landscape impacts related to the emergence of very large foreign elements in the hitherto agricultural landscape,
e) obstruction of animal migrations as well as changes in the landscape due to the forest clearing for the purpose of constructing a shared wide cable bed.

## 21.8 Transboundary impacts

The shortest distance from the Baltica OWF CI construction area to the boundary of the Swedish exclusive economic zone is approximately 42 km, and about 118 km to the land border. Due to its location, scale, method of implementation and anticipated impacts, the Baltica OWF CI is not expected to generate cross-border environmental impacts at any stage.

## 21.9 Analysis and comparison of the variants considered and the variant most beneficial for the environment

In view of the specific nature of the planned project, namely the integration of the power generated by the Baltica OWF into the NPS, the location of the planned project in both variants results from the location of the wind farm and the PSE onshore substation (Choczewo Substation). The location of the offshore part of the planned project in the APV is determined by the location decisions, namely Decision no. 2/K/19 of 21 October 2019 and Decision no. 3/K/19 of 28 October 2019 issued by the Minister of Maritime Economy and Inland Navigation, as well as Decisions no. 1/DS/20 and 2/DS/20 of 6 November 2020 issued by the Director of the Maritime Office in Gdynia. The location of the onshore part of the Baltica OWF CI was determined on the basis of an analysis of pre-investment environmental survey results (bypassing the most valuable natural areas) as well as location arrangements with the Choczewo Forest Inspectorate. The location of both OWF CI variants is the same. The variants are also identical in terms of technology. The only difference is a different maximum number of cable lines to be constructed. In the APV, the construction of up to 9 cable lines is planned whereas in the RAV – up to 11 cable lines.

The analysis of environmental data and the existing use of the area intended for the construction of the Baltica OWF CI indicates that it is possible to implement the project according to the APV. The implementation of this variant will be more beneficial to the environment compared to the RAV.

## 21.10 Comparison of the technology proposed with the technology compliant with the requirements stated in Art. 143 of the Environmental Protection Law

Pursuant to Article 143 of the Act of 27 April 2001 – *Environmental Protection Law* (Journal of Laws of 2001, No. 2021, item 1973, as amended), the technologies used in newly commissioned systems should meet the requirements which consider, in particular:

- the use of substances with a low hazard potential;
- the effective generation and use of energy;
- ensuring rational consumption of water and other raw materials as well as consumables and fuels;
- the use of waste-free and low-waste technologies and possibility of waste recovery;
- indication of the type, range and size of emissions;
- the use of comparable processes and methods which have been effectively applied on industrial scale;
- scientific and technical progress.

According to Article 3.6 of the *Environmental Protection Law* (Journal of Laws of 2001, No. 2021, item 1973, as amended), “installation” shall mean:

- a stationary technical unit;
- a group of stationary technical units which are technologically linked together, being under the management of the same entity, and located in the area of the same plant;
- structures which are not technical units nor groups thereof, the operation of which may cause emission.

### 21.10.1 Use of substances with a low hazard potential

In each phase of the planned project, hazardous waste may be generated. Such waste will be stored at designated sites in a manner which is selective and safe for people and the environment; subsequently, it will be transferred to authorised waste collectors, thus, limiting the potential hazards. The OnSS operation may involve leakage of electrical insulating oils into the ground and the release of SF6 insulating gas or refrigerants from the cooling system into the atmosphere.

### 21.10.2 Effective generation and use of energy

The planned project will not involve power generation but its transmission by means of underground cable lines as well as power processing and transformation for the NPS. Rational energy consumption will be ensured as part of the planned project. The OnSS power demand will be primarily met in-house by means of MV/LV transformers, with external back-up supply by means of MV line, as well as by means of an in-house power generator, in case of emergency. During the construction phase and during possible dismantling in the decommissioning phase, electricity required to power the construction equipment will come from power generators, while during the operation phase, thanks to the use of modern technological solutions, electrical transmission losses will be reduced.

### 21.10.3 Ensuring rational use of water and other resources as well as materials and fuels

The use of water, raw materials, consumables and fuels will be mostly related to the construction phase and possible dismantling during decommissioning, as well as to maintenance works. During the operation of the planned project, there will be no need to use these resources. As for the OnSS, it will not be intended for permanent staff presence.

### 21.10.4 Use of waste-free and low-waste technologies and possibility of waste recovery

During the construction phase and possible dismantling in the decommissioning phase, waste will be collected selectively at locations specially designated and adapted for this purpose, under conditions preventing the release of harmful substances into the environment. It will be ensured that they are collected by eligible entities responsible for waste management or reuse. The waste management will comply with the applicable Act of 14 December 2012 *on waste* (Journal of Laws of 2021, item 2183, item 779, as amended). The operation of the underground power line in the offshore and onshore areas, the OnSS and the busbar systems will not generate any waste with the exception of minor amounts of waste related to maintenance works or removal of possible failures.

### 21.10.5 Type, range and size of emissions

During the operation phase, the planned project in the form of an underground cable line will be a source of heat and EMF emission, as described in detail in respective subsections. In the event of a failure, the OnSS will be a source of noise, EMF, heat and gas emissions into the atmosphere. The construction phase and possible dismantling in the decommissioning phase will result in noise emissions, exhaust emissions from vehicle engines, as well as waste and wastewater generation. These emissions will be short-term and local.

#### 21.10.6 Use of comparable processes and methods which have been effectively applied on an industrial scale

The selected technologies and materials to be used for the construction of the underground power line, the OnSS and busbar systems conform to the current EU standards and can be considered optimal for a project of this type – these technologies have been widely used in Poland, EU countries and in other parts of the world.

#### 21.10.7 Scientific and technical progress

The solutions used during the project implementation will be best available techniques and technologies that are currently in use globally and are characterised by safety and high efficiency. All the work associated with the project implementation will be supervised by site managers experienced in construction of similar facilities, environmental specialists, expert construction and engineering supervision in accordance with the applicable provisions. In view of the above, as part of the planned project, best available techniques (BAT) are to be applied as provided for in the Act of 27 April 2001 – *Environmental Protection Law* (Journal of Laws of 2021, item 1973, as amended).

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

#### OFFSHORE AREA

Below there are suggested general actions aimed at limiting the negative impact of the Baltica OWF CI on the marine environment and a set of recommendations aimed at minimising the impacts on birds and marine mammals. In the case of other elements of the environment, which were the subject of the impact analysis (see: Section 21.6), no need for measures mitigating the negative impact of the planned project in each phase of its implementation was identified.

**General recommendations:**

- construction of subsea cable lines in the shortest possible time, using state-of-the-art equipment and vessels.

**Seabirds:**

- intensification of the pace of construction works in the months of April–September, when the number of birds in this sea area is the lowest;
- limiting sources of strong light directed upwards at night – this mainly concerns the periods of bird migration. The Applicant declares that they will limit the light emission to the necessary level, resulting from the applicable regulations and work safety standards.

**Marine mammals:**

- proper planning of cable laying activities to avoid the mating, moulting, and breeding periods of sensitive species – ideally from May to October;
- commencement of the works in the best possible weather conditions and with high quality equipment (particularly important in the case of vessels with DP) in order to reduce as much as possible the level of the noise generated;
- use of deterring sounds/MMO observations before the commencement of work. The movement of vessels alone will be detected by mammals when the noise source appears at

a considerable distance from the individual, the likely avoidance response will therefore occur before dangerous levels of impact occur.

### ONSHORE AREA

The analysis of impacts on onshore environment elements showed that their scale, and consequently their significance, can be reduced by using efficient machinery and equipment, particularly during the construction and possible decommissioning phases. For some impacts, targeted mitigating measures were proposed, e.g.:

- transfer of dead trees from the construction area to its surroundings, as they provide a habitat for the rare *Neolentinus cyathiformis* fungus;
- drainage works conducted along short sections to limit the overdrying of plant habitats;
- temporary fencing of excavations to separate open trenches from amphibian habitats;
- temporal limitation of construction and dismantling works to protect bird nests and broods as well as migratory movements of certain animals.

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

### OFFSHORE AREA

The results of the environmental surveys of the Baltica OWF CI development area as well as the identification of potential impacts have shown that the environmental resources in the project area are typical for the coastal waters of the southern part of the Baltic Sea and that such resources would not be affected by significant impacts. The project will have the greatest impact on the marine environment in the construction phase, mainly due to the disturbance of the seabed, which will result in the destruction of the animal and, to a lesser extent, sporadically recorded plant benthic communities within the strip of the cable line construction, as well as in the scaring of fish and marine mammals from the area of underwater operations. The restoration of benthic communities will begin directly after the completion of underwater operations. The qualitative and quantitative benthic resources will stabilise after a few days from the completion of the construction phase at the latest. The restoration time is likely to be much shorter as the zoobenthos species travelling on the seabed (including most mussel species) will relocate from the seabed areas adjacent to the construction area. Underwater operations will also generate underwater noise which will scare away fish and marine mammals. It is anticipated that due to the noise characteristics and its duration, the scaring of animals will have a local scale and will cease after the completion of such works. The traffic of vessels involved in construction works will also temporarily scare away the marine mammals and seabirds within a small area. It should be underlined that the Baltica OWF CI area is constantly used for navigation and fishing, thus, the presence of vessels involved in the project will not change the nature of this area and will not cause, with the exception of activities directly related to the interference in the seabed, the emergence of new environmental impacts in this part of the Baltic Sea. In the operation phase, the impact will be much smaller than during the construction phase and will result from cable line inspections involving non-invasive methods. In case of the decommissioning phase, two methods of its implementation are considered. The first method – preferred by the Applicant – will consist in deactivation of the Baltica OWF CI, without dismantling of its components. No environmental impacts will occur in this situation. The second method assumes a complete dismantling of the Baltica OWF CI, with a range of environmental impacts very similar to those identified for the construction phase. On the basis of the previous experiences describing the response of the marine environment elements to the impacts generated by projects with characteristics similar to the project in question as well as due to the relatively small anticipated impact of the Baltica OWF CI on the marine environment in each phase of its implementation, it is proposed that no environmental monitoring be conducted to identify and assess the impact of the project on the marine environment. The information cited above indicate that such a monitoring is unjustified in the context of gaining new knowledge and will not contribute to improving the protection and status of the environment, because the scope of impacts identified, their influence on the elements of the environment as well as the receptors' response to the impacts are known and do not require further studies.

Reliable data is available from the State Environmental Monitoring (SEM) conducted by CIEP in accordance with the Water Law (Water Framework Directive) and implementing regulations, i.e. the Regulation of the Minister of Infrastructure dated 13 July 2021 *on the forms and methods of conducting the monitoring of surface and underground water bodies (Journal of Laws of 2021, item 1576)* and the Regulation of the Minister of Infrastructure dated 25 June 2021 *on the classification of ecological status, ecological potential and chemical status and the method of classifying the status of surface water bodies as well as environmental quality standards for priority substances* (Journal of Laws of 2021, item 1475).

The environmental monitoring of the Polish part of the Baltic Sea is carried out as part of the SEM. This monitoring includes the surveys of the following parameters:

- physico-chemical: temperature, salinity, oxygen concentration, Secchi disc visibility, content of nutrients, heavy metals and persistent organic pollutants;
- biological: phytoplankton, zooplankton, phytobenthos and zoobenthos.

As part of the Marine Strategy Framework Directive, the level of harmful substances in the water and in marine organisms as well as the content of radionuclides in the water and in sediments are also monitored. In addition, ichthyofauna and optional microbiology surveys are carried out, as well as the surveys of hydrographic conditions, waste in the marine environment and underwater noise. The results of this monitoring are collected and stored in the Oceanographic Database at the Gdynia Maritime Branch of the IMWM-NRI and in the "ICHTIOFAUNA" database at the Chief Inspectorate for Environmental Protection in Warsaw.

## ONSHORE AREA

**Monitoring of bird mortality in the OnSS area**

The main objective of the monitoring is to determine the species and number of birds dying as a result of collision with and electrocution from power cables that are components of busbar systems. The highest mortality is expected during the migration period. Monitoring should be conducted on the basis of the following methodological assumptions:

a) monitoring should be conducted in the first and third year after the project commissioning;
b) monitoring should cover the entire width of the busbar systems, including those running within the OnSS and over the OnSS access road; observations should also cover, if feasible, the widest possible area under the busbar systems included in the scope of the project located in the Choczewo Substation area;
c) 3 inspections per month should be carried out in the period from March to April and from September to November, and one inspection per month in the remaining months (due to the rate of disappearance of dead birds, each inspection should be carried out on two adjacent days; during each inspection day the entire monitored area should be covered);

d) each inspection should be carried out using a GPS receiver along designated routes, 5–10 m apart (depending on the type of vegetation), which will allow maintaining the same passage routes during subsequent inspections, with comparable results; the course of transects within the OnSS area should be agreed with the Applicant;
e) birds should be recorded by species and, if possible, also by sex and age.

## 21.13 Limited use area

Pursuant to Art. 135 of the Act of 27 April 2001 *Environmental Protection Law* (consolidated text: Journal of Laws of 2021, item 1973, as amended) a limited use area (LUA) is established in situations when despite applying available technical, technological and organisational solutions the environmental quality standards cannot be met outside the area of the plant. Considering the expected adherence to all environmental standards, the implementation of the project does not require the establishment of a limited use area.

## 21.14 Analysis of possible social conflicts related to the planned project, including the analysis of impacts on the local community

The planned project – the Baltica OWF CI – will be implemented in areas characterised by various forms of existing and planned use. Its implementation may therefore be a source of social conflicts with other users of the space that will fall within the scope of the project impact.

Some potential conflicts have been or will be resolved at the early stage of the project implementation, in the pre-investment phase, for example a potential conflict over space with other applicants planning to build transmission infrastructure in the maritime area was resolved by location permits issued by the minister in charge of maritime economy and the Director of Maritime Office in Gdynia, and in the offshore area – by including the project in the studies of conditions of spatial development and local plans.

The analysis of the location of the planned project in relation to the existing and planned use of sea areas indicated that particularly fishermen may submit their concerns regarding the continuation of their activities in an unchanged manner. Such a situation may take place especially when safety zones are delineated for cable lines on the basis of the decision of the Director of the Maritime Office in Gdynia. This conflict seems unlikely due to the low significance of the statistical rectangles in which the project will be located in the overall fishing activities.

No social conflicts resulting from obstructions to shipping are anticipated, given the insignificant scale of these obstructions. The analysis of the potential impact of the project on natural elements of the offshore area does not indicate that more than moderate negative impacts might occur, which allows to believe that there will be no conflict in the context of nature conservation.

In the onshore area, the majority of the Baltica OWF CI area is located in forest areas within the Choczewo Forest District, far from residential, commercial and tourism buildings. The OnSS and busbar systems will be constructed on a part of a plot that is currently arable land. The access road to the OnSS will be located on a plot of land currently constituting a plot of the Osieki Lęborskie – Lublewko district road no.1432G and partially on plots constituting arable land.

Implementation of the Baltica OWF CI may result in conflicts with local communities due to:

- lack of precise and comprehensible information about the planned project;
- concerns regarding a decrease in the tourism value of the area in the vicinity of the planned project;

- concerns regarding a decrease in the value of the land neighbouring with the planned project;
- concerns about the impact of the planned project on human health and natural environment.

The analysis of the above-mentioned conflicts showed that the location of the project is the major factor that will be responsible for their occurrence and intensity. In the mitigation process initiated at the early design stage, it was assumed that the Baltica OWF CI must be located as far as possible from built-up areas, areas extensively used for tourism and recreation, and outside areas characterised by exceptional natural values. Discussions and agreements with the authorities of Choczewo commune and Choczewo Forest Inspectorate helped determine the optimum location and conditions for the implementation of the Baltica OWF CI. These discussions also included other entities involved in the development of projects aimed at power evacuation from the OWF and their connection to the NPS within the Choczewo commune.

In addition to the location, the methods of implementing individual phases of the project are important for the mitigation of conflicts. For example, the mitigation of negative impacts on areas used extensively for tourism and recreation – i.e. coastal beaches as well as areas and sites valuable in terms of natural resources – will be ensured by using trenchless methods of cable line installation.

In order to ensure comprehensive information about the planned project, the local community and authorities of the Choczewo commune were involved in the information process already at the initial design stage. Communication activities have been conducted jointly by both the Applicant (PGE Baltica) and representatives of the transmission system operator (PSE S.A.), as well as other entities involved in the development of projects for the construction and operation of power transmission infrastructure, i.e. Baltic Power and Ocean Winds. This has helped avoid a situation in which a number of entities carry out communication activities on individual projects which, from the perspective of the local community, constitute a broadly understood power infrastructure.

The proper public consultation stage is foreseen within the environmental impact assessment procedure, where the environmental report will be made available to the interested parties. It will be possible to submit comments and applications following the beginning of a 30-day procedure of public participation in the proceedings. The comments submitted during the public consultations should be addressed in the justification to the decision.

## 21.15 Indication of difficulties resulting from technical shortcomings or gaps in the state of the art encountered during the preparation of the report

When preparing the Environmental Impact Assessment Report for the Baltica OWF CI, no difficulties resulting from technical shortcomings were encountered.

The main difficulties encountered during the preparation of this EIA Report resulted from the lack of detailed data and information on other investment projects that will be carried out in the future in the vicinity of the Baltica OWF CI. In the case of gaps in the state of the art, it should be noted that there is no data available on the impact of EMF emitted by extra high voltage lines on marine and terrestrial organisms within the range of the field. The environmental impacts associated with the construction, operation and decommissioning phases of the planned project are well recognised for this type of project, and therefore the formulation of potential environmental impacts and the formulation of mitigating measures was rather straightforward.