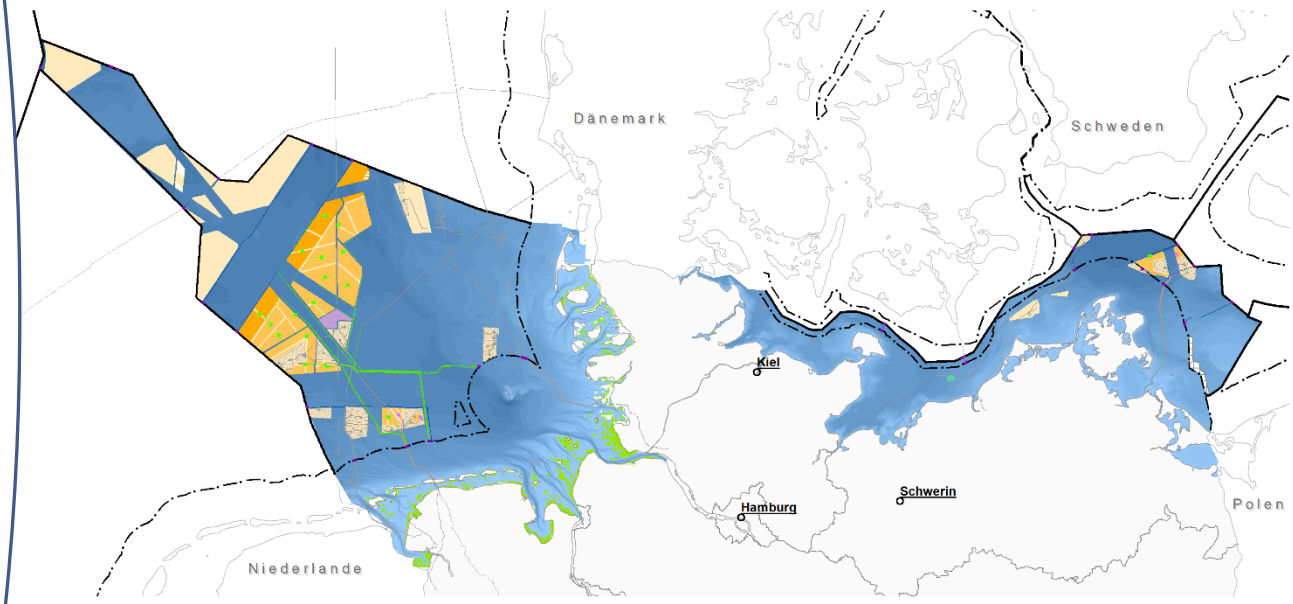
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

# Site Development Plan 2025 for the German North and Baltic Sea

## - unofficial translation -

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| | |
|---|---|
| a | year |
| AC | Alternating current |
| AIS | Automatic Identification System |
| APD | Acoustic Porpoise Deterrent |
| ASG | Artillerieschießgebiet |
| EEZ | Exclusive Economic Zone |
| BAW | Federal Waterways Engineering and Research Institute |
| BfN | Federal Agency for Nature Conservation |
| BGBl | Federal Law Gazette |
| BMDV | Federal Ministry for Digital and Transport Affairs |
| BMJ | Federal Ministry of Justice |
| BMU | Federal Ministry for Environment, Nature Conservation and Nuclear Safety |
| FNA | Federal Nature Conservation Act |
| BNetzA | Federal Network Agency |
| BSH | Federal Maritime and Hydrographic Agency |
| BT-Drs. | Bundestag printed pages |
| cm | centimetres |
| CPS | Cable Protection System |
| DC | Direct current |
| DTS | Distributed Temperature Sensing |
| DUWHAS | German Underwater Obstacle Information System |
| EU | European Union |
| EnWG | Energy Industry Act |
| SDP | Site Development Plan |
| FFH-LRT | Habitat types according to Annex I of the Flora-Fauna-Habitat Directive |
| FIR | Flight information region |
| GDWS | Directorate-General for Waterways and Shipping |
| GIS | Gas-insulated switchgear |
| GW | Gigawatt |
| ARC | Act against Restraints of Competition |
| h | Hour |
| HVDC | High-voltage direct current |
| HKG | Hauptkonzentrationsgebiet |
| IALA | International Association of Lighthouse Authorities |
| IPCEI | Important Project of Common European Interest |
| K | Kelvin |
| KGS | Gravel, coarse sand and shell layers |
| km | Kilometres |
| $km^2$ | Square kilometres |
| kn | Knots |
| kV | Kilovolt |
| m | Metre |
| MARPOL | International Convention for the Prevention of Marine Pollution from Ships, also MARPOL (marine pollution)) |
| MHz | Megahertz |
| MSC | Maritime Safety Centre |
| MW | Megawatt |
| GCP | Grid Connection Point |

| | |
|---|---|
| GDP | Grid Development Plan |
| NSG | Naturschutzgebiet |
| NSGSylV | Ordinance on the Designation of the “Sylt Outer Reef – Eastern German Bight” nature conservation area |
| OGCS | Offshore grid connection system |
| OWF | Offshore wind farms |
| PFAS | Per- and polyfluoroalkyl substances |
| QI, QII, QIII, QIV | Quarters of a calendar year |
| ROP | Maritime Spatial Plan |
| ROG | Spatial Planning Act |
| SCADA | Supervisory Control and Data Acquisition |
| $SF_6$ | Sulphur hexafluoride |
| nm | Nautical mile |
| SMV | Maritime Transport Technology |
| SOLF | Standard Offshore Aviation for the German Exclusive Economic Zone |
| UNCLOS | United Nations Convention on the Law of the Sea |
| SEA | Strategic Environmental Assessment |
| t | Tonne |
| TBT | Tributyl tin |
| TCM | Transmission Capacity Management |
| TSO | Transmission System Operator |
| UVPG | Environmental Impact Assessment Act |
| VHF | Very High Frequency |
| TSZ | Traffic Separation Zone |
| WT | Wind turbine |
| WHG | Water Resources Act |
| WindSeeG | Offshore Wind Energy Act (WindSeeG) |
| WSV | Federal Waterways and Shipping Administration |

# I. Objective

The WindSeeG[1] stipulates that a total installed output of at least 70 GW of offshore wind turbines or offshore wind installations is to be achieved in the Federal Republic of Germany by 2045. The construction of offshore wind turbines (WT) and offshore grid connection systems (OGCS) is in the overriding public interest and serves public health and safety) (Section 1 para. 3 WindSeeG). In order to achieve the aforementioned expansion targets of the WindSeeG, the SDP (Site Development Plan) must be revised. The objective of this revision is, among other things, to designate extended areas and sites in Shipping route SN10 designated in ROP 2021 as well as new areas to the west of it in order to identify sufficient areas for an installed output of at least 70 GW by 2045. This SDP also includes designations for the commissioning of sites and OGCS up to 2034. Further time related designations (e.g. those contained in the draft SDP of 7 June 2024), will be taken up in a future revision of the SDP and are presented in an implementation variant in the informational appendix to this SDP.

In order to achieve and permanently fulfil the long-term expansion targets, it must be taken into consideration that because of the expected future deconstruction and new construction of OGCS and offshore wind farms (OWF) in the course of the subsequent use of sites and route corridors on parts of the wind energy areas, grid feed-in will not be possible at times. The total areas, sites, route corridors, and gates to the territorial sea designated for wind energy use must therefore be sufficient for the permanent operation of at least 70 GW of installed output plus additional sites, route corridors, and gates where no feed-in occurs temporarily because of deconstruction or new construction activities. The average proportion of sites or route corridors and gates through which there can be no feed depends on different factors and can presently not yet be reliably determined. The operating hours of OWF and OGCS as well as the period between end of operation of an existing OWF and the commissioning of a new one are key factors in this regard. The BSH currently expects an average unavailability of around 10% of the sites so that sites, route corridors, and gates with a total potential of around 78 GW will be required to ensure the expansion target of at least 70 GW in the long term.

As an instrument of federal sectoral planning, the designations of the SDP form the basis for the site investigation according to Sections 9 et seq. WindSeeG as well as for the planning approval procedure and planning permission according to Sections 66 et seq. WindSeeG and are therefore necessary for the orderly planning and construction of WT and OGCS.

[1] Offshore Wind Energy Act of 13 October 2016 (Federal Law Gazette I p. 2258, 2310) as last amended by Article 44 of the Act of 23 October 2024 (Federal Law Gazette 2024 I p. 323).

# II. Designations

Section 5 para. 1 sentence 1 WindSeeG regulates that the SDP shall make designations for the German EEZ and the territorial sea for the period from 2026. In detail, the SDP contains specifications on the points mentioned in Section 5 para. 1 sentence 1 Nos. 1–11 WindSeeG.

## 1 Areas and sites

The SDP designates the areas and sites shown in Table 1. Table 1 further has the designations of the expected output to be installed on the sites. A cartographic illustration can be found in Figure 1.

The new designations in this Site Development Plan are limited to the North Sea and include among other things expansions of Areas N-6, N-9, N-12, and N-13 as well as the inclusion of Areas N-14, N-16, N-17, N-19 and the area in general operating plan N-20. Areas N-4 and N-5, which completely or partially overlap with existing OWF, will be defined for future subsequent use in a partially modified layout.

The spatial expansions of Areas N-9, N-12, N-13, N-14, N-16, and N-17 implement the results of the joint investigations with the authorities concerned in the Netherlands and Denmark to identify sites for wind energy in the area of Shipping route SN10 and other shipping routes. The results of the study were recognised as a good working basis, and areas and sites are designated in this SDP based on this. Compared with the status of ROP 2021, this will result in a considerable expansion of the areas for offshore wind energy yet safeguard the concerns of maritime shipping, in particular the safety and ease of traffic. With the new sites defined in this SDP in Areas N-9, N-12, and N-13, an additional expansion with an expected installed output of 8 GW can be achieved. The commissioning of most wind farms on these sites with an expected generation output of 6 GW is planned until the end of 2034. Thus, together with the already approved or under construction OWF as well as the sites already designated in SDP 2023 for commissioning until the year 2032, there arises an expected total output of approx. 42.6 GW for the year 2034. In a future revision, further sites could be designated for commissioning in 2034 and later.

**North Sea**

Area N-6 is expanded by Site N-6.8 already designated in SDP 2023 (referred to as N-21.1 in SDP 2023). Areas N-9, N-12, and N-13 are expanded by Sites N-9.4, N-9.5, N-12.4, N-12.5, N-12.6, and N-13.4 erweitert. Areas N-14, N-16, N-17, and N-19 are being designated for the first time to the west of Shipping route SN10. In addition, an area under review is designated with N-20[2].

A relatively small-scale inconsistency in the planning of SDP 2023 is corrected for Area N-13 as well as Site N-13.1.

The spatial expansions of Areas N-5, N-9, N-12, N-13, N-14, N-16, and N-17 deviate from the priority and reservation areas defined in ROP 2021. In particular, the respective priority areas for shipping of ROP 2021 will be partially overplanned by the designations of the SDP because of international agreements on the postponement or closure of Shipping routes SN8, SN10, SN15, SN16, and SN17. Insofar as a deviation from priority areas of ROP 2021 is planned, a deviation procedure was carried out for these areas

[2] In ROP 2021, the associated area EN20 is designated as a reservation area for offshore wind energy from 1 January 2027 unless the Federal Ministry responsible for fishery research proves to the Federal Ministry responsible for maritime spatial planning by 31 December 2026 that keeping the area free of development by WT is essential for fishery research.

and sites in the course of this SDP revision procedure, which is explained in more detail in Section IV.7.

Sites N-12.6, N-13.4 and a small sub-area of Area N-16 partially overlap with the reservation area for fishery for Norway lobster of ROP 2021.

Site N-13.4 has a partial overlap with the seasonally limited reservation area for harbour porpoises designated in ROP 2021. Furthermore, in ROP 2021 a part of Area N-13.4 is designated as a conditional priority area for wind energy EN13-North[3] and as a temporary reservation area for shipping SN19[4]. The area of Site N-13.4, which overlaps with Area EN13-North, is designated as the site under review.

Area N-14 has a partial overlap with the reservation area hydrocarbon extraction KWN2 designated in ROP 2021.

The area under review N-20 spatially corresponds to the conditional reservation area EN20 of ROP 2021. It overlaps with the research reservation area FoN3 defined in ROP 2021.

Areas N-4 and N-5 are located within the main distribution area for harbour porpoise, Area N-5 lies entirely within the main concentration area for divers and overlaps with the priority area of Shipping route SN8 and partly with the main distribution area of divers of ROP 2021. The layout of Area N-5 takes into consideration a possible expansion of Shipping route SN7 with simultaneous replanning of Shipping route SN8. Area N-4 is largely located in the main concentration area of divers; it is therefore also located in the reservation area for divers of ROP 2021 but does not overlap with the priority area for divers of ROP 2021.

**Baltic Sea**

There is no additional designation of areas and sites for the Baltic Sea compared with SDP 2023 (cf. Figure 9).

[3] In ROP 2021, the area EN13-Nord is defined as a priority area for wind energy from 1 January 2030 unless the federal ministry responsible for shipping proves by 31 December 2025 that this area is required for shipping for compelling reasons of the safety and ease of navigation (cf. 2.2.2. para. 1 sub-para. 2 ROP 2021).

[4] In ROP 2021, Area SN19 is designated as a reservation area for shipping until 31 December 2030. The limitation lapses when the Federal Ministry responsible for shipping proves to the Federal Ministry responsible for maritime spatial planning by 31 December 2025 that this area will be needed for shipping for urgent reasons of safety and ease of navigation (cf. 2.2.2. para. 1 and sub-para. 2 of ROP 2021).

Table 1: Designations on areas and sites

| Designation Area | Base Area [km²] | Designation Site | Base Site [km²] | Expected installed output [MW] |
|---|---|---|---|---|
| N-1 | 79 | | | |
| N-2 | 223 | | | |
| N-3 | 308 | N-3.5 | 29 | 420 |
| | | N-3.6 | 33 | 480 |
| | | N-3.7 | 17 | 225 |
| | | N-3.8 | 23 | 433 |
| N-4[a)] | 148 | | | |
| N-5[a)] | 396 | | | |
| N-6 | 543 | N-6.6 | 44 | 630 |
| | | N-6.7 | 16 | 270 |
| | | N-6.8 | 246 | 2,000 |
| N-7 | 163 | N-7.2 | 58 | 980 |
| N-8 | 124 | | | |
| N-9 | 782 | N-9.1 | 158 | 2,000 |
| | | N-9.2 | 157 | 2,000 |
| | | N-9.3 | 106 | 1,500 |
| | | N-9.4 | 141 | 1,000[b)] |
| | | N-9.5 | 146 | 1,000[b)] |
| N-10 | 195 | N-10.1 | 151 | 2,000 |
| | | N-10.2 | 31 | 500 |
| N-11 | 378 | N-11.1 | 205 | 2,000 |
| | | N-11.2 | 156 | 1,500 |
| N-12 | 964 | N-12.1 | 193 | 2,000 |
| | | N-12.2 | 187 | 2,000 |
| | | N-12.3 | 80 | 1,000 |
| | | N-12.4 | 90 | 1,000 |
| | | N-12.5 | 105 | 1,000 |
| | | N-12.6 | 213 | 2,000 |
| N-13[c)] | 573 | N-13.1 | 49 | 500 |
| | | N-13.2 | 91 | 1,000 |
| | | N-13.3 | 195 | 2,000 |
| | | N-13.4[d)] | 194 | 2,000 |
| N-14 | 577 | | | |
| N-16 | 1095 | | | |
| N-17 | 396 | | | |
| N-19 | 553 | | | |
| N-20[e)] | 68 | | | |
| O-1 | 129 | O-1.3 | 25 | 300 |
| O-2 | 177 | O-2.2 | 102 | 1,000 |
| O-3 | 28 | | | |

Colour coding:
Designation in a previous SDP | Designation in a previous SDP with changes | New designation

[a)] Area for subsequent use
[b)] For Sites N-9.4 and N-9.5, the actual output to be installed should exceed the allocated grid connection capacity by 20% (see Section 7.11.1).
[c)] A part of Area N-13 with a size of approx. 15 km² is designated as an area under review.
[d)] A part of Site N-13.4 with a size of approx. 15 km² is designated as a site under review.
[e)] Area under review

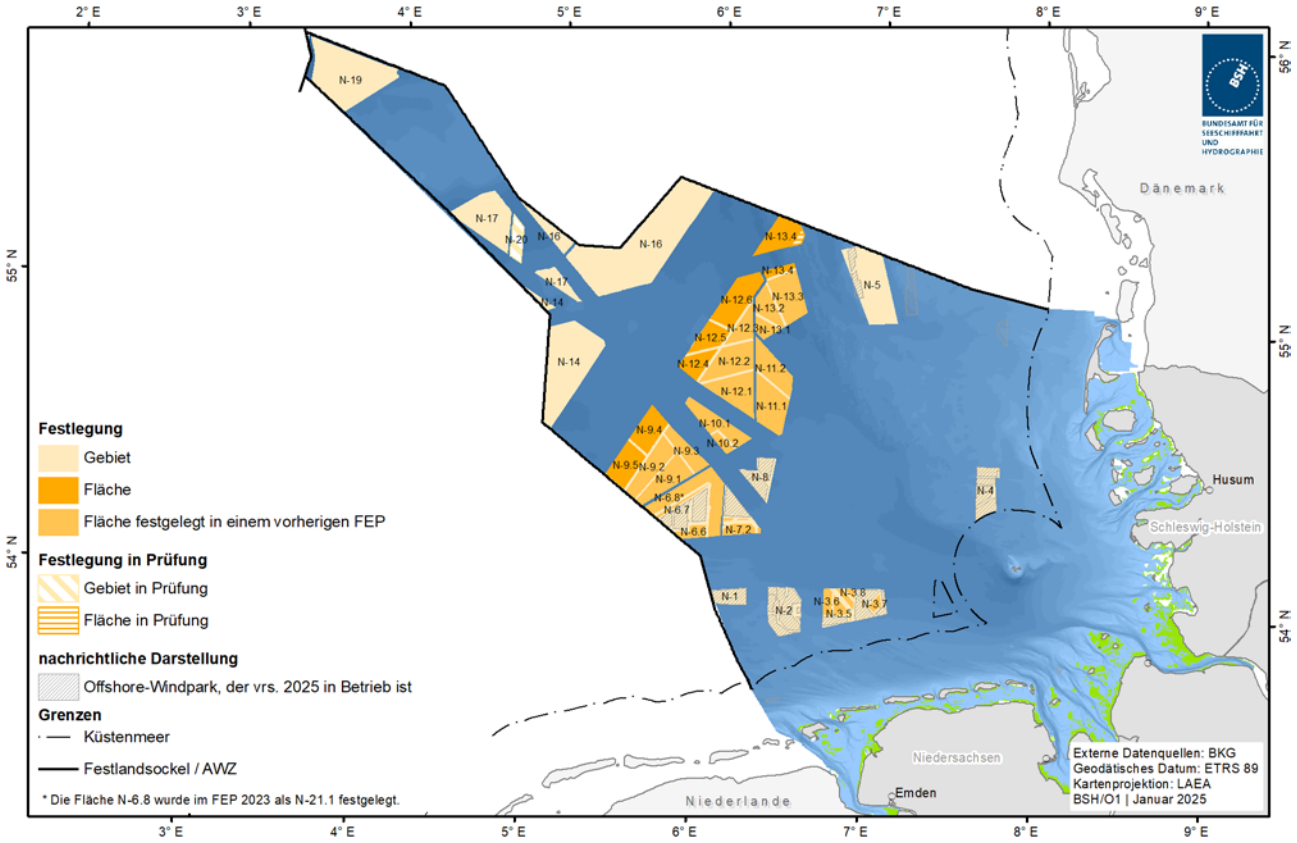


Figure 1: Designations on areas and sites in the EEZ of North Sea

## 2 Acceleration site

### 2.1 Acceleration sites according to Section 8a WindSeeG shown for information

The legislator has made use of the option in Article 15c of Directive (EU) 2018/2001[5] to declare sites already designated for wind energy as acceleration sites under certain conditions. In accordance with Section 8a WindSeeG, the areas and sites in the North Sea designated in SDP 2023 for which the year of the tender has already been determined are acceleration sites (with the exception of Area N-3). According to this, the following sites are acceleration sites: N-6.6, N-6.7, N-7.2, N-9.1, N-9.2, N-9.3, N-10.1, N-10.2, N-11.1, N-11.2, N-12.1, N-12.2, N-12.3, N-13.1, N-13.2, and N-21.1 (now N-6.8). These sites are shown in Figure 2.

[5] Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Ordinance (EU) 2018/1999 and Directive 98/70/EC with regard to the promotion of energy from renewable sources and repealing Council Directive (EU) 2015/652, OJ L, 2023/2413, 31 October 2023; available at: Directive – EU – 2023/2413 – EN -– EUR-Lex, hereinafter uniformly referred to as “Directive (EU) 2018/2001”.

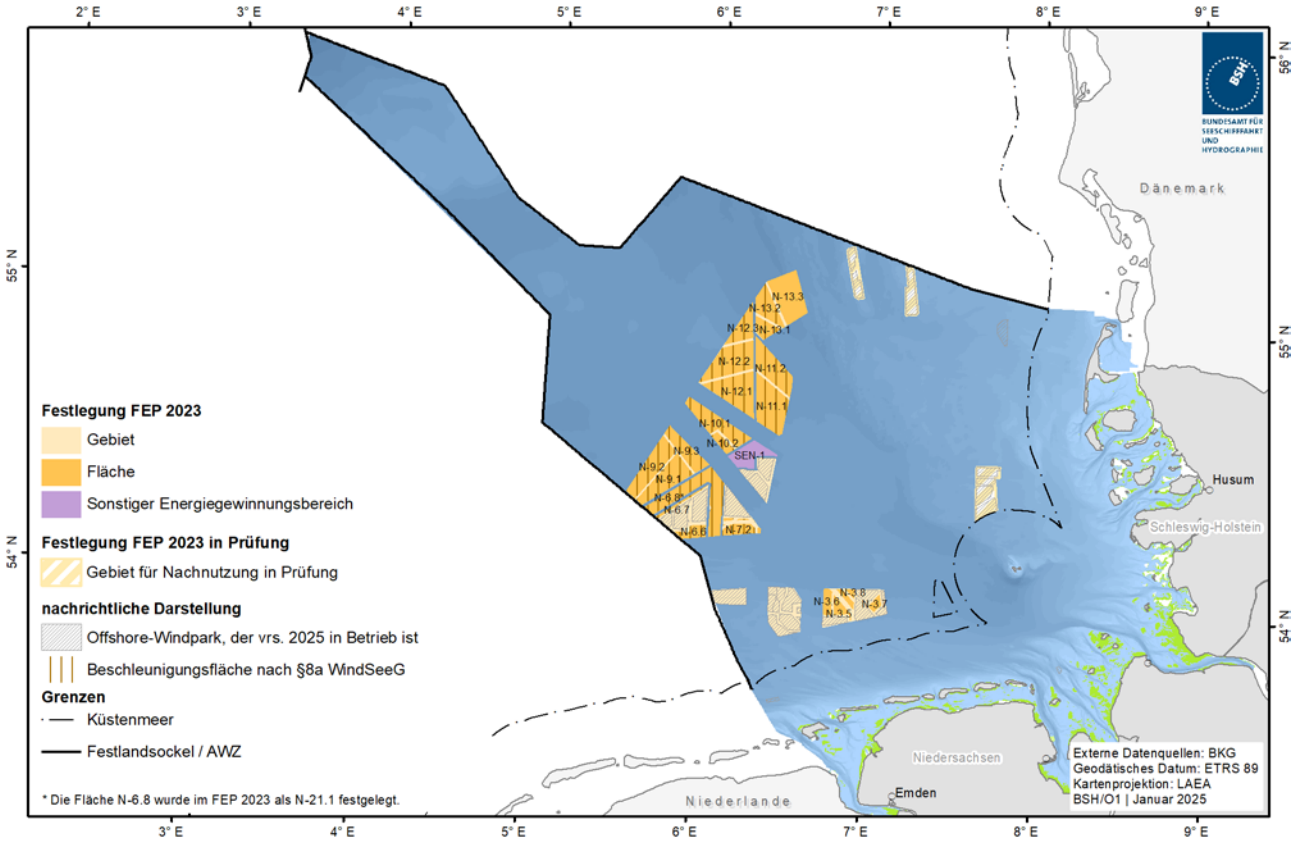


Figure 2: Acceleration sites according to Section 8a WindSeeG (Note: Illustration of the areas and sites of SDP 2023)

## 2.2 Mitigation measures for acceleration sites according to Section 8a WindSeeG

The following mitigation measures are designated for sites designated as acceleration sites according to Section 8a WindSeeG; these are also mitigation measures according to Article 15c para. 1 lit. b Directive (EU) 2018/2001. Specifically, the mitigation measures as well as rules for mitigation measures listed in Tabelle 2 for the respective acceleration sites are designated. Details of the mitigation measures can be found in the sources in the Planungsgrundsätzen, the environmental report, and the catalogue in Section 2.2 of the reasoning.

Table 2: Acceleration sites according to Section 8a WindSeeG and associated mitigation measures

| Designation of site | Designated mitigation measures from Section III.2.2 |
|---|---|
| N-6.6 | A to S |
| N-6.7 | A to S |
| N-6.8 (formerly N-21.1) | A to S |
| N-7.2 | A to S |
| N-9.1 | A to S |
| N-9.2 | A to S |
| N-9.3 | A to S |
| N-10.1 | A to S |
| N-10.2 | A to S |
| N-11.1 | A to S |
| N-11.2 | A to S |

| | |
|---|---|
| N-12.1 | A to S |
| N-12.2 | A to S |
| N-12.3 | A to S |
| N-13.1 | A to S |
| N-13.2 | A to S |

# 3 Subsea cables and pipelines

## 3.1 Gates to the territorial sea

According to Section 5 para. 1 No. 8 WindSeeG, the SDP designates locations where the OGCS cross the boundary between the EEZ and the territorial sea (gates).

In Table 3, the gates from the EEZ to the territorial sea for the North Sea and Baltic Sea are listed. Every gate is additionally assigned existing subsea cables and subsea cables envisaged or designated in the SDP; this includes OGCS and interconnectors.

The currently known gates to the territorial sea and their respective expected capacities are sufficient to route the onshore OGCS defined in this revision to the associated grid connection point (GCP). However, no sufficient cross-border corridor capacities have yet been identified for the OGCS that go beyond this to achieve the expansion target of at least 70 GW by 2045 and further offshore capacities as part of cooperation projects with littoral states of the North Sea and Baltic Sea in line with the objectives of the Offshore Network Development Plan. To this end, the BSH has initiated a coordination process with the responsible federal states of Lower Saxony and Schleswig-Holstein as well as with the Federal Network Agency (FNA), the Directorate-General for Waterways and Shipping (GDWS), and the transmission system operators (TSO).

Table 3: Allocation of subsea cables to the gates to the territorial sea

| Gate | Subsea cables |
|---|---|
| N-I | (1) NOR-1-1<br>(2) NOR-8-1<br>(3) NOR-2-3<br>(4) COBRAcable |
| N-II | (1) NOR-7-1<br>(2) NOR-3-1<br>(3) NOR-2-2<br>(4) NOR-2-1<br>(5) NOR-6-1<br>(6) NOR-6-2<br>(7) NOR-3-3<br>(8) NOR-3-2<br>(9) NOR-6-3<br>(10) NOR-9-1<br>(11) NOR-10-1<br>(12) NOR-6-4 |
| N-III | (1) NOR-9-3<br>(2) NOR-9-2<br>(3) NOR-12-1<br>(4) NOR-11-2<br>(5) NOR-13-1<br>(6) NOR-9-4<br>(7) -- (intended for OGCS)<br>(8) -- (intended for OGCS)<br>(9) -- (intended for OGCS)<br>(10) -- (intended for OGCS)<br>(11) -- (intended for OGCS)<br>(12) -- (intended for OGCS)<br>(13) I-NOR-10 (Tarchon)<br>(-) I-NOR-5 (NeuConnect) |
| N-V | (1) NOR-7-2<br>(2) NOR-11-1<br>(3) NOR-12-2<br>(4) NOR-12-3<br>(5) NOR-12-4<br>(6) -- (intended for OGCS)<br>(7) -- (intended for OGCS)<br>(8) -- (intended for OGCS) |
| N-IV | (1) NOR-4-2<br>(2) NOR-4-1<br>(3) NOR-5-1<br>(4) NordLink |
| O-I | (1) OST-1-1<br>(2) OST-1-2<br>(3) OST-1-3<br>(4) OST-2-1<br>(5) OST-2-2<br>(6) OST-2-3<br>(7) OST-1-4<br>(8) OST-2-4<br>(9) I-OST-6<br>(10) I-OST-7 |

| Gate | Subsea cables |
|---|---|
| O-II | (1) OST-2-1 |
| O-III | (1) OST-3-1<br>(2) OST-3-2<br>(3) I-OST-4<br>(4) I-OST-5 |
| O-IV | (1) Kontek<br>(2) I-OST-8 |
| O-V | (1) I-OST-9 |
| O-XIII | (1) I-OST-13 |

### 3.2 Offshore grid connection systems

The OGCS shown in Tabelle 4 are designated and serve as grid connection of the sites designated in Section II.1.

The standard concept based on direct current technology with a transmission capacity of 2,000 MW is designated for all the newly designated OGCS in Tabelle 4.

For the grid connection concepts of the OGCS going into operation up to including 2031, refer to the designations of SDP 2023, Section 2.2.

Table 4: Designations for OGCS

| OGCS | Transmission capacity [MW] | Gate | Grid connection point (for information on the basis of GDP 2037/2045) |
|---|---|---|---|
| OST-1-4 | 300 | O-I | Lubmin |
| NOR-7-2[a)] | 980 | N-V | Büttel |
| NOR-3-2 | 900 | N-II | Hanekenfähr |
| NOR-6-3[a)] | 900 | N-II | Hanekenfähr |
| NOR-9-1[a)] | 2,000 | N-II | Wehrendorf |
| NOR-9-2[a)] | 2,000 | N-III | Wilhelmshaven 2 |
| NOR-9-3[a)] | 2,000 | N-III | Unterweser |
| OST-2-4[a)] | 2,000 | O-I | Brünzow/Kemnitz |
| NOR-10-1[a)] | 2,000 | N-II | Westerkappeln |
| NOR-11-1[a)] | 2,000 | N-V | Heide/West |
| NOR-12-1[a)] | 2,000 | N-III | Unterweser |
| NOR-12-2[a)] | 2,000 | N-V | Heide/West |
| NOR-11-2[a)] | 2,000 | N-III | Wilhelmshaven 2 |
| NOR-13-1[a)] | 2,000 | N-III | Rastede |
| NOR-6-4[a)] | 2,000 | N-II | Kusenhorst[b)] |
| NOR-9-4 | 2,000 | N-III | Blockland/new |
| NOR-12-3 | 2,000 | N-V | Search space of municipalities Pöschendorf |
| NOR-12-4 | 2,000 | N-V | Search space of municipalities Pöschendorf |

Colour coding:
Designation in a previous SDP | Designation in a previous SDP with changes | New designation

[a)] spatial change

[b)] The grid connection point will be adjusted in consultation with the FNA based on the proposal of Amprion compared with the confirmation of GDP 2037/2045.

According to Section 5 para. 1 No. 6 WindSeeG, the SDP shall designate locations of converter platforms, collector platforms and, if required, transformer stations. According to Section 5 para. 1 No. 7 WindSeeG, the SDP shall designate routes or route corridors for offshore connecting cables.

Converter platforms as well as cable routes are designated only for grid connection to the sites, for which even a quarter of the commissioning is designated. A designation of transformer platforms is not needed because of the direct grid connection concept.

The converter locations should always be placed within the site for the connection of a site. If several sites are to be connected, the converter site should be located as centrally as possible between the sites. Figure 4 shows the spatial designations for the North Sea and Abbildung 5 for the Baltic Sea.

In order to rule out any adverse effect on the military security, it is not possible in principle for OGCS to cross the North Sea artillery firing range defined as a reservation area for defence in ROP 2021.

As a result, a conditional designation for OGCS NOR-11-1, NOR-11-2, NOR-12-1, NOR-12-2, and NOR-13-1 deviates from the original designation in SDP 2023.

By 30 April 2025, the TSO shall submit to the BSH a report in which alternative options for laying the aforementioned routes are examined according to the criteria (i) temporal impact on the commissioning and operation of the OGCS, (ii) total economic costs, and (iii) environmental impacts. Other aspects such as additional technical specifications can also be examined. The report shows the best possible level of detail that can be provided up to this point in time. The TSO involve the BSH and the Naval Command on an ongoing basis.

The BSH will decide on the route of the individual OGCS by 15 May 2025 with the approval of the v. A route deviating from the conditional designation below may be taken only if the security of the military is not adversely affected. If no separate decision is published on the BSH website (www.bsh.de) by 15 May 2025, OGCS NOR-11-1, NOR-11-2, NOR-12-1, NOR-12-2, and NOR-13-1 will be designated as follows:

If the BSH, with the consent of the Naval Command, does not publish any deviating routes on its website by 15 May 2025, the aforementioned OGCS will be designated to run west along the North Sea artillery firing range according to Abbildung 3.

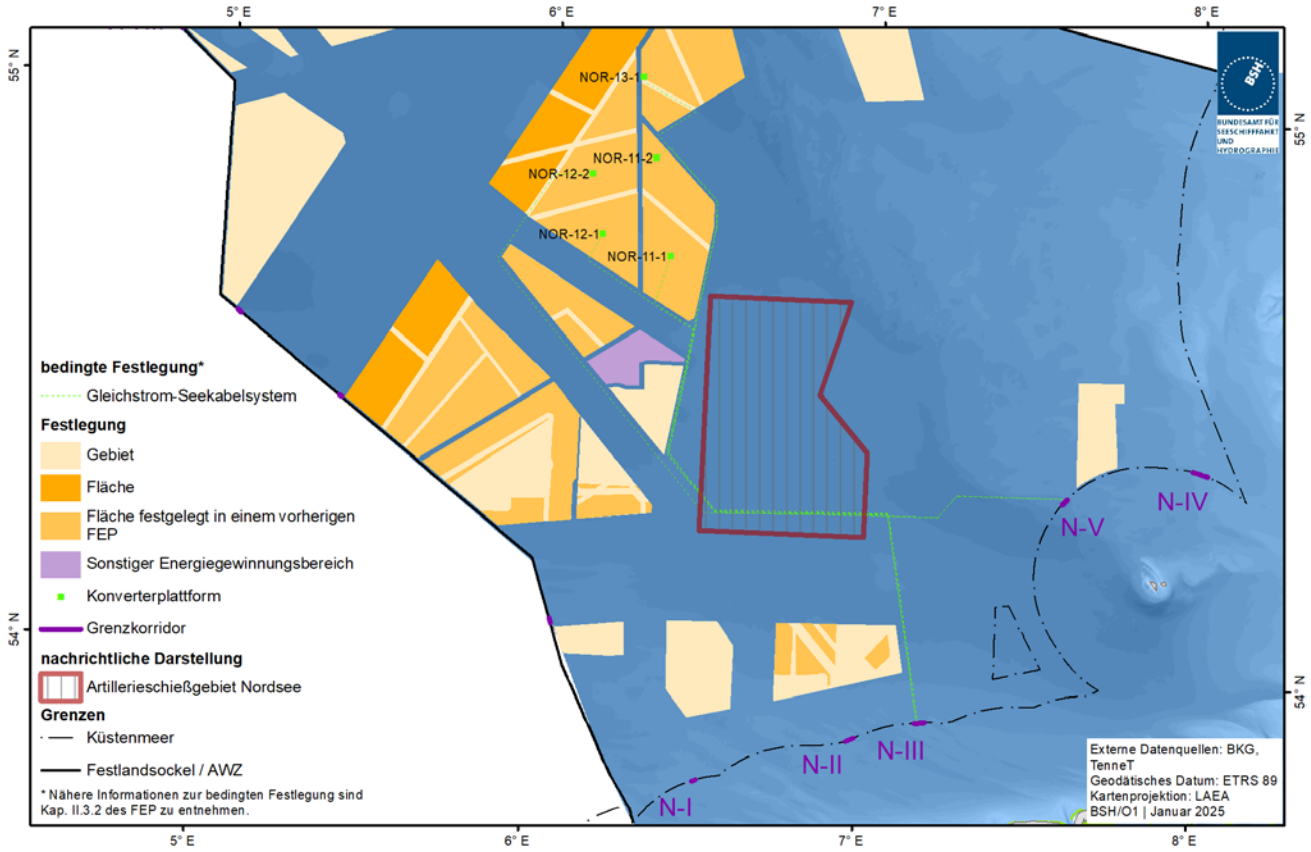


Figure 3: Conditional designation of routes for OGCS NOR-11-1, NOR-11-2, NOR-12-1, NOR-12-2, and NOR-13-1

### 3.3 Interconnectors

Interconnectors within the meaning of this plan should be understood as subsea cables, which run through the territory or the EEZ of at least on other neighbouring coastal states of North Sea or Baltic Sea.

**North Sea**

I-NOR-7 and I-NOR-8 are two route corridors for two interconnectors to the north and I-NOR-6 is a route corridor for an interconnector to the south along Shipping route SN10. The spatially defined routes of the interconnectors cannot be considered conclusive under the current spatial framework.

Parallel to the cross-border submarine cable system Viking Link, which has been in operation since the end of 2023, a further route corridor for an interconnector (I-NOR-9) will be designated from Gate N-VIII to N-XII.

In addition, Route corridor I-NOR-10 is designated for a connection with Great Britain. This runs parallel to Route I-NOR-5 (Neuconnect) from Gate N-XV to Gate N-III.

**Baltic Sea**

From Converter platform OST-2-4 in Area O-2.2, three interconnectors to border Gate O-X will be established in order to enable the connection of sites in the Danish EEZ to use the free connection capacity of OGCS OST-2-4.

Table 5 presents the gates and routes for interconnectors designated in the SDP. Implementation of the European and respective national expansion targets necessitating more interconnectors is to be anticipated. The designation of more interconnectors will probably me done in the further revisions of the SDP.

Table 5: Gates and routes for interconnectors

| Submarine cables | Point A | Point B | Country A | Country B | Name (if known) |
|---|---|---|---|---|---|
| **North Sea** | | | | | |
| *Subsea cables that go ashore in Germany* | | | | | |
| I-NOR-5 | N-III | N-XV | Germany | UK | NeuConnect |
| I-NOR-10 | N-III | N-XV | Germany | UK | Tarchon |
| *Subsea cables crossing the EEZ of the North Sea without going ashore in Germany* | | | | | |
| I-NOR-6[a)] | N-VI | N-XIV | Denmark/Norway | Netherlands | |
| I-NOR-7[a)] | N-VII | N-XIII | Denmark/Norway | Netherlands | |
| I-NOR-8[a)] | N-VII | N-XIII | Denmark | Netherlands | |
| I-NOR-9 | N-VIII | N-XII | Denmark | UK | |
| **Baltic Sea** | | | | | |
| I-OST-9 | O-V | O-VI | Germany | Denmark | |
| I-OST-8 | O-IV | O-VII | Germany | Denmark | |
| I-OST-4 | O-III | O-IX | Germany | Sweden | |
| I-OST-5 | O-III | O-IX | Germany | Sweden | |
| I-OST-7[a)] | O-I | O-X | Germany | Denmark | |
| I-OST-6[a)] | O-I | O-XI | Germany | Denmark | Bornholm Energy Island |
| I-OST-10 to -12 | OST-2-4[b)] | O-X | Germany | Denmark | |
| I-OST-13 | O-XIII | O-XII | Germany | n.n. | |

Colour coding:
Designation in a previous SDP | Designation in a previous SDP with changes | New designation

[a)] spatial change

### 3.4 Cross connections of installations with each other

According to Section 5 para 1 No. 10 WindSeeG, the SDP may contain designations for routes or route corridors for the possible cross connections of offshore installations, grid connection cables, and interconnectors as well as the locations of converter platforms.

This plan does not designate cross connections between installations.

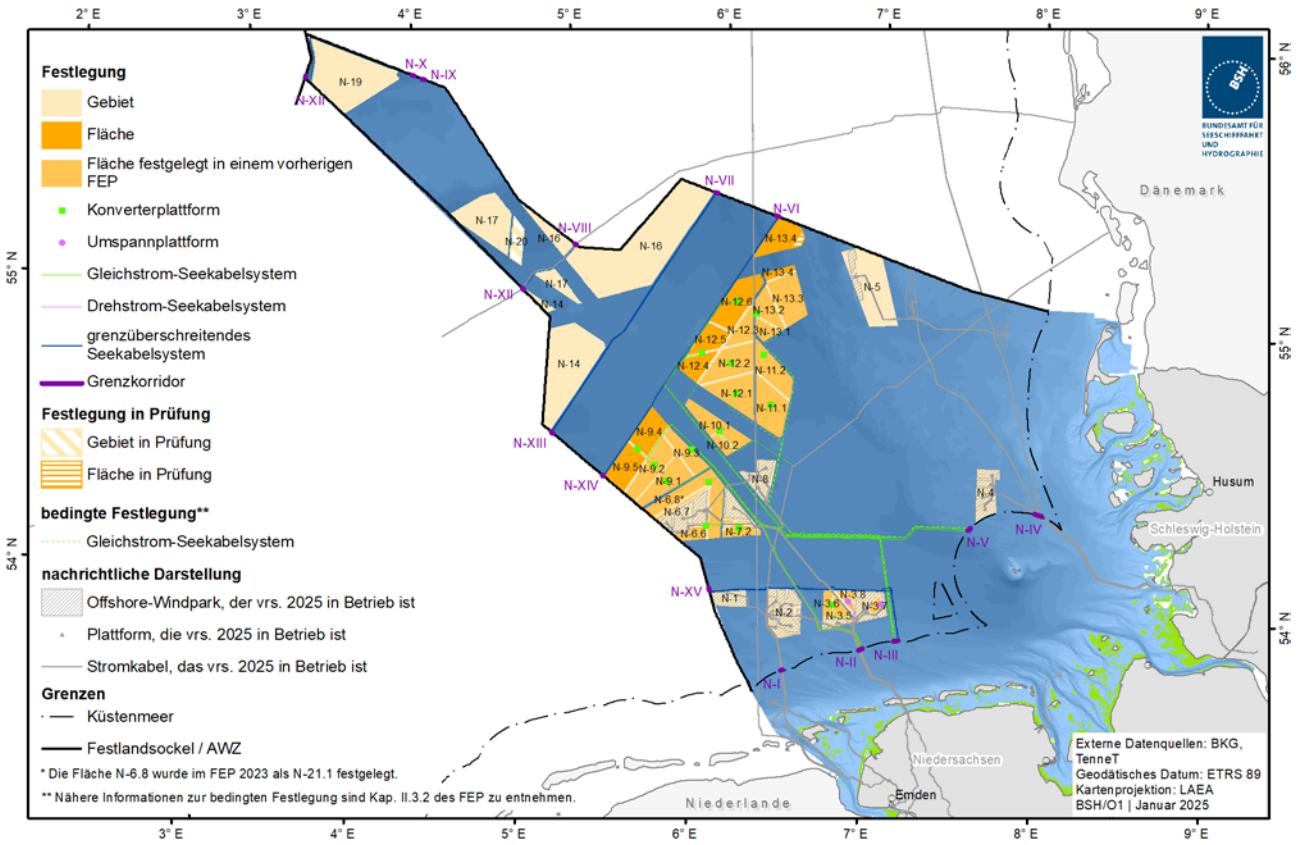


Figure 4: Designations on subsea cables and pipelines in the EEZ of North Sea

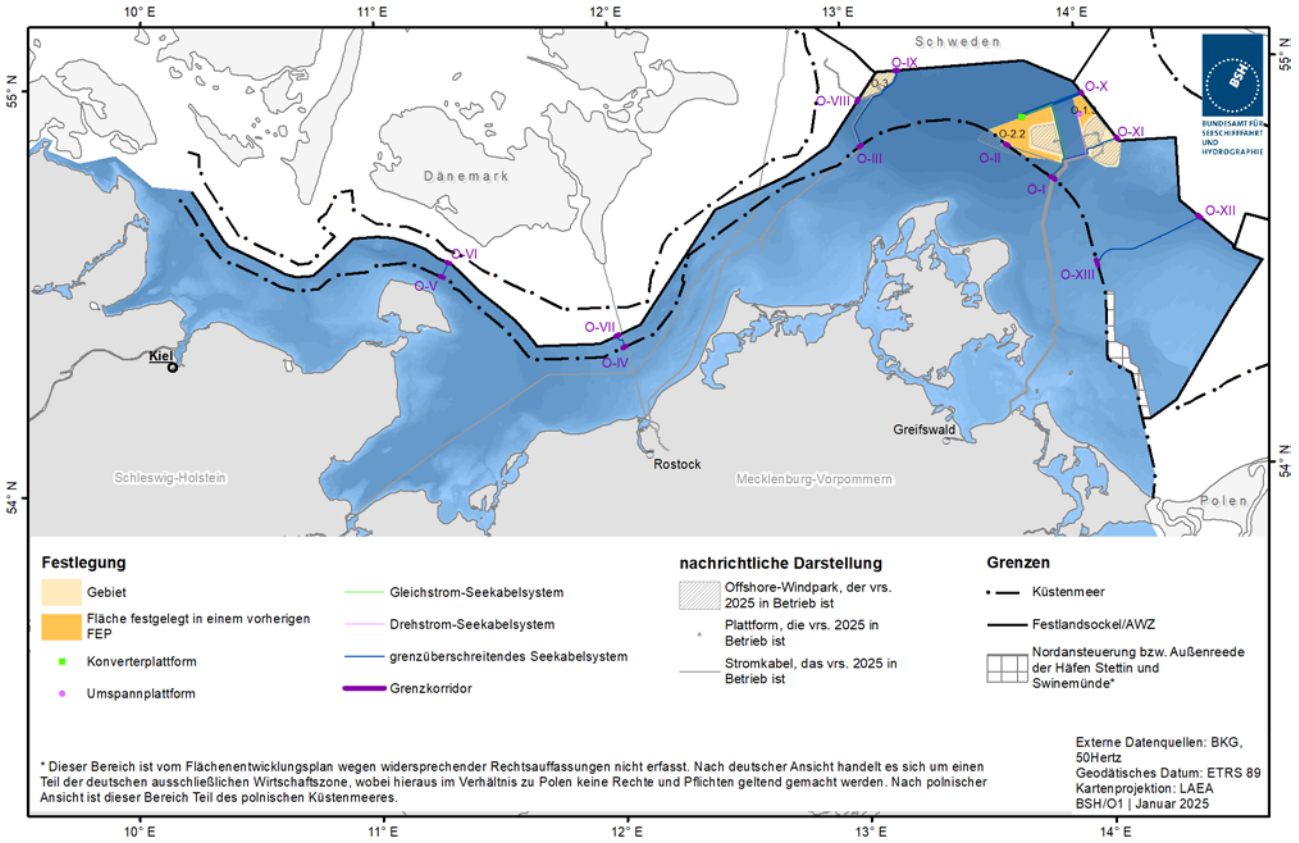


Figure 5: Designations on subsea cables and pipelines in the EEZ of Baltic Sea

## 4 Designations for the territorial sea

In accordance with Section 4 para. 1 sentence 2 WindSeeG, the SDP may also make sectoral planning designations for areas, sites, the chronological sequence in which the sites are put out to tender, the calendar years of commissioning, and the expected generation output as well as for testing grounds and areas for other energy generation for the territorial sea.

There are no new designations in the area of the territorial sea compared with SDP 2023.

## 5 Central site investigation and calendar years of tender and commissioning

According to Section 5 para. 1 No. 3 WindSeeG, the SDP makes designations on the time sequence, in which the designated sites should come for tender, including the naming of the respective calendar years and the designation whether the section should be centrally pre-investigated and according to no. 4, designations as to in which quarter of the respective calendar year the allocated WT system and the corresponding OGCS should be commissioned.

In order to ensure a synchronisation between OWF and OGCS, the SDP further designates the quarter of the respective calendar year, in which the feeding of the in-farm cabling of the OWF to be connected in the converter platform of the TSO should happen.

### 5.1 Central site investigation

In accordance with Section 2a para. 2 WindSeeG, the tender volume will be divided equally between centrally pre-investigated and non-centrally pre-investigated sites starting in 2027. Sites N-9.5, N-12.6, and N-13.4 are to be centrally pre- investigated (cf. Figure 6).

In addition, it is designated that a site in the north of Area N-16 in the area of Site N-16.1 of the draft of 7 June 2024 is to be centrally pre-investigated.

There is no additional designation for the Baltic Sea compared with SDP 2023. cf. Figure 14 for the existing designations on the central site investigation of sites.

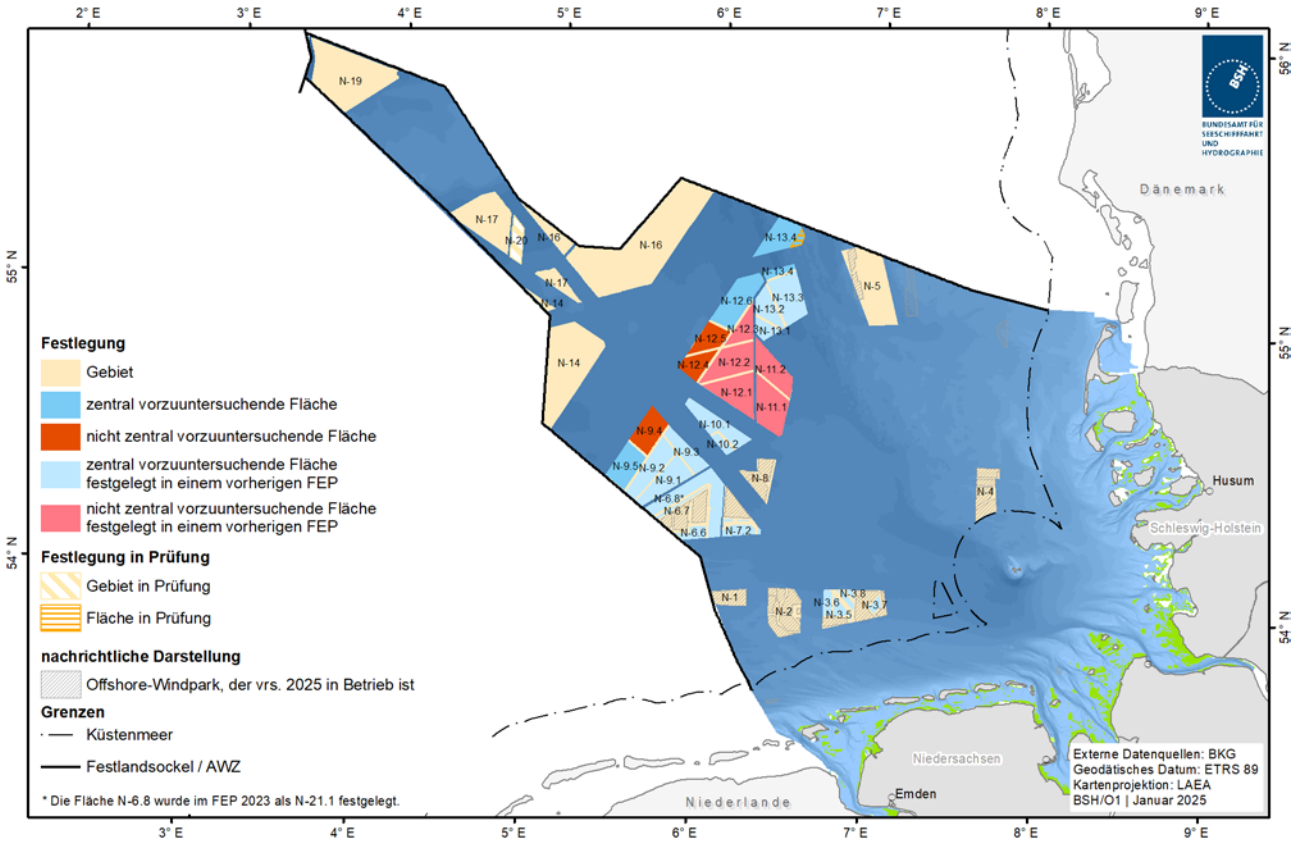


Figure 6: Designations for central investigation of the sites in the North Sea

## 5.2 Calendar years of tender and commissioning

Table 6 and Table 7 constitute the designations of time sequence of tender and commissioning of the designated sites and OGCS. Sites that are centrally pre-investigated are shown in Tabelle 6; sites without central site investigation are shown in Table 7. For a complete overview, please refer to Tabelle 14 in the Appendix of this document.

There are no time designations for Sites N-13.3 and N-13.4 in this revision.

Table 6: Overview of the calendar years of tender and commissioning for WT system and the associated OGCS including the respective quarters (QI - QIV) in the calendar year - Sites with central site investigation

| Designation of site | Expected installed output [MW] | Tender year | Commissioning of the WT installed on the respective sites | Feeding of in-farm cabling of the WT installed in platform | Designation of OGCS | Commissioning of OGCS |
|---|---|---|---|---|---|---|
| N-3.7 | 225 | 2021 | 2026 (QIII) | n/a | NOR-3-3 | n/a |
| N-3.8 | 433 | 2021 | 2026 (QIII) | n/a | | |
| O-1.3 | 300 | 2021 | 2026 (QIII) | 2026 (QII) | OST-1-4 | 2026 (QIII) |
| N-7.2 | 980 | 2022 | 2027 (QIV) | 2027 (QIII) | NOR-7-2 | 2027 (QIV) |
| N-3.5 | 420 | 2023 | 2028 (QIII) | 2028 (QI) | NOR-3-2 | 2028 (QIII) |
| N-3.6 | 480 | 2023 | 2028 (QIII) | 2028 (QII) | | |
| N-6.6 | 630 | 2023 | 2028 (QIV) | 2028 (QI) | NOR-6-3 | 2028 (QIV) |
| N-6.7 | 270 | 2023 | 2028 (QIV) | 2028 (QII) | | |
| N-9.1 | 2,000 | 2024 | 2030 (QIII)[a)] | 2029 (QIII-IV)[a)] | NOR-9-1 | 2030 (QIII)[a)] |
| N-9.2 | 2,000 | 2024 | 2031 (QIV)[a)] | 2031 (QIII-IV)[a)] | NOR-9-2 | 2031 (QIV)[a)] |
| N-9.3 | 1,500 | 2024 | 2029 (QIV) | 2029 (QI) | NOR-9-3 | 2029 (QIV)[b)] |
| N-10.2[b)] | 500 | 2025 | 2030 (QIII) | 2030 (QI) | | |
| N-10.1 | 2,000 | 2025 | 2031 (QIII)[a)] | 2031 (QI-II)[a)] | NOR-10-1 | 2031 (QIII)[a)] |
| N-13.1 | 500 | 2026 | 2031 (QIV)[a)] | 2031 (QIII-QIV)[a)] | NOR-11-2 | 2031 (QIV)[a)] |
| N-13.2 | 1,000 | 2026 | 2031 (QIII) | 2031 (QII) | NOR-13-1 | 2031 (QIII) |
| N-6.8 | 2,000 | 2027 | 2032 (QIII) | 2032 (QI-II) | NOR-6-4 | 2032 (QIII) |
| N-9.5[b,c)] | 1,000 | 2028 | 2033 (QIII) | 2033 (QI-II) | NOR-9-4 | 2032 (QIII)[b)] |
| N-12.6 | 2,000 | 2029 | 2034 (QIII) | 2034 (QI-II) | NOR-12-4 | 2034 (QIII) |

Colour coding:
Designation in a previous SDP | Designation in a previous SDP with changes | New designation

[a)] Update to SDP 2023 because of an expected completion date of the OGCS announced by the responsible TSO in deviation from the designation of SDP 2023 in accordance with Section 17d para. 2 sentence 3 EnWG.
[b)] The responsible TSO should announce a separate, site-specific expected completion date for sites for which the SDP designates a commissioning year that is after the year of commissioning of the associated OGCS. This site-specific expected completion date is intended to take into consideration the later date of commissioning of the site compared with the commissioning of the OGCS and should generally be in the quarter and year that the SDP designates for the commissioning of the WT on the respective site.
[d)] For Site N-9.5, the actual output to be installed should exceed the allocated grid connection capacity by 20% (see Section7.11.1.).

Table 7: Overview of the calendar years of tender and commissioning for WT and the associated OGCS including the respective quarters (QI - QIV) in the calendar year - Sites without central site investigation

| Designation of site | Expected installed output [MW] | Tender year | Commissioning of the WT installed on the respective sites | Feeding of in-farm cabling of the WT installed in platform | Designation of OGCS | Commissioning of OGCS |
|---|---|---|---|---|---|---|
| N-11.1 | 2,000 | 2023 | 2032 (QIV)[a)] | 2032 (QI-II)[a)] | NOR-11-1 | 2032 (QIV)[a)] |
| N-12.1 | 2,000 | 2023 | 2030 (QIII) | 2030 (QI-II) | NOR-12-1 | 2030 (QIII) |
| N-12.2 | 2,000 | 2023 | 2030 (QIV) | 2030 (QI-II) | NOR-12-2 | 2030 (QIV) |
| O-2.2 | 1,000 | 2023 | 2031 (QII)[a)] | 2030 (QIV) – 2031 (QI) | OST-2-4 | 2031 (QII)[a)] |
| N-11.2 | 1,500 | 2024 | 2031 (QIV)[a)] | 2031 (QIII)[a)] | NOR-11-2 | 2031 (QIV)[a)] |
| N-12.3 | 1,000 | 2024 | 2031 (QIII) | 2031 (QI) | NOR-13-1 | 2031 (QIII) |
| N-9.4[b)] | 1,000 | 2025 | 2032 (QIII) | 2032 (QI-II) | NOR-9-4 | 2032 (QIII) |
| N-12.4 | 1,000 | 2026 | 2033 (QIII) | 2033 (QI) | NOR-12-3 | 2033 (QIII) |
| N-12.5 | 1,000 | 2026 | 2033 (QIII) | 2033 (QII) | NOR-12-3 | 2033 (QIII) |

Colour coding:
Designation in a previous SDP | Designation in a previous SDP with changes | New designation

[a)] Update to SDP 2023 because of an expected completion date of the OGCS announced by the responsible TSO in deviation from the designation of SDP 2023 in accordance with Section 17d para. 2 sentence 3 EnWG.
[b)] For Site N-9.4, the actual output to be installed should exceed the allocated grid connection capacity by 20% (see Section7.11.1.).

## 6 Standard technical principles

According to Section 5 para. 1 No. 11 WindSeeG, standard technical principles are to be laid down in the SDP for the purpose of planning. With regard to technical grid connection concepts, there is a distinction between the North Sea and Baltic Sea up to SDP 2020. This differential is not applicable from SDP 2023 and only one standard concept is designated.

The standard grid connection concept was designated until SDP 2023 with a 66 kV direct grid connection. This continues to apply to all designations with a year of commissioning of the OGCS up to and including 2032, including OGCS NOR-6-4 and NOR-9-4. The designation of a 132 kV direct connection concept made in Section 6.9 applies to all designations from commissioning in 2033, including NOR-12-3 and NOR-12-4.

A delay in the commissioning of an OGCS after the initial designation in the SDP has no influence on the applicable voltage level unless otherwise regulated in individual cases.

### 6.1 Standard concept – DC system

The standard concept is a direct current system.

### 6.2 Interface between TSO and OWF project developer

The primary interface[6] between TSO and OWF project developer is the input of 132 kV subsea cables on the converter platform (cable sealing box of 132 kV subsea cable).

(a) The responsibility for grid connection of WT to the converter platform is with the OWF project developer.

(b) The 132 kV subsea cables are fed to the platform by the direct pull-in concept[7], according to which, the OWF project developer routes the subsea cables up to the gas-insulated switchgear (GIS).

(c) For the grid connection of the 132 kV subsea cable, the OWF project developer ensures a freely usable length (from cable hang-off) of the subsea cable of 15 m after direct pull-in on the platform. The measurement of the required freely usable length of the subsea cable is measured in individual case according to the requirement of the TSO.

(d) Optionally, the TSO may specify the interface at a connector as a result of the platform design. In this case, the 132 kV subsea cables routed up to a connector pre-installed on the platform, which also constitute the boundary of the property. The connector then forms the transition point between the in-farm subsea cables and a pre-installed platform cable connection leading up to the GIS. The OWF project developer carries out the submarine cable pull-in and termination with a suitable plug for the pre-installed plug connection on the platform. Here, too, the designation of the maximum usable length (from cable hang-off) is 15 m to the plug connection applies. The TSO shall announce the concept prior to the tender of the respective sites.

(e) The start of the quarter designated for the respective sites or OGCS for the feed of the in-farm cabling is the time until which, the TSO must have completed all the necessary prerequisites that are required for feeding the in-farm cabling.

[6] In the context of the standardised technical principles of the SDP, interface is basically understood as the property boundary between the TSO and the OWF project developer.

[7] The direct pull-in method is defined as direct feed of cable to the platform up to the GIS or the pre-installed connector.

(f) All the cables of in-farm cabling, which must be fed in the platform of TSO, are fed by the OWF project developer within the quarter designated in the SDP, taking into consideration the platform-specific framework conditions. Feeding the in-farm cabling for all the allocated WT is to be completed by the end of the quarter designated in the SDP.

(g) The TSO shall, at the latest by the end of the quarter designated for the site (feeding of in-farm cabling), take the necessary steps on the platform side for all AC cables of the in-farm cabling that have been pulled onto the platform to such an extent that a complete commissioning of all WT to be connected to a site is possible.

(h) All parties have to keep eachother informed of project-relevant developments and coordinate the dates in all the phases.

(i) If necessary, a bilateral agreement must be concluded between the TSO and the OWF project developer for the neccessary installations of the communication technology of the OWF project developer including the associated maintenance and service work on the converter platform of the TSO. The spatial requirements and the power supply for the communication technology should not delay the timely commissioning of OGCS which could be caused by significant subsequent changes in the platform design.

### 6.3 Self-commutated converter

The existing OGCS and those planned as part of the SDP are designed with self-commutated converters, also known as voltage-sourced converters (VSC).

### 6.4 Transmission voltage ± 525 kV

A transmission voltage of ± 525 kV is designated for the OGCS envisaged as a part of the SDP.

### 6.5 Standard power 2,000 MW

A standard transmission power of 2,000 MW is designated for the high-voltage DC power transmission systems (HVDC).

### 6.6 Version with metallic return conductors

HVDC systems are to be designed as a bipolar system with a metallic return conductor for the purpose of increased reliability and improved controllability.

### 6.7 Connection on the converter platform/switch bays to be provided

(a) For a connection power of 1,000 MW at transmission voltage 132 kV, eight switch gear panels and J-tubes each are to be provided by the TSO.

(b) At a connection power deviating from 1,000 MW, the number of switch gear panels to be provided changes accordingly, depending on the connection power.

### 6.8 Prerequisites for cross connections between installations

To ensure cross connections between platforms via direct current transmission, the necessary prerequisites must be taken into consideration in good time when planning each OGCS – even if the connection has not been determined at the time of tender and commissioning.

### 6.9 Grid connection concept

For the connection of WT to the converter platform, the 132 kV direct grid connection concept will be defined as the standard connection concept from the year of commissioning 2033. The connections are made in three-phase technology with 50 Hz mains frequency and a transmission voltage of 132 kV.

### 6.10 Interconnectors: Bundled subsea cables

Interconnectors are to be implemented in direct current technology and designed with the highest possible transmission capacity. The cross connections should each be made with supply and return conductors, which are laid bundled with fibre optic cables of sufficient dimensions.

### 6.11 Interconnectors: Consideration of overall system

Planning and construction of interconnectors have to take into consideration the designations of this plan.

### 6.12 Interconnectors: Version with metallic return conductors

Interconnectors, which have the facility of a cross connection with an OGCS according to the standard concept should be made as a bipole with metallic return conductors.

### 6.13 Deviation possibilities

It is generally not possible to deviate from the standard technical principles.

Exceptions can only be made in justified individual cases, especially if it is necessary or sensible based on new insights or because of foreseeable technical innovations. Because of the most likely significant impacts on the planning and implementation process as well as the interface between TSO and OWF operator, deviations should be introduced early on, justified, and agreed upon with all the parties involved.

## 7 Planning principles

In accordance with Section 5 para. 1 No. 11 WindSeeG, the SDP contains designations on planning principles.

The planning principles apply to the German EEZ and are based on Section 5 WindSeeG as well as the objectives and principles of ROP 2021 for the German EEZ. In all planning principles, the overriding public interest in the construction of WT and OGCS and their importance for public health and safety according to Section 1 para. 3 WindSeeG shall be taken into consideration in weighing decisions. In the concrete application of the planning principles in the planning approval procedure or planning permission procedure, the overriding public interests must be taken into consideration when weighing up the concerns. The planning principles also apply for installations and areas for other energy generation.

### 7.1 No threat to the marine environment

The following principles have a specific reference to environmental protection and nature conservation. They should not be understood as conclusive in this sense. Planning principles listed under other sub-points may also have an impact on concerns of environmental and nature conservation.

#### 7.1.1 Observance of environmental and nature conservation framework conditions

For the location and route selection and as a part of the construction, operation and deconstruction or any plans of subsequent use of WT, platforms, subsea cables and other forms of energy generation, the framework conditions under environmental protection and nature conservation law must be followed.

In addition, economic uses should be sustainable and as far as possible, economical in space in accordance with Principle 2.2.1 (1) of ROP 2021.

Principle 2.4 (6) of ROP 2021 for the requirement of preventive and mitigation measures within the identified bird migration corridors is accordingly applicable for this sectoral plan.

### 7.1.2 Overall time coordination of the construction and installation work and maintenance and repairs works

To avoid or mitigate cumulative effects on the marine environment, overall time coordination of the construction and installation work of an individual project is to be planned, taking into consideration the project-specific framework conditions. This also includes the reduction of shipping traffic for the construction and operation and the associated acoustic and visual adverse effects to a minimum by optimum construction and time planning (cf. also Planning principle 7.1.4).

The construction work for WT, platforms, and other energy generation installations and the laying of subsea cables by different project developers in close proximity to each other should be coordinated in terms of timing if this does not result in a postponement of the realisation deadlines in accordance with Section 81 para. 2 WindSeeG or the binding completion date according to Section 17d para. 2 EnWG. The organisers of projects that are constructed in a spatial and temporal context should inform and coordinate each other on a bilateral or trilateral basis. Planning principle 7.1.3g must be observed for pile driving or other noise-intensive activities.

### 7.1.3 Noise protection in the foundations and operation of installations

(a) In accordance with the state of the art or the state of the art in science and technology, the installation process and working method to be used for the foundations and installations shall as quiet as possible under the circumstances. If no low-noise foundation method (i.e. an alternative foundation method with lower sound inputs than impulse pile driving) is possible at a site, this must be justified.

(b) If WT or platforms and other forms of energy generation are installed by means of impulse pile driving, the use of effective technical noise mitigation measures in accordance with the state of the art or the state of the art in science and technology must be provided for during the pile driving of the foundations. The provisions of the noise protection concept of the BMU (BMU, 2013) are to be complied with.

(c) Before pile driving is carried out, animals must be deterred from the hazard area using a configurable system according to the state of the art or the state of the art in science and technology. In the case of noise-intensive pile driving, the maximum sound input at the start of pile driving (soft start) must be avoided.

(d) The duration of the ramming process including the deterrence must be limited to a minimum in pile driving. The duration of the pile-driving process is specified on a project-specific basis and designated in the subsequent approval procedure.

(e) The draft noise protection concept for a specific project must be submitted to the BSH at least 12 months before the start of construction if pile driving or similar noise-intensive foundation methods are planned for an installation. Selection of the envisaged foundation structure, construction process, work method, and noise mitigation measures as well the noise forecast shown in the draft of the noise protection concept are to be justified. The noise forecast must take into consideration the envisaged foundation structure and construction process.

(f) The measures to mitigate noise and prevent damage to the marine environment shall be tested in good time before the start of construction according to the state of the art in science and technology under comparable offshore conditions insofar as they are not

yet state of the art and have not yet been tested in a comparable manner. The noise emissions during these tests must be quantified and presented in a report for the BSH and the Federal Agency for Nature Conservation (BfN) with regard to the effects on species and nature conservation.

(g) In order to avoid or mitigate significant cumulative effects and to comply with the provisions of the noise protection concept of the BMU (BMU, 2013), the project developers must coordinate their construction site activities with other projects under construction at the same time or other noise-intensive activities of other project developers, taking into consideration the project-specific framework conditions, in such a way that the noise-intensive construction activities do not take place in a temporal and spatial context wherever possible. For sites that are not close to nature conservation areas or the main concentration area of the harbour porpoise, a maximum of eight pile-driving sites may be active at the same time. In sites of high seasonal importance for harbour porpoises (between May and August), only one pile-driving site may be active at any one time to avoid disturbance during the sensitive period (May to August). This means that ramming is not permitted in several places at the same time on these sites. If required, an overall temporal and spatial coordination of the pile driving work can be ordered within the framework of the subordinate approval procedure.

(h) Blasting is generally not permitted. If blasting to remove non-transportable munitions in the project sites or on the routes of the grid connection cables is unavoidable, the BSH must be informed of this in good time in advance so that the responsible authority can assess the need for a nature conservation procedure. Among other things, a noise protection and deterrence concept must be submitted in good time in advance. In particular, the periods that are especially sensitive for the conservation of marine mammals must already be taken into consideration by the project developer.

(i) The project developer must select the system design that minimises operational noise as far as possible according to the state of the art or the state of the art in science and technology.

#### 7.1.4 Traffic logistics concept

For projects for which ship-related service traffic takes place in the main concentration area of the divers, the main concentration area of the harbour porpoise, or the “Sylt Outer Reef – Eastern German Bight” nature conservation area, a traffic logistics concept for the service traffic must be submitted and agreed with the BSH as part of the project approval procedure. This planning principle applies to OWF projects, OGCS, and other energy generation areas. The logistics concept includes statements on planned arrival and departure routes and the expected frequency of service vessel trips during periods that are sensitive for seabirds and resting birds and harbour porpoises and contains a list of the vessel types involved during construction and operation as well as a description of the planned optimisations. The concept is to be delivered to the ship’s command of the vessels concerned. The implementation of the concept must be guaranteed by the project organiser. The safe ship’s command may not be adversely affected by the traffic logistics concept. The concept can be deviated from in emergencies. The transport logistics concept should also set out compliance with the following points:

(a) The aforementioned areas should be travelled as slowly as possible.

(b) In order to minimise construction- and operation-related adverse effects because of the

project-related shipping traffic, as far as possible, maritime traffic will take place in areas of designated shipping routes (priority areas for shipping) and in the vicinity of existing wind farms. Traffic in the nature conservation area and the main concentration area of divers and the harbour porpoise will be avoided or reduced to a minimum wherever possible, especially during sensitive periods.

(c) Noise-intensive activities, especially during vessel operations (e.g. positioning work (Dynamic Positioning Mode) or temporary mooring manoeuvres at WT) must be reduced to a minimum and, if possible, improved by operating procedures or ships that generate less noise so that the noise impact is minimised to protect harbour porpoises.

(d) The traffic logistics concept should lead to a reduction in traffic congestion in the aforementioned areas and must be updated regularly.

#### 7.1.5 Prevention and mitigation of emissions

**General information**

(a) Emissions are to be avoided or, if they are unavoidable, to be reduced.

(b) An emission study to survey the emissions arising from the respective design and equipment variant or their prevention must be prepared in the enforcement procedure. In the approval procedure, an emissions concept is sufficient as part of the application documents because the requirements for an emissions study cannot usually be fully met yet because of the early design phase.

(c) Structures shall be planned and implemented in such a way that neither their construction nor their operation cause emissions that are avoidable according to the state of the art or, insofar as the causing of emissions is unavoidable as a result of the actions that are absolutely necessary in order to fulfil the safety requirements (e.g. of shipping and air traffic) and these shall cause the fewest possible impacts on the marine environment without generating electromagnetic waves capable of interfering with the functioning of customary navigation and communication systems as well as frequency ranges of the correction signals.

(d) During operation of the OWT and platforms, lighting that is as compatible with nature as possible must be provided in order to reduce attraction effects as far as possible taking into consideration the requirements of safe shipping and air traffic and occupational safety (e.g. switching obstacle lights on and off as needed and selecting suitable light intensities/spectra and lighting intervals).

(e) Environmentally compatible operating fluids are to be used as far as possible for the operation of the offshore installation, and biodegradable operating fluids are to be preferred where available.

(f) Operating materials that have no or the lowest possible greenhouse gas potential should be used in switchgear, cooling and air-conditioning systems as well as fire protection systems. The legal requirements of Ordinance (EU) 2024/573 of the European Parliament and of the Council of 7 February

2024 on fluorinated greenhouse gases[8] shall be complied with. The operating materials used must be assessed for their climate impact.

(g) All technical installations and infrastructure used on the installation must be secured and monitored by structural safety systems and safety measures in accordance with the state of the art that pollutant accidents and environmental discharges are prevented and that the project developer can take countermeasures as quickly as possible in the event of damage. Organisational and technical precautionary measures must be taken for changes of operating materials and refuelling measures to prevent pollutant accidents and environmental discharges.

**Waste**

(h) The dumping and discharge of waste into the marine environment is prohibited. Waste must be taken ashore and disposed of there according to the applicable waste disposal regulations.

**Corrosion protection**

(i) The corrosion protection used for the offshore installation must be as free of pollutants and low in emissions as possible.

(j) Wherever possible, Impressed Current Cathodic Protection (ICCP) shall be used as cathodic corrosion protection of the foundation structures.

(k) If the use of galvanic anodes is unavoidable, it is permissible only in combination with coatings of the foundation structures. The content of impurities of the anode alloys, in particular zinc, cadmium, lead, copper, and mercury, shall be reduced as far as possible.

(l) The use of zinc anodes is prohibited.

(m) The use of biocides to protect the technical surfaces from the undesired settlement of organisms (biofouling) is prohibited.

**Systems cooling**

(n) A closed cooling system should be used for system cooling, with no discharges of cooling water or other substances (anti-fouling agents or biocides) into the marine environment.

**Sewage water**

(o) The project developer shall in principle collect sewage water from sanitary devices, sanitation facilities, kitchens and laundries in a professional manner, transport it ashore and dispose of it there in accordance with the applicable designations of waste management.

**Oil content of the drainage water**

(p) Drainage water shall not exceed an oil content of 5 milligrams per litre when discharged.

(q) The oil content of the drainage water must be continuously monitored at the outlet using sensors. The current values measured with the sensors must be readable remotely.

(r) If the threshold value of 5 mg/l is exceeded, the use of appropriate automatic valves must ensure that the drainage water is not discharged into the marine environment. Instead of it, the drainage water can, for example, be directed into collection tanks or reprocessed.

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[8] Regulation (EU) 2024/573 of the European Parliament and of the Council of 7 February 2024 on fluorinated greenhouse gases, amending Directive (EU) 2019/1937 and repealing Ordinance (EU) No. 517/2014, available at: Ordinance – EU – 2024/573 – EN – EUR-Lex

**Firefighting foam on helicopter landing decks**

(s) On helicopter landing decks, foaming agents for firefighting foam production shall not contain perfluorinated and polyfluorinated alkyl substances (PFAS).

(t) The provisions of Regulation 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Approval and Restriction of Chemicals (REACH)[9] and Ordinance 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants[10] must be complied with.

(u) Drainage systems connected to the helicopter landing decks must have bypass systems, which ensure that the produced firefighting foam is automatically drained in a collection tank bypassing the oil separator. The firefighting foam shall not be discharged into the marine environment via the drainage system.

(v) Fire-fighting exercises must only be performed using water.

**Diesel generators**

(w) Diesel generators used on platforms shall be certified to the emission limits of Tier III of MARPOL Annex VI, Regulation 13 para. 5.1.1 or to emission standards equivalent to or more stringent than the emission standards defined in MARPOL Annex VI, Regulation 13 para. 5.1.1. This is to be documented.

(x) For OWT, the use of diesel generators for emergency power supply is to be avoided.

(y) Insofar as the operation of diesel generators should be planned, fuel with the lowest possible sulphur content must be used.

**Grouting method and grouting material**

(z) If grouting methods should be used, the grouting material must be as free of pollutants as possible. Corresponding technologies and devices for the grouting process (installation phase) must be used, which prevent the grout material from entering the marine environment as far as possible.

### 7.1.6 Minimisation of scour and cable protection measures

(a) Scour protection measures must be reduced to a minimum. Introduction of hard substrate must be limited to the minimum level necessary for establishing protection of the respective installation. Only rock berm made of natural stones or inert and natural materials are to be used as scour protection on OWT and platforms. The use of concrete or plastic-based alternatives (e.g. geotextile sand containers, (recycled) plastic nets filled with natural stones, plastic-covered concrete mattresses) is not permitted as scour protection on OWT and platforms.

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[9] Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Approval and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93 and Commission Regulation (EC) No. 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC. Available at: EUR-Lex – 02006R1907-20241010 – EN – EUR-Lex

[10] Ordinance (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants. Available at: EUR-Lex – 02019R1021-20241017 – EN – EUR-Lex

(b) If crossing constructions cannot be avoided, they must be reduced to a minimum. Introduction of hard substrate must be limited to the minimum level necessary for establishing crossing construction. Crossing constructions must be made of natural stone or other natural or biologically inert materials. To separate the crossing cable systems within the crossing construction, the use of concrete mattresses is permitted and must be limited to what is absolutely necessary. Further use of concrete mattresses is permitted if technically necessary and must be limited to what is absolutely necessary. In case of an unavoidable use of concrete mattresses, plastic coatings must be avoided. The use of geotextiles is to be excluded.

(c) Preferably rock berm made of natural stones or inert and natural materials are to be used as other cable protection, for instance, on WT and platforms. The use of concrete mattresses or rockbags must be kept to a minimum. The use of cable protection systems containing plastic is only permitted in individual cases and must be kept to a minimum. Rockbags may be used only if they are made of natural fibres, are biologically inert and do not have harmful additives, which dissolve in the seawater.

(d) The use of plastic cable protection systems (CPS) is, in principle, permitted only for crossing structures and in the area of the WT and platform intake and must be limited to what is absolutely necessary – especially if they are lying open on the sediment or are in the water column.

### 7.1.7 Sediment warming

When laying subsea cables, potential adverse effects on the marine environment because of a cable-induced sediment warming should be reduced as part of the legal provisions in accordance with Section 17d para. 1b EnWG. As a precautionary value for nature conservation, the “2 K criterion”, which specifies a maximum tolerable temperature increase in the sediment of 2 degrees (Kelvin) at a sediment depth of 20 cm in the German EEZ, should generally be adhered to. According to Section 17d para. 1b sentence 2 EnWG, a stronger warming than 2 K is permissible if it does not last more than 10 days per year in total. Here, greater warming in individual hours should be added as long as the threshold value of 10 d/a or (240 h/a) is reached. Furthermore, greater warming is permissible if it affects less than 1 km length of OGCS. It is also applicable for in-farm subsea cable of sites and areas for other energy generation and interconnectors. In all cases, the maximum length of 1 km refers to the total length of the project. Accordingly, stronger heating at different sections is approvable as long as a total length of 1 km is not exceeded.

(a) For this purpose, the cable system must be laid at a depth that ensures compliance with the 2 K criterion. Please refer to Planning principle 7.13.6.

(b) Proof of the expected maximum sediment warming must be provided as part of the project approval procedure, taking into consideration the expected operating mode of the submarine cable.

(c) Compliance with the 2 K criterion in ongoing operation should be reviewed by the TSO using model procedures such as transmission capacity management (TCM) II.

### 7.1.8 Bird collision monitoring

For the monitoring of bird collisions with WT, state-of-the-art collision detection systems should be installed in OWF always within all sites and areas for other energy generation designated in the SDP. With reference to Section 77 para. 1 sentence 1 No. 1 WindSeeG and Section 77 para. 3 No. 1 WindSeeG, this provision applies also outside the bird migration corridors. In terms of time, an initial term of 10 years from

commissioning of the installations is to be assumed. The exact configuration of the collision monitoring (e.g. the locations, number, and technical specifications of the survey devices) shall be coordinated with the BSH on a procedure- and site-specific basis. The methods of monitoring must be suitable to interpret the location-specific collision risk in relation to the location-related migration intensity and evaluate it with respect to the impacts of weather conditions and operating status of WT or correlate them. The following requirement should be fulfilled for the respective configuration of collision monitoring, provided it is the latest technological advancements.

(a) Combined surveys of overall site-related migration activity, the number of birds flying through the rotor area, and collisions of birds as well as accompanying data on weather and the operational status of the WT using various systems (e.g. radar, camera, weather sensors) must be conducted.

(b) Methods suitable in terms of a continuous and automated survey (day and night) should be selected, at least during the main migration periods.

(c) The number and position of the measurement points should be selected such that the species composition and number of birds can be representatively surveyed.

(d) The survey systems must be calibrated and the calibration documented.

(e) Specialised bird radars for survey of migration intensity and migration phenology must be used, provided they are the latest technological advancements.

(f) If bats or collisions of bats are detected during bird collision monitoring, these events must be documented and the results included in the reporting and in the enforcement procedure.

#### 7.1.9 Accompanying environmental research

In principle, it should be possible to carry out accompanying environmental research commissioned or supported by the BSH or BfN in the sites designated in the SDP and on the converter platforms designated in the SDP. The project developers support the accompanying research within the scope of their possibilities provided that the proper operation of the WT or platforms as well as necessary maintenance work and ongoing ecological operational monitoring are not adversely affected by the research activities. Where possible, accompanying research projects are taken into consideration during the planning of the OWF or the platforms. Concretisation takes place at the downstream approval level.

### 7.2 No adverse effect on the safety and ease of navigation

The safety and ease of navigation may not be affected by the construction and operation of WT, platforms, subsea cables and other forms of energy generation.

(a) To ensure the safety of shipping and/or facilities, safety zones are established around the WT in accordance with Section 74 WindSeeG – in particular in neighbouring priority or reserved areas for shipping – generally 500 m, measured from any point on the outer edge, around the WT, platform or other energy generation installation. Within the designated areas and outside the designated sites, the safety zone shall be defined in such a way that it is contiguous and gaps are avoided. The safety zone shall be established outside the priority and reservation areas for shipping (ROP 2021).

(b) Structural installations must be designed according to the latest technological advancements in a way that in case of a vessel collision, the damage to the hull is as small as possible and the WT does not fall on the

vessel; this includes the construction and operation of the working vehicles. Compliance with the latest technological advancements is presumed if the requirements of "Standard construction –minimum requirements for design of offshore structures in the EEZ"[11] are met.

(c) The construction of platforms on the border of the area as well as the development of sites should blend in the overall ensemble of the development of the area in which the platform or the site lies and happen cohesively.

(d) In addition, the concerns of shipping (especially in relation to priority and reservation areas) are taken into consideration in the course of conflict minimisation in the selection of routes of subsea cables. The routes run as far as possible away from the main shipping routes. However, in case of sufficient driving depth, the planning at the border of those priority and reservation areas, which are adjacent to the OWF project to be connected, is also feasible provided no negative impact on the route is expected from laying the subsea cables.

(e) WT, other forms of energy generation, platforms and other relevant obstacles should be equipped with the latest state of the art devices for marking, which ensure the safety of shipping and air traffic, up to their distance from the maritime area. In the construction of further sites or areas for other energy generation directly adjacent to the respective site, the developer of the project must adjust the marking for safety of shipping traffic in agreement with the developers of adjacent projects according to the overall development situation in the traffic area.

(f) A maritime surveillance according to the latest technological advancements must be conducted for sites, areas for other energy generation and platforms.

(g) From the start of installation and during the entire installation phase of WT, other forms of energy generation and platforms, a traffic safety vehicle should be used in the site environment for safeguarding the environment of the site and prevention of collisions with vessels. The traffic safety vehicle shall be used from the start of preparatory construction measures insofar as this is necessary for traffic safety. The traffic safety vehicle is to be used exclusively for the purpose of traffic safety. The traffic safety vehicle and its use shall correspond to the latest technological advancements. Until the commissioning of the regular marking, the WT, other forms of energy generation, and platforms must have temporary visual and radio marking according to the state of the art. The site environment must have the latest state-of-the-art-marking as a general danger zone by public display of lighted cardinal marks.

(h) All the implements and vehicles used, including the traffic safety vehicle, must conform in their marking and traffic behaviour to the Ordinance on International Regulations of 1972 for Preventing Collisions at Sea dated 13 June 1977 (Federal Law Gazette I p. 813), last amended by Article 1 of the ordinance dated 7 December 2021 (Federal Law Gazette I p. 5188) and meet the safety standard required for the federal flag or a demonstrably equivalent standard in relation to the equipment and crew. The safety requirements of the Ship safety division of

[11] Available on the BSH website at: https://www.bsh.de/DE/PUBLIKATIONEN/_Anlagen/Downloads/Offshore/Standards/Standard-Konstruktive-Ausfuehrung-von-Offshore-Windenergieanlagen-Aktualisierung-01-06-21.pdf

the trade association for traffic and transport are to be taken into consideration.

(j) The BSH can order measures, in particular the provision of additional towing capacity with suitable bollard pull by the project developer, as part of the approval decision in order to reduce the risk to the safety and ease of navigation (see also the following planning principle).

(k) The OWF project developers of the sites in the traffic area of Shipping route SN10 of ROP 2021 are obliged to ensure that sufficiently dimensioned, additional towing capacities are permanently kept available on site in the catchment area of Shipping route SN10 for the maritime traffic prevailing there and the hazard situation. For this, the relevant authorities have the authority to issue instructions and the right of access if necessary. The project developers of the areas in the catchment area of Shipping route SN10 are obliged to provide the towing capacity in such a way that each is obliged to provide the entire capacity. However, this is required only once in the catchment area of Shipping route SN10 (joint liability). The obligation arises at the time of the first complete development of a site in Areas N-11 or N-12. Any requirements for the necessary design of other additional towing capacities, especially in other traffic areas remain unaffected by this regulation.

### 7.3 No adverse effect on the safety and ease of air traffic

The safety and ease of air traffic may not be affected by the construction, operation, and deconstruction of WT, platforms, subsea cables and other forms of energy generation.

(a) The regulations of the "Standard Offshore Aviation for the German Exclusive Economic Zone"[12] (SOLF) of the Federal Ministry of Transport and Digital Infrastructure (BMDV) in the version applicable in accordance with the transitional provision must be observed in the planning, construction and operation of WT, platforms, subsea cables, and other energy generation facilities as well as the installation and operation of aviation infrastructure in this context.

(b) Existing and planned offshore airfields should be prevented from becoming unusable due to the increase in obstacles in their surroundings. For this purpose, obstacle limitation areas and sectors up to which objects may project into the airspace are defined in the approval procedure. As much as possible, there must be an underlying holistic (i.e. area-wide and, if required, cross-area) strategy. Changes to the obstacle profile because of newly constructed or considerably modified installations may make it necessary to adapt or extend the obstacle limitation areas and sectors of existing or authorised offshore airfields. This may also require a corresponding adaptation or expansion of any obstacle limitation areas and sectors on or in the sites on which these obstacles are constructed. The parties involved must coordinate the alignment and dimensioning of the obstacle limitation areas and sectors during the planning phase. The obstacle limitation areas and sectors of existing (neighbouring) wind farms remain in place.

(c) If justifiable from an aviation safety point of view, obstacle limitation areas and sectors of helicopter landing decks should be

[12] Available at: https://www.verwaltungsvorschriften-im-internet.de/bsvwvbund_12082022_LF156116525.htm

planned in such a way that sites or other energy generation areas of third parties are adversely affected as little as possible. They may not be located beyond the boundaries of the German EEZ, if the express consent of the neighbouring state, whose EEZ is affected is not available.

(d) For helicopter landing decks, for which obstacle limitation areas are made in the form of flight corridors, obstacles along these flight corridors should be equipped with a tower beacon if the corridors should also be operated at night and a tower beacon is required in accordance with the provisions of SOLF. If third-party flight corridors are in a site or an other energy generation area or are directly adjacent to it or them, then the third party should be allowed the installation and operation of these tower beacons.

### 7.4 No adverse effect on the safety of the military

Security of the military may not be affected by the construction and operation of WT, platforms, subsea cables and other forms of energy generation.

(a) In the course of conflict minimisation, the selection of locations for WT as well as platforms and installations for other forms of energy generation or the routing of subsea cables shall take into consideration the concerns of national defence and the alliance commitment.

(b) If the construction or operational work affects reservation areas for defence (military training or restricted areas) designated in ROP 2021 or if the use of acoustic, optical, optronic, magnetic sensor, electrical, electronic, electromagnetic, or seismic measuring devices as well as unmanned underwater vehicles is planned, in view of the obligations resulting from Section 77 para. 3 No. 3 WindSeeG, this must generally be communicated to the Naval Command at least 20 working days in advance stating the coordinates of the respective area of operation and the period of operation. The use of measuring equipment shall also be limited to what is necessary.

(c) Vehicles of the Bundeswehr may navigate the OWF and their safety zones according to the principles of good seamanship, provided the operation and maintenance of the OWF is not affected or affected negligibly.

(d) Sonar transponders should be installed at the suitable corner positions of OWF, platforms, and other forms of energy generation in accordance with Section 77 para. 3, no. 2 WindSeeG. The arrangement and specification of the sonar transponders shall be adapted to the requirements of the Bundeswehr with regard to functionality. Use of mobile sonar transponders is strictly barred.

(e) The Bundeswehr should be able to install and operate fixed installations such as transmitters and receivers on WT, platforms, and other energy generation installations, especially on platforms. This is subject to the proviso that the operation of the military installations on the WT, platforms, and other energy generation installations is necessary from a military point of view for national and alliance defence and that the operation of the WT, platforms, and other energy generation installations be adversely affected as little as possible as a result.

(f) For all subsea cables and pipelines that cross reservation areas for the defence of ROP 2021 (military exercise or prohibited areas), the operator of a pipeline must grant access to the responsible authorities of the Bundeswehr.

### 7.5 Removal of devices

If the planning approval decision or the planning permission becomes invalid, the installations must be removed in accordance with Section 80 para. 1 WindSeeG. The facilities are to be removed with the objective of ensuring the complete subsequent use of the site as well as the restoration of the performance and functionality of the site. The BSH shall decide on the scope of removal considering the concerns named in Section 69 para. 3 sentence 1 No. 1 to 4 WindSeeG, the latest technological advancements in science and technology, and the generally recognised international standards as well as the requirements of an Ordinance under Section 96 No. 7 WindSeeG.

After deconstruction, the reuse of removed components before recycling and this, before any other, especially energetic recovery should be strived if possible, otherwise the removed components should be – demonstrably – properly removed on land.

### 7.6 Determination and consideration of objects

A subsoil investigation and route investigation[13] according to the BSH standard for subsoil exploration should be conducted and evaluated as a basis for the planning and execution of the installations. The available cables, subsea cables and pipelines, wrecks, cultural assets, and material assets as well as other objects on the site, route, platform site, or the area for other forms of energy generation should be determined in this context.

(a) Any sites where objects have been found should be taken into consideration when selecting the site or route. The developer of the project is responsible for the resulting necessary measures (e.g. adaptation of farm layout, protective measures, or recovery and removal).

(b) If there is unexploded ordinance on the site, route, platform site, or the area for other forms of energy generation, protective measures should be taken. If unexploded ordinance is found, proceed in accordance with the instructions of the BSH “UXO Survey and Procedure in finding unexploded ammunition in the area of German EEZ of the North Sea and Baltic Sea”14. In particular, the reporting obligations must be followed and measures should be taken.

### 7.7 Consideration of cultural assets

Known sites where cultural assets have been found should be taken into consideration when selecting the site or route. If previously unknown shipwrecks of cultural and historical value be found in the seabed during the planning or construction of WT, platforms or subsea cables, and other energy generation installations, exclusion areas with a radius of generally 50 m around the dimensions of the place of recovery should be provided. If necessary, this can also be designated for known shipwrecks. No impacts whatsoever on the seabed or the previously found shipwreck are permitted in this exclusion zone. Measures are to be taken to safeguard the cultural asset while safeguarding the overriding public interest in the development of offshore wind energy. The authorities responsible for the preservation of monuments and archaeology should be involved at an early stage when sites are found.

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[13] Available at https://www.bsh.de/DE/PUBLIKATIONEN/_Anlagen/Downloads/Offshore/Standards/Standard-Baugrunderkundung-Offshore-Windenergieanlagen.pdf?__blob=publicationFile&v=13

[14] Available at https://www.bsh.de/DE/THEMEN/Offshore/Offshore-Vorhaben/_Anlagen/Downloads/Hinweise_Munition.pdf?__blob=publicationFile&v=2

### 7.8 Official standards, provisions or concepts

For the planning, construction and operation of WT, platforms, subsea cables, and other energy generation installations, official standards, specifications, and concepts must be observed, taking into consideration any transitional regulations in their currently applicable version and the overriding public interest in the construction of WT and OGCS. The overriding public interest in the construction of WT and OGCS must be taken into consideration in weighing up the protected assets.

### 7.9 Communication and monitoringG

In order to ensure the safety of installations as well as the safety and ease of traffic, sufficient communication infrastructure and monitoring shall be ensured in the vicinity of the WT and platforms.

(a) The latest technological advancements facilities for coastal radio stations in maritime mobile service approved for bidirectional communication with shipping should be developed and operated on suitable WT or installations in areas for other energy generation within a site or other energy generation area. This includes the survey of Automatic Identification System (AIS) data. For the range requirement for the installations, a coverage of at least 15 nautical miles (nm) around the outer boundary of the site or other energy generation area is specified with a ship antenna height of 5 m to be taken into consideration. Furthermore, meteorological environmental data (wind direction, wind force, temperature, and visibility) are to be recorded and transferred with the aforementioned data. The data are to be sent out or handed over to the Federal Waterways and Shipping Administration (WSV) according to their specifications.

(b) OWF project developers must ensure that a state-of-the-art mobile radio network is operated within a site and within 2 nm of the outer boundary of the site.

(c) In the North Sea, OWF project developers for Sites N-6.8, N-9.5, N-12.6, and N-13.1 must install state-of-the-art radar systems at suitable structures on the respective site. The binding designation of the installation locations of the radar systems is carried out in the project approval procedure by the BSH in consultation with the GDWS. The data must be provided to the WSV via a suitable interface according to its specification.

(d) In the Baltic Sea, the responsible TSO must install a state-of-the-art radar system on the OST-2-4 platform. There is also a need for a radar system in the area of Site O-1.3 and Transformer platform OST-1-4. The data must be provided to the WSV via a suitable interface according to its specifications.

(e) If drone flights are recorded as part of bird collision monitoring or bird migration monitoring and the operator is not known, this must be reported immediately to the responsible authorities and the Maritime Safety Centre (MSC) – if necessary with the help of automated evaluations.

(f) If drone flights or unauthorised maritime traffic are sighted during activities on the wind farm (e.g. repair and maintenance work), this must be reported immediately to the responsible authorities and the MSC.

The principles (a) and (b) are not applicable if a coverage of OWF and the surrounding traffic space is from land. Principles (c) to (f) apply from the announcement of this plan.

### 7.10 Consideration of all existing, approved[15], and designated uses

Due consideration should be given to existing and approved uses as well as designations made in the context of this plan and other concerns worth protection. Where subsoil conditions do not require greater distances, the following principles shall apply:

#### 7.10.1 General information

(a) Other designations and existing and approved uses, usage rights and other concerns worth protection should be considered in the concrete selection of locations of WT, platforms, other forms of energy generation as well as routing of subsea cables.

(b) Planning, construction and operation of the WT, platforms and subsea cables should be executed in close coordination between the TSO and OWF project developer.

(c) When using sites for wind energy that overlap in whole or in part with reservation areas for raw material extraction of ROP 2021 in the EEZ of the North Sea, special consideration must be given to the concerns of raw material extraction. If possible, a multiple use should be permitted in the overlap areas.

(d) In overlap areas of sites for wind energy with reservation areas for research in the EEZ of the North Sea, which were defined by ROP 2021, the concerns of research must be given special consideration. If possible, fishery research should be allowed in these areas to the same extent and in the same manner as before. For the affected overlap areas, it is stipulated that two corridors at a 90° angle to each other should be kept free of WT when planning the park layouts. The corridors should have a total length of 5 nm and a total width of 1.025 nm so that research vessels can carry out a half-hour haul at a speed of 4 knots with bottom-disturbing fishing gear (trawls) towed freely in the water column. Please refer to Planning principle 7.13.6. The safe access and exit of the corridors should also be ensured, and the ground in the area of the corridor should be kept free of obstacles. After the award of affected sites, the parties concerned must independently discuss the specific organisation of research opportunities. These requirements apply exclusively to WT that are firmly anchored to the seabed.

#### 7.10.2 Pipelines

Impacts on the seabed should be strictly avoided in a protection zone of 500 m on both sides of the pipelines. Exceptions are permissible only if an influence within the 500 m is justified and unavoidable and agreed upon with the operator of pipelines. Compliance with the current standards for technical and organisational safety measures must be ensured.

#### 7.10.3 Subsea cables

(a) A distance of 500 m must be maintained on both sides of the subsea cables of third parties by WT, in-farm cabling, platforms of the OWF operator, or other forms of energy generation. The in-farm cabling of OWF or areas for other energy generation must be designed in such a way that existing, authorised, or planned pipelines as well as existing, authorised, and defined subsea cables and pipelines within the framework of this plan are not crossed as far as possible. If a crossing is unavoidable, the provisions of Planning principle 7.13.4 to Kreuzungen are applicable.

[15] It is clarified that “approved” means all approval procedures.

(b) When laying subsea cables in parallel, a distance of 100 m must be maintained between the individual systems alternately and a distance of 200 m after every second cable system. Here, especially in the Baltic Sea, the concrete ground conditions must be taken into account. From a construction technology perspective, deviations from the SDP route should be minimised, and, where possible, a laying radius of 250 m should not be exceeded at turning points.

(c) If the routes for cross connections of installations with each other cross designated sites and do not run parallel to the grid connection system of TSO, the transfer areas between two neighbouring sites are designated. A width of 500 m is designated for these transfer areas. It must be ensured that cross connections of installations with each other can be routed through transfer areas at the site boundaries. When selecting the locations of the WT, it must be taken into consideration that the route for a connection between installations may be no more than 20% longer than the direct route from the converter platform to the site boundary. The route of cross connection of installations with each other should also be as straight as possible. The necessary distances between WT and subsea cables must be taken into consideration. Because the cross connection of installations would be realised only after a site has been put out to tender, the OWF project developer can propose a deviating crossing-free route within a corridor with a maximum width of 1,000 m as part of its own approval procedure.

#### 7.10.4 Platforms

WT should strictly not be constructed in a protection zone of 1,000 m around the location of converter platform designated in SDP. Exceptions to this are possible in agreement with the TSO within an area of 500–1,000 m around the site. Work within the entire 1000 m protection zone may be carried out only in agreement with the responsible TSO.

#### 7.10.5 Wind turbines and other forms of energy generation

WT and other forms of energy generation must maintain a sufficient distance from the WT of neighbouring sites or areas for other energy generation

(a) A distance of at least five times the larger rotor diameter must be maintained between WT in neighbouring areas and areas for other energy generation. This includes WT that are approved or are in planning. If neighbouring OWF are planned during the same period, proof of coordination with the respective project developer must be submitted as part of the individual project approval procedure.

(b) WT must strictly maintain a distance of at least two and half the times of the rotor diameter of the WT placed within the respective site or other energy generation area from the centre line, which arises from the boundaries of two neighbouring sites or areas for other energy generation or the boundaries of a site and a neighbouring other energy generation area.

(c) WT must strictly maintain a distance of at least five times the larger rotor diameter from the approved WT in exclusive economic zones or territorial seas of neighbouring countries. In case of a simultaneous planning of neighbouring wind farm, there should be coordination between the respective project developers for conformance to a corresponding distance.

(d) When designating an OWF layout and deciding on the design loads of the WT for stability, the project developer must make suitable assumptions to ensure that WT can be constructed in neighbouring sites or other

areas for energy generation while maintaining a distance of at least five times the rotor diameter or the distance resulting from (a) to (c).

(e) The construction of WT and other energy generation installations is permitted only within the designated sites or in areas for other energy generation.

Principles (b) and (c) are applicable only for WT within sites and other energy generation areas designated from this SDP (see Tabelle 1) as well as for SEN-1 and N-13.3.

### 7.11 Specific planning principles for sites and wind turbines

Planning principles for sites, primarily for the construction and operation of WT are listed below.

#### 7.11.1 Deviation of the actually installed output from the allocated grid connection capacity

The number of WT to be installed on the site and, if applicable, any generation output in excess of the allocated grid connection capacity shall generally be determined as part of the approval procedure.

(a) If the scope of increase in installed output does not exceed 10% of the allocated grid connection capacity, the OWF project developer does not have to provide any additional proofs. If, on the other hand, the bidder intends to increase the installed output by more than 10% of the allocated grid connection capacity, approval from the TSO is required with regard to compliance with the maximum temperatures of the operating equipment of the TSO.

(b) For Sites N-9.4 and N-9.5, the actual output to be installed should exceed the allocated grid connection capacity by 20%. Notwithstanding (a), the OWF project developer is not required to provide additional evidence of compliance with the maximum temperatures of the operating equipment of the TSO.

(c) The additional WT are to be constructed within the allocated site.

### 7.12 Specific planning principles for platforms

Planning principles for platforms are listed below. Platforms usually include converter platforms, collector platforms, transformer platforms, platforms for other energy generation installations, and accommodation platforms as well as other platforms located in areas or other energy generation areas.

#### 7.12.1 Planning and public display of platforms

During planning, construction, operation and deconstruction of the platform, particular attention shall be paid to structural safety, supply and disposal, including the provision of drinking water, sewage water treatment and occupational health and safety concerns, including escape routes and means of rescue.

(a) The compliance of this planning principle should be presented in the project approval procedure.

(b) The accommodation of personnel on platforms should take place in accommodation already provided for this purpose during the planning of the platform. The later installation of residential units, which were not planned in the concept in terms of residential units already considered in the planning of the platform (temporary living quarters), is to be avoided.

(c) At least two independent means of access and egress suitable for the purpose of escape and rescue shall be provided for a platform; these shall use different transport systems.

(d) A helicopter hoist platform can be set up on platforms as a rescue area for emergencies. Their use is in principle restricted to the prevention of danger to life and limb of persons (emergency) or to necessary measures; regular access of persons to the platform by means of helicopter hoist operation is not permitted.

(e) When dimensioning the rescue and emergency response resources, longer arrival times and maximum ranges (outward and return journeys) because of the greater coastal distances of the emergency resources and forces must be considered.

### 7.13 Specific planning principles for subsea cables

The planning principles for subsea cables are listed below. For the purposes of this plan, these include power cable systems such as OGCS, interconnectors, cross connections, an subsea cables for other energy generation installations. For subsea cables of the in-farm cabling – also those of other energy generation areas – the following planning principles apply with the exception of 7.13.2 and 7.13.3.

#### 7.13.1 Bundling

(a) The biggest possible bundling in line with a routing parallel with each other should be sought while laying the subsea cables.

(b) The routing should be as parallel as possible to existing structures and structural installations.

#### 7.13.2 Routing through gates

(a) Subsea cables that go ashore in Germany must always pass through Gates N-I to N-V and O-I to O-V defined at the border with the EEZ and the 12 nm zone.

(b) Interconnectors must also be routed through the defined gates.

(c) Interconnectors that do not go ashore in Germany should not be routed through the gates defined at the EEZ border and the 12 nm zone.

#### 7.13.3 Crossing of shipping lanes

Submarine cables should be routed through traffic separation zones (TSZ), the continuations of these, and the Kiel–Baltic Sea route by the shortest possible route if parallel routing to existing structures is not possible.

#### 7.13.4 Crossings

Crossings are to be kept to the minimum necessary from a planning and technical point of view.

(a) Crossings of subsea cables with each other and with pipelines should be avoided as far as possible.

(b) If crossings cannot be avoided, they are to be the latest technological advancements, and should be designed at right angle as far as possible and in agreement with the owners of the affected, laid, or approved subsea cables and pipelines.

(c) Crossings between subsea cables designated in the SDP are to be designed free of construction, (e.g. by laying the first system to be crossed in the expected crossing area sufficiently deep) provided the local geological conditions permit it. A decision is reserved for individual cases as part of the approval procedure.

(d) The design of crossing structure must be as environment-friendly as possible depending on the seabed conditions (also refer the regulations under Planning principle 7.1.6).

(e) If possible, crossing structures should be designed such overfishing can be done in the area for fishery, even with seabed touching trawls.

(f) When planning a crossing construction, the subsoil conditions and the respective laying

radii of the cables must be taken into consideration.

(g) In the case of crossings, the conditions of planned crossings are to be contractually agreed with the owners of affected, laid or approved underwater cables and pipelines.

(h) In the event of cutting of decommissioned cables (out-of-service cables), these cables shall be laid down and their cable ends fixed in the seabed in such a way that any adverse effects on shipping and fishery are permanently ruled out. The sealing of the seabed by the fixation must be limited to what is absolutely necessary. Please refer to Planning principle 7.5.

### 7.13.5 Minimally disruptive cable laying procedure

According to Section 17d para. 1a of the EnWG, all the technically suitable methods can be used for the construction of OGCS. In order to protect the marine environment, the gentlest possible cable laying procedure should be chosen from those available in each case as long as this allows parallel laying of multiple OGCS and the timely laying.

(a) Any anchor positions should be placed such that significant adverse effect of legally protected biotopes is avoided as far as possible.

(b) When clearing stone, avoid clearing over large areas. The clearing of individual stones must be carried out within a 20 m wide impact zone (10 m to the right and left of the route) or 30 m in curved areas. The stones shall be deposited as close as possible to their recovery site, preventing uplift from the water body, and no more than 20 m outside the working strip within the biotopes. Area clearance and clearance outside the impact zone must be applied for separately and approved by the BSH.

(c) In the case of reef occurrences, a minimum distance of 50 m is to be maintained where this is technically possible. Please refer to Planning principle 7.1.1.

(d) The non-natural obstacles recovered during the pre-lay grapnel run must be disposed of properly on land. Proof must be submitted to the BSH in writing. The pre-lay grapnel run must be carried out exclusively on the subsequent cable route and must be located within the working strip of the actual cable laying. Should additional work be necessary to the left and right of the route, this should be limited to exceptional cases and kept to a minimum.

### 7.13.6 Covering over

When designating the permanent covering over of subsea cables, the concerns of marine environment protection, shipping, defence, and system security must be considered within the framework of weighing decisions, taking into consideration the overriding public concerns in offshore wind energy.

(a) A covering over of at least 1.5 m should be designated for all subsea cables in the EEZ of the North Sea outside the areas and areas for other energy generation designated in the SDP.

(b) A covering over of at least 1.5 m should be designated for all subsea cables in the EEZ of the North Sea for the corridors for scientific research vessels in the overlap areas of sites for wind energy with reservation areas of scientific research.

(c) The covering over for subsea cables in the Baltic Sea is designated in an individual procedure based on the comprehensive study in agreement with the GDWS as well as with the involvement of the BfN. The study and the proposed covering over of the various

route sections based on it are to be submitted to the BSH in principle with the application documents.

### 7.14 Deviation possibilities

The possibility of deviating from planning principles depends, among other things, on whether the planning principles are based on binding regulations from sectoral law. If special provisions can be found from the sectoral law, any deviations from this should be measured. It is not possible to deviate from mandatory regulations (e.g. renewable energy law or nature conservation law such as the Offshore wind Energy Act, the Federal Nature Conservation Act, and other national specialised laws as well as binding Union law provisions).

With regard to existing official standards, provisions and concepts, the SDP does not make any new designations but rather refers to existing rules. Accordingly, it does not make any statements on the possibilities for deviation regulated within this framework.

Deviations from objectives within the meaning of Section 3 para. 1 No. 2 ROG are possible only under the conditions specified in the ROG as part of an objective deviation procedure according to Section 19 in conjunction with Section 6 para. 2 ROG.

Furthermore, in justified cases, it is possible to deviate from planning principles that are not based on mandatory sectoral law or which do not represent maritime spatial planning objectives. This concerns cases in which compliance cannot or can no longer be guaranteed because of special framework conditions. Furthermore, some situations are conceivable in which not all principles can be implemented at the same time because they partly serve conflicting concerns and must therefore be offset.

If sectoral law does not provide any binding provisions, options for deviations in foreseeable (individual) cases are outlined in the respective planning principles.

In an overall consideration, it is necessary that the deviation fulfils the objectives and purposes of the respective principle and of the plan pursued by the rule in an equivalent manner or does not adversely affect them in a significant manner. The basic principles of planning may not be affected. Following the principles developed within the framework of the ROG, atypical individual cases in particular may be an indication of such possible deviations.

Section 1 para. 3 WindSeeG shall be taken into consideration when defining the planning principles.

## 8 Pilot offshore wind turbines

The grid connection capacities available for pilot offshore wind turbines according to Section 95 para. 2 WindSeeG are shown in Tabelle 8. This is a free capacity on the converters or DC grid connection systems in the North Sea and AC grid connection systems in the Baltic Sea, for which, neither an unconditional grid connection confirmation under Section 118 para. 12 of the EnWG nor an allocation under Section 17d para. 3 sentence 1 or Section 118 para. 19 of the ENWG nor an award under Section 14a, Section 23 or Section 34 WindSeeG, has been issued until now.

Table 8: Grid connection capacities available for pilot offshore wind turbines

| Grid connection | Available grid connection capacities for pilot offshore wind turbines |
|---|---|
| **North Sea** | |
| NOR-2-2 DolWin1/alpha | 38.44 MW |
| **Baltic Sea** | |
| OST-1-3 | 15 MW |
| OST-2-1 | 3 MW |

| | |
|---|---|
| OST-2-3 | 23.75 MW |

In order to prevent spatial conflicts, the SDP also sets out the following provisions for the grid connection of pilot offshore wind turbines for the area of the German EEZ:

(a) In accordance with Section 5 para. 2 WindSeeG, pilot offshore wind turbines may be constructed only in the areas designated in the SDP.

(b) For the consideration of public and private concerns, the planning principles under II.7 must be adhered to.

## 9 Areas for other energy generation

The other energy generation area SEN-1 was designated in SDP 2023 in the EEZ of the North Sea. This revision makes no new designations for areas for other energy generation compared with SDP 2023.

The planning principles of the SDP and the objectives and principles of ROP 2021 must be complied with.

A grid connection of area SEN-1 to existing and planned pipelines that exclusively transport the final energy carrier (e.g. hydrogen) is mandatory. For a grid connection to an existing pipeline, the required stub cable should be planned to the shortest possible route within the area for other energy generation and crossings with own cables as well as third-party cables should be avoided as far as possible.

The pipeline operator must ensure the facility of discrimination-free connection of more areas for other energy generation operated by third parties if the final energy carrier is taken away through such a pipeline.

# III. Reasoning

Amendment and revision of the SDP in agreement with the FNA, Section 8 para. 1 para. 4 sentence 2 in conjunction with Section 6 WindSeeG is the responsibility of the BSH. Designations for an installed output of WT of at least 30 GW, connected to the grid were already made with the Site Development Plan 2023. Therefore, to attain a at least 70 GW by 2045 in the long-term according to Section 1 para. 2 sentence 1 WindSeeG, will need further revisions. Because of changes (e.g. those in the legal framework, findings, or planning), changes beyond these designations are also necessary. This has been taken into account in the SDP.

## 1 Areas and sites

Scope of the designations

Compared with the draft SDP of 7 June 2024, the scope of the designations for areas and sites has been reduced with regard to the sites. While sites within the expansions of Areas N-9, N-12, and N-13 will continue to be designated, there will be no designations of sites in Areas N-14 and N-16. On one hand, this is due to current investigations by the TSO with the objective of increasing the transmission capacity of OGCS while maintaining the voltage level of 525 kV. An increase in the standard transmission output to over 2,000 MW would have effects on site allocations and the expected generation output to be installed on these sites. On the other hand, the FNA and the BSH are currently examining on behalf of the BMWK to what extent a deviation of the installed OWF output from the grid connection capacity could achieve further economic optimisation of the energy supply from offshore wind energy. A systematic deviation of the installed OWF output from the grid connection capacity would also have effects on the designation of sites because of additional degrees of freedom in the selection of the expected generation output. In order not to stand in the way of possible further technical development of OGCS and further optimisation of energy provision as a whole, the early designation of sites and OGCS in Areas N-14 and N-16 in this SDP is refrained from. The tender of the specified volume according to Section 2a WindSeeG for 2025–2026 is ensured by the designation of sites in the expansions of Areas N-9 and N-12.

Coordination with the Netherlands and Denmark

The spatial designations of areas N-9, N-12, N-13, N-14, N-16, and N-17 implement the results of consultation with the authorities in the Netherlands and Denmark concerned. In this process, different variants for additional wind energy areas in the area of shipping route SN10 were investigated regarding their consistency with the concerns of shipping (vgl. ABL Group, 2022; ABL Group, MARIN, 2024). The variants were additionally investigated with respect to their contribution for wind energy use, specifically, in relation to additional size of the site and potential installed capacities. Furthermore, the expected energy yield and the generation efficiency (e.g. expressed as full load hours) is investigated for many variants (vgl. Dörenkämper, et al., 2023; Vollmer & Dörenkämper, 2023; Vollmer & Dörenkämper, 2024a; Vollmer & Dörenkämper, 2024b).

In principle, variants of a central strip for wind energy outlined in ROP 2021 were considered as well as variants of peripheral development as an alternative. In the international coordination, solely the peripheral development has proved to be an implementable option.

In a second phase of the investigations, different variants of the peripheral development were analysed in depth with regard to their effects on the safety and ease of navigation. The results of these investigations were recognised as a good working basis in consultation with the responsible ministries and authorities in the Netherlands, Denmark, and Germany. This SDP realises the

preferred option from the planning perspective of the BSH.

The investigations of the experts clearly showed that the option of building on the edge of Shipping route SN10 with a simultaneously closed Shipping route SN17 and an alternative route through Denmark is fundamentally suitable in terms of the safety risk for shipping. This option reduces potential risks for shipping, especially in the crossing area of shipping routes SN10, SN15 and SN17 and simultaneously opens up other areas for Offshore wind energy. Denmark, Netherlands, and Germany have intensively exchanged ideas on various options of northbound route based on the insights from the expert report. At this time, no concerns regarding the safety and ease of navigation were identified for the route preferred by Germany. For this reason, this preferred option will be implemented as the basis for further site development planning for offshore wind energy.

This preferred option is based on adjustments to the routing of Shipping routes SN10, SN15, and SN16 of ROP 2021, which are intended for international maritime traffic. Shipping route SN17 is not provided further.

The width of Shipping route SN10 will be reduced compared with the designations in ROP 2021 by designating areas on its edge. This is compatible with the concerns of shipping because there is still a sufficiently large corridor of around 15 nm available for shipping. This is also confirmed by the results of the international Formal Safety Assessment, which was carried out jointly with Denmark and the Netherlands (ABL Group, MARIN, 2024). The areas not needed for shipping are therefore provided for use by wind energy in this SDP. This allows the expansion of Areas N-9, N-12, and N-13 to the north-west and the designation of Areas N-14 and N-16, which in their spatial extension to the south-east go beyond the designations of the reservation areas for wind energy EN14 and EN16 of ROP 2021.

The course of Shipping route SN15 will, in fact, be slightly adjusted compared with the designations of ROP 2021 as a result of the planned development and will now run slightly further north. The adjusted route considers areas for extraction of hydrocarbons in the Dutch EEZ. In order to ensure coherent routing, it will be necessary to adjust the neighbouring areas for wind energy compared with the designations of ROP 2021. However, this will have no effects on the total expected generation output. The width of shipping route SN15 remains unchanged.

Compared with the designation of ROP 2021, the course of Shipping route SN16 will, in fact, be laid to the north as a result of the planned development with the objective of enlarging the sub-area of Area N-17 for wind energy located to the south of Shipping route SN16. As a further consequence, the northernmost sub-area of reservation area EN17 of ROP 2021 will no longer be considered for wind energy. The width of shipping route SN16 remains unchanged. The course of adjusted shipping route SN16 overlaps with the nature conservation area Dogger Bank. The course of this route was also the subject of international coordination with Denmark and the Netherlands and was taken into consideration in the shipping report (ABL Group, MARIN, 2024).

Shipping route SN17 of ROP 2021 has been discontinued. The alternative routes (vgl. ABL Group, MARIN, 2024) adopted as part of the Formal Safety Assessment lead to a reduction in the risk of collision at the intersection of Shipping routes SN10, SN15, and SN17. As a result, the wind energy Area N-16 can be expanded by the area no longer needed for shipping.

The de facto adjusted shipping routes as a result of the development take into consideration the overriding public interest in the realisation of offshore WT and result in an expansion of the areas for wind energy use. Reference is made to the deviation procedure carried out as part of the revision procedure for the SDP (cf. Section IV.7for details).

Apart from the expansions and adjustments described, Area N-14 covers major parts of reservation areas for wind energy EN14 and EN15 designated in ROP 2021, and Area N-16 covers major parts of reservation areas for wind energy EN16 and EN18.

Site N-6.8

Site N-6.8 was slightly enlarged compared with SDP 2023 because of the omission of a route for cross connections between installations still planned in SDP 2023.

Site N-12.6

Although fishery for Norway lobster in the overlap area of Site N-12.6 with Reservation area FiN1 is of particular importance, the concerns of wind energy, which are in the overriding public interest and serve public health and safety, prevail here. There is a lack of reliable knowledge on the specific design of further designations for fishery for Norway lobster in the overlap area. This also applies to the overlap area with Site N-13.4 and Area N-16; in any case, these are not chronologically ranked.

Area N-13 and Site N-13.1

Between Sites N-11.2 and N-13.1, SDP 2023 does not designate a distance of 1,000 m regularly provided for sites with a commissioning after 2030. This inconsistency in planning is corrected and Area N-13 as well as Site N-13.1 are accordingly reduced on the south-west edge by a strip of around 280 m width.

Among other things, because of the distances of at least five times the rotor diameter to be anyway maintained from the WT of Site N-11.2, it is assumed that adjustment of the site layout implies no significant restriction for the actual development of Site N-13.1. The site is therefore changed in line with a consistent plan and equal treatment of sites compared to the designation of SDP 2023. A sub-area of Area N-13 is shown as an area under review (see the following comments on Site N-13.4).

Site N-13.4

There are insights only on the occurrences of legally protected biotopes and for geological quality of the seabed with potential impacts on the further development of sites for Site N-13.4. Further information can be found in the environmental report.

Parts of the site are designated as a site under review because there is an overlap with the conditional priority area EN13-North of ROP 2021. According to this, this area is designated as a priority area for wind energy unless the federal ministry responsible for shipping proves to the federal ministry responsible for maritime spatial planning by 31 December 2025 that this area is required for shipping for compelling reasons of safety and ease of navigation.

There is no time designated for this site in this revision procedure.

Area N-14

Area N-14 has a partial overlap with the reservation area hydrocarbon extraction KWN2 designated in ROP 2021, which is based on the exploration licence Area NE3-0002-01. With the expiry of exploration licence NE3-0002-01 (Landesamt für Bergbau, Energie und Geologie, 2023) the direct reason for safeguarding the space of production of raw material by the reservation area KWN2 of ROP 2021 is not applicable. The construction of wind turbine is of overriding public interest and serves the public security. Use of Area N-14 by wind energy is in agreement with the requirements of maritime spatial planning.

Area N-19

Area N-19 is located entirely within the FFH habitat type sandbank “Dogger Bank” (cf. Figure 13 in Section 2.5.2 in the North Sea Environmental Report) reported to the EU by the BfN and thus within a legally protected biotope. In addition, there are initial indications of the occurrence of

coarse sediments that may be classified as legally protected biotope type gravel, coarse sand, and shell layers (KGS). It is assumed that the KGS biotopes are so small-scale that they can be adequately taken into consideration or bypassed in the detailed planning of the sites of Area N-19. In accordance with Section 72 para. 2 WindSeeG, a significant adverse effect on biotopes within the meaning of Section 30 para. 2 sentence 1 BNatSchG[16] should be avoided as far as possible. This means that a protected biotope would not necessarily prevent development. A corresponding assessment of the significance and, if necessary (depending on the assessment result), a subsequent assessment of the question of avoidability within the meaning of Section 72 para. 2 WindSeeG would have to be carried out when the plans are further specified at the subsequent planning or project levels. Further information can be found in the environmental report.

Area under review N-20

Area N-20 (under review) spatially matches Area EN20, which is designated in ROP 2021 as reservation area of Offshore wind energy from 1 January 2027 unless the Federal Ministry responsible for fishery research proves to the Federal Ministry responsible for maritime spatial planning by 31 December 2026 that keeping the area free of development by wind turbines is indispensable for fishery research (cf. Principle 2.2.2. (2) para. 3 of ROP 2021). In addition, EN20 also partially overlaps with Reservation area for research FoN3; in this respect, fishery research should remain possible in the type and scope in which it is currently carried out (cf. Principle 2.2.2. (3) of ROP 2021).

For designation of Areas N-4 and N-5 for subsequent use

To date, since the initial preparation of the SDP in 2019, Areas N-4 and N-5 have had the status “Area for subsequent use under review” for nature conservation and environmental reasons. Both the areas, N-4 and N-5, are located in important habitats of protected species/species groups. The requirement to review the areas with regard to any subsequent use arises from Section 8 para. 3 WindSeeG. The wind farms in operation in Areas N-4 and N-5 for subsequent use are among the first projects to go into operation. For these, the question of subsequent use therefore arises at an early stage. For this reason, the current revision of the SDP includes designations for the subsequent use of Areas N-4 and N-5 in order to create planning certainty for the future use of these areas.

Also against the background of the increase in the expansion targets for offshore wind energy to at least 70 GW in 2045, a further assessment of the subsequent use of Areas N-4 and N-5 appeared necessary because the initial situation has changed: In the previous assessment, it was possible to prioritise possible areas that appeared preferable to Areas N-4 and N-5 in the overall view without the implementation of statutory expansion targets being called into question. In view of the constant installed output to at least 70 GW, there are hardly any areas available, where competing uses of offshore wind energy are permitted and which are also more suitable for nature conservation than N-4 or N-5. Area N-4 is designated in the previous layout according to ROP 2021. An expected output to be installed of 2,000 MW is presently assumed for Area N-4 for subsequent use.

[16] Federal Nature Conservation Act of 29 July 2009 (Federal Law Gazette I p. 2542), last amended by Article 48 of the Act of 23 October 2024 (Federal Law Gazette 2024 I No. 323).

A changed layout is designated for Area N-5. The Butendiek OWF within Sub-area II of the "Sylt Outer Reef – Eastern German Bight" nature conservation area and the Dan Tysk OWF immediately adjacent to Sub-area II are not designated as an area or site for subsequent use.

The following considerations underlie the area layout N-5:

- Shipping: The area is determined under consideration of a possible expansion of shipping route SN7 (object of the research project "Traffic flows in the EEZ" currently planned by the BMDV (the Federal Ministry for Transport and Digital Infrastructure)). The area has a distance of 2 nautical miles from the priority area SN7 defined in ROP 2021. At the same time, Shipping route SN8 will be closed. Compared with the draft SDP of 7 June 2024, a small-scale adjustment has been made to the north-western edge of Area N-5. This is now based on the trilaterally agreed reorganisation of SN15.
- Output: In the interest of efficiently using the grid connection, as outlined in Section 5 para. 4 sentence 1 WindSeeG (see below for further explanation), the area is defined on the assumption that its size should enable an output equivalent to a multiple of the standard transmission output of an OGCS, which is 2,000 MW. Based on this, it is assumed that the output to be installed in Area N-5 will increase to 4,000 MW in the course of subsequent use.

From an environmental point of view, the following aspects must also be taken into consideration in the subsequent use of Areas N-5 (rezoning) and partly Area N-4. These do not preclude the designation of an area and will be appropriately taken into consideration as part of the specific site designation in a further revision procedure:

- The location in the main concentration area of the harbour porpoise results in restrictions with regard to the subsequent use of Areas N-4 and N-5 in accordance with the reasoning to Section 2.4 para. 4 ROP 2021 in that particular attention should be paid to the effectiveness of avoidance and mitigation measures, especially during the sensitive season, when constructing wind turbines at the approval level (cf. ROP 2021). The noise protection concept of the BMU (BMU, 2013) must be strictly applied (cf. Planning principle 7.1.3). Low-noise, alternative foundation methods are to be favoured here.
- Consideration of occurrences of very coarse sediments (superficial boulder clay), local boulder fields, reefs, species-rich KGS biotopes protected by law according to Section 30 BNatSchG, and the FFH habitat type sublittoral sandbanks (1110) in Area N-5 during the subsequent detailed area layout and site selection for WT.
- Consideration of an appropriate distance to Area II of the "Sylt Outer Reef – Eastern German Bight" nature conservation area in the east and to Sub-area III in the south (cf. Ordinance on the designation of the "Sylt Outer Reef – Eastern German Bight" nature conservation area, NSGSylV[17]).
- The closure of Shipping route SN8 and the newly included Planning principle 7.1.4 are expected to mitigate the scaring effects on seabirds and resting birds in the main concentration area of divers.

[17] Ordinance on the designation of the "Sylt Outer Reef – Eastern German Bight" nature conservation area of 22 September 2017 (Federal Law Gazette I p. 3423), which was amended by Article 1 of the Ordinance of 4 December 2024 (Federal Law Gazette 2024 I No. 397).

In accordance with the aggregated map of the spatial distribution of the sensitivity of seabirds to OWF (products of logarithmised individual densities and species-specific sensitivity summed across all species) in the German North Sea based on the modelled distribution for 2011–2016 of (Dierschke, et al., 2024), the area of the rezoning of Area N-5 is not of outstanding importance overall for most seabird and resting bird species considered.

Area size

According to Section 2a para. 2 WindSeeG, each area to be put out to tender should permit an installed output of 500 to 2,000 MW in principle. For this SDP, it is assumed that an OGCS with a standard output of 2,000 MW will connect one or two sites each. This is expected to result in an expected generation output of 1,000 to 2,000 MW per site. The reason for the designation of large areas with the resulting reduction in individual sites and OWF projects is the associated expectation of increased efficiency for the various phases of a site or an OWF from planning and preliminary investigation to tender and approval to realisation and operation to deconstruction. In individual cases, these considerations lead to the designation of sites with two spatially separate sub-areas, as in the example of Site N-13.4.

The reason for the grid connection of two sites specified for individual connection systems and the resulting expected generation output of less than 2,000 MW per site is the diversification of project sizes in order to increase the number of potential bidders.

Distances between sites and other energy generation areas

Areas and other energy generation areas that are defined as of this SDP are planned within the areas at a distance of at least 1,000 m from neighbouring areas and areas for other energy generation. The distances between WT and other energy generation installations and WT and other energy generation installations in neighbouring sites and other energy generation areas are subject to the requirements of Section 7.10.5.

Expected generation output

The objective of determining the expected generation output is to ensure the development of offshore wind energy and OGCS in synchronisation and to achieve the statutory expansion targets for offshore wind energy. Accordingly, the required capacity of the OGCS is determined and the grid connection of the sites is defined. The aim is to achieve an orderly and efficient use of OGCS.

By determining the expected installed output, the expected tender volume on the respective site is predetermined. The share of the respective area in the tendering volume is determined for centrally pre-investigated areas on the basis of the preliminary site investigation as part of the suitability assessment and determination of the respective area with the associated Ordinance on the Implementation of the Offshore Wind Energy Act (WindSeeV) in accordance with Section 12 para. 5 WindSeeG. Therefore, the installed output determined in the site investigation may deviate from the designations of the SDP. For the tender of sites that are not centrally pre-investigated, the determination of the expected installed output in the SDP is decisive.

The methodology for determining performance was consulted on extensively as part of the amendment and revision procedure for SDP 2020; please refer to SDP 2020 for further background information.

The determination of the expected output to be installed in the respective area as part of this amendment and revision of the SDP is carried out by taking the following competing objectives in consideration:

1. Achieving targets and efficient use of space:

In accordance with Section 1 para. 2 WindSeeG, the objective of the WindSeeG is to increase the installed output of offshore wind turbines in order to achieve the expansion targets. In view of the limited availability of space in the German EEZ, it must be taken into consideration when determining the expected installed output that the expansion targets must be achieved with the areas available for wind energy use. By coordinating with the responsible authorities of the Netherlands and Denmark on the management of international shipping routes, it will be possible to considerably expand the areas available for wind energy use compared with the specifications of ROP 2021. This will make a considerable contribution to achieving the objectives. Nevertheless, in order to achieve the target, it is still necessary to use rather high output densities in an international comparison when determining the expected generation output. In addition, the SDP makes stipulations in accordance with Section 4 para. 2 No. 2 WindSeeG with the objective, among other things, of expanding electricity generation from offshore WT with efficient use of space. High power densities help in the efficient use of space by reducing the total area required to achieve the target.

2. Cost efficiency:

In accordance with Section 1 para. 2 sentence 2 WindSeeG, the development of offshore wind energy should be cost-efficient. The expected full-load hours are considered to be an influencing factor influencing cost efficiency. These, in turn, are significantly influenced by the power density in addition to other influences. Other factors such as distance from the coast and installation technology also play a role in cost efficiency. With all other assumptions remaining the same, a lower power density leads to a reduction in losses because wake effects within wind farms and in neighbouring wind farms and thus, within a certain range, to a reduction in the levelised cost of energy. In terms of cost efficiency, a lower power density is therefore advantageous within a certain range.

3. Efficiency of the grid connection

According to Section 5 para. 4 sentence 1 WindSeeG, the objective of the designation of sites in the SDP is also the efficient use of the offshore connection cables. Accordingly, inefficiencies such as residual capacities on OGCS or cross-territory connections must be avoided when determining the expected generation output. This approach serves in particular to ensure coordinated and systematic overall planning so that the limited space for the routing of grid connection cables in the territorial sea can be used efficiently. For the designation of the expected generation output in this SDP, this means that it is based on the OGCS standard output of 2,000 MW per grid connection system. For the expansions of Areas N-9, N-12, and N-13, the expected generation output specified for the first time in this SDP corresponds to a multiple of the standard transmission output of 2,000 MW for each area. For Sites N-9.4 and N-9.5, however, the previous planning assumption that the actual installed output corresponds to the allocated grid connection capacity is deviated from for the first time (see Section 7.11.1). The objective is, among other things, to increase the efficiency of the grid connection.

Plausibility check using the corrected power density

The base area is only of limited suitability as an initial value for the expected power of an area. In addition to the size of the site, the geometry of the site and the underlying systems technology are important aspects in determining the potential output of a site. For this reason, SDP 2020 introduced the corrected power density as a comparative value (cf. Section 4.7 of SDP 2020). The expected generation output is based on a corrected base area, which supplements the defined area with a buffer strip half the width of a

turbine spacing. This makes it possible to compare sites of different sizes and geometries.

When determining areas and the expected generation output, a similar level of the resulting corrected power density is generally aimed for. The specifications in this SDP are based on a target value for the corrected output density of 10 MW/km², taking into consideration the criteria of efficient use of space and cost efficiency when determining the expected generation output. However, because of the individual spatial conditions and planning constraints, in particular the size of areas in conjunction with the efficiency of the standard grid connection, there are differences between the areas. The corrected power densities of the areas are shown in

Table 9.

Table 9: Corrected power density

| Designation of area | Designation of site | Corrected power density[a] [MW/km²] |
|---|---|---|
| N-3 | N-3.7 | 7.5 |
| | N-3.8 | 9.3 |
| | N-3.5 | 8.8 |
| | N-3.6 | 9.9 |
| N-6 | N-6.6 | 9.6 |
| | N-6.7 | 5.7 |
| | N-6.8 | 6.6 |
| N-7 | N-7.2 | 9.3 |
| N-9 | N-9.1 | 10.7 |
| | N-9.2 | 10.6 |
| | N-9.3 | 11.2 |
| | N-9.4 | 6.0 or 7.2[b] |
| | N-9.5 | 5.8 or 7.0[b] |
| N-10 | N-10.1 | 10.6 |
| | N-10.2 | 10.2 |
| N-11 | N-11.1 | 8.3 |
| | N-11.2 | 7.8 |
| N-12 | N-12.1 | 8.7 |
| | N-12.2 | 9.1 |
| | N-12.3 | 9.4 |
| | N-12.4 | 8.9 |
| | N-12.5 | 7.8 |
| | N-12.6 | 8.1 |
| N-13 | N-13.1 | 7.7 |
| | N-13.2 | 8.6 |
| | N-13.3 | 8.7 |
| | N-13.4 | 8.4[c] |
| O-1 | O-1.3 | 7.3 |
| O-2 | O-2.2 | 7.3 |

Colour coding:
Designation in a previous SDP | Designation in a previous SDP with changes | New designation

[a] For the areas defined for the first time in this SDP, a buffer distance of 500 m was assumed for the calculation of the corrected power density.

[b] Indication applies for a capacity assumption of 1,000 MW corresponding to the expected generation capacity or for 1,200 MW taking into consideration a capacity exceeding the allocated grid connection capacity by 20% in accordance with Section 7.11.1.

[c] Information applies to N-13.4, including the sub-site under review.

Estimation of the expected energy yield

In order to estimate the expected annual energy generation and to assess the influence of wake effects on the electricity yield, extensive modelling was carried out in various expansion scenarios as part of the scientific expert report commissioned by the BSH to accompany the revision procedure of the SDP. Current results are published on the website of the BSH (Vollmer & Dörenkämper, 2024a; Vollmer & Dörenkämper, 2024b; Vollmer & Dörenkämper, 2025), which also take into consideration updated assumptions for wind energy expansion in the Dutch EEZ and hypothetical assumptions for an expanded expansion in the Danish EEZ, which represent an unfavourable case for wind farms within the German EEZ.

The results serve to check the plausibility of the power calculation and as an indicator of the expected cost efficiency of electricity generation.

The assumption of an increasing expansion of offshore wind energy in the German EEZ and in neighbouring EEZs leads to an overall reduction in the expected full load hours for wind farms within the German EEZ of the North Sea. For the full expansion considered in the scenarios, the estimates – without taking into account the considerations on peak capping – result in full load hours averaging around 3,200 h/a for the North Sea (without taking into account the extended assumptions for an expansion in the Danish EEZ) (Vollmer & Dörenkämper, 2024a; Vollmer & Dörenkämper, 2025) and around 3,300 h/a for the Baltic Sea (Dörenkämper, et al., 2023).

The expansion of areas N-9, N-12 and N-13 by additional areas creates very large contiguous wind energy areas with significant additional energy yields for these areas. At the same time, however, additional shading will result in lower average full load hours for these areas. The assumption of an extended expansion of wind farms within the Dutch EEZ also has an additional negative impact on the expected energy yields within the neighbouring areas in the German EEZ. Because of the gradual expansion of areas N-6, N-9 and N-12 as a result of international consultations, which took place over several revisions of the SDP, some sites within these areas are directly surrounded by other sites on all or several sides. As a rule, below-average full load hours are to be expected for OWF in these areas.

When assessing the results of the yield estimate, it should be noted that these were determined assuming full availability of WT and OGCS and without taking electrical losses into consideration. On the other hand, the long-term average yields are expected to be slightly higher than for the reference year 2006 assumed in the scenarios (Vollmer, Dörenkämper, & Borowski, 2023) A recent development in the modelling approach leads to an increased yield estimate compared with the model previously used; this was investigated for one scenario as an example in the accompanying scientific report (Vollmer & Dörenkämper, 2025). The yield estimates are dependent on assumptions and are subject to uncertainties.

On the expected generation capacity for Sites N-9.4 and N-9.5

For the expansion of Area N-9 to include Sites N-9.4 and N-9.5, the designation of an additional expected generation capacity totalling 2,000 MW and alternatively 4,000 MW was examined because of the additional area. Accordingly, one or two OGCS are required for the connection. A cross-area grid connection (e.g. with Area N-12) was ruled out because of the large distance and the need to cross the main corridor for cables and pipelines in the direction of Zones 4 and 5 (north-western region of the German EEZ). The determination of the expected power to be installed for Sites N-9.4 and N-9.5 will also have impacts on the expected energy yields of wind

farms on neighbouring areas because of the expected shading losses. Sites N-9.1, N-9.2 and N-9.3 are affected in particular.

The BSH has had the expected energy yields for wind farms on Sites N-9.4 and N-9.5 and neighbouring sites estimated in two exemplary scenarios as part of the scientific support for the SDP. Updated assumptions on wind energy expansion in the Dutch EEZ were also taken into consideration, which are also expected to have impacts on the expected yields for neighbouring wind farms within the German EEZ. The results are summarised and published in a separate report (Vollmer & Dörenkämper, 2024a).

The determination of an expected total installed capacity of 4,000 MW for Sites N-9.4 and N-9.5 is supported by the additional determination of 2,000 MW, which would otherwise have to be planned elsewhere, probably much further from the coast. Because of the higher total nominal capacity in Area N-9, a higher total energy yield can be expected for this area. However, because of the simultaneous increase in shading losses, the relative increase in yield is lower than the increase in output. With a specification of 2,000 MW each for Sites N-9.4 and N-9.5, there are smaller differences between the areas within Area N-9 in terms of the power densities and the expected full load hours. Compared to the other sites in Area N-9, higher full-load hours can be assumed for Sites N-9.4 and N-9.5 because of their peripheral location despite their above-average power density. In addition, lower overall costs for the grid connection can be expected for Area N-9 compared to areas further offshore because of the shorter lengths of submarine cable required. If two OGCS are defined for Sites N-9.4 and N-9.5, this results in a small spatial distance between the seaward converter platforms and would favour a connection between these converter platforms.

The alternative specification of an expected total installed capacity of 2,000 MW for Sites N-9.4 and N-9.5 is supported by the higher expected full load hours – which result in particular for Sites N-9.4 and N-9.5 – but also for neighbouring sites. This has a favourable effect on cost efficiency. In addition, the lower resulting power densities in the case of an expected installed capacity of 1,000 MW each result in greater leeway in the choice of turbine locations for wind farms on these sites.

As a third option, the joint connection of Sites N-9.4 and N-9.5 to an OGCS with a grid connection capacity of 2,000 MW was examined in cross connections with an installed capacity of the wind farms that exceeds the grid connection capacity. This approach represents a first-time departure from the previous planning assumption that the installed capacity corresponds to the allocated grid connection capacity and should also be examined more closely for future designations (see also informational representation in Appendix 3). This approach can lead to an increase in the use of the OGCS and thus contribute to a reduction in grid connection costs. This is offset by the fact that parts of the potential energy yield of the connected wind farms cannot be dissipated via the grid connection (peak capping). Because of their size and location, an installed capacity of 1,200 MW was assumed for Sites N-9.4 and N-9.5 and investigated in more detail as part of the scientific monitoring (Vollmer & Dörenkämper, 2025). This corresponds to a 20% increase in capacity to be installed compared with the allocated grid connection capacity. The argument in favour of this option is that an overall more balanced compromise can be achieved between the objectives of the efficient use of space, cost efficiency, and the efficiency of the grid connection than with the aforementioned options. With a total nominal capacity of 2,400 MW for wind farms on Sites N-9.4 and N-9.5, an increase in the energy yield fed into the grid and better use of the grid connection can be assumed compared with a total nominal capacity of 2,000 MW, even taking into consideration peak capping. Compared with a total nominal capacity of 4,000 MW for Sites N-9.4 and N-9.5, the

expected full load hours are higher for these sites in particular but also for neighbouring sites. As a result, an expected generation capacity of 1,000 MW each is designated for Sites N-9.4 and N-9.5. The tender volume of a site is based on the expected generation capacity to be installed or the expected generation capacity specified in the determination of suitability. The bid quantity must correspond to the tender volume of a site (Sections 17 para. 2 sentence 1, 51 para. 2 sentence 1 WindSeeG); at the same time, the bid quantity corresponds to the allocated grid connection capacity (Sections 24 para. 1 No. 3 lit. b, 55 para. 1 No. 2 lit. b WindSeeG). Because of the designation of a deviating capacity in Planning principle 7.11.1 of the SDP, the actual installed capacity of Sites N-9.4 and N-9.5 should amount to 1,200 MW each.

## 2 Acceleration site

### 2.1 Acceleration sites according to Section 8a WindSeeG shown for information

The declaration of existing sites as acceleration sites is based on the amendment to the WindSeeG by the "Act to amend the Renewable Energy Sources Act and other energy industry provisions to increase the expansion of photovoltaic energy generation" of 8 May 2024 (Federal Law Gazette I 2024 No. 151 of 15 May 2024). Article 10 of this law was added to Section 8a WindSeeG. As a result, existing sites for which the year of the tender has already been designated by the SDP 2023 will be declared acceleration sites. Even if the designation is not made by the SDP itself, the relevant sites (N-6.6, N-6.7, N-7.2, N-9.1, N-9.2, N-9.3, N-10.1, N-10.2, N-11.1, N-11.2, N-12.1, N-12.2, N-12.3, N-13.1, N-13.2, and N-21.1 (now N-6.8)) are shown for information purposes for better clarity.

### 2.2 Mitigation measures for acceleration sites according to Section 8a WindSeeG

For these sites designated by law as acceleration sites, the designation of mitigation measures and rules for mitigation measures are made as a precautionary measure. This will ensure that effective and proportionate mitigation measures and rules for mitigation measures for acceleration sites will be defined in accordance with the provision under Article 15c para. 1 lit. b of Directive (EU) 2018/2001 and that these can be applied immediately as soon as implementation of the rules on acceleration sites has entered into force.

The designation of mitigation measures also means that other provisions such as compliance with planning principles and legal obligations remain in place.

According to Article 15c para. 1 lit. b Directive (EU) 2018/2001, effective preventive and mitigation measures or rules for mitigation measures are designated for acceleration sites and infrastructure areas in accordance with Article 15e para. 1 lit. e Directive (EU) 2018/2001 in order to avoid possible negative environmental impacts or, if this is not possible, to significantly reduce them where appropriate. On and outside acceleration sites for one or more pilot projects, the possibility may be provided for the approval agency to order novel mitigation measures, the effectiveness of which has not yet been comprehensively tested, for a limited period of time. Corresponding new mitigation measures are not designated in the current SDP.

These measures and rules for measures are described in this chapter. The necessary mitigation measures or rules for mitigation measures are designated for each site as part of the areas declared acceleration sites by the legislator according to Section 8a WindSeeG. The term mitigation measures also includes possible measures that lead to the avoidance of negative environmental impacts (e.g. the deterrence of potentially affected animals). The rules to be defined are rules

that serve to prevent, mitigate, or significantly reduce the effects of offshore wind energy, including rules on the design of mitigation measures in downstream procedures or the possibility of further design. In Table 10 itself, no distinction is made between measures and rules for measures because the boundaries are fluid.

Mitigation measures and rules for mitigation measures

Mitigation measures and rules for mitigation measures for acceleration sites can be referred to from the following Table 10. The measure is specified in concrete terms by referring to the planning principle in the SDP. Here, the measure or the rules for the measure are described in more detail and are to be referred to during implementation. This also applies insofar as further reference is made to the environmental report in the planning principles. In particular, the explanations in section 4 et seq of the North Sea environmental report must be observed. Insofar as reference is made to further environmental assessments in the description of the planning principles and/or the environmental reports, it can be assumed that these can be omitted for the acceleration sites based on the implementation of Article 16a para. 3 Directive (EU) 2018/2001.

Table 10: Mitigation measures and rules for mitigation measures for acceleration sites

| Measure/rule for measure | Designation | Brief description | Description can be found under: |
|---|---|---|---|
| A | Observance of environmental and nature conservation framework conditions | Maximum possible prevention of any adverse effect of legally protected biotopes in accordance with Section 72 para. 2 WindSeeG; compatibility of the specifications with the protective purpose of the nature conservation areas in accordance with Section 57 BNatSchG; planning and implementation to save as much space as possible; requirement of preventive and mitigation measures within the designated bird migration corridors | Planning principle (PP) 7.1.1 |
| B | Overall time coordination of the construction and installation work | Prevention and reduction of cumulative effects through optimised construction planning and scheduling | PP 7.1.2 |
| C | Maximum possible low-noise construction process and working method | For the foundations and installation, a construction process and working method that are as quiet as possible under the given circumstances and in line with the latest technological advancements must be used. | PP 7.1.3 |
| D | Noise protection during the foundations of installations in compliance with the noise protection concept of the BMU | Use of effective technical noise mitigation measures during installation by pulse pile driving to ensure that | PP 7.1.3 |

| | | | |
|---|---|---|---|
| | | noise emissions at a distance of 750 m do not exceed 160 dB for the SEL05[18] broadband single event level and 190 dB for the peak sound pressure level[19] | |
| E | Deterrence | Deterrence of fauna from the hazard area before pile driving work | PP 7.1.3 |
| F | Duration of the pile driving operation | Limiting the duration of the ramming process including the deterrence to a minimum in pile driving | PP 7.1.3 |
| G | Noise mitigation concept with noise forecast | Submission of the noise protection concept (draft) at least 12 months before the start of construction with reasoning of the planned foundation structure, the planned construction process, the planned working method and the planned noise mitigation measures as well as the noise forecast | PP 7.1.3 |
| H | Coordination of pile driving work | Overall temporal and spatial coordination of the pile driving work within the framework of the subordinate approval procedure | PP 7.1.3 |
| I | Noise protection during ammunition blasting | Requirement for noise protection concept for blasting of non-transportable munitions, including deterrence measures | PP 7.1.3 |
| J | Noise protection during operation of the installations | Select the system design that is as low-noise as possible according to the state of the art | PP 7.1.3 |
| K | Traffic logistics concept | Reduction and bundling of shipping traffic and other ship-related measures in the “Sylt Outer Reef – Eastern German Bight” nature conservation area, in the main concentration area of the divers, and in the main concentration area of the harbour porpoise | PP 7.1.4 |
| L | Prevention and reduction of chemical emissions | Prevention and/or maximum possible reduction of emissions: Preparation of emission concept and later emission study, use of environmentally friendly operating materials wherever possible, safeguarding and monitoring of all technical installations through structural safety systems and safety measures, specifications for corrosion protection, system cooling, waste and waste water disposal, handling of firefighting foam, use of diesel generators, grouting processes and grouting material | PP 7.1.5 |

[18] Sound exposure level in dB re 1 µPa² s; dB = decibel; re = in reference to; 1 µPa = 1 microPascal; 1 µPa² s = 1 microPascal squared · second; the reference level for water is 1 µPa.

| | | | |
|---|---|---|---|
| M | Prevention and reduction of light emissions | Environmentally friendly lighting (e.g. switching the obstruction light on and off as needed, and selecting suitable lighting intensities, spectra, or lighting intervals) during operation to reduce attraction effects | PP 7.1.5 |
| N | Minimisation of scour protection measures | Reduction of scour protection to a minimum; minimisation of hard substrate; only rockfill made of natural stones or inert and natural materials are to be used as scour protection | PP 7.1.6 |
| O | Minimisation of cable protection measures | Reduce the use of hard substrate to a minimum, natural/inert cable protection | PP 7.1.6 |
| P | Sediment warming | Compliance with the provisions for sediment warming | PP 7.1.7 |
| Q | Bird collision monitoring | Installation of state-of-the-art collision detection systems for monitoring the bird collision with the WT | PP 7.1.8 |
| R | Consideration of objects | Fundamental prevention of blasting, otherwise noise protection concept | PP 7.1.3 |
| S | Reduction of crossing structures | Reduction of crossing structures to the technically necessary minimum; if possible, structure-free crossings | PP 7.13.4 |

# 3 Subsea cables and pipelines

## 3.1 Gates to the territorial sea

The routes planned in the SDP must be able to be reasonably routed through the territorial sea to the GCP (cf. Planning principle 7.13.2). For coordination with the coastal states, the gates serve as locations where the grid connection cables cross the border between the EEZ and the territorial sea. In this way, the cable systems are to be concentrated at these points as far as possible and bundled for further routing towards the GCP. The routing in the territorial sea is not determined; this is the responsibility of other bodies in the procedures provided for this purpose. When the corridors were designated, no assessment of the further routing (e.g. with regard to nature conservation concerns in the territorial sea) was carried out. This is also the responsibility of the competent authorities in the procedures provided for this purpose.

The dimensioning of the gates at the transition to the territorial sea results from the distances between the cable systems and the number of required or possible systems as well as the respective space situation at the transition to the territorial sea.

With regard to the planned location of the gates, there are restrictions within the EEZ because of the approved and existing OWF so that the conflicts resulting from the existing lack of space cannot be easily resolved by designations in this plan. In addition, existing structures (i.e. in particular cable systems and pipelines already in operation) must be taken into consideration, whereby the subsea cables planned must fit into the existing system. At the same time, planning in the territorial sea has not yet progressed to the point where a sufficient number of routes have been identified to achieve the expansion targets. The gates in this plan are therefore defined in close consultation with the coastal states. The BSH is in consultation with the responsible federal states, the FNA, the GDWS, and the TSO to

identify further gates and additional route capacities on existing gates. The objective of this coordination is to identify sufficient route corridors and gates to permanently achieve the statutory expansion target of at least 70 GW by 2045. Additional demand for route corridors and gates arises from the realisation of further international interconnection projects to cover the import demand for renewable electricity from abroad.

The gates are intended for power cables. No capacity is planned for pipelines here, and hence these must be routed outside the defined gates.

**North Sea**

At the present time, no further systems can be planned for the border corridor N-I (Ems route) as part of the SDP because this will already be fully utilised after 2025.

Gate N-II (Norderney route) will be fully occupied with the commissioning of NOR-6-4 (defined as NOR-21-1 in SDP 2023).

OGCS via Gate N-III should be routed via the two islands of Baltrum and Langeoog in the territorial sea in future - subject to further assessments. The total capacity of the N-III gate has not been finally determined. However, according to findings from the “Seetrassen 2030” project, a potential total of 13 OGCS could be derived from this gate from a technical point of view using the methods currently available. Five of these OGCS would then be routed via the island of Baltrum and a further eight OGCS via the island of Langeoog. Only two OGCS via the island of Baltrum have been approved by the state planning authorities until now. Following a notification according to Section 15 para. 5 sentence 2 ROG, the waiver of the application for a further regional planning procedure (ROV) was notified for three further OGCS beyond the route corridor determined by the state planning authority. In a letter dated 30 November 2022, the higher Lower Saxony state planning authority confirmed that no new ROV is required for these three OGCS. With five OGCS, the capacity of the Baltrum corridor will be exhausted. For the Langeoog corridor, the higher Lower Saxony state planning authority decided in a letter dated 7 May 2024 that a spatial impact assessment does not need to be carried out for the eight OGCS planned there.

The route corridor via the island of Baltrum is available earlier than the route corridor via the island of Langeoog. For this reason, the OGCS NOR-9-2, NOR-9-3, NOR-12-1, NOR-11-2, and NOR-13-1 defined in SDP 2023 up to and including 2031 with Gate N-III are planned spatially via the island of Baltrum.

After commissioning these five OGCS, the transmission line corridor via Baltrum will be exhausted and all further OGCS via the Gate N-III will be routed via Langeoog.

Gate N-V to the North Sea territorial sea of Schleswig-Holstein is defined south-west of Area N-4. Following an assessment of the capacity via the Büsum corridor in the territorial sea of Schleswig-Holstein as part of the revision procedure of SDP 2023, it was determined that 12 systems can probably be routed via the corridor without the need to relocate within the fairway. This corresponds to a capacity of eight OGCS for Gate N-V while the remaining four systems are no longer required for the Gate N-IV, which is already fully utilised.

The described capacities on the Gates N-II, N-III, and N-V are sufficient to bring the OGCS defined in this plan ashore through the territorial sea of the North Sea.

**Baltic Sea**

Gate O-I serves to connect the OWF in Areas O-1 and O-2 to the coastal sea. In addition, two interconnectors are planned (see Section 3.3).

Gate O-II is not a corridor for the connection of OWF through the territorial sea to the GCP in the sense of this plan. This corridor serves exclusively for the connection of the OWF “ARCADIS East I” (Area O-4), which has been authorised in the territorial sea.

Gate O-III is defined by the existing systems for the “EnBW wind farm Baltic 2” OWF. Two interconnectors are planned for this corridor (see Section 3.3).

Gates O-IV, O-V, and O-XIII are also used exclusively for the routing of interconnectors within the framework of this plan (see Section 3.3).

### 3.2 Offshore grid connection systems

Compared with the designations of SDP 2023, this plan defines three further OGCS with the calendar year of commissioning from 2032. The defined OGCS serve for the grid connection of the defined areas. OGCS are only defined for those areas for which a year or quarter of the tender and commissioning are also defined.

The main basis for designating the OGCS in this plan is GDP 2037/2045, which was confirmed by the FNA on 1 March 2024. In the GDP, the OGCS are confirmed with the year of commissioning and the respective GCP. The responsibility of the TSO for the respective OGCS is derived from the allocation of the GCP. Based on the location of the GCP, the confirmed OGCS are allocated to the gates in the territorial sea. The known capacities of the gates corridors are taken into consideration.

The allocation of areas to be connected to the OGCS or gates to be used takes the spatial location of the respective sites into consideration. Therefore, OGCS NOR-12-3 and NOR-12-4, which are located in the northern part of the EEZ, are included in Gate N-V. Crossings with the OGCS located further south, which are routed to Gate N-III, can thus be avoided. OGCS NOR-6-4 is assigned to Gate N-II because Site N-6.8 is located in the western part of the EEZ. According to the current state of knowledge, NOR-6-4 is the last OGCS that can be routed via N-II. Compared with the confirmation in GDP 2037/2045, the GCP for the OGCS will be adjusted from Niederrhein to Kusenhorst. This update was proposed by the responsible TSO in the course of dispensing with OGCS NOR-9-5, which was still included in the draft SDP of 7 June 2024. No spatial change is required in the EEZ as a result of this adjustment; the OGCS will continue to be managed as N-II. The other OGCS NOR-9-4 designated in this plan is routed to Lower Saxony via Gate N-III. OGCS NOR-9-5, which is still included in the draft, is no longer designated. The expected generation capacity on Sites N-9.4 and N-9.5 was reduced (see Section II.1) so that both sites can now be connected via an OGCS (NOR-9-4). The remaining OGCS west of SN10 included in the draft are also not designated because no sites are designated here either. Reference is made to the informative presentation in Appendix 3.

In Tabelle 4, spatial changes are shown for some OGCS already defined in a previous SDP. Spatial adjustments were made to Grid connection cable NOR-10-1 with regard to the route to the converter platform through Site N-10.1 and at the north-western boundaries of other energy generation area SEN-1. The grid connection cables of NOR-10-1 now run between Sites N-10.1 and N-10.2 and, after bending in a north-easterly direction, along the north-western boundaries of Other energy generation area SEN-1. In the case of OGCS OST-2-4, the TSO proposed a spatial swap with the route for Interconnector I-OST-7. The other spatial changes shown are in each case small-scale adjustments based on changes to the crossing of pipelines or new findings from the project approval procedure.

The locations of the converter platforms in the sites to be connected were already the subject of consultation in previous plans. As a result and after consideration of all comments, the converter platforms are generally positioned in the centre of the site to be connected. If two or more sites are connected to a converter platform, the converter platform is positioned as centrally as possible between the sites. This can minimise the overall length of the cabling within the wind

farm. The increasing size of WT is accompanied by greater absolute distances between them. This, in turn, creates further opportunities for the creation of flight corridors for the helicopter landing deck of the platform within the sites without significantly restricting the use of the site.

A location for Converter platform NOR-12-4 is designated in the centre of Site N-12.6. Converter platforms NOR-12-3 and NOR-9-4 are each designated in the centre between the two sites to be connected. The course of OGCS NOR-9-4 from the converter platform has been adjusted compared to the design and is now located between Sites N-9.4 and N-9.2 or N-9.3. The crossings required for this with OGCS NOR-9-2 should be designed without structures; reference is made to Planning principle 7.13.4.

For the specified locations of converter platforms, a small-scale shift in the location may be necessary during the detailed planning phase – for example, because of the results of the site investigation or the positioning of the helicopter landing decks on the platform – even beyond the inaccuracy of the planning scale. As long as this does not result in any changes to the protection zone of 1,000 m defined in Planning principle 7.10.4 around the converter platform site defined in the SDP, wherein no WT may be erected, it is assumed that this will generally not have any significant impacts on the OWF developer of the project in the respective site.

For the spatial designations, please refer to the planning scale of 1:400,000 and the associated inaccuracies of the graphic designations. The depiction of turning points of cable routes in the SDP is always (right-)angled. This does not correspond to the actual, technically required trawl or laying radii of the installation vessels, which also depend on the cable system to be laid. The exact representation of laying radii is given in respective approval procedure. Please refer to Planning principle 7.10.3 (b). It is also pointed out that the resulting differences in the area of the turning points in the project approval procedure are not to be regarded as a deviation from the SDP.

Compared with the original designation in SDP 2023, the routes of OGCS NOR-11-1, NOR-11-2, NOR-12-1, NOR-12-2, and NOR-13-1 are defined differently with a conditional designation. A short-term review procedure involving the responsible TSO will be carried out to assess any routes that deviate from this. The adaptation of the routes and the planned test procedure are a response to a changed security and threat situation. The objective is to offset military requirements and planning with the concerns of offshore expansion.

In deviation from the routes for OGCS NOR-12-3 and NOR-12-4 contained in the draft SDP of 7 June 2024, these will now be routed via transmission line corridor LN1 designated in ROP 2021. This eliminates the need to cross the ASG North Sea.

The OGCS NOR-10-1 runs a short distance along the western edge of the North Sea artillery firing range. It is not necessary to adapt the original route to take into consideration military concerns.

### 3.3 Interconnectors

The SDP is intended to spatially secure routes or route corridors for possible interconnectors in order to be able to ensure in future that the existing and planned interconnectors are spatially integrated into a coordinated overall system (i.e. in particular with regard to the grid connection cables for OWF).

**North Sea**

As part of this plan, a route for an additional interconnector will be designated in the EEZ of the North Sea. For the other interconnectors, reference is made to the designation and reasoning of SDP 2023.

The route for an interconnector I-NOR-10 (Tarchon), parallel to the route for I-NOR-5 (Neuconnect), which also connects the UK and Germany, will be newly designated. Upon entering the German EEZ, this runs through Gate N-XV north of the interconnector I-NOR-5 (Neuconnect). After crossing the Europipe 2 pipeline and the subsea cables running parallel to it, the cable route swings to the south before the bend in I-NOR-5 (Neuconnect) and crosses it. It then continues to run parallel, west of I-NOR-5 (Neuconnect) to the south of Gate N-III.

The routes for interconnectors designated in SDP 2023 will be changed spatially in some cases (cf. Table 5).

**Baltic Sea**

In the Baltic Sea, the two interconnectors I-OST-6 and I-OST-7 will be spatially amended compared with the designations of SDP 2023. These interconnectors are designated from Gate O-I to Gate O-X or O-XI. In its comment on the preliminary draft dated 1 September 2023, the TSO responsible for the grid connection of Bornholm Energy Island (BEI) announced that it would examine the possible route alternatives both between Gates O-XI and O-I as well as between Gates O-XII and O-XIII. Following completion of this review process, it is now planned to realise Interconnector I-OST-6 for the grid connection of BEI via the route from Gate O-XI to O-I. After entering the German EEZ, this runs via Gate O-XI between the OWF Wikinger and Arkona Becken Südost and crosses Shipping route SO2 parallel to OST-1-4. From Area O-2, it runs parallel to OST-1-4 and I-OST-7 to Gate O-I towards the territorial sea.

Compared with SDP 2023, the routes of the OGCS OST-2-4 and the interconnectors I-OST-7 in the area east of Area O-2 were swapped at the suggestion of the responsible TSO.

In order to enable cross connections of OGCS OST-2-4 with Denmark, Converter platform OST-2-4 will provide three routes, I-OST-10, I-OST-11 and I-OST-12, for interconnectors to Gate O-X. These run north of Site O-2.2 parallel to the route corridor of the OGCS OST-2-4. After the route corridor for OST-2-4 turns to the south, the routes continue to run along the southern edge of shipping route SO1 parallel to the cross-border submarine cable system I-OST-7 in an easterly direction and from the level of Site O-1.3 parallel to the Bornholm Subsea Cable to Gate O-X. Shortly before reaching the gate to Denmark, the three systems cross the edge of a submarine exercise area. Also with regard to the O-X border corridor, it is pointed out that this is located on the edge of a submarine diving area and that, for military reasons, the route should be planned outside this NATO exercise area also in the Danish area. The designation of three routes is based on the assumption that the remaining free capacity on the OGCS OST-2-4 in the amount of 1,000 MW could be developed with a three-phase connection with three submarine cables, each with a voltage of 220 kV. In this case, however, the OWF to be connected would have to provide a transformer platform in direct proximity to Converter platform OST-2-4.

### 3.4 Cross connections of installations with each other

Cross connections that were defined in previous revisions of the SDP will not be realised because this would jeopardise the timely commissioning of the respective OGCS. There is no designation of cross connections between the OGCS defined in this plan. Because of the omission of OGCS NOR-9-5, the originally intended cross connections between NOR-9-4 and NOR-9-5 are also omitted. Cross connections of the two remaining OGCS NOR-12-3 and NOR-12-4 do not make sense because both have the same GCP on land.

With the designation of further OGCS in the upcoming amendment and revision procedure of the SDP, the designation of cross connections

between the OGCS is also planned. The GDP process will identify meaningful cross connections in this regard; these can be spatially designated in the SDP.

## 4 Designations for the territorial sea

In accordance with Section 4 para. 1 sentence 2 WindSeeG, the SDP may also make sectoral planning designations for areas, sites, the chronological sequence in which the sites are put out to tender, the calendar years of commissioning, and the expected generation output as well as for testing grounds and areas for other energy generation for the territorial sea. According to an administrative agreement between the Federal Government, represented by the BSH, and the competent state, the individual designations for the territorial waters are determined in more detail.

According to Section 4 para. 1 sentence 4 WindSeeG, the Federal State shall provide the BSH with the information and documents required in each case, including those required for the Strategic Environmental Assessment (SEA).

An administrative agreement[20] was concluded between the federal government, represented by the BSH, and the state of Mecklenburg–Western Pomerania as part of the process of preparing SDP 2019.

According to Administrative Agreement, designations for the territorial sea shall not include

- the locations for converter platforms, collector platforms and transformer stations
- Routes or route corridors for offshore connection cables, for cross-border subsea cables or for possible cross connections between installations, routes and route corridors, and
- the definition of locations where the offshore connection cables cross the boundary between the EEZ and the territorial sea, and
- standard technical principles and planning principles according to Section 5 para. 1 No. 6 to 11 WindSeeG.

The corresponding technical and spatial requirements are the subject of the planning and individual project approval procedures within the jurisdiction of the Land.

No such administrative agreement has been concluded with the federal states of Lower Saxony and Schleswig-Holstein. Therefore, no designations are made in the territorial sea of these federal states.

Areas and sites for the construction and operation of offshore wind turbines

Please refer to the reasoning in SDP 2023.

Testing ground and testing ground grid connection

Please refer to the reasoning in SDP 2023. However, an adjustment is made with regard to the specification of a testing ground grid connection to be realised by the TSO with a capacity of 300 MW and commissioning in the calendar year 2032. The aforementioned testing ground grid connection (see also Chapter 3 of SDP 2023) will not be designated. This is due to the fact that the state of Mecklenburg-Western Pomerania did not announce the need for such a testing ground grid connection by 30 June 2023.

[20] Available on the BSH website at: https://www.bsh.de/DE/THEMEN/Offshore/Meeresfachplanung/_Anlagen/Downloads/Flaechenentwicklungsplan_Verwaltungsvereinbarung_BSH_Mecklenburg_Vorpommern.pdf

# 5 Central site investigation and calendar years of tender and commissioning

Section 5 para. 4 WindSeeG specifies the criteria to be applied for site designation in the SDP as well as the chronological order in which they are to be put out to tender. The overriding objective of the specifications is to ensure that the development of offshore wind energy and the associated OGCS on these sites takes place in parallel and that the existing OGCS are used efficiently and utilised to capacity. This ensures that all offshore WT are connected on time and that unused capacity on the OGCS is avoided. In this way, the development of the use of wind energy will be carried out as cost-efficiently as possible. When applying the criteria specified in Section 5 para. 4 sentence 2 WindSeeG, this objective and the general objective of the Act is to ensure that a steady and cost-efficient expansion of the use of offshore wind energy must always be taken into account. The list in Section 5 para. 4 sentence 2 WindSeeG is not exhaustive.

For a detailed description of the criteria and their application, please refer to Section 4.8 of SDP 2020.

There must be at least enough months between the calendar year of the tender for a site and the calendar year of the commissioning of the awarded WT on this site to ensure that the realisation deadlines according to Section 81 WindSeeG can be met.

The basis for determining the chronological order of the sites and OGCS is initially the achievement of the expansion targets in accordance with Section 1 para. 2 sentence 1 WindSeeG. In addition, Section 2a para. 1 WindSeeG specifies the magnitude of the tendering volume in the individual calendar years.

According to Section 5 para. 1 No. 3 WindSeeG, the SDP designates whether the respective area is to be centrally pre-investigated and tendered according to Part 3, Section 4 WindSeeG or whether a tender for non-centrally pre-investigated sites is to be made according to Part 3, Section 5 WindSeeG. Section 5 para. 4 sentence 2 WindSeeG sets out criteria for the determination of sites and the chronological order of their tendering.

## 5.1 Central site investigation

When designating sites for centralised pre-investigation, the provisions of the WindSeeG regarding the tender volume and the principle of a 50/50 distribution between the centrally pre-investigated and non-centrally pre-investigated sites are taken into account in particular (Section 2a WindSeeG). In addition, the different time frames for the tender of the respective sites and the lead time for the centralised site investigations are taken into consideration.

The present plan designates Sites N-9.5, N-12.6, and N-13.4 for central site investigation. In addition, a site for central site investigation is designated in the north of Area N-16. This will be finally determined spatially as part of the upcoming revision and is located in the area of Site N-16.1 provided for in the draft of 7 June 2024.

In terms of nature conservation, the development of this area is preferable to Sites N-13.3, and N-13.4, which are also spatially defined but not chronologically ranked and should therefore take place before these. In order to ensure the continuous tender of sites according to the provisions of the WindSeeG, it is necessary, taking into consideration the necessary lead time for the investigation of sites, to have already determined the central preliminary investigation in this site.

### 5.2 Calendar years of tender and commissioning

In accordance with Section 5 para. 1 No. 4 WindSeeG, the SDP specifies the calendar years, including the quarter in the respective calendar year, in which the WT awarded on the specified sites and the corresponding OGCS are to be put into operation, as well as the quarters in the respective calendar year in which the cables for the internal cabling of the awarded WT are to be connected to the converters or the transformer platform. In addition, the SDP can specify key intermediate steps for the joint realisation schedule in accordance with Section 17d para. 2 of the Energy Industry Act (EnWG).

As part of the consultation for SDP 2020, the interaction between the commissioning of the OGCS and the commissioning of the WT was consulted on. Against this background, the first or second quarter is generally determined for the connection of two areas sites an OGCS. If only one site is connected to the converter platform, the period for cable installation is generally designated as the first and second quarter of the respective calendar year.

In accordance with Section 5 para. 1 No. 4 WindSeeG, the Site Development Plan determines the respective quarter of the calendar year for sites and OGCS in addition to the calendar year of commissioning. The question of which quarter of the respective calendar year the OGCS can be commissioned as early as possible was discussed extensively during the consultation on the draft of SDP 2020. Against this background, the third quarter of the respective calendar year is generally set for the commissioning of the OGCS. In accordance with Section 17d para. 2 sentence 1 of the EnWG, the TSO with a connection obligation commissions the OGCS in good time so that the completion dates are in the calendar years specified for this purpose in the SDP, including the quarter in the respective calendar year.

The calendar years for tendering and commissioning mentioned in Tabelle 6 and Tabelle 7 are based, among other things, on the GCP available for connecting the sites to the grid. The availability of the GCP is proposed by the TSO as part of the GDP process and reviewed by the FNA. For the measures confirmed in the GDP for which designations are made, this results in a distribution to GCP in the control areas of the responsible TSO. To avoid crossings in both the EEZ and the territorial sea, sites that can reasonably be routed via the border corridors to Lower Saxony or Schleswig-Holstein in the year specified for the GCP in the GDP must therefore be identified . As a result, neighbouring areas may not be put out to tender or put into operation in the same or consecutive years, but may be delayed because of the availability of the GCP.

In addition to the availability of the GCP, the determination of areas for carrying out a centralised site investigation is also an important factor because the tendering volume of the calendar years should generally be divided equally in accordance with Section 2a para. 2 WindSeeG. The different lead times for centrally pre-investigated and non-centrally pre-investigated sites are taken into consideration when determining the calendar years for the tender and commissioning.

Compared with the designations of SDP 2023, there have been delays in the realisation of measures at some OGCS. This results in deviations for the relevant OGCS from the designations for the calendar year and quarter of commissioning of SDP 2023. The SDP presents these deviations only for those OGCS for which a corresponding delay has already been announced by the TSO as part of the publication of the expected completion dates in accordance with Section 17d para. 2 sentence 3 EnWG. This applies to OGCS NOR-9-1, NOR-9-2, NOR-10-1, NOR-11-1, NOR-11-2, and OST-2-4. The original designations and the expected completion dates according to Section 17d para. 2 EnWG,

some of which deviate from these, are listed in Table 11 depending on the OGCS. To justify the delays, the responsible TSO refer to problems in the supply chain of all important components of an OGCS (in particular submarine cable, converter platform, civil engineering). Accordingly, it was not possible to conclude contracts with the respective suppliers or service providers for the timely commissioning of the OGCS.

Table 11: Designations for the commissioning of OGCS in comparison to the expected completion dates announced by the TSO according to Section 17d para. 2 EnWG

| OGCS | Responsible TSO | Commissioning according to the original designation in SDP 2023 | Estimated completion date announced by the TSO according to Section 17d para. 2 EnWG |
|---|---|---|---|
| OST-1-4 | 50 Hertz | 2026 (QIII) | 30 September 2026 |
| NOR-7-2 | TenneT | 2027 (QIV) | 1 October 2027 |
| NOR-3-2 | Amprion | 2028 (QIII) | 31 August 2028 |
| NOR-6-3 | Amprion | 2028 (QIV) | 16 November 2028 |
| NOR-9-1 | Amprion | 2029 (QIII) | 16 September 2030 |
| NOR-9-2 | TenneT | 2029 (QIII) | 31 December 2031 |
| NOR-9-3 | TenneT | 2029 (QIV) | 31 December 2029 |
| OST-2-4 | 50 Hertz | 2030 (QIII) | 31 May 2031 |
| NOR-10-1 | Amprion | 2030 (QIII) | 15 September 2031 |
| NOR-11-1 | 50 Hertz | 2030 (QIII) | 31 December 2032 |
| NOR-12-1 | TenneT | 2030 (QIII) | 30 September 2030 |
| NOR-12-2 | TenneT | 2030 (QIV) | 31 December 2030 |
| NOR-11-2 | TenneT | 2031 (QIII) | 31 December 2031 |
| NOR-13-1 | TenneT | 2031 (QIII) | 30 September 2031 |

The delays described result in the changes to the sites to be connected shown in Table 6 and Table 7 compared with the designations of SDP 2023. For Site N-10.1 to be put out to tender in 2025 and Site N-13.1 to be put out to tender in 2026, the designations shown, which deviate from SDP 2023, therefore apply to the calendar year and quarter of commissioning as well as the time at which the in-farm cabling is connected to the converter platform.

There are no time designations for Sites N-13.3 and N-13.4 in this SDP. The designation of parts of Site N-13.4 is also under review because there is an overlap with the conditional priority area EN13-North of the ROP 2021. Designations for the temporal realisation of Sites N-13.3, N-13.4 are planned for a subsequent revision.

## 6 Standard technical principles

The strategic planning of the expansion of offshore wind energy and the associated grid topology for the transmission of electricity is of enormous importance for the supply of renewable energy. With the increase in different uses in the German EEZ, the space available for future uses and infrastructure is becoming increasingly scarce.

### 6.1 Standard concept – DC system

The length of the line connecting a site or an area to the GCP on land appears to be the decisive factor in the selection of the appropriate transmission technology for the grid connection of OWF. For route lengths of more than 100 km, additional devices for power factor correction must regularly be provided for AC connections. The transmission losses also increase with the length of the cable system. With HVDC transmission, these losses are significantly lower. For the EEZ, route lengths of more than 100 km are required, with increasing distance from the coast, even significantly more.

Compared to a grid connection using AC technology, HVDC requires a significantly smaller number of cable systems for the same transmission capacity and thus reduces the area required for the cable systems.

### 6.2 Interface between TSO and OWF project developer

With the direct connection concept, there is an increased need for coordination in the preparation and implementation of the respective project approval procedures. The shared use of the converter platform in consequence of the interface between the TSO and the OWF Project Developer at the entrance of the AC subsea cables requires close coordination and clear responsibility for tasks in planning, construction, operation, maintenance and repairs, the possible case of repair and deconstruction between the TSO and the OWF Project Developers, and, if necessary, between different OWF Project Developers who connect their offshore WT to the same converter platform. For the parties involved, there is an absolute need for cooperative collaboration. This applies in particular to the exchange of information on project deadlines, the mutual transfer of necessary information and details on the platform and the components to be installed on it. Please refer to the implementation schedule in accordance with Section 17d para. 2 EnWG.

The OWF project developer must be able to carry out the measures required for the grid connection on the converter platform in good time. On the other hand, the TSO must coordinate and carry out the measures necessary for preparing the grid connection with the OWF project developer in time.

When applying the direct connection concept, the converter platform offers the only possibility of a centralised installation of the communication technology of the OWF. Alternatively, the technology would have to be installed decentrally in the WT. In addition to spatial advantages, the availability of the converter platform also speaks in favour of a central installation of communication equipment compared with the availability of individual WT. In addition, the functioning of satellite-based communication technology in the lower part of the WT could be adversely affected by the shadowing of the rotors or the tower. In order to bundle the necessary technology in one place, the responsible TSO must provide sufficient space on the converter platform for communication technology such as mobile radio technology, Supervisory Control and Data Acquisition (SCADA) systems, and Tetra and Very High Frequency (VHF) systems. The agreement between the TSO and the OWF project developer should grant the latter a right of access for maintenance and service. It must also regulate the clearly assignable power supply for the installed technology as well as the liability for technology and communication processes.

### 6.3 Self-guided technology

This variant was already designated as the standard in the spatial offshore grid plan for the Offshore North Sea (BFO-N) and can be described as established.

In contrast to the classic, grid-guided technology, self-guided HVDC can reconstruct a grid without having to provide reactive power from the connected alternating system. This feature is necessary in order to independently rebuild the

transmission after a grid fault, to control it during normal operation, and to stabilise the surrounding three-phase grid. Please refer to Section 5.1.2.2 of the BFO-N 16/17 for further reasoning on the designation of self-guided technology.

### 6.4 Transmission voltage ± 525 kV

The designation of a uniform voltage level for DC systems (consisting of the converter on the converter platform, the DC subsea cable system and the converter on shore) serves to create a standard for the grid connection systems, specifically also for the converter platform. Based on the designation of framework parameters, manufacturers and grid operators can develop standardised solutions and, in the long term, advance planning at an early stage – if necessary also independently of location. The objective is to achieve a certain degree of standardisation in the planning of the installations through standardising requirements and thus to accelerate the planning process and achieve planning security for grid and wind farm operators and suppliers, and reduce costs. A uniform voltage level also prepares for possible cross connections of offshore grid connections to each other.

In order to enable the most spatially compatible planning and implementation of connections between the offshore grid connecting cables, the aim is to achieve the highest possible DC system power and therefore the highest possible system voltage. So far, a manufacturer-independent transmission voltage standard of ± 320 kV has developed on the market. Limitations of the power result mainly from the available cable technology as well as the space requirements of the converter platform.

Because of the possibility of increasing the power to be transmitted with a higher voltage level and thus making connection systems more efficient, the standard transmission voltage for OGCS with commissioning from 2029 was increased to ± 525 kV in previous plans. Please refer to Section 5.4 of SDP 2023 for the reasoning.

### 6.5 Standard power 2,000 MW

The designation of a standardised transmission capacity of the direct current grid connection systems formed the central basis for spatial planning in the BFO-N. Based on a standard capacity of 900 MW, the spatial requirements for the transmission of the installed wind power capacity were determined.

A standard capacity is also designated in the SDP. It is sensible to designate the highest possible standard capacity in order to minimise the number of, and thus the space required for, converter platforms and routes for dissipating the wind energy capacity.

Based on current knowledge, it is assumed that the DC connection concept with a transmission capacity of 2,000 MW will be applied in the long term. There are also numerous other projects with this grid connection concept outside the German EEZ. From a planning perspective, a further increase in transmission capacity is to be welcomed; the technical feasibility of an increase to 2,200 MW is being examined by the TSO. Reference is made to the informative presentation in Appendix 4.

### 6.6 Version with metallic return conductors

With the help of this design, in the event of failure or unavailability of one pole, the system can be operated with the remaining pole as a monopole, which allows at least a transmission of a maximum of 50% of the transmission power. With the bipolar design with metallic return conductor, in contrast to the DC grid connection systems laid in the EEZ of the North Sea to date, an additional cable is required so that three cable systems have to be laid in a bundle.

If the design with metallic return conductor is no longer planned within the framework of technical

developments, this can be introduced within the framework of a revision of the SDP.

### 6.7 Connection on the converter platform/switch bays to be provided

For the connection of OWF to a converter platform, switch bays and J-tubes shall be provided by the responsible TSO. The number of switch bays and J-Tubes is determined depending on the connected load.

For the transmission voltage of 66 kV, based on 14 switch bays and J-tubes per 1,000 MW connected load, there are seven switch bays and J-tubes for a connected load of 500 MW or 28 switch bays and J-tubes for a connected load of 2,000 MW. These serve to connect OWF.

If the transmission voltage is 132 kV, the required number of switch panels and J-tubes can be approximately halved compared with the connection with 66 kV. Accordingly, for a connected load of 1,000 MW eight, for 500 MW four, and for 2,000 MW 16 switch bays and J-tubes are to be assumed.

The number of switch bays and J-tubes is determined in the event of a deviation from the standard concept depending on the connected load.

The number of J-tubes and switch bays available for the connection of OWF to a converter platform are often the subject of coordination between the OWF Project Developer and the TSO responsible. For the purpose of long-term standardisation and equal treatment, it is advisable to define the J-tubes and switch bays available for a specific connected load in the SDP at an early stage.

Deviations from the designations can be made by agreement between the responsible TSO and the project developer of the respective OWF, taking into consideration the grid connection rules. If the OWF project developer does not fully utilise the specified number, another OWF project developer whose site or awarded WT will be connected to the same platform may use these unused switch bays or J-tubes for connection in agreement with the responsible TSO.

### 6.8 Prerequisites for cross connections

The SDP can assign spatial designations for cross connections between converter platforms.

Cross connections can contribute to ensuring system reliability. In principle, OGCS cross connections are realised via direct current transmission.

In order to be able to use these connections and pull in associated subsea cables on the converter platform, the corresponding technical prerequisites are to be created (in particular sufficient J-tubes).

### 6.9 Grid connection concept

The voltage level for the direct connection concept according to the standardised technical principles 6.9 will be increased from 66 kV to 132 kV from the year of commissioning 2033. In order to ensure the availability of the components required for the switch to 132 kV – particularly on the WT side – the introduction of 132 kV was postponed by one year (i.e. from 2032 to 2033) compared with the original designation in SDP 2023.

### 6.10 Interconnectors: Bundled subsea cables

Because of the significantly lower losses and the elimination of the need for reactive power compensation compared to the AC subsea cable system, all known projects for interconnectors through the German EEZ are already planned as DC links.

Through the bundled laying of the supply and return conductors, a magnetic flux density can generally be achieved that is significantly below the average strength of the earth's magnetic field and excludes significant impacts on protected assets. Because the development of offshore

wind energy, in addition to “classic” interconnectors that connect terrestrial grids, hybrid cross-border connections including OWF such as the “Kriegers Flak Combined Grid Solution” are now also being constructed. These connections can be implemented as AC connections because of the shorter route length and the need for a matching grid connection concept, and are therefore not covered by this requirement.

In the interests of land-efficient use of the EEZ, a provision for the bundled laying of cross-border subsea cables with fibre optic cables is included.

### 6.11 Interconnectors: Consideration of overall system

For interconnectors, it must be explained in the approval procedure how they can be included in grid planning without adversely affecting the expansion targets for offshore wind energy. From this perspective, it makes sense to assess on a case-by-case basis whether and to what extent interconnectors can connect OWF. The technology used must therefore be examined and weighed up in terms of its compatibility with the overall network against other advantages (e.g. higher transmission power).

In the course of the further revision of the SDP, the development of an international offshore grid including both the interconnectors and the grid connection for offshore wind energy will be further accompanied. Before any integration of the interconnectors into a meshed offshore grid, technical and regulatory issues would have to be clarified in addition to the question of economic viability.

The possibility of connecting interconnectors to converter platforms is not excluded.

### 6.12 Interconnectors: Version with metallic return conductors

The design of interconnectors with metallic return conductors is a technical prerequisite for the subsequent possibility of constructing an offshore grid, in particular by connecting cross-border power cables with OGCS. The standard concept in the German EEZ of the North Sea provides for a DC system with a transmission voltage of ± 525 kV and a metallic return conductor. Further technical requirements of these possible connections are to be examined and designated in the context of a next revision.

### 6.13 Deviation possibilities

For reasons of clarity and congruence with the planning principles, the possibilities for deviations are moved to a separate Section (6.13) and supplemented by foreseeable technical innovations. Please refer to Section III.5 of SDP 2023 for further reasoning of the standard technical principles that have already been defined.

# 7 Planning principles

## 7.1 No threat to the marine environment

The environmental and nature conservation planning principles ensure that the marine environment is not threatened (Section 5 para. 3 sentence 2 No. 2 WindSeeG) and that environmental and nature conservation concerns are concretised and safeguarded. They therefore generally constitute avoidance and reduction measures within the meaning of Section 40 para. 2 sentence 1 No. 6 UVPG[21].

### 7.1.1 Observance of environmental and nature conservation framework conditions

This planning principle specifies the applicable environmental and nature conservation provisions in concrete terms. These include the following aspects in particular - The list is not exhaustive.

Significant adverse effect of legally protected biotopes within the meaning of Section 30 para. 2 sentence 1 BNatSchG should be avoided as far as possible in accordance with Section 72 para. 2 WindSeeG when constructing facilities in accordance with the WindSeeG.

Areas, sites, and other energy generation areas must be compatible with the protective purpose of a Protected Area Ordinance issued according to Section 57 BNatSchG; designations are permissible if, according to Section 34 para. 2 BNatSchG, they cannot lead to significant adverse effects on the components of the area relevant to the protective purpose of the respective Protected Area Ordinance, or if they meet the requirements of Section 34 para. 3 to 5 BNatSchG.

Section 45a of the Act on Managing Water Resources[22] (WHG) is referred to. Best environmental practice in accordance with the Helsinki and OSPAR Conventions and the respective technological advancements must be taken into consideration and further specified in the individual procedure.

In accordance with Section 2 para. 2 No. 6 ROG, the area is to be developed, safeguarded or, where necessary, possible, and appropriate, restored in terms of its importance for the functional capacity of soils, the water balance, fauna and flora, and the climate, including the respective interrelationships. The importance of the area for the functionality of the soils, the water balance, the fauna and flora, and the climate, including the respective interrelationships with the requirements of the biotope network system, must be preserved. This should ensure that the dispersal processes and long-range ecological interrelationships of species and their habitats are taken into consideration.

When laying subsea cables, possible adverse effects on the marine environment should be minimised. To this end, the subsea cables should be laid outside nature conservation areas wherever possible.

Known occurrences of legally protected biotopes according to Section 30 BNatSchG should therefore also be avoided as far as possible when laying subsea cables in accordance with Section 72 para. 2 WindSeeG.

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[21] Act on the Assessment of Environmental Impacts in the version of the announcement of 18 March 2021 (Federal Law Gazette I p. 540), last amended by Article 10 of the Act of 23 October 2024 (Federal Law Gazette 2024 I No. 323).

[22] Act on Managing Water Resources of 31 July 2009 (Federal Law Gazette I p. 2585), last amended by Article 2 G on the implementation of requirements of Directive (EU) 2018/2001 for approval procedures under the Federal Immission Control Act, the Act on Managing Water Resources and the Federal Waterways Act of 18 August 2021 (Federal Law Gazette p. 3901).

Prevention and mitigation measures may be required for specific sites and projects when planning and constructing WT and other energy generation facilities at sea in close proximity to nature conservation areas in order to ensure compliance with site protection provisions. These must be concretised at the approval level, taking into consideration the specific plans of the project developers. For acceleration sites, such mitigation measures are included in the catalogue of mitigation measures or rules for mitigation measures (cf. Section II. 2.2 and III.2.2) and, if necessary, also in project approval procedures .

Depending on the location and foundation design of the WT and other energy generation installations as well as the protective purpose of the nature conservation area, additional or specific protective measures may be required in individual cases.

If occurrences of structures listed in Section 30 BNatSchG are found during closer investigations in the specific individual procedure, these are analysed and taken into consideration in the decision-making process.

The laying of subsea cables as well as their operation, maintenance and possible retention after abandonment of operation or deconstruction can lead to adverse effects on sensitive habitats. In order to limit potential negative effects on sensitive habitats and to safeguard the protective purposes of nature conservation areas, subsea cables within the EEZ should be routed primarily outside of nature conservation areas. If this is not possible, impacts on the protection and conservation objectives of the nature conservation areas must be assessed in the individual project approval procedure.

In ROP 2021, main bird migration routes were identified as bird migration corridors on the basis of extensive data source. During migration events, an increased risk of collision for birds is to be expected within these areas compared with other areas of the EEZ. The operation of WT should, within reasonable limits, be as environmentally compatible as possible. Insofar as birds within the bird migration corridors of ROP 2021 cannot be protected from a significantly increased risk of collision with WT by other measures, the requirement of preventive and mitigation measures (e.g. the shut-down of the installations during mass migration events) ensures the targeted protection of migratory birds. This is necessary to protect the marine environment by preventing a proven significantly increased risk of birds colliding with WT that cannot be mitigated in any other way. Please refer to Planning principle 7.1.8.

### 7.1.2 Overall time coordination of the construction and installation work and maintenance and repairs works

The designation corresponds to the provisions for overall time coordination in Principle 2.2.3 (8) of the ROP 2021.

In this way, the number of encroachments can be reduced and possible cumulative effects avoided or mitigated.

### 7.1.3 Noise protection in the foundations and operation of installations

This provision ensures prevention of hazards to the marine environment from noise emissions. In particular to ensure compliance with the ban on killing and injuring in accordance with Section 44 para. 1 No. 1 and the prohibition of disturbance in accordance with Section 44 para. 1 No. 2 BNatSchG with regard to the protected species of harbour porpoise, appropriate measures must be taken to avoid noise emissions as far as possible and to prevent damage. The planning principle also corresponds to the assessment of requirement 2.2.2 (6) of ROP 2021.

The further development of low-noise installation methods is to be encouraged. In addition, the further development of noise protection measures,

particularly for the installation of large-diameter monopiles, is to be driven forward so that the threshold values set out in the noise protection concept of the BMU (BMU, 2013) can continue to be reliably complied with. The noise protection measures are further specified in concrete terms on a project-specific basis as part of the approval procedure.

Best environmental practice in accordance with international conventions on marine protection and the state of the art in science and technology should be taken into consideration. Within the meaning of the precautionary principle, this is intended to initiate the (further) development of low-noise foundation methods or the further development of noise-reducing methods. In this context, no measures for which the application is technically not feasible or justifiable under consideration of cost-benefit ratios are demanded. For this reason, the planning principle also refers to the state of the art – in the event that measures that go beyond the state of the art are not considered necessary or appropriate in individual cases. This includes, in particular, cases in which, for reasons of stability and the like, a design according to the state of the art is already required by specialised law or administrative regulations (such as the design standard). In this respect, technical clauses and recognised standards (e.g. from administrative regulations) remain unaffected. The decision on necessity and appropriateness must be made at the approval level. The state of the art is the level of development of advanced processes, installations, and operating methods that, according to the prevailing opinion of leading experts, makes it appear certain that the legally prescribed objective will be achieved. Procedures, installations, and modes of operation or comparable procedures must have proven themselves in practice or, if this is not yet the case, should have been successfully tested in practice if possible (BMJ, 2024). The state of the art in science and technology refers to the most advanced processes, installations, and operating methods that, according to leading experts, are necessary based on the latest scientifically justifiable findings related to the statutory objective and are believed to ensure its achievement (BMJ, 2024).

The best available method or a combination of the best available methods according to the state of the art or according to the state of the art in science and technology shall be used to mitigate the input of underwater noise to comply with applicable noise protection values during the installation of foundation piles; these possible methods include in particular the large bubble curtain, cladding tube, hydro-silencer, limitation of pile-driving energy, or optimised pile-driving method with real-time monitoring. When designing suitable noise mitigation systems, the respective subsoil conditions must be taken into account.

According to these considerations and taking into account the successful testing of certain low-noise foundation options in 2024 (in particular the injection method), the project developer must explain why – if no alternative, low-noise foundation methods are used – they were not used in the specific project. This does not initially mean that there is an obligation to apply these procedures but rather serves as a first step to ensure the transparency of the decision of the project developer and to gain knowledge for the approval agency.

In addition to the actual noise mitigation system, the use of further extensive sound protection measures and monitoring measures, in particular through the survey of underwater noise input as well as the activity of the harbour porpoise during the installation of foundations, is required.

Reference is made to the statements under 7.2 of the 2013 concept of the BMU for the protection of harbour porpoises from noise pollution during the construction of OWF in the German North Sea (BMU, 2013).

The SEA comes to the conclusion that, according to the current state of knowledge, it can be

ensured with the necessary certainty that the requirements for species protection will be met and that nature conservation areas will not be significantly adversely affected in their components relevant to the conservation objectives or purpose of protection if applicable noise protection values are complied with and the requirements of the noise protection concept of the BMU (BMU, 2013) are implemented in the EEZ of the North Sea.

**Deterrence**

To prevent animals that could be harmed by pile driving noise from being in the vicinity of planned work, a deterrence measure must be implemented before pile driving begins. According to the current status, the danger zone is at least a radius of 750 m around the pile-driving site (cf. noise protection concept of the BMU (BMU, 2013).

The provision of Planning principle 7.1.3 under (c) serves to avoid a violation of the prohibition of killing and injuring species according to Section 44 para. 1 No. 1 BNatSchG. The harbour porpoise is the species that needs to be prioritised for protection. Representatives of other species can also be protected.

Configurable state-of-the-art deterrence systems currently include FaunaGuard or Acoustic Porpoise Deterrent (APD).

The planned measures to prevent damage to the marine environment must be presented in the noise protection concept. As part of the approval procedure, it is also regularly stipulated that a concept for reviewing the efficiency of the deterrence and noise-reducing measures must be submitted.

**Duration of the pile driving operation**

Limiting the duration of individual pile driving operations is intended to minimise the impact and serves to prevent a violation of the prohibition of disturbance under species protection law, Section 44 para. 1 No. 2 BNatSchG

According to current knowledge, the disturbance effect on marine mammals is determined not only by the absolute volume but also by the duration of the noise emissions. The spatial extent of the disturbance of fauna and the duration of the disturbance until presence rates comparable to the situation prior to the impulse sound input are restored depend on the duration of the pile driving work, including deterrence: The longer the duration of the noise-intensive work, the longer it takes to restore presence rates in the vicinity of the construction site. The temporary loss of habitat due to avoidance behaviour can have a considerable impact as a result of prolonged noise emissions, even if the noise level is reduced. This should be prevented by limiting the duration, whereby the effectiveness can be monitored.

For the various foundation types (e.g. monopile, jacket) and dimensions, there are maximum pile-driving periods that must be specified specifically for each project based on the subsoil found and the foundation used. The guideline values for a maximum pile-driving duration are currently 180 minutes for monopiles and 140 minutes for jacket piles. In order to effectively prevent any threat to the marine environment, further specifications will be made by the BSH in the approval procedure on the basis of these provisions.

As far as the chronological order is concerned, the deterrence is followed by the provision that indicates that in case of noise-intensive pile driving, the highest possible sound input already at the beginning of the pile driving is to be avoided. The purpose of this stipulation is to give fauna that continue or return to the vicinity of pile driving work the opportunity to move away from the sound source before they are exposed to the full intensity of the sound. At present, a common procedure for ensuring this provision is the soft-start procedure.

**Draft noise protection concept**

In order to ensure that the threshold values for noise protection are complied with during pile driving work, a noise protection concept must be drafted and submitted to the BSH.

The draft noise protection concept must describe:

- the site conditions,
- the planned foundation structure
- the planned construction process,
- the planned working method,
- the planned measures to mitigate noise and prevent damage to the marine environment,
- the noise forecast (including the expected frequency spectrum of the hammer) and
- the suitability of the noise mitigation systems for reducing the emitted noise according to the latest advancements in science and technology.

The draft must be submitted to the BSH in good time so that the plans can be checked and, if necessary, adjusted before the noise-intensive work and the noise mitigation system are commissioned. As part of the approval procedure, the noise protection concept is regularly ordered to be submitted at least 12 months before the start of construction. It is strongly recommended that the noise protection concept is submitted before concluding the corresponding contracts. It should also be ensured that noise protection is included in the design and that the planned noise protection measures are coordinated with the planned supporting structure. In particular, lifting vessels and crane capacities must be designed so that additional noise minimisation measures can be incorporated if necessary.

The selection of the planned procedures and the noise forecast must be justified.

As part of the description of the planned working method, the properties of the hammer and the options for controlling the pile-driving process must be described.

Measures to mitigate noise are noise-minimising measures that already affect the sound input (e.g. high frequency low energy, HiLo process) and noise-minimising accompanying measures individually or in combination, in each case according to the state of the art or the state of the art in science and technology. Accompanying noise-reducing measures are measures away from the piles (bubble curtain systems) and, if necessary, noise mitigation systems close to the piles. Measures to prevent damage include, in particular, deterrence. A concept for this must be submitted as part of the draft noise protection concept.

When designing the preventive and mitigation measures, the current state of knowledge from other procedures as well as results from investigations conducted as part of the government's accompanying ecological research and the monitoring of nature conservation areas must be taken into consideration. The noise forecast must take all relevant parameters into consideration.

The final noise protection concept must also take into consideration the specific location- and installation-specific characteristics (basic design).

As part of the approval process, it is required to regularly submit an implementation plan no later than six months before the start of construction. This specifies the valid noise protection concept and sets out the processes and components in detail.

**Testing**

The provision to test the noise protection measures and damage prevention measures under offshore conditions should ensure that the noise mitigation predicted in the noise protection concept can be achieved. In particular, an offshore test must be carried out when using a system that has not yet been used under comparable conditions. If the test shows that the selected

system cannot achieve the required noise mitigation, it may also be necessary to change or supplement the noise protection system – if no milder, equally suitable means are available – in order to ensure that no prohibitions under species protection law are realised. As part of the approval procedure, it is regularly stipulated that a concept for reviewing the efficiency of the noise-reducing measures must be submitted.

**Coordination of time of pile driving work**

The arrangement of an overall temporal and spatial coordination of the pile driving work within the framework of the subordinate approval procedure can be applied on the basis of both species protection law and site protection law requirements if there is insufficient coordination between the project developers.

The noise protection concept of the BMU (BMU, 2013) states that, according to current knowledge, noise-related disturbances of harbour porpoises in the form of flight and avoidance behaviour may occur even if the noise emission values are complied with.

Section 7.3.1 of the noise protection concept of the BMU states that: “In order to exclude significant population-relevant disturbances in the German North Sea now and in the future, sufficient areas for harbour porpoises that are not exposed to pile driving noise must be available.” The protection concept assumes that this is always the case if, first, no more than 10% of the area of the EEZ of the German North Sea lies within the disturbance radii of the OWF under construction and, second, the threshold value for impulsive noise from the prohibition of killing and injury is complied with (ibid.).

**Most environmentally compatible working method**

Based on the environmental conditions, the developer of the project must select the quietest or otherwise most environmentally compatible construction process according to the circumstances found. The same applies to the working method. This provision will be further specified within the framework of the approval procedure.

During the pile driving work for the foundations of WT, platforms and other energy generation facilities, effective technical noise mitigation systems must be used in order to comply with species and site protection concerns.

In order to prevent the killing and injury of harbour porpoises (Section 44 para. 1 No. 1 BNatSchG, substantiated by the noise protection concept of the BMU), individual project approval procedures regularly stipulate that a suitable noise protection concept must ensure that noise emissions at a distance of 750 m do not exceed the value of 160 dB for the broadband sound exposure level SEL05[23] and the value of 190 dB for the peak sound pressure level[24]. Noise protection measures, which include technical noise mitigation, optimised pile driving, deterrence, and monitoring of effectiveness, are further specified on a location-specific basis and in relation to the foundation construction used in individual cases. A restriction of the bid within the framework of the invitation to tender for the respective site with regard to the type of foundation shall thus not take place. The working method established according to the state of the art or the method justified according to the state of the art in science and technology that is as low-noise as possible under the circumstances found must be used.

[23] Sound exposure level in dB re 1 µPa² s; dB = decibel; re = in reference to; 1 µPa = 1 microPascal; 1 µPa² s = 1 microPascal squared · second; the reference level for water is 1 µPa.

[24] Peak sound pressure level in dB re 1 µPa; dB = decibel; re = in reference to; 1 µPa = 1 microPascal; 1 µPa² s = 1 microPascal squared · second; the reference level for water is 1 µPa.

To avoid disturbance of the harbour porpoise as a protected species within the meaning of Section 44 para. 1 No. 2 BNatSchG in conjunction with the noise protection concept of the BMU (BMU, 2013), suitable overall coordination may be required so that no more than 10% of the area of the EEZ is exposed to disturbance-inducing impulse noise at any time. In order to fulfil the species protection requirements under Section 44 BNatSchG, it is necessary to ensure that sufficient alternative habitats are permanently available for harbour porpoises in the German North Sea EEZ and that significant disturbance of the local population can be ruled out with the necessary certainty. Appropriate spatial and temporal coordination of parallel construction sites can prevent significant disturbance even in the years with the highest construction rates, 2029 to 2030 (cf. explanations in Section 4.12.3 North Sea Environmental Report on SDP 2023).

In order to comply with the requirements under site protection law within the meaning of Section 34 BNatSchG in conjunction with the noise protection concept of the BMU, (BMU, 2013) appropriate overall coordination may be required so that no more than 10% of the area of one of the nature conservation areas is exposed to disturbance-triggering impulse noise at any time. When implementing projects in areas adjacent to Area I of the "Sylt Outer Reef – Eastern German Bight" nature conservation area or in or near the main concentration area of harbour porpoises, stricter requirements apply in the period from 1 May to 31 August in accordance with the noise protection concept. For the particularly sensitive period of the harbour porpoise (May to August), it is additionally necessary (in accordance with the noise protection concept) to keep the Natura 2000 site "Sylt Outer Reef" (corresponds to Area I of the "Sylt Outer Reef – Eastern German Bight" nature conservation area) as well as the main concentration area of the harbour porpoise free of sound-intensive construction measures during this period, where cumulatively more than 1% of the area is within the disturbance radius of 8 km. This is intended to meet the requirements of site protection law according to Section 34 of the BNatSchG by ensuring that there are sufficient permanent escape routes for harbour porpoises and that any adverse effect of the conservation objectives and the purpose of protection of the nature conservation area can be ruled out with the necessary degree of certainty.

If compliance with the aforementioned 1% (protection in the sensitive phase in the Natura 2000 site "Sylt Outer Reef" as well as in the main concentration area of the harbour porpoise) or the 10% criterion (species protection) cannot be technically ensured in the individual procedures, spatial and temporal coordination of parallel construction sites could be considered – as already implemented from 2013 to 2018. This means that at the downstream approval level, it may be possible to issue orders regarding the permitted period for pile-driving work for individual OWF projects whose pile driving work overlaps with that of other projects. For individual projects, it may not be possible for sound-intensive work to take place at certain times.

**Blasting**

Blasting is generally not permitted because of harmful impacts on the marine environment, in particular harmful sound pressures. If blasting to remove non-transportable munitions in the project area or on the routes of the grid connection is unavoidable, a noise protection concept must be submitted to the BSH as the approval agency in good time beforehand. The provision of a noise protection concept is necessary in order to avoid endangering the marine environment through the use of suitable protective measures (e.g. scaring and the use of bubble curtains) even in the exceptional case of blasting of non-transportable munitions regulated here.

**Operational noise**

In order to protect the marine environment from significant sound input during the operation of the installations, it is necessary to always ensure

that the installations are as low-noise as possible in accordance with the state of the art or the state of the art in science and technology. According to the current state of knowledge, the WT that have been used so far are relatively quiet. Even at a short distance from the installation, the sound emission does not differ from the usual ambient sound (Bellmann, Müller, Scheiblich, & Betke, 2023). This applies to all types of installations since 2009 (alpha ventus) until today in the German EEZ of the North Sea and Baltic Sea regardless of manufacturer, capacity, size, foundation type, and location.

#### 7.1.4 Traffic logistics concept

This new planning principle included in the current SDP serves the purpose of reducing the impact of service traffic on seabirds and resting birds and the harbour porpoise as far as possible. The planning principle expressly applies only to service traffic that takes place within the main concentration area of the divers and the harbour porpoise or the “Sylt Outer Reef edz Eastern German Bight” nature conservation area and can be limited to sensitive periods, specifically the main resting period of the divers from 1 March to 15 May and the sensitive breeding phase of the harbour porpoise from 1 May to 31 August. The traffic logistics concept aims to reduce the number of journeys through the aforementioned areas during sensitive periods by minimising the number of journeys and keeping them as short as possible. Possible examples of optimisations to be examined could be a re-routing of the arrival and departure routes, a bundling of routes, the use of hotel ships instead of daily transfers ashore, or providing anchor points in the OWF instead of using Dynamic Positioning Mode.

#### 7.1.5 Prevention and mitigation of emissions

The avoidance and mitigation requirement ensures that the construction and operation of offshore installations does not lead to pollution of the marine environment within the meaning of Article 1 para. 1 No. 4 of the Convention on the Law of the Sea and threat of the marine environment in accordance with Sections 5 para. 3 sentence 2 No. 2, 69 para. 3 sentence 1 No. 1 l WindSeeG. In addition, the provisions of the Ordinance on Environmentally Sound Practices in Maritime Shipping[25] must be complied with.

In this context, “emissions” are substances or energy directly or indirectly introduced to the marine environment (e.g. heat, sound, vibration, light, electrical, or electromagnetic radiation).

In order to prevent pollution and threats to the marine environment, genererally no substances maybe discharged into the sea during the construction, operation, maintenance, and deconstruction of installations. If the discharge of such installation-specific emissions into the marine environment is unavoidable for technical reasons (e.g. because of safety-relevant provisions of shipping or air traffic), this has to be documented and reasoned to the approval agency within the framework of the approval procedure, together with an environmental assessment. Installation-specific examination of reasonable alternatives must be performed and documented.

The minimisation requirement for material discharges applies.

**Emissions study**

The preparation of an emissions study to survey the emissions arising from the respective design and equipment variant and their prevention, respectively, is mandatory. For the preparation of

[25] See-Umweltverhaltensverordnung [Maritime Environmental Behaviour Regulations] of 13 August 2014 (Federal Law Gazette I p. 1371), last amended by Article 3 of the Ordinance of 13 December 2019 (Federal Law Gazette I p. 2739).

the emission study, the minimum requirements of the guidelines published by the BSH "Guideline for the emission study for offshore platforms in the German EEZ" and "Guideline for the emission study for offshore wind turbines in the German EEZ" [26], as amended, must be taken into consideration. Because of the early design phase, it is generally not yet possible to fully fulfil the requirements for an emissions study in the approval procedure. For this reason,at first an emissions concept must be submitted as part of the application documents. In the concept, the project developer shall address emissions that are as concrete and project-related as possible, the possible and applied avoidance and mitigation measures, and the cumulative effects of the installation(s). The emissions study to be submitted in the enforcement procedure forms the basis for the waste and operating materials concept to be drawn up. When preparing the waste and operating materials concept, the minimum requirements of the "Waste and operation materials concept for OWF and their grid connection systems in the German EEZ"[27] published by the BSH, as amended, must be taken into consideration. Emergency plans shall be drawn up, inter alia, for accidents involving substances hazardous to water during the construction and operation phases and other unexpected events giving rise to concerns about pollution of the marine environment.

**Light emissions**

The attraction effect of artificial light on birds that migrate at night has long been known and documented (summarised in (Ballasus, Hill, & Hüppop, 2009; Dierschke, et al., 2021; Brayley, How, & Wakefield, 2022). Especially in poor weather conditions and low visibility, songbirds are attracted by light on lighthouses, ships, research platforms, and oil rigs. On one hand, this increases the risk of collision (with illuminated and unlit parts of the structures); on the other hand, artificial light can lead to disorientation of the birds and can be associated with energy losses (Ballasus, Hill, & Hüppop, 2009; Dierschke, et al., 2021).

Investigations have shown that the light intensity, the colour of the light, and the flashing frequency can affect the attraction of migratory birds (Burt, et al., 2023). Recent research shows that, if it is not possible to switch them off completely, red flashing lights, in contrast to other colours and continuous lighting, have the lowest attraction effect on migrating birds at night (Evans, Akashi, Altman, & Manville, 2007; Rebke, et al., 2019; Zhao, Zhang, Che, & Zou, 2020). Long dark phases with short light phases and synchronisation of the flashing regime of all WT of an OWF are recommended (Ballasus, Hill, & Hüppop, 2009; Dierschke, et al., 2021).

Measures to reduce light emissions are only possible if the requirements of safe shipping and air traffic are taken into consideration.

The exterior coating shall be as glare-free as possible without prejudice to the regulation on air and navigation marking.

**Operating materials**

The minimisation requirement also includes that environmentally compatible operating materials

[26] The guidelines for the emission study for offshore platforms (https://www.bsh.de/DE/THEMEN/Offshore/Offshore-Vorhaben/Windparks/_Anlagen/Downloads/Leitlinie_Emissionsstudie_fuer_Offshore_Plattformen_inkl_Annex.pdf) and offshore wind farms (https://www.bsh.de/DE/THEMEN/Offshore/Offshore-Vorhaben/Windparks/_Anlagen/Downloads/Leitlinie_Emissionsstudie_fuer_Offshore_WEA.pdf) are available on the BSH website.

[27] The framework concept is available at https://www.bsh.de/EN/TOPICS/Offshore/Offshore_projects/Wind_farms/_Anlagen/Downloads/Rahmenkonzept-Abfall-Betriebsstoffe.pdf

(e.g. oils, greases) are to be used as far as possible for the operation of the installation and that biodegradable operating materials are to be preferred, if available. The environmental compatibility of the operating materials used in the installations must be ensured by examination of reasonable alternatives .

**Fluorinated greenhouse gases in switchgear, cooling and air-conditioning systems and fire protection systems**

Because the provisions of Ordinance (EU) 2024/573 of the European Parliament and of the Council of 7 February 2024 on fluorinated greenhouse gases must be complied with, the operating materials used in switchgear, cooling, and air-conditioning systems and fire protection systems must be assessed for their climate impact. The transitional provisions set out in this ordinance shall apply.

In compliance with the aforementioned ordinance, operating materials that have no or the lowest possible greenhouse gas potential should be used. In particular, sulphur hexafluoride ($SF_6$) is a highly climate-impacting gas. It must be examined whether $SF_6$ – if its use would be permitted at all under the aforementioned ordinance – can be replaced by a less or non-climate-impacting alternative according to the state of the art. The substitution test and its result shall be presented and reasoned in the approval procedure.

**Constructional and operational precautions and safety measures**

Possible structural safety systems and measures to prevent and monitor pollutant accidents and environmental discharges include containments, double walls, room/door thresholds, drip pans, drainage systems, collection tanks, and leakage and remote monitoring. This applies in particular to installations that contain or carry larger quantities of operating fluids and/or substances hazardous to water (e.g. diesel tanks, pipelines, transformers). False activations of the fire protection systems on helicopter landing decks must be avoided at all costs.

Because there is an increased hazard potential in the offshore area from changes of operating materials and refuelling measures, special organisational and technical precautionary measures must be taken for these activities (e.g. preparation of method statements, precautionary measures during crane work, self-sealing breakaway couplings (emergency breakaway couplings), dry couplings, drip pans, overfill protections, and spill kits) in order to prevent pollution accidents and environmental discharges.

**Waste**

Waste must be taken ashore and disposed of there according to the applicable waste disposal regulations. The regulations of this planning principle on the permissible discharge of properly treated sewage water or the discharge of drainage water with a maximum oil content of 5 mg/l in individual cases remain unaffected.

**Corrosion protection**

If the use of galvanic anodes (sacrificial anodes), typically consisting of aluminium-zinc-indium alloys, is unavoidable, this is only permissible in combination with a suitable coating of the foundation structures (cf. BSH design standard). The impurities of the anode alloys, in particular zinc, cadmium, lead, copper and mercury, shall be reduced as far as possible. The zinc content required for the functionality of the anodes must also be limited to a technically necessary minimum.

The cathodic corrosion protection system must be dimensioned such that the use of galvanic anodes is limited to a technically necessary minimum. The use of zinc anodes (in the sense of zinc being the main component of the anodes) is prohibited. Where necessary, impressed current cathodic protection (iCCP) systems should be used as a cathodic corrosion protection system in the internal areas of the foundation structures.

The minimum requirements for the corrosion protection in the BSH Standard Design must be met. The use of biocides such as tributyltin (TBT) or other anti-fouling agents to protect the technical surfaces from the undesired settlement of organisms (biofouling) is prohibited.

**Cooling systems**

Seawater cooling systems with discharges during regular operation are only permissible in justified exceptional cases (e.g. if the required cooling capacity demonstrably cannot be achieved with closed systems or system variants and no suitable alternative systems are available).

Antifouling agents and biocides are reactive substances and, depending on the concentration, have detrimental impacts on the aquatic environment. To counteract pollution of the marine environment, the use of antifouling agents or biocides in seawater cooling systems must be minimised through a needs-based treatment strategy. The possibility of seasonally switching off the addition of antifouling agents or biocides, taking into account the expected strength of marine growth, is to be examined. If processes involving chlorination are planned, the concentration at the outlet (i.e. when discharged into the marine environment) must be monitored, and a maximum discharge concentration of 0.2 ppm Total Residual Oxidant (TRO) must generally be observed. Consideration should be given to monitoring the level of fouling. The use of antifouling agents or biocides requires a comprehensive environmental assessment in advance.

**Sewage water**

Sewage water treatment plants on platforms are generally not permitted and the sewage water specified in the planning principle may not be released into the marine environment. Because the discharge of treated sewage water is still associated with material discharges to a certain extent, the sewage water must always be collected professionally, transported to land and disposed of there in accordance with the applicable waste management regulations.

On platforms that are not continuously manned, solutions must be found that do not lead to a discharge, for example by providing sufficiently dimensioned collection tanks for the professional collection of sewage water in order to bring the limited quantities of sewage water ashore, or other solutions must be used (such as “incinerating toilets”).

Exceptions may be permitted in individual cases and are determined in particular by the manning level of a platform.

On permanently manned platforms, a sewage water treatment plant is exceptionally permissible, in particular if the negative impacts on the marine environment associated with bringing the sewage water ashore - for example due to the required number of ship transports - exceeds the impact associated with discharging the treated sewage water.

The sewage water treatment plant must correspond to the latest technological advancements. This includes, inter alia, that only a sewage water treatment plant that reduces nitrogen and phosphorus compounds at least in accordance with the requirements of MARPOL Resolution MEPC.227(64) “2012 Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants” Annex 22 para. No. 2.7 (MARPOL, 2012) is permitted.

If sewage water treatment plants are permissible in individual cases, they shall treat all sewage water arising on the platform.

Chlorination of sewage water is not permitted because chlorination processes produce halogenated byproducts that are harmful to the environment. Other techniques must be used that are demonstrably more environmentally friendly (e.g. UV systems and ultrafiltration). Retained solids must be disposed of on land.

To ensure proper operation and to check the purification performance and the discharge values in the operating phase, the sewage water must be sampled and analysed regularly. At sewage water treatment plants, suitable sampling points shall be provided at the inlet and outlet for this purpose. This is to enable sampling and subsequent analysis of the sewage water.

On platforms manned only during maintenance work, sewage water is generated only for a limited period of time. However, sewage water treatment plants are effective only to a limited extent in discontinuous operation so that inadequately treated sewage water can lead to emissions into the marine environment that exceed avoidable levels. On such platforms, it is therefore necessary to either use solutions that do not lead to a discharge (see above) or permanently maintain the functionality of the sewage water treatment plants (e.g. by adding nutrient solutions). Otherwise, the above provisions for the operation of sewage water treatment plants apply accordingly. A reasoning for the necessity of a sewage water treatment plant must be provided for the respective application as part of the approval procedure.

**Oil content of the drainage water**

If an oil separator is used instead of a closed system for collecting the drainage water and subsequent disposal on land, the oil content may not exceed 5 milligrams per litre during discharge in order to reduce the discharge of oil contained in the drainage water into the marine environment. The designation of the maximum oil content at 5 milligrams per litre is based on the current state of implementation in the existing OWF and the technical availability of these systems (e.g. DIN EN 858-1).

In order to monitor compliance with the maximum oil content when discharging into the marine environment, the oil content in the drainage water shall be continuously monitored in the discharge by means of sensors after passing the oil separator.

**Use of chemicals, especially in firefighting foams on helicopter landing decks**

Due to the proximity of the offshore installations to the marine environment, the use of chemicals potentially hazardous to humans and the environment must be minimised as much as possible. Perfluorinated and polyfluorinated alkyl substances (PFAS), e.g. in fire-fighting foams, are ecotoxicologically critical substances with proven negative effects on the marine environment and accumulate as highly persistent substances. Foaming agents that comply with the provisions of Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and Regulation (EU) 2019/1021 on persistent organic pollutants, including the amendments to the appendices of the aforementioned regulations, are therefore to be selected. In addition, for substances not covered by the ordinances mentioned, foaming agents that do not contain PFAS must be selected (“PFAS-free”).

The general principle that emissions should be avoided or, if unavoidable, mitigated is concretised with the provision that fire fighting exercises are to be carried out exclusively with water.

**Diesel generators**

This provision for platforms ensures that the adequate level of protection is guaranteed while a choice can be made between different suitable certifications.

For OWT, the use of diesel generators for emergency power supply is to be avoided. The use of diesel generators leads to air emissions. In addition, the operation of diesel generators requires extensive refuelling and fuel storage, which can result in risks of environmental hazards from oil spills. Therefore, alternative systems are to be used for the temporary supply of the OWT, if

possible, within the framework of ensuring general operational safety. If the use of diesel generators for the emergency power supply cannot be avoided in justified individual cases, these diesel generators must also be certified with regard to emission values according to MARPOL (Appendix VI). If these emission values are not applicable because the generators are not powerful enough, other applicable emission standards must be used (e.g. EU standard 97/68/EC and its amendments, there: stage III/IV).

In order to reduce sulphur dioxide emissions to a minimum, fuel with the lowest possible sulphur content must be used (such as low-sulphur heating oil according to DIN 51603-1 or diesel according to DIN EN 590 (land diesel)), taking into consideration the storage stability of the respective product. This applies to temporary generators during installation work on OWT and platforms as well as to permanent diesel generators (grid backup systems) on platforms. When selecting the appropriate diesel generators, suitability for the respective fuel type is to be ensured in good time.

**Grouting method and grouting material**

The specification on grouting procedures serves to minimise the discharge of grouting material during the construction phase and the release of pollutants from the grouting material into the marine environment.

#### 7.1.6 Minimisation of scour and cable protection measures

In certain areas, measures to prevent scour are necessary to ensure the long-term stability and positional safety of structures on the seabed.

For any scour and cable protection measures, the placement of hard substrate must be limited to the minimum necessary to provide protection in order to minimise the impact on the marine environment. It must be ensured that a nautically sufficient water column is maintained above the crossing structure.

If the use of natural stone or other inert and natural materials is not technically possible when constructing the surface layer of crossing constructions, to a limited extent there are no fundamental technical reasons for excluding the use of other inert materials (e.g. plastic-free and pollutant-free concrete mattresses) provided that material emissions and the abrasion of plastic particles into the water column can be ruled out.

Also in the case of other cable protection measures that are required (e.g. when cables are fed into OWT or the platform), to a limited extent there are no fundamental technical reasons for excluding the use of other inert materials (e.g. plastic-free and pollutant-free concrete mattresses) provided that material emissions and the abrasion of plastic particles into the water column can be ruled out.

#### 7.1.7 Sediment warming

The designation on sediment warming is based on the reasoning of Principle 2.2.3 (6) of ROP 2021 as well as on Section 17d para. 1b EnWG.

During operation of subsea cables, the surrounding sediment heats up radially around the cable systems. The heat emission results from the thermal losses of the cable during energy transmission. The conductor temperature can be a maximum of 70°C for DC conductors and 90 C for AC conductors.

The “2 K criterion” (i.e. a maximum temperature increase of 2 degrees (Kelvin) 20 cm below the seabed surface) has become established as a precautionary value for nature conservation in current official approval practice for all submarine cable systems laid in the EEZ area. The 2 K criterion represents a precautionary value which, according to the assessment of the Federal Agency for Nature Conservation based on the current state of knowledge, ensures with sufficient probability that significant negative impacts of cable warming on the marine environment and the benthic biocoenosis are avoided. A stronger

warming of the uppermost sediment layer of the seabed can lead to a change in the benthic communities in the area of the submarine cable route. In the process, cold-stenothermal species, which are bound to a low temperature range and are sensitive to temperature fluctuations, can be displaced from the area of the cable routes, especially in lower areas within the uppermost sediment layer. In addition, there is the possibility that new, non-native species could become established as a result of sediment warming. Furthermore, an increase in seabed temperature could change the physico-chemical properties of the sediment, which in turn could result in a change in oxygen or nutrient profiles.

In addition to the ambient temperature in the area of the subsea cables and the thermal resistance of the sediment, the cable type and the transmission capacity have a significant influence on the extent of sediment warming. Compliance with the 2 K criterion should therefore be ensured when dimensioning the cable systems, taking into consideration Section 17d para. 1b EnWG.

For the temperature development in the near-surface sediment layer, the depth position or covering over of the cable systems is also decisive.

It must be taken into consideration that in the area of crossing structures, it may not be possible to fulfil the required covering over for compliance with the 2 K criterion.

For further reasoning and discussion of this planning principle during the revision procedure for SDP 2020, please refer to the explanations in Section 4.4.4.8 of SDP 2020.

### 7.1.8 Bird collision monitoring

Section 77 para. 1 sentence 1 No. 1 WindSeeG obliges the persons responsible according to Section 78 WindSeeG to ensure that no hazards to the marine environment emanate from the device during construction and operation as well as after cessation of operation. This also includes ensuring that there is no proven significantly increased risk of birds colliding with WT that cannot be mitigated by protective measures, Section 69 para. 3 sentence 1 No. 1b WindSeeG in conjunction with Section 44 BNatSchG. This provision also applies outside the bird migration corridors. In addition, Section 77 para. 3 No. 1 WindSeeG stipulates that the responsible persons must carry out monitoring of the construction- and operation-related impacts of the installations on the marine environment during the construction phase and during the first 10 years of operation of the turbines and must immediately transmit the data obtained to the BSH and the BfN. As part of the environmental precautionary principle for the protection of migratory birds, bird collision monitoring should always be carried out with regard to possible collisions between birds and WT. Bird collision monitoring is initially to be planned for a period of 10 years as part of operational monitoring. Reference is made to the options under Section 79 para. 1 to 3 in conjunction with Section 69 para. 3 sentence 1 No. 1b WindSeeG.

In order to ensure that professionally coordinated bird collision monitoring is carried out, it is necessary to submit a monitoring concept at an early stage. The concept must be drawn up by technical experts and agreed with the BSH.

The objective of the survey is that the location-specific collision risk in relation to the location-related migration intensity and evaluate it with respect to the impacts of weather conditions and operating status of WT or correlate them. High migration rates are not necessarily associated with a high risk of collision (relative proportion of collisions to the total number of migrating birds in the area analysed). Some birds can avoid the rotors on a small scale (micro-avoidance). In contrast, collisions can occur even with low migration rates (e.g. in poor weather conditions).

In order to record the number of birds colliding with the WT operated on the sites, collision monitoring is required using measuring systems suitable for the marine environment that can record the full range of species composition to be expected (including small songbirds). According to the latest technological developments, this requires a combination of radar systems to survey migration phenology and intensity, camera systems (including infrared cameras) to record individuals in the rotor area and weather sensors. With regard to the survey of weather conditions, the parameters precipitation, fog/visibility, wind speed and wind direction must be recorded. The operating status of the WT (standstill, spinning, revolutions per minute and alignment of the rotor blades to the migratory direction) must also be recorded as additional accompanying data. If technical systems that can quantitatively and reliably record direct bird collisions with WT (e.g. vibration sensors) are available, these should be used in consultation with the BSH in order to reliably measure actual collisions in real time. The direct survey of collisions in addition to camera recordings is likely to provide a more precise measurement of collision mortality than the sole camera-based recording of birds in the vicinity of the rotor blades. The latter is a conservative method that potentially overestimates the number of collisions and is dependent on visibility conditions.

Should a technical necessity arise during the course of the bird collision monitoring programme, it may be necessary to adapt or retrofit the systems used or the evaluation methodology within the framework of proportionality.

During the migration periods in autumn and spring, most migratory birds cross the German North Sea and Baltic Sea EEZs. For this reason, continuous surveys are required during the main migration periods from 1 March to 31 May and from 15 July to 30 November. In order to ensure this, replacement devices must be kept ready in case one or more systems fail so that recording can be immediately resumed. The BSH must be informed immediately of any failures in recording as well as of any measures taken to resume the survey.

The number and locations of the WT equipped with recording systems must be suitable for collecting representative data for the respective site or other energy generation area. As part of a current wind farm project in the Baltic Sea, for example, plans are being made to use systems to record data on the transformer platform as well as on five WT. The number of sites with survey recording systems must be determined in each case depending on the wind farm layout, the location in the context of other OWF and the respective site conditions and may also deviate from this number. Data are representative if they allow reliable extrapolations of collision events to the entire area of investigation. A clear assignment of the individuals affected by collisions is required at least up to the species group. It must therefore be ensured that no collisions are missed (“false negatives”) and that detected collisions (“true positives”) can be correctly classified and quantified. The detection systems used must be technically capable and positioned in such a way that the generally expected species composition of bird migration (including very small and light songbirds) is recorded at all times (even in poor weather conditions and when the WT are in and out of operation) and throughout the entire rotor area (i.e. 100% coverage of the danger zone). The expected species composition can be taken from annual reports on the standard surveys for the protected asset migratory birds and from specialist literature on bird migration over the German EEZ. If several measuring systems (of the same or a different type) are used to cover the entire rotor area, it must be ensured that there are no multiple counts or that these can be clearly recognised and taken into consideration in the evaluation.

The calibration of the systems used is a prerequisite for the interpretation of the measurement

data and must be described in detail in the investigation concept of bird collision monitoring. It must be completed and approved by the BSH before operation begins. The documentation of the calibration is part of the reporting to the BSH.

In order to set the collision risk in relation to the site-specific migration intensity, the overall migration activity must be recorded using bird radars. In addition to the continuous survey of bird migration, specialised bird radar systems allow insects to be reliably distinguished from bird signals and species groups to be differentiated from one another. This is necessary for analysing the risk of collision and is not possible with conventional ship radars, which were not developed for bird detection.

Bird collision monitoring is primarily used to survey migratory birds. However, if the detection systems detect bats in the vicinity or in the danger zone of the installations, these data must be analysed separately and included in the report as well as in the enforcement procedure.

#### 7.1.9 Accompanying environmental research

Accompanying research projects (e.g. by the BfN, the BSH, or research institutions) contribute to a better understanding and assessment of the interrelationships between OWF and the marine environment. In particular, the interrelationship between the various protected assets and wind farms have not yet been conclusively clarified nor have the cumulative effects of simultaneous construction work or the effect of contiguous sites on individual protected assets, the effect of contiguous sites on the interrelationships between the protected assets, and the impact on the ecosystem.

The project developers should facilitate access for the organisation conducting the accompanying research by arrangement and support the accompanying environmental research as far as possible. This does not mean an obligation to bear the costs but rather a request for good neighbourly cooperation. For example, unused spaces could be made available for transfer, or measurement data could be forwarded via the means of communication of the project developer (if technically and logistically possible), or a power connection could be made available.

### 7.2 No adverse effect on the safety and ease of navigation

This designation is derived from Principle 2.2.1 (3) of the ROP 2021, according to which economic uses should affect the safety and ease of traffic as little as possible.

The BSH regularly establishes a common safety zone around WT and platforms. The effect of this safety zone is that commercial shipping does not take place in these areas and that proper shipping operated in accordance with the rules of good seamanship continues to be generally possible without danger. Reference is made to the responsibility of the GDWS in this regard for the establishment of any navigation regulation for OWF. In the areas where, as part of the deviation from ROP 2021, areas and sites within priority areas for shipping of ROP 2021 are designated, the definition of safety zones within these priority and reservation areas for shipping is also required contrary to the planning principle.

In the case of cable systems, the specified covering over (cf. Planning principle 7.13.6) and the crossing angles (cf. Planning principle 7.13.3) are not expected to have an adverse effect on shipping.

Please refer to Planning principles 7.8 and 7.10.

According to the current state of knowledge, the provision of additional towing capacity of presumably at least one additional tug in the traffic area of Shipping route SN10 of ROP 2021 is a necessary prerequisite in order to minimise the risks to the safety and ease of navigation caused by the further development of sites in Zone 3 as

well as in the area of Shipping route SN10. This is the conclusion reached by the risk analysis developed on the occasion of the revision of the SDP in the expert opinion "Verkehrlich-schifffahrtspolizeiliche Risikoanalyse der im Rahmen der Fortschreibung des FEP der deutschen AWZ der Nordsee festzulegenden Gebiete"(DNV GL, 2021) dated April 2021, taking into consideration the parameters, criteria, and acceptance limits specified by the "Guideline values relevant to approval" working group of the BMDV in connection with the risk analysis and assessment of offshore wind farms. Current findings of the shipping report for the future design of Shipping route SN10 also support the assumption of the need for additional towing capacity in the aforementioned traffic area using a different methodology (ABL Group, MARIN, 2024). The obligation to provide additional towing capacity initially affects the OWF Project Developers east of Shipping route SN10 in areas N-9, N-10, N-11, N-12, and N-13 both individually and jointly. It is left to the OWF Project Developers to develop a collaborative model for operation. This requirement is also fulfilled if the provision is carried out by third parties (e.g. Central Command for Maritime Emergencies, WSV) at the expense of the OWF project developers. Based on the shipping reports available, especially (DNV GL, 2021), it is to be expected that the need for additional towing capacity will arise from the time of the first fully completed development of a site in the areas N-11 or N-12.

The positioning of the additional towing capacity is likely to be at the intersection of Shipping route SN10 and Shipping route SN4.

Towing capacity requirements must be appropriate to the conditions of the traffic area concerned. In addition, equipment and personnel must be available to provide adequate first aid. The WSV traffic centres should have the authority to issue instructions regarding the towing capacities. In addition, the Central Command for Maritime Emergencies must have the right of access when needed and the responsible Bundeswehr authorities in the event of defence. Other solutions for the provision and operation of towing capacities, which are developed in consultation with all authorities involved, are not excluded by the above planning principle.

The additional trawl capacity or the tug must be designed in such a way that it remains operational in the intended maritime area, even in the most adverse weather conditions, and has the necessary crew size and suitable towing equipment for emergency towing operations. In addition, the tug must reach a minimum speed depending on the intended positioning location in order to be able to reach a damaged ship as quickly as possible in the event of an emergency. The required bollard pull of the trawl must be designated according to the prevailing traffic in the maritime area.

At a minimum, the requirements for existing state emergency towing capacities must be met (e.g. emergency tug Nordic; see also the standards and guidelines for the type and number of towing equipment components to be carried on board as outlined in the concept for towing equipment for multi-purpose vessels by the Central Command for Maritime Emergencies). Emergency towing essentially includes the establishment of a towing connection and the subsequent holding at sea or towing ("controlled drifting") of the drifting damaged ship. These measures are carried out until the manoeuvrability of the damaged ship is restored, commercial emergency tugs can safely take over the damaged ship or the danger has been eliminated in some other way. This designation of additional towing capacity in the catchment area of Shipping route SN 10 shall be without prejudice to requirements for the provision of additional towing capacity in other traffic areas, in particular on the Baltic Sea or in the area of areas N-1 to N-8 if necessary. The need for any additional towing capacity will have to be assessed depending on further development

and traffic development in the relevant traffic area or other relevant framework conditions and cannot be excluded at present.

### 7.3 No adverse effect on the safety and ease of air traffic

The planning principles ensure that the safety and ease of traffic, in this case air traffic, is not impaired, Section 5 para. 3 sentence 1 No. 3 WindSeeG.

Offshore structures, parts thereof, or associated activities may pose a risk to air traffic (risk of collision). In order to minimise the potential danger, such structures and temporary obstacles caused by construction, maintenance, or dismantling must therefore be marked as obstacles to aviation if the relevant prerequisites are met. Because the regulations applicable to the marking of aviation obstacles on the territory do not extend to the German EEZ, with the SOLF, among others, the BMDV has created a corresponding regulation for the EEZ for this purpose. This must be complied with in the version applicable according to the transitional provision.

Section 9 para. 8 of the EEG specifies the sites in the German EEZ whose night-time labelling must be demand-driven.

Provisions for the installation and operation of aviation infrastructure (helicopter landing decks, helicopter hoist platform on WT and platforms) are set out in the SOLF.

Sufficient permanent obstacle clearance is an essential criterion for safe flight operations at an offshore aerodrome (currently only helicopter landing decks in the EEZ). The dimensions and orientation of the approach and departure areas (especially flight corridors) to be provided and kept free for this purpose are also derived from the SOLF.

A holistic view (i.e. a comprehensive view of the obstacle profile covering the entire area) is intended to ensure that the air traffic interests of third parties in the area concerned or regularly also in neighbouring areas are sufficiently taken into consideration in addition to the interests of the operator (e.g. if a helicopter landing deck of a third party is to be set up and operated in a site as is regularly the case with platforms of the TSO). In this case, the third party must be able to comply with or implement all necessary regulations on the required obstacle clearance (flight corridors) in accordance with Part 3 of the SOLF. Only in this way can it be ensured that the obstacle protection requirements of all helicopter landing decks to be set up are adequately taken into consideration. The primary objective is that the erection of obstacles (e.g. WT) may not result in one of the helicopter landing decks located in the relevant vicinity becoming unusable or one planned there not being able to be erected. It is also important to note that changes to the obstacle profile may also make it necessary to adapt the obstacle limitation areas and sectors. For example, if larger installations than previously expected are erected adjacent to an existing obstacle profile and an existing flight corridor, the required flight corridor may become longer, which must be taken into consideration when selecting turbine locations.

The spatial proximity of the OWF in an area and the manoeuvring requirements of a helicopter regularly require an area-wide consideration in addition to a cross-area consideration. It cannot be ruled out that obstacle limitation areas and sectors may extend into other sites or areas for other energy generation or be located entirely within them. If the helicopter landing decks of third parties are located on converter or transformer platforms already designated by the SDP or shown therein for information purposes or if the helicopter landing deck has already been designated or approved in the planning documents of an approval procedure at the start of participation, the installation of these helicopter landing decks, including the associated obstacle limitation areas and sectors, must be made possible. The parties involved must coordinate with each other during the planning process, taking

into account the relevant regulations in the SOLF. If helicopter landing decks with obstacle limitation areas and sectors already exist or are authorised, their obstacle clearance must be ensured.

This may impose restrictions on layout planning within sites or other energy generation areas. The obstacle limitation areas and sectors should therefore be planned in such a way that sites or other energy generation areas of third parties are impaired as little as possible within the framework of the SOLF requirements by planning the obstacle limitation areas and sectors as far as possible outside areas and other energy generation areas or by using areas that are to be kept free from development anyway (e.g. cable corridors for the installation of the air traffic areas).

Obstacle limitation areas and sectors of helicopter landing decks may not be created beyond the boundaries of the German EEZ in order to prevent them from being restricted in their use or rendered unusable outside the German EEZ or restricting uses there. Outside the German EEZ borders, there is no influence on any uses planned there so that reliable planning and the necessary freedom from obstacles in accordance with Planning principle (b) cannot be guaranteed for these areas. Therefore, a deviation is only possible if the developer of the project submits express consent from the neighbouring state whose EEZ is affected.

A tower beacon along the affected flight corridors is intended to ensure the safe use of helicopter landing decks at night becausee it increases the visibility of these obstacles and makes it easier for helicopter crews to orientate themselves, thereby giving them a spatial impression of their surroundings. In this way, the approach to obstacles can be better assessed because the lateral limits of the approach and departure paths are marked. If third-party flight corridors extend into sites or areas for other energy generation and tower radiation is required along these corridors in accordance with the SOLF, a tower beacon must be permitted in order to avoid hazards to air traffic. In these cases, in order to ensure proper operation of the tower beacon, the third-party operating the tower beacon must be given access to the installations of the project developer in order to carry out necessary maintenance or repairs.

### 7.4 No adverse effect on the safety of the military

The stipulations comply with Section 5 para. 3 sentence 2 No. 4 WindSeeG as well as objective 2.2.2 (5.1) and Principle 2.2.2 (5.2) of the ROP 2021.

The designation of areas, sites, platforms and other energy generation facilities within reservation areas for defence must be avoided. Insofar as the specific military requirements are not restricted by the designation, designation in these areas is not ruled out in individual cases. The aim should be to route subsea cables outside the military training areas for floating units.

Designations (c) and (e) comply with Objective 2.2.2. (5.1) as well as Principle 2.2.2 (5.2) of the ROP 2021 and serve to ensure effective military defence. For further reasoning, please refer to ROP 2021.

A deviation from the transitional regulation is necessary for para. (f) of this planning principle in order to continue to ensure military security.

### 7.5 Removal of devices

According to Section 80 para. 1 sentence 1 WindSeeG, the facilities must be removed if the planning approval procedure or the planning permission becomes invalid, with the objective of ensuring the complete subsequent use and restoration of the performance and functional reliability of the site. Objective 2.2.1 (2) of the ROP 2021 stipulates that fixed installations must be dismantled at the end of their use. Deviating legal regulations remain unaffected.

The BSH will decide at the time of the dismantling procedure to what extent the facilities (in particular the foundations) are to be removed in order to achieve the objective in Section 80 para. 1 sentence 1 WindSeeG. The interests and standards specified in Section 80 para. 1 WindSeeG must be taken into consideration.

The developer of the project should complete the removal within twelve months of the fulfilment of the removal obligation at the latest, Section 80 para. 2 WindSeeG. In order to ensure the fulfilment of the removal obligation, the BSH can order the provision of suitable security in the planning approval or in the planning permission in accordance with Section 80 para. 3 WindSeeG.

### 7.6 Determination and consideration of objects

A subsoil investigation and route investigation according to the latest prevailing version of BSH standard for subsoil exploration should be conducted and evaluated as a basis for the planning and execution of the installations. In the case of centrally pre-investigated sites, the results of the subsoil investigation can be used.

In this context, existing objects, in particular cables, lines, wrecks, cultural assets and material goods as well as stones and blocks on surfaces, routes, platforms or other energy generation areas must be identified.

Sites where objects are found should be taken into consideration when planning locations and routes. The developer of the project is responsible for the resulting necessary measures (e.g. adaptation of farm layout, protective measures, or recovery and removal).

With regard to any munitions found, in 2011, a federal–state working group published a basic report on the munition contamination of German marine waters. This is updated annually. According to current knowledge, the explosive ordnance load in the German Baltic Sea is estimated at up to 0.3 million tonnes and in the German North Sea at up to 1.3 million tonnes. The overall data availability is insufficient. It can thus be assumed that explosive ordnance deposits are also to be expected in the area of the German EEZ (e.g. remnants of mine barriers and combat operations). The location of known munitions dumping areas can be found on the official nautical charts and in the aforementioned 2011 report (which also includes suspected areas for munitions-contaminated areas) (Böttcher, et al., 2011)[28]..

Developers of projects are recommended to carry out detailed historical research into the possible presence of munitions as part of the concrete planning of a project.

According to DIN 4020 (Geotechnical investigations for structural engineering purposes), the client is responsible for ensuring that the site is free of explosive ordnance. This task remains with the developer of the project as a duty to avert danger as part of the general duty to ensure public safety. The latter shall take measures to protect its employees.

The respective project developer is responsible for the identification and exploration of explosive ordnance as well as for all resulting protective measures. Within this framework, the Project Developer is also responsible for any necessary salvage or removal of found munitions. The responsibility of the project developer also includes its obligation to bear the costs of identification, exploration, resulting protective measures and the recovery or removal of found munitions.

If unexploded ordnance is found, proceed in accordance with the instructions of the BSH “UXO

[28] The reports of the Federal-State Working Group are available at www.munition-im-meer.de.

Survey and Procedure in finding unexploded ordnance in the area of German EEZ of the North Sea and Baltic Sea"[29]. In particular, the reporting obligations must be followed and measures should be taken.

If there are no instructions of specific relevance, the Quality Guide for Offshore Ordnance Disposal of the University of Leipzig can be referred to.

Blasting of found munitions is generally not permitted, also see Planning principle 7.1.3.

Transportable munitions found may not be dumped again after recovery but rather must be disposed of properly on land in consultation with the responsible explosive ordnance disposal team of the States.

The relevant details of any protective measures that may become necessary are regulated in the individual procedure.

The Federal Agency for Nature Conservation is currently in charge of drafting the guideline "Nature conservation law and technical requirements for the clearance/disposal of old munitions in the North Sea and Baltic Sea". The responsible persons are obliged to keep themselves informed of the entry into force of the guidelines.

### 7.7 Consideration of cultural assets

This stipulation is in line with the values of Principle 2.2.1 (3) of the ROP 2021, according to which adverse effects to the cultural heritage through economic use should be minimised.

The seabed may contain cultural assets of archaeological value such as seabed monuments, settlement remains, or historic shipwrecks. In accordance with Article 303 of the United Nations Convention on the Law of the Sea (UNCLOS), states have a duty to protect objects of an archaeological or historical nature found in the sea and to cooperate to this end.

Many shipwrecks are known and recorded in the German Underwater Obstacle Information System (DUWHAS) maintained by the BSH. The information available at the competent authorities should be taken into consideration when selecting sites for the construction of WT and platforms or the specific routing of subsea cables. For consideration in spatial planning, all known wrecks located within these reservation areas were forwarded to the state monument authorities with a request for examination and assessment of the required distances when the reserved areas for pipelines were defined in ROP 2021. These assessments of the case-by-case assessment are used for the spatial planning in the SDP. In the immediate vicinity of the designated converter sites, there are no known wrecks that are relevant for monument protection. However, it cannot be ruled out that previously unknown cultural assets will be found during the closer investigation of planned sites or a suitable route or during construction. The authorities responsible for the preservation of monuments and archaeology should be involved at an early stage in the case of discoveries. In order to avoid damaging these sites, exclusion zones are to be defined around historic shipwrecks provided that this does not jeopardise the targeted development of offshore wind energy. The provision is based on Section 5 para. 3 sentence 2 no. 2 in conjunction with Section 69 para. 3 sentence 1 No. 1, Section 8 WindSeeG and Article 303 UNCLOS. The size of the exclusion zone may vary depending on the size of the shipwreck. The restriction to shipwrecks is based on the assessment that such cultural assets can be easily detected and demarcated. In addition, in approval procedures,

[29] The notes are available at https://www.bsh.de/DE/THEMEN/Offshore/Offshore-Vorhaben/_Anlagen/Downloads/Hinweise_Munition.pdf

suitable safeguarding measures should be implemented in consultation with the relevant authority with the involvement of monument protection and monument specialist authorities of the federal states of Lower Saxony, Schleswig-Holstein, and Mecklenburg–Western Pomerania in compliance with the overriding public interest in the development of offshore wind energy within the framework of weighing decisions.

### 7.8 Official standards, provisions or concepts

This planning principle regulates that the planning, construction and operation of WT, platforms, subsea cables, and installations for other forms of energy generation shall comply official standards, provisions, and concepts in their currently applicable version must be observed according to the respective transitional provisions, taking into construction the overriding public interest in the construction of WT and OGCS in the context of weighing decisions. This serves to ensure a speedy approval procedure as well as the safe and proper construction and operation of the installations. Particular attention should be paid to

- The “Standard - investigation of impacts of offshore wind turbines on the marine environment (StUK)” of the BSH
- The “Standard for subsoil exploration – Minimum requirements for subsoil exploration and investigation for offshore wind turbines, offshore stations and power cables” of the BSH
- The “Design standard – minimum requirements for design of offshore structures in the EEZ” of the BSH,
- The “SOLF - Standard offshore aviation for the German EEZ” of the Federal Ministry for Transport and Digital Infrastructure,
- The “WSV framework provisions for the identification of offshore installations” of the Directorate General of Waterways and Shipping (GDWS),
- the implementation directive “Maritime surveillance of offshore wind farms” of the BMDV
- the “Directive for offshore installations to ensure the safety and ease of navigation” of the GDWS
- recommendations R0139 (Marking of man-made Offshore-Structures) and R0126 (Use of the AIS in Marine AtoN Services) as well as Directive G1162 (Marking of Offshore man-made Structures) of the International Association of Marine Aids to Navigation and Lighthouse Authorities
- the “Offshore wind energy - safety framework concept” of the Federal Ministry for Transport and Digital Infrastructure
- the “Framework concept for waste and operating fluids for OWF and their grid connection systems in the German EEZ” of the BSH
- the “Guideline for the emission study for offshore platforms in the German EEZ” of the BSH
- The “Guideline for the emission study for offshore wind turbines in the German EEZ” of the BSH
- the instructions “UXO Survey and Procedure in finding unexploded ordnance in the area of German EEZ of the North Sea and Baltic Sea” of the BSH
- the German regulations on safety and health at work
- the “concept for the protection of harbour porpoises from noise pollution during the construction of OWF in the German North Sea (noise protection concept)” of the BMU

- the mapping guidelines of the BfN for the German EEZ “species-rich gravel, coarse sand and shell layers in marine and coastal areas – definition and mapping guidelines for gravel, coarse sand and shell layers”.

It should be noted that the planning, construction, operation and deconstruction of WT, platforms, submarine cable systems and other energy generation facilities must take into account the health and safety, rescue and medical care needs of people working in the area of offshore facilities in the vicinity of these installations.

### 7.9 Communication and monitoringG

As a result of the bundling of traffic in the EEZ because of the existing and emerging offshore installations, it is necessary to provide data and voice radio capabilities for the WSV and transfer them to shore. The interface required for this is to fulfil all technical requirements for communication with the Maritime Traffic Technology (SMV) system. A grid connection of the data to the SMV is made via the safety zone of the transfer service.

The construction of all installations (offshore to the onshore interface) and their operation are the responsibility of the Project Developer of the OWF. The application for and obtaining of frequency allocation certificates (if required) is the responsibility of the OWF project developer. The latest technological advancements according to the current the latest technological advancements: For the mobile maritime radio service, installations must be provided for three radio channels of the VHF maritime radio service with the frequencies of channel 16 (156.800 MHz), channel 70 (156.525 MHz, Digital Selective Calling (DSC)) and a radio channel to be determined by the WSV to cover the requirements of the traffic centres of the WSV in the frequency range of the mobile maritime radio service. To ensure the AIS service, the frequencies of the channels (161.975 MHz, AIS 1) and (162.025 MHz, AIS 2) are to be received.

The transfer/acceptance of data into the SMV takes place via IP addresses. The transmission path is the responsibility of the OWF developer of the project. The data must be encrypted in accordance with the WSV provisions and provided or retrieved via a virtual private network tunnel.

To ensure the availability requirements of 99.9% at the transfer point, a suitable system design and transmission path must be considered.

The mobile network serves the safety of the installations and traffic. It forms a second communication channel alongside digital radio systems. The purpose of designating this principle is to achieve universal mobile phone coverage. A specific mobile radio standard should not be specified; rather, the mobile radio network should correspond to the latest technological advancements. It must also be possible for the public to use the mobile network with commercially available end devices.

A mobile radio network also enables communication in areas far from the coast; this is of considerable safety-relevant importance there in particular. For example, telemedical care could also be ensured in case of need when other communication channels are not available. In addition, occasional traffic of smaller vessels, especially recreational sailors, can also be assumed in more distant farms. Here, experience shows that accessibility via mobile radio can lead to a significant increase in safety. Furthermore, access to a mobile network opens up the otherwise non-existent or limited possibility of transmitting more comprehensive sensor data for environmental monitoring on land. Because of the existing grid connection of the installations by high-performance fibre optic cables, the laying of additional cables does not appear to be necessary. This reduces the effort required to set up a mobile network.

If it is advantageous and technically feasible from a technical or economic point of view, it should also be possible to install mobile radio

technology on TSO platforms in consultation with the responsible TSO. The costs for the installation and operation of the mobile radio technology shall be borne by the OWF developer of the project.

For the installation of communication technology on TSO platforms, the standardised technology principles according to Section 6.2 must also be observed.

Current findings from the evaluation of traffic data show that the maritime surveillance practised to date, mainly by means of AIS as an exclusively co-operative survey method, is no longer sufficient. For this reason, at suitable locations in the EEZ of the North Sea and Baltic Sea, the maritime surveillance to be carried out using radar systems must be operated by the project developers as an active monitoring method alongside AIS, and the data collected must be made available to the responsible traffic centre of the WSV. In the North Sea, this concerns Sites N-6.8 in the southern part of the area adjacent to the TSZ German Bight Western Approach, Sites N-9.5 and N-12.6, both adjacent to SN10, and Site N-13.1 in the south-east. In addition, the GDWS estimates that there is a need for a radar system in the area of Sites N-3.5 and N-3.6 in the TSZ area. In the Baltic Sea, the requirement concerns Converter platform OST-2-4 as well as the northern part of Area O-1 with the approved Site O-1.3 (wind anchor) and the plan-approved OGCS OST-1-4 (Ostwind 3).

The construction of all radar systems (offshore to the onshore interface) and their operation are the responsibility of the respective project developer. The radar antenna, the radar transceiver, and the radar signal processing must at least comply with the radar system configuration “Basic” or “X1” from the International Association of Lighthouse Authorities (IALA) Guideline G1111-3. The exact specification must be determined according to the nautical requirements in each individual case and is subject to approval by the WSV. It must be ensured that the operation of the radar systems does not interfere with the installations of the WSV. The transfer of data takes place via IP addresses. The transmission path is the responsibility of the project developer. The data must be encrypted in accordance with the WSV provisions and provided or retrieved via a virtual private network tunnel. The transfer point is designated on a case-by-case basis.

To ensure the availability requirements of 99.75% at the transfer point, a suitable system design and transmission path must be considered.

In order to ensure the safety and ease of navigation, air traffic and installations, activities by unknown actors should be reported to the responsible authorities and the MSC. This includes both drone flight activities and unauthorised maritime traffic.

Drone flights by unknown actors can jeopardise the safety and ease of traffic. If drones are detected as part of bird collision monitoring or bird migration monitoring, this must therefore be reported immediately to the responsible authorities and the MSC – if necessary with the help of automated evaluations. The same applies if corresponding flight activities are sighted as part of activities on the wind farm (e.g. maintenance and repair work). Unauthorised maritime traffic must also be reported if it is noticed during these activities.

A deviation from the transitional regulation is necessary for para. (c) to (f) of this planning principle in order to continue to ensure the safety of traffic.

### 7.10 Consideration of all existing, approved, and designated uses

This planning principle also corresponds to the evaluations in ROP 2021, including in Requirements 2.2.1 (3), 2.2.2 (3), 2.2.2 (4), 2.2.2 (5.1), and 2.2.2 (5.2).

### 7.10.1 General information

In the course of minimising conflicts, the concerns of shipping (cf. Planning principle 7.2) and military concerns (cf. Planning principle 7.4) as well as existing and approved uses, rights of use (including OWF) and other concerns worthy of protection should be taken into consideration as early as possible when selecting locations for WT, platforms, other energy generation installations, and the routing of subsea cables. A route outside these areas should be sought if the laying of the subsea cables is expected to have a negative impact on the aforementioned uses and concerns.

Because of the close proximity between the OWF project and the OGCS, including the platforms of the TSO, there is a high need for coordination between the OWF developer of the project and the TSO. Accordingly, it is imperative that close coordination between the TSO and the OWF project developer takes place at an early stage of the project. For the OWF developer of the project and the TSO, there is an unrestricted need for cooperation on both sides. This applies, in particular, to the exchange of information on project deadlines, to the mutual transfer of necessary information and details on the planning, construction, commissioning, and operation of the platform and subsea cables, to any repair and maintenance work, and during the deconstruction. In particular, the construction is to be coordinated and optimised in good neighbourly cooperation at an early stage. Reference is made to standardised technical principle 6.2.

Fishing over subsea cables outside the safety zones is generally made possible by a sufficient covering over of the cables as well as corresponding conditions in the individual procedures; reference is made to the requirements of Principle 7.13.6. Regulations within OWF sites according to Principles 2.2.2 (4) and 2.2.5 (2) of ROP 2021 are to be clarified on a case-by-case basis.

In the reservation area for research designated in ROP 2021, official research activities are regularly carried out in the overlap area within the framework of the EU Common Fisheries Policy and according to standardised methods, which contribute to the annual international assessment of the status of fish populations. A self-responsible exchange of the users concerned is imperative. For this purpose, the concerns of the research institutions should be taken into consideration as early as possible in the conceptualisation of the OWF project or grid connection and in the downstream planning and decision-making levels once the sites concerned have been awarded. For the overlap area of affected use areas in the North Sea EEZ, the navigability of research vessels is therefore defined in two corridors to be kept free of WT. The corridors should each have a length of 5 nm and a width of 1.025 nm and be as perpendicular with each other as possible (e.g. one in a north-south direction and another in an east-west direction). The dimensions of the corridors result from a safety distance of 800 m on both sides of the trawl tracks as well as an additional safety distance of 150 m on both sides to the pylons or other installations or platforms. Turning areas are already included in the aforementioned dimensions of the corridors. The above requirements apply only to WT that are firmly anchored on the seabed. Specifications regarding the type of fishing gear used (mobile, bottom-disturbing, pelagic) are made on an area-specific basis. Please refer to Section II.1. Measures to implement and ensure navigability are to be developed and implemented by the affected users on their own responsibility after the award of affected sites.

### 7.10.2 Pipelines

In order to reduce the risk of damage to existing pipelines and to avoid impairing repair options, impacts on the seabed within a protection zone of 500 m on either side of pipelines should be avoided as a matter of principle. The respective

subsoil conditions may also require greater distances in individual cases. The centre line of the pipeline is decisive for determining the protection zone.

Exceptions are permitted, for example, if compliance with this principle demonstrably jeopardises or significantly impedes the commissioning or grid connection of an OWF. In addition, planning that leads to an impact within the 500 m protection zone of pipelines requires close coordination with the respective operator.

### 7.10.3 Subsea cables

According to the planning scale of 1:400,000, the SDP does not define the actual submarine cable routes but rather only corridors. The exact planning of the submarine cable route ("fine routing") is reserved for the respective approval or enforcement procedure. The routing and associated arrangement of the cable systems must take into consideration the implementation of the planning principles as early as possible. This can minimise the space required and the environmental impact of laying and deconstruction.

The distance of 500 m between subsea cables and WT is necessary so that work can be carried out on the subsea cables while the OWF is in operation. Even if work on cable systems and the OWF is carried out simultaneously, sufficient space must be available for the WT construction ship and the laying ship. The centre line of the submarine cable system is decisive for determining the required distance.

Existing subsea cables must also be taken into consideration during planning and laying. In accordance with the provisions of the principle, a distance of 100 m or 200 m must be provided alternately between submarine cables. This also applies to distances from data cables and existing interconnectors. With this distance, a smaller distance is designated for the shallower water depths of up to 45 m in the planned area compared with corresponding internationally agreed industry guidelines, which apply for water depths of up to 75 m. This distance is required above all for low-risk work on the subsea cables (e.g. in the event of possible repair work). In individual cases, the possibility of a smaller distance between subsea cables in a parallel position on certain route sections can be examined.

In order to ensure the area-efficient laying of (bundled) subsea cables, deviations from the SDP route must be kept to the minimum necessary in terms of construction technology. This applies in particular to routes that run parallel to other existing, authorised, and planned cable routes (cf. Planning principle 7.13.1). Particularly at turning points, larger deviations from the SDP route have effects on surrounding cable systems so that either the applicable distances can no longer be maintained or the total area required for the bundled systems is increased. For this reason, the installation radii should be kept as small as technically possible and should not exceed a radius of 250 m.

Please refer to the reasoning of Planning principle 6.4.2 in SDP 2023 for the reasoning for the specified distances to submarine cables.

The planning principle also applies to subsea cables of the in-farm cabling of sites and areas for other forms of energy generation provided that they are located outside areas, sites, or areas for other forms of energy generation.

If cross connections between installations cross areas and do not run parallel to grid connection systems, this is likely to have an adverse effect on the planning of the site. In order to minimise this, the SDP can firstly define transfer areas between sites. As a result, possible routes can be taken into consideration early when planning the site even if a route has not yet been selected. Secondly, the OWF developer of the project must enable the guideway for a route for the cross connections of installations with each other on the corresponding site starting from the converter platform through the site up to the

transfer area. However, the bidder is granted flexibility in the WT layout planning to the extent that the possible connection may be a maximum of 20% longer than the direct route from the converter platform to the site boundary. After consultation between the responsible TSO and the OWF developer of the project, it is possible to deviate from the specified distances between the WT and the connecting line. Crossings between multiple interconnecting lines as well as between connecting cable and in-farm cabling should be avoided wherever possible.

### 7.10.4 Platforms

In order to reduce the risk of damage during the construction and operating phase of the platforms and avoid compromising the ability to carry out the necessary maintenance and servicing work, due consideration must be given to existing and authorised structures when planning future platforms. Among other things, the distance to be maintained depends on the position of the platform in space in relation to building structures on site, the subsoil conditions, and the water depth.

In the area of the converter platform, it must be ensured that sufficient space is available for routing the DC and AC subsea cables of the TSO because of the large number of cable systems being fed in. Therefore, a distance of at least 1,000 m must be maintained between the platform and the nearest WT in the area where the subsea cables are routed to the converter platform. The centre of the platform is decisive for the distance.

In addition, interference-free operation of existing installations (e.g. radio or radar systems) must be ensured.

### 7.10.5 Wind turbines and other forms of energy generation

The planning principle serves to limit wake effects and turbine loads caused by turbulence between WT in neighbouring areas and areas for other energy generation.

The minimum distance of five times the rotor diameter of the new installations to be constructed to WT of the neighbouring OWF project according to Section 7.10.5 (a) is measured between the centres of the installations. The larger rotor diameter is to be used as a basis. The legal provisions for minimum distances only apply to installations of neighbouring OWF. This paragraph does not apply to the distances between WT within a site. The same also applies in the case of the same developer of the project or if the respective developers of the project have agreed on a different arrangement. In order to ensure coordinated planning of adjacent OWF that are being planned during the same period, a proof of coordination with the respective developer of the project must be submitted as part of the project approval procedure. Existing installations or installations that have already been specified or authorised in the planning documents of an approval procedure at the time of the customary announcement of the plan design must be taken into account. With regard to two adjacent areas on which the planning by the respective developer of the project takes place at the same time, close coordination between the developers of the project is required at an early stage in good neighbourly cooperation with regard to the turbine locations and distances, taking into account the rotor diameters. Therefore, the submission of proof of coordination is designated as a prerequisite for the respective individual project approval procedure.

The distance of at least two and a half times the rotor diameter according to Section 7.10.5 (b) is measured from the respective centre point of the installation. The geographical position of the centre line is provided by the BSH via the

GeoSeaPortal. The centre lines are not defined by the SDP, but are provided for information purposes. This requirement is intended to harmonise the possibility of utilising neighbouring sites or other energy generation areas for different planning periods and commissioning years. The distance of five times the rotor diameter according to para. (a) continues to apply regardless of the distance to the centre line. This paragraph shall not apply in the case of neighbouring sites with the same developer of the project or in the case of a deviating agreement between the project developers.

The distance of at least five times the rotor diameter according to Section 7.10.5 (c) is measured between the centres of the installations. In the case of simultaneous planning of neighbouring wind farms, close coordination between the project developers regarding the installation locations and distances should take place at an early stage in good neighbourly cooperation, taking into consideration the rotor diameters.

The provisions from 7.10.5 (a) to (c) apply cumulatively.

As a consequence of the distance of at least five times the rotor diameter between WT in neighbouring sites or other energy generation areas and the designation of sites in close proximity to each other by the SDP, the project developer must make suitable assumptions when designing OWF and their WT to take into consideration that WT can be constructed at a corresponding distance on neighbouring sites or neighbouring energy generation areas. This is clarified in the new para. 7.10.5 (d) included in this SDP.

If the project developer of a previously approved OWF has concerns that the operation of a neighbouring OWF to be constructed at a later date could lead to adverse effects on the stability of their own WT despite compliance with a minimum distance of five times the rotor diameter according to Sections 7.10.5 (a) to (c) and is this due to circumstances that were not foreseeable when the OWF and its WT were designed, both must be verified by an expert report examined by an accredited certifier and submitted in the approval procedure for the neighbouring OWF by the project developer of the previously approved OWF. If the expert report demonstrates an adverse effect on stability, further measures can be ordered to ensure stability (e.g. for system routing). If these are proven to be insufficient, an increase in the distance may also be considered in a final step within the framework of proportionality.

The location of a WT within a site or within other energy generation areas according to Section 7.10.5 (e) is determined by the centre point of the WT. In the case of other energy generation systems, all installation components should be located entirely within the other energy generation area.

## 7.11 Specific planning principles for sites and wind turbines

Planning principles for sites, primarily for the construction and operation of WT, are listed below. Reference is made to section 7.12, which sets out planning principles for platforms as well as for transformer and accommodation platforms. Planning principle 7.11.1 is not applicable to areas for other energy generation.

### 7.11.1 Deviation of the actually installed output from the allocated grid connection capacity

According to the explanatory memorandum to Section 24 para. 1 No. 2 WindSeeG, the OWF project developer has the option of installing additional WT in excess of the bid quantity if this is permitted by the planning approval decision. Furthermore, a supplementary capacity allocation can be made according to Section 14a WindSeeG. However, an excess feed-in over the allocated grid connection capacity is not permitted at any time.

As part of the application, the OWF project developer must state whether and to what extent additional installations should be installed over and above the allocated grid connection capacity.

The increase in installed capacity beyond the allocated grid connection capacity serves to offset electrical losses and the unavailability of individual WT. When demonstrating compliance with the 2 K criterion by the responsible TSO, the non-availability of individual WT, the OGCS or feed-in management measures as well as the electrical losses of the internal farm cabling are generally not taken into consideration. Because of the conservative approach of the verification procedure, measures to increase the installed capacity beyond the allocated grid connection capacity are thus covered within a certain framework.

Proof of compliance with the 2 K criterion for the in-farm cabling by the OWF project developer is comparable to the proof for the OGCS without taking into consideration the aforementioned power-reducing restrictions. As a result of the conservative approach of the verification procedure, subsequent measures to increase the installed capacity beyond the originally permitted nominal capacity are covered within a certain framework.

If the increase in installed capacity exceeds 10% of the allocated grid connection capacity, the approval of the responsible TSO is required with regard to compliance with the maximum temperatures of the operating resources.

Compliance with the 2 K criterion during operation of the grid connection system should be checked by the TSO using modelling procedures (e.g. TCM II), especially if the actual installed capacity exceeds the allocated grid connection capacity.

The increase in installed capacity via the allocated grid connection capacity for Sites N-9.4 and N-9.5 should lead to an increase in the expected energy yield and higher use of the OGCS. It thus serves the purpose of the SDP according to Section 4 para. 2 WindSeeG to expand electricity generation from offshore wind turbines or offshore wind installations in an efficient use of space and to ensure efficient use of the offshore connection cables.

The potential to increase the installed capacity via the allocated grid connection capacity and thus to increase the power density for Sites N-9.4 and N-9.5 results from the low corrected power density of these sites in comparison with other sites of the SDP in cross connections with the location of Sites N-9.4 and N-9.5 on the edge of Area N-9. The expected generation capacity of Sites N-9.4 and N-9.5 was also reduced from 2,000 MW each to 1,000 MW each compared with the draft SDP (cf. Section II.1).

The increase in installed capacity above the allocated grid connection capacity has no effect on the number of J-tubes and switch panels to be provided according to Section II.6.7 for which only the allocated grid connection capacity (connected load) is decisive.

The increase in installed capacity above the allocated grid connection capacity for Sites N-9.4 and N-9.5 must be taken into consideration by the responsible TSO for the verification of the expected maximum sediment warming.

## 7.12 Specific planning principles for platforms

### 7.12.1 Planning and public display of platforms

During planning, construction, operation and deconstruction of the platform, particular attention shall be paid to structural safety, supply and disposal, including the provision of drinking water, sewage water treatment and occupational health and safety concerns, including escape routes and means of rescue. Reference is made to the

requirements of Planning principle 7.8 regarding official standards, provisions and concepts and Planning principle 7.1.5 (emission minimisation) with regard to supply and disposal as well as sewage water treatment.

The implementation of the planning principle must be demonstrated in the project approval procedure for the various areas mentioned.

Major challenges are regularly associated with the subsequent installation of residential units to accommodate personnel. These should therefore be avoided and, where necessary, accommodation should be provided when planning the platform.

At least two standard access points must be provided in the escape and rescue concept. Each installation should be equipped with a facility (e.g. boat landing) that enables rescue workers who dock at the installation with a ship without wave-compensated access systems and persons who have fallen overboard to ascend in an emergency. On platforms, another access system (e.g. helicopter landing deck, landing point for wave-compensated access systems) is regularly set up in addition to access by boat landing. It should be possible to use two different transport systems so that if access by crew transfer vessel is restricted because of weather conditions, the helicopter landing deck or the landing point for wave-compensated access systems is available as an alternative access option. On a platform, the establishment of a helicopter hoist platform can be taken into consideration only as a rescue area for emergencies. Use of the winch operation site on a platform beyond emergencies is permissible by way of exception if, in the event of a technical incident, the hazard potential must be reduced within a short period of time in order to prevent the occurrence of an emergency, intervention from shore is not possible or countermeasures initiated have remained unsuccessful and no more suitable means of access to the platform are temporarily available.

The dimensions of the rescue and emergency response equipment must be calculated in such a way as to ensure that the arrival times (e.g. rescue operation) can be bridged and that all conceivable hazards (e.g. fire-fighting operation) can be completely averted. If necessary, especially at greater distances from the coast, suitable landing and refuelling facilities for airborne rescue equipment must be provided. In this context, the case of a complex damage situation or complex rescue situation may not be disregarded.

### 7.13 Specific planning principles for subsea cables

The reasonings for planning principles for subsea cables are listed below. For the purposes of this plan, these include power cable systems such as OGCS, interconnectors, cross connections, an subsea cables for other energy generation installations. For subsea cables of the in-farm cabling also of other energy generation areas, the following planning principles apply with the exception of 7.13.2 and 7.13.3.

#### 7.13.1 Bundling

This designation implements Principle 2.2.3 (5) of ROP 2021.

The bundling principle is intended to minimise impacts on other uses and the need for coordination with each other and with other uses. In addition, it should create as few constraints as possible for future uses. Bundling in the sense of parallel routing also reduces undesirable fragmentation effects.

The planning principle also applies to subsea cables of the in-farm cabling of sites and areas for other forms of energy generation provided that they are located outside areas, sites, or areas for other forms of energy generation.

### 7.13.2 Routing through gates

This designation ensures that subsea cables are routed through specified gates. This concentrates the subsea cables and pipelines at these points as far as possible and bundles them for further discharge towards land. This designation implements Objective 2.2.3 (3) and Principle 2.2.3 (4) of ROP 2021 with modifications. The designation was made in close consultation with the coastal federal states.

Gates were designated at the external borders of the EEZ with neighbouring states; from these, a route within the German EEZ appears possible. In some cases, these make use of existing infrastructures such as already laid subsea cables or pipelines. The designation was made in consultation with the neighbouring countries.

Because of the limited number of available routes in the territorial sea, interconnectors that do not go ashore in Germany should not be routed through Gates N-I to N-V.

### 7.13.3 Crossing of shipping lanes

This designation corresponds to the requirements of Principle 2.2.3 (5) of ROP 2021.

To minimise mutual adverse effects between shipping and network infrastructure, it is necessary for the cable routes to cross the TSZ, its continuations, and the Kiel–Baltic Sea route by the shortest possible route unless parallel routing to existing structures and buildings is possible. Because of the many cable systems to be expected, this applies in particular to OGCS as well as all other subsea cables. By routing them parallel to existing structures, the use of marine space and – to the benefit of shipping – the devaluation of the manoeuvring site as an anchorage ground can be reduced. In addition, conflicts can be minimised by laying the subsea cables sufficiently deep. Please refer to Planning principle 7.13.6.

### 7.13.4 Crossings

The designation also corresponds to the values of Principle 2.2.3 (5) of ROP 2021.

The purpose of the legal provision is to avoid damage to third-party subsea cables and pipelines as well as other third-party devices that have already been laid, designated, or approved by the SDP. In addition, crossings of subsea cables are to be avoided wherever possible to prevent interference with the marine environment through the introduction of hard substrate. Recommendations for the construction of crossing structures are defined, for example, in the recommendations of the European Subsea Cables Association (ESCA) and the International Cable Protection Committee (ICPC).

The two crossing cable systems must usually be mechanically separated from each other. If both cables are newly laid, a structure-free crossing must be implemented when planning them provided the local geological conditions permit this and it is possible with reasonable effort. The crossing cable systems can be separated, for example, by laying the first system to be crossed sufficiently deep. If a crossing without structures is not possible, separation is usually achieved by constructing a crossing structure. When building crossings, a technical structure is usually constructed on the seabed using hard substrate.

By laying the cables without crossing constructions, it is not necessary to cover the upper cable system with a covering over or stone packing. This minimises the interference, especially in the case of expected large crossing constructions.

A structure-free crossing should be implemented in particular if several cables cross each other and the overall impacts on the marine environment are likely to be lower.

If crossing constructions cannot be avoided, the crossing should be designed as right-angled as possible according to the respective the latest technological advancements. This determination is intended to minimise the size of the crossing

structure and thus the amount of soil sealing. In justified cases, the crossing angle can be reduced to up to 45° if this leads to a lower overall use of marine space and is technically feasible. This applies, in particular, to the crossing of several cables in parallel with existing cables, which can lead to significant additional cable lengths. In principle, the crossing angle may not be less than 45°. Within the crossing structure, the two crossing subsea cables are usually separated from each other by concrete mattresses. These extend approx. 30 m on each side beyond the subsea cables to be crossed. The narrower the crossing angle, the longer the required crossing construction. Within the crossing construction, it is not possible to repair the lower cable system because of these structural measures. If there are faults in the lower cable system, a new crossing construction may be required. The decision is made on a case-by-case basis in the approval procedure. Reference is made to 7.14.

When crossing a subsea cable via an existing pipeline, it is possible, depending on the individual agreements or crossing contracts between the pipeline operator and the developer of the power line, to implement the crossing in the form of a sinusoidal crossing (Abbildung 7). If deviations are necessary on the planned route in the area of the crossing over a pipeline because of existing anodes, a slight deviation of a 90° angle is possible. Because of the planning scale of 1:400,000, the spatial representation of the cables in the SDP is linear but assumes that the crossing occurs at right angles on a small scale, in the form of a sinusoidal crossing.

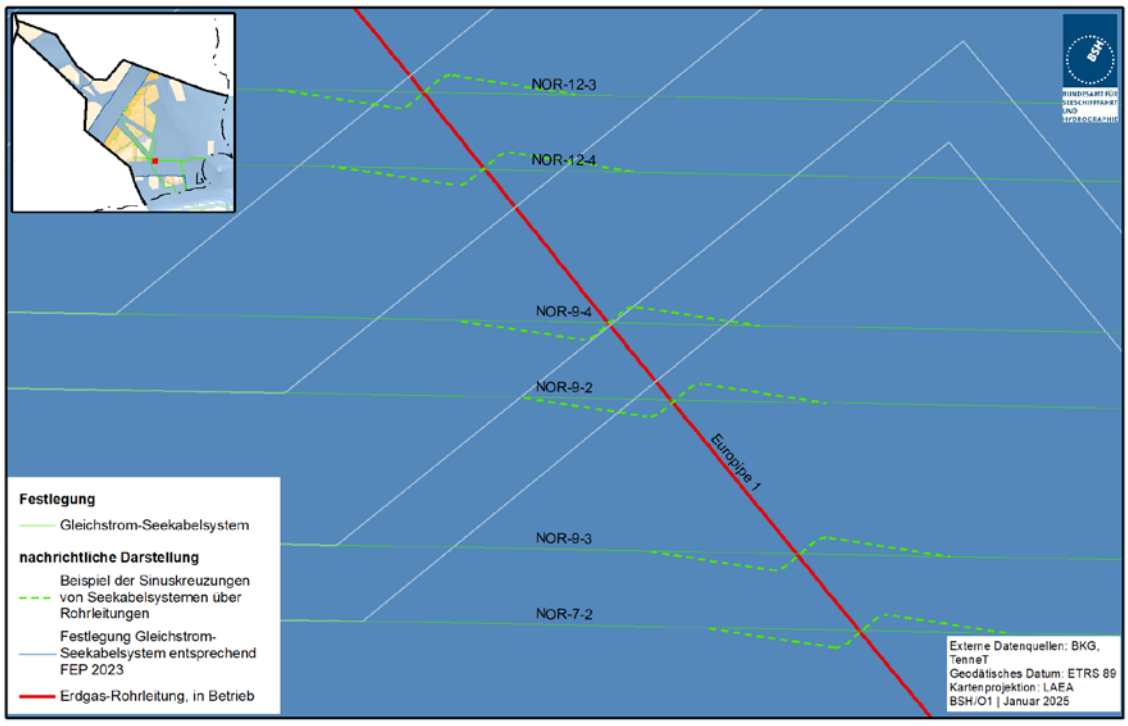


Figure 7: Exemplary design of a sinusoidal crossing via a pipeline using the example of the subsea cables NOR-7-2, NOR-9-3, NOR-9-2, NOR-9-4, NOR-12-4, and NOR-12-3 via Europipe 1.

In addition, the laying radii of the submarine cable must be taken into consideration, especially for crossings. When crossing existing cables, it must be ensured that the laying radii of the newly crossing subsea cables are not in the area of the crossing structure so as not to enlarge it.

The routes for the subsea cables of the TSO shall be provided without any crossings within

the sites, and the in-farm cabling of the OWF shall be designed accordingly.

If the cutting of decommissioned cables (out-of-service cables) becomes necessary, these cables shall be laid down and their cable ends fixed in the seabed in such a way that any adverse effects on shipping and fishery is permanently ruled out. Sealing of the seabed must be limited to what is absolutely necessary. The fixed cable ends shall be measured exactly for the aforementioned purpose, and the coordinates shall be documented to the BSH. The cables removed from the seabed shall be properly disposed of on land.

#### 7.13.5 Minimally disruptive cable laying procedure

The designation corresponds to the values of Principle 2.2.3 (6) of ROP 2021.

In order to minimise possible negative impacts on the marine environment through the laying of subsea cables, a cable laying procedure should be selected in the individual procedure, in particular depending on the geological conditions, which has the least interference and impact on the marine environment, but at the same time can be expected to safely achieve the specified covering over. The use of the cable laying procedure should cause as few adverse effects as possible to the safety and ease of navigation.

The pre-lay grapnel run is one of the preparatory construction measures. During the pre-lay grapnel run, the cable route is freed from interfering objects such as stray fishing nets and metal ropes. The work required for the pre-lay grapnel run adversely affects the seabed and must therefore be limited to the actual working strip of the cable route.

#### 7.13.6 Covering over

This planning principle is also found in and clarifies Principle 2.2.3 (5) of ROP 2021. According to the spatial offshore grid plan for Offshore North Sea (BFO-N) 16/17, a continuous covering over of at least 1.5 m must be ensured for the cable system in the North Sea during laying. Please refer to the reasoning for this in Planning principle 5.3.2.7 of BFO-N 16/17. Within areas defined in the SDP, the requirements of the planning principle of sediment warming (7.1.7) must be taken into consideration with regard to the required covering over.

Different regulations may apply in areas where designated areas overlap with reservation areas for other uses in ROP 2021 and multiple use is intended. These are weighed up and specified in the respective project approval procedures. For the corridors for research vessels in the overlap areas of areas for wind energy with reservation areas for scientific research, a covering over of at least 1.5 m is required for all subsea cables, including inner-farm cabling, in order to be able to implement multiple use.

The covering over to be created in the Baltic Sea was designated on the basis of Planning principle 5.4.2.7 of the Federal Sectoral Plan for the Baltic Sea (BFO-O) 16/17 in the project approval procedure and/or in the enforcement procedure on the basis of a comprehensive study.

### 7.14 Deviation possibilities

The specific decision regarding the possibility of a deviation is made on a case-by-case basis when weighing up the conflicting interests on the basis of the relevant planning principle and the associated technical regulations.

## 8 Pilot offshore wind turbines

In accordance with Section 5 para. 2 No. 2 WindSeeG, the SDP can designate available grid connection capacities for areas in the EEZ and in the territorial sea on existing offshore connection lines or offshore connection cables to be completed in the coming years, which can be allocated to pilot offshore wind turbines in accordance with Section 95 para. 2 WindSeeG. In this

context, the SDP identifies those grid connection capacities which are not sufficient for the efficient, economic operation of a larger number of offshore WT in the spatial context and which are therefore not to be included in the tenders, but which are sufficient for the grid connection of pilot offshore wind turbines. This is intended to increase the efficient use of OGCS.

The SDP can make spatial legal requirements for the construction of pilot offshore wind turbines in areas and designate the technical conditions of the OGCS and the resulting technical prerequisites for the grid connection of pilot offshore wind turbines. A preliminary investigation of sites for pilot offshore wind turbines does not take place.

It should be noted that the SDP, by identifying available grid connection capacities, does not make any statement as to whether free sites for the construction and operation of pilot offshore wind turbines are available in an area. Furthermore, the SDP makes no statement as to whether pilot offshore wind turbines can be connected to the OGCS on which grid connection capacity is available. Whether and where exactly the construction and operation of pilot offshore wind turbines are permissible will be decided solely by the approval procedure for pilot offshore wind turbines to be carried out later.

With the second Law on Amendments to the Offshore Wind Energy Act (WindSeeG) and other regulations of 20 July 2022 (Federal Law Gazette I, p. 1325), the legislator introduced regulations on supplementary capacity allocation from 1 January 2023 in Section 14a WindSeeG. Since the announcement of SDP 2023, the FNA has allocated corresponding additional capacities to the OGCS NOR-2-2, NOR-2-3, and NOR-6-2. This means that Grid connection cables NOR-2-3 and NOR-6-2 are no longer available for pilot offshore wind turbines. The available capacity for the grid connection line NOR-2-2 has thus been reduced to 38.44 MW.

No additional capacity was allocated for the grid connection line NOR-4-2. This is no longer listed as available grid connection capacity for pilot energy plants because it is available only for a limited period until OGCS NOR-7-2 is fully commissioned in QIV 2027.

## 9 Areas for other energy generation

In accordance with Section 5 para. 2a WindSeeG Energy Act, the SDP may designate areas for other energy generation outside areas.

The SDP can set spatial and technical provisions for areas for other energy generation regarding wind turbines and other forms of energy generation facilities, lines or cables that discharge energy or energy sources from these and their ancillary facilities (Section 5 para. 2a sentence 1 WindSeeG).

The provision stating that the lines or cables for the grid connection of SEN-1 should be routed within the reservation areas for lines as far as possible is based on Principle 2.2.3 (2) of the ROP 2021.

In accordance with Section 5 para. 2a sentence 2 WindSeeG, the designation of lines or cables for the grid connection of other energy generation areas in routes or route corridors for offshore connection cables is not permitted. For this reason, the routing of subsea cables and pipelines or cables for grid connection to SEN-1 via the Gates N-I to N-V designated in the SDP is excluded. However, it cannot be ruled out that the pipeline may run in close proximity to the gates for power cables. This also results from the aforementioned Principle 2.2.3 (2).

Questions regarding third party access to existing and planned pipelines are to be clarified exclusively by the respective project developer.

The Ordinance on the allocation of other energy generation areas in the Exclusive Economic Zone (SoEnergieV) is currently being revised.

The tender of other energy generation areas can take place in several sub-areas.

Reference is made to the consultation of the BMWK on the “Layout sub-area of other energy generation area SEN-1”.

# IV. Conformity of the designations with private and public concerns

According to Section 5 para. 3 sentence 1 WindSeeG, spatial designations are inadmissible if there are overriding opposing public or private concerns. Section 5 para. 3 sentence 2 WindSeeG contains a catalogue of standard examples for the inadmissibility of designations of the SDP. If one of the grounds for exclusion listed in Section 5 para. 3 sentence 2 WindSeeG applies, a designation is inadmissible in any case. The list of grounds for exclusion is not exhaustive.[30] Individual concerns must be weighed against each other if they contradict. Section 5 para. 3 sentence 3 WindSeeG emphasises that the overriding public interest in the construction of offshore wind turbines and offshore connection cables and their importance for public safety according to Section 1 para. 3 WindSeeG must be taken into consideration in this weighing up.

For the designation of sites and areas according to Section 5 para. 1 No. 1 and 2 WindSeeG that are located in a cluster designated by the Spatial Offshore Grid Plan according to Section 17a EnWG, or in a priority, reserved or designated area of a maritime spatial plan according to Section 17 para. 3 sentence 1 ROG, the admissibility of the designation needs to be examined only if additional or other significant aspects are discernible or if updates and elaborations of the assessment are required (cf. Section 5 para. 3 sentence 4 WindSeeG). The background to this is that when assessing the designations of the clusters in the Spatial Offshore Grid Plan and priority, reserved or designated sites in the Maritime Spatial Plans for the EEZ of the North Sea and Baltic Sea, a weighing decision had already been made in accordance with the applicable provisions in which the concerns were weighed against and among one another. With the exception of the designations in the SDP shown under IV.7, which deviate from objectives of maritime spatial planning, all of the sites and areas designated in this SDP are located in areas of the EEZ that are designated for wind energy in maritime spatial planning (priority or reservation area for wind energy). Additional or other significant aspects are not recognisable after the assessment, nor are updates or an in-depth assessment required. For compliance with the requirements of spatial planning, see IV.1 below. The approval of target deviations is examined and presented separately under IV.7.

The assessment of the aforementioned reasons for the inadmissibility of designations according to Section 5 para. 3 sentence 2 Nos. 1–5 WindSeeG are presented in detail below with regard to the SDP:

## 1 Compliance with the requirements of spatial planning

Designations that do not comply with the requirements of maritime spatial planning according to Section 17 para. 3 ROG are inadmissible (Section 5 para. 3 sentence 2 No. 1 WindSeeG). According to Section 3 para. 1 No. 1 ROG, the requirements of spatial planning represent the superordinate concept for the objectives, principles, and other requirements of spatial planning. According to Section 4 para. 1 No. 1 ROG, the objectives of maritime spatial planning must be observed in spatially significant plans and measures by public authorities, and principles and other requirements of spatial planning must be taken into consideration in discretionary decisions.

ROP 2021 sets out objectives and principles of maritime spatial planning for the EEZ with regard to various maritime uses and functions. A vision and guiding principles for spatial development

[30] cf. BT printed pages 18/8860, p. 273.

are formulated. ROP 2021 makes coordinated designations (objectives and principles for the individual uses and functions of shipping, raw material extraction, subsea cables and pipelines, scientific uses, offshore wind energy, fishery and marine aquaculture, protection and improvement of the marine environment, security aspects, and the military as well as other concerns to be taken into consideration.

The designations of the SDP were checked to ensure that they comply with the objectives of maritime spatial planning and took into consideration the principles and other requirements. Because of some deviations of the SDP from the objectives of ROP 2021, a deviation procedure was carried out as part of the revision procedure of the SDP (cf. Section IV.7 for details). In the case of deviations from the principles and other requirements of ROP 2021, the respective designations and underlying concerns of ROP 2021, from which the SDP deviates, were weighed against the conflicting concerns of the designations of the SDP – namely the development of offshore wind energy within the framework of the objectives and regulations of the WindSeeG. Insofar as the concerns of the SDP outweighed the requirements of spatial planning after consideration, the corresponding designation was made in the SDP. This applies to the overlap areas and sites of the SDP with the reservation area for fishery for Norway lobster. Details of the respective considerations can be found in the designations, the associated reasoning, and the integrated consideration of this SDP.

## 2 No threat to the marine environment

According to Section 5 para. 3 sentence 2 No. 2 WindSeeG, designations that threaten the marine environment are inadmissible. The technical assessment criterion “threat to the marine environment” represents an independent assessment standard. In addition, the existing provisions of specialised law apply (in this case primarily those relating to species and habitat protection as well as the other requirements regarding likely significant environmental impacts within the scope of the SEA). With regard to both the concept of endangering the marine environment in the narrower sense and the mandatory provisions of nature conservation law, the following section examines whether the designations of the SDP conflict with this. The designations of the SDP, insofar as they correspond to corresponding designations in ROP 2021, were re-examined for their approval with regard to the threat to the marine environment as part of the revision of this SDP according to Section 5 para. 3 sentence 4 WindSeeG only insofar as additional or other significant aspects were identified or updates and a more in-depth assessment were required. As part of the maritime spatial planning revision procedure, a comprehensive SEA was carried out, and an environmental report was prepared for each of the German EEZ of the North Sea (BSH, 2021a) and the Baltic Sea (BSH, 2021b). Deviations from ROP 2021, which were designated as part of the revision of SDP 2023, were also investigated in detail in the SEA for SDP 2023.

In accordance with Section 56 para. 1 BNatSchG, all regulations of the BNatSchG (with the exception of Chapter 2: landscape management) also apply in the German EEZ and continental shelf according to UNCLOS and the provisions according to Section 56 para. 1 BNatSchG. This means that the provisions of statutory biotope protection (Section 30 BNatSchG), European site protection (Section 34 BNatSchG), and special species protection (Section 44 et seq. BNatSchG) must be observed in particular. The special provisions of Section 72 para. 2 WindSeeG (for marine biotopes) and Section 5 para. 3 No. 5 WindSeeG were also taken into consideration. The corresponding assessments were carried out as part of the SEA, and the results were presented in the

environmental reports and in the summarised environmental statement.

For the assessment of the threat to the marine environment, reference is therefore made in particular to Chapter 5 of the environmental reports as well as to the environmental reports from previous revision procedures of the SDP and ROP 2021.

With regard to the areas and sites of the SDP, the parts of areas and sites newly defined in this SDP and deviating from ROP 2021 had to be examined in particular. The new Sites N-9.4, N-9.5, N-12.4, N-12.5, and N-12.6 as well as Areas N-14, N-16, and N-17 should be emphasised here because they entail more extensive changes in terms of area. Furthermore, the change in the site layout for Site N-13.4 and the subsequent use of areas N-4 and N-5 were significant in assessing the threat to the marine environment.

In detail:

The following should be mentioned as **overarching** examination aspects in accordance with Section 5 para. 3 sentence 2 No. 2 WindSeeG:

- It was examined whether, based on current findings, the assessment of the prohibitions under Section 44 para. 1 No. 2 BNatSchG with regard to the common guillemot should be assessed differently compared to assessments in past revision procedures of the SDP and ROP 2021. The current findings on avoidance behaviour, especially of the guillemot, have all found their way into the SEA. Reference is made to the explanations in Section 5.3.2 of the Environmental Report for the North Sea.
- Noise protection: The SEA has made extensive additions to the cumulative effects of pile-driving noise and operational noise on marine mammals in the German EEZ of the North Sea. Based on the results on impact noise, Planning principle 7.1.3Noise protection was adjusted. The designations in the SDP are also not expected to jeopardise the marine environment in terms of cumulative sound-related impacts (cf. Section 4.17.3 of the North Sea Environmental Report)

Area and site designations:

All areas and sites of the SDP are located outside of nature conservation areas. Furthermore, no impacts of sites identified outside protected areas on existing protected areas were designated. Consequently, compatibility with the purpose of protection of legally designated protected areas is given. The following special features from the assessment with regard to the designation of areas and sites can be emphasised in this regard:

**Area N-4** for subsequent use is designated in the layout of reservation area for wind energy EN4 from ROP 2021. The assessment comes to the conclusion that the designations of the SDP do not adversely affect the protective purposes and conservation objectives of the “Sylt Outer Reef – Eastern German Bight” nature conservation area.

A changed layout is designated for **Area N-5**. Area N-5 is located within the reservation area and partly within the priority area for divers. As described in detail in the reasoning for the designation of this area (see Section III.1), based on a number of aspects (in particular findings on the sensitivity of seabirds to OWF, distance to Area II and the future Part III of the “Sylt Outer Reef – Eastern German Bight” nature conservation areas, expected mitigation of deterrence effects on seabirds and resting birds resulting from the closure of Shipping route SN8. and the newly included Planning principle 7.1.8 on the transport logistics concept), the SEA concludes that there is no threat to the marine environment for Area N-5.

**Sites N-12.4, N-12.5, and N-12.6** overlap with the area of autumn occurrence of the guillemot. For Site **N-12.6**, a significant disturbance of the guillemot within the meaning of Section 44 para.

1 No. 2 BNatSchG cannot be ruled out with certainty by the site designation in the main area of distribution of the guillemot in autumn. Also with regard to the designations of Sites **N-12.4** and **N-12.5**, a detrimental effect on the guillemot cannot be ruled out with certainty. With regard to Site N-12.6, an SEA will be carried out according to the findings of the site investigations as part of the determination of suitability. This is described in detail in the environmental report, in particular under 5.2.2.2.

Sites **N-13.1, N-13.2, N-13.3**, and **N-13.4** are also partly located within the reservation area for the harbour porpoise defined in ROP 2021, which corresponds to the main concentration area of the harbour porpoise in the EEZ. Insofar as the main concentration area of harbour porpoise is overlapped, the concerns of harbour porpoises must be given special weight for spatial planning reasons alone. In addition, the overriding public interest in the development of offshore wind energy must be taken into consideration as part of the expansion targets of the WindSeeG (Section 1 para. 3 WindSeeG). In order to do justice to the concerns for harbour porpoises, particularly in the main concentration area of the harbour porpoise, the SEA focused on assessing whether noise protection measures could be specified, compliance with which would mean that the prohibition requirements of the BNatSchG are not met. The SEA has shown that if the noise protection concept of the BMU (BMU, 2013) (i.e. the noise protection and noise mitigation measures now specified under Planning principle 7.1.3, the spatial and temporal coordination of noise-intensive work, and the regularly substantiating arrangements in the approvals) is complied with, it can be assumed that the possibility of killing or significant disturbance within the meaning of Section 44 para. 1 No. 1, 2 BNatSchG can be ruled out with the necessary certainty. This is described in detail in the environmental report, in particular under 5.2.1.1 and 5.2.2.1 as well as in Section 4.17.3. Reference is made to Principle (6) of ROP 2021 under Section 2.2.2 of the designations of ROP 2021. In Planning principle 7.1.2, in order to avoid or mitigate cumulative impacts, the overall coordination of construction and installation work over time is designated. This also includes reducing shipping traffic for construction and operation to a minimum through optimal construction and time planning. In addition, the planning principle on noise protection (cf. 7.1.3) ensures the implementation of noise protection measures according to the state of the art or the state of the art in science and technology and application of the noise protection concept for the North Sea(BMU, 2013). Particularly during the sensitive season, additional preventive and mitigation measures can be taken, especially with regard to impulsive sound inputs during construction work. This also corresponds to the current approval practice at the BSH.

**Site N-13.4** is designated for the first time in the current SDP. There are insights only on the occurrences of legally protected biotopes and for geological quality of the seabed with potential impacts on the further development of sites for Site N-13.4. The same applies to Site N-13.3 already defined in SDP 2023. Adverse effects on these biotopes should be avoided as far as possible; there are no indications that this is not possible in compliance with the planning principles laid down in this plan.

Also with regard to the designations of Sites N-13.3 and N-13.4, a detrimental effect on the guillemot cannot be ruled out with certainty. These sites have not yet been included in the chronological sequence for the tender years, and no calendar year of commissioning has been designated. A site investigation with suitability assessment is planned here. This is described in detail in the environmental report, in particular under 5.2.2.2.

**Area N-14** lies outside known sensitive areas.

**Area N-16** overlaps in parts with the area of the autumn occurrence of the guillemot. For the

south-eastern part of Area N-16, a detrimental effect on the guillemot cannot be ruled out with certainty. This is described in detail in the environmental report, in particular under 5.2.2.2.

**Area N-17** has been spatially adapted compared with the designation in ROP 2021. By shifting Shipping route SN16 to the north, the sub-area of Area N-17 to the south of SN16 will be enlarged to the north. As a further consequence, the northernmost sub-area of reservation area EN17 of ROP 2021 will no longer be considered for wind energy. For parts of Area N-17, no conclusive assessment is currently possible with regard to the guillemot. A further assessment will be carried out as part of the next revision.

**Area N-19** is located entirely within the FFH habitat type sandbank "Dogger Bank" reported to the EU by the BfN and thus within a legally protected biotope. In addition, there are initial indications of the occurrence of coarse sediments that may be classified as legally protected biotope type KGS. It is assumed that the KGS biotopes are so small-scale that they can be adequately taken into consideration or bypassed in the detailed planning of the sites of Area N-19.

For **Area N-20 under review**, no conclusive assessment is currently possible with regard to the guillemot. A further assessment will be carried out as part of the next revision.

With regard to the **locations of platforms, routes, and route corridors for offshore grid connection lines** as well as for interconnectors and locations where the connection cables cross the boundary between the EEZ and the territorial sea, it should be noted that there is no threat to the marine environment. Cross connections between installations from SDP 2023 are no longer designated in the current SDP. The designations for OGCS of SDP 2023 were examined to determine whether additional or other significant aspects were recognisable or whether updates and a more in-depth assessment were required. This assessment has shown that there is no risk to the marine environment here either.

## 3 No adverse effect on the safety and ease of traffic

Designations that adversely affect the safety and ease of traffic are also inadmissible in accordance with Section 5 para. 3 sentence 2 No. 3 WindSeeG.

The designations of the areas in the EEZ of the North Sea and Baltic Sea are largely consistent with the priority and reservation areas for wind energy designated in ROP 2021. The concerns relating to shipping and air traffic were examined as part of the revision of ROP 2021 and with regard to deviations from ROP 2021 as part of the revision of SDP 2023. The assessment of this aspect in accordance with Section 5 para. 3 sentence 4 WindSeeG is therefore limited to the assessment of new findings and the new designations for Areas N-14, N-16, N-17, and N-19, Area N-20 (under review), and Sites N-9.4, N-9.5, N-12.4, N-12.5, N-12.6, and N-13.4. Because the aforementioned changes to the designations of areas and sites in the SDP also entail the overplanning of priority areas for shipping of ROP 2021, these changes were examined in detail as part of the deviation procedure (see below, IV.7). The assessments of the deviation procedure have shown that the safety and ease of traffic are not adversely affected by the designations in the SDP. All aspects relating to this concern mentioned in the context of national and international participation have also been sufficiently taken into account in the consideration of the designations – as can be seen in particular from the reasoning and the integrated consideration of the SDP.

## 4 No adverse effect on the safety of the military

According to Section 5 para. 3 No. 4 WindSeeG, the security of the military may not be adversely

affected by any designations. The concerns of military security were included in the consideration during the revision procedure of the SDP.

The designated areas and sites are located outside of military training areas. These designations therefore do not have any adverse effect on military security.

Designations of OGCS within the North Sea artillery firing range defined as a reservation area for defence in ROP 2021 are also generally out of the question. The OGCS NOR-11-1, NOR-11-2, NOR-12-1, NOR-12-2, and NOR-13-1 designated accordingly in SDP 2023 will now, in deviation from their respective original designations, be defined to the west of the North Sea artillery firing range and to the east of the boundary of Area N-8 provided that the BSH, with the consent of the Naval Command, does not publish any deviating routes on its website by 15 May 2025.

## 5 Compatibility of the designations with the purpose of protection of legally designated protected areas

Section 5 para. 3 sentence 2 No. 5 WindSeeG stipulates that designations are inadmissible if areas, sites, or areas for other forms of energy generation are not compatible with the protective purpose of a protected area ordinance issued according to Section 57 BNatSchG. Accordingly, designations are permissible if, according to Section 34 para. 2 BNatSchG, they cannot lead to significant adverse effects on the components of the protected area relevant to the protective purpose of the respective protected area ordinance or if they meet the requirements according to Section 34 para. 3 to 5 BNatSchG.

The designations of the areas, sites, and other energy generation areas in the North Sea and Baltic Sea were taken over largely from the priority and reservation areas of ROP 2021 as well as the designations from previous versions of the SDP. No designations of areas, sites, or areas for other forms of energy generation in nature conservation areas are stipulated. According to the results of the SEA for the current SDP, which incorporates the new area allocations, sites, and necessary updates, and examines the potential effects of these designations on protected areas, compatibility with the protective purpose of legally designated protected areas is ensured.

## 6 Other public and private interests

In addition to the reasons expressly listed in Section 5 para. 3 sentence 2 No. 1 to 5 WindSeeG for the inadmissibility of designations of the SDP, Section 5 para. 3 sentence 1 WindSeeG requires an examination whether other overriding public or private concerns conflict with the designations of the SDP. In individual cases, consideration must be given to the designations of the SDP and the underlying concerns with possible opposing public and private interests. According to the function of the SDP, the designations of the SDP are fundamentally based on the concerns of the development of offshore wind energy within the framework of the objectives and provisions of the WindSeeG. Section 5 para. 3 sentence 3 WindSeeG emphasises that the overriding public interest in the construction of offshore wind turbines and offshore connection cables and their importance for public health and safety according to Section 1 para. 3 WindSeeG must be taken into consideration in the weighing up.

Other public and private concerns within the meaning of Section 5 para. 3 sentence 1 WindSeeG are those in connection with other uses, in particular planned and existing data cables, pipelines, and mining activities. This also includes the concerns of fishery, marine aquaculture, health and safety, cultural heritage, and disaster prevention as well as the economic costs of constructing and operating OWF and OGCS.

In Section 5 para. 4 sentence 2 Nos. 1 and 2 of the WindSeeG, the latter concern is also considered in the designation of sites and the chronological sequence of their tender, based on the criteria of efficient use of the grid connection cables, and efficient planning, construction, and use of the grid connection cables and land-based grid connection points still to be completed. The cost efficiency is taken into consideration in the designations of the SDP through the criteria of spatial proximity to the coast, chronological sequence, and the expected generation capacity; these are also specified in Section 5 para. 4 sentence 2 WindSeeG.

As part of the revision procedure of the SDP, all designations of the SDP were examined to determine which other public and private concerns oppose the respective designations. These were weighed against the designations of the SDP and the underlying purpose in each case. Insofar as the designations of the SDP have now been determined, the consideration of these other public and private concerns has shown that the development of offshore wind energy prevails in each individual case in accordance with Section 1 para. 3 WindSeeG. In addition, a deviation procedure had to be carried out for target deviations from ROP 2021; the prerequisites for approval of these deviations are described in detail below.

## 7 Deviation procedure according to Sections 6, 19 ROG

The SDP contains some designations that deviate from the objectives of ROP 2021 and for which a deviation procedure was required in accordance with Sections 6 and 19 ROG. As in the revision procedure for SDP 2023 (there for other target deviations), such a deviation procedure was carried out as part of the SDP revision procedure in accordance with Section 19 sentence 2 ROG.

### 7.1 Background: Requirement of the deviation procedure, embedding in the revision procedure of the SDP

As described above, designations that do not comply with the requirements of spatial planning according to Section 17 para. 1 ROG are inadmissible in accordance with Section 5 para. 3 sentence 2 No. 1 WindSeeG. The following section explains how the conformity of the designations of SDP with ROP 2021 was checked and why the requirements of Section 5 para. 3 sentence 2 No. 1 WindSeeG are met.

The term requirements of spatial planning includes both objectives of maritime spatial planning as well as principles and other requirements of spatial planning (Section 3 para. 1 No. 1 ROG). In the context of the SDP revision procedure, the distinction between deviations from objectives of maritime spatial planning and deviations from principles and other requirements of spatial planning is relevant for the following reason: In the case of spatially significant planning and measures by public bodies, objectives of maritime spatial planning must be observed while principles and other requirements of spatial planning must be taken into account in considerations or discretionary decisions (Section 4 para. 1 sentence 1 No. 1 ROG).

Deviations from the principles and other requirements of ROP 2021 were examined and taken into consideration as part of the consideration process. The designations of the SDP with the associated reasoning and the integrated consideration reflect these consideration results and the background for the designations after weighing up deviating principles and other requirements of ROP 2021.

Because priority areas of ROP 2021 and deviations from gates of ROP 2021 to the territorial sea have the character of objectives of maritime spatial planning (cf. preliminary remark under 2. Designations of ROP 2021), a deviation procedure must be carried out for these deviations according to Sections 6, 19 sentence 2 ROG. Pri-

ority areas are areas that are designated for certain spatially significant functions or uses and exclude other spatially significant functions or uses in this area if these are not compatible with the priority functions and uses (Section 7 para. 3 No. 1 ROG). Objectives of maritime spatial planning are binding provisions in the form of spatially and objectively definable textual or graphic specifications in maritime spatial plans for the development, organisation and safeguarding of space that have been finally weighed up by the spatial planning authority (Section 3 para. 1, no. 2 ROG). It is clear from the above definitions that objectives of maritime spatial planning are not open to consideration and that there is therefore no possibility at the downstream level of the SDP (unlike in the case of reserved areas, for example) to weigh up the priority uses against deviating planned uses.

Deviation procedures can be carried out as part of the update procedure of the SDP (Section 19 sentence 2 Alt. 1 ROG). The deviations of the designations in the SDP from the objectives of ROP 2021 described below were presented in the draft of 7 June 2024 and consulted on accordingly. With regard to the spatial expansion of the areas, there has been no expansion compared with the draft SDP. In the strategic environmental assessment, environmental impacts of the deviations presented below were assessed accordingly.

### 7.2 Facts on deviations from ROP 2021 objectives

The following designations for areas and sites of the SDP contain deviations from the priority areas (objectives) of ROP 2021:

For Area N-5

The layout of Area N-5 has changed; details are described under II.1. Area N-5 now overlaps in parts with the priority area for divers. N-5 will also overlap shipping route SN8 along its entire length. In this respect, the area overlaps with Priority area for shipping SN8 of ROP 2021. Shipping route SN8 will no longer be used because of the international agreements on the widening of Shipping route SN7. A deviation procedure is therefore required for both of the aforementioned overplanning of priority areas.

Sites in the extended Areas N-9 and N-12

Sites N-9.4, N-9.5, N-12.4, N-12.5, and N-12.6 of the SDP are each located entirely in the southwestern area of Priority area for shipping SN10 of ROP 2021. As described in particular under II.1 and III.1, the investigation results now available for planning parts of Shipping route SN10 were recognised as a good working basis and implemented in the form of the preferred solution from the point of view of the BSH. A deviation procedure is also required in this respect. Site N-12.6 is also partly located in Priority area for shipping SN15 of ROP 2021; following international coordination, Shipping route SN15 is now to have a slightly different course so that no adverse effect on the safety and ease of navigation is to be expected despite the replanning of Priority area for shipping SN15.

For Site N-13.4

Site N-13.4 is also partially located in the priority area for shipping SN10 of ROP 2021. In ROP 2021, EN13-Nord is defined as a priority area for wind energy from 1 January 2030 unless the federal ministry responsible for shipping proves to the federal ministry responsible for maritime spatial planning by 31 December 2025 that this area is required for shipping for compelling reasons of the safety and ease of navigation. A deviation procedure must be carried out for the area where Site N-13.4 protrudes into Priority area for shipping SN10.

In the southern sub-area of Site N-13.4 there is also an overplanning of Priority area for shipping SN15 of ROP 2021. This is due to international coordination with Denmark and the Netherlands, according to which the course of Shipping route SN15 is to be slightly adjusted. This new course

of SN15 takes into consideration areas for the extraction of hydrocarbons in the Dutch EEZ. A deviation procedure is therefore also required for this deviation.

For Area N-14

Area N-14 is partly located in Priority areas for shipping SN10, SN15, and SN17 of ROP 2021. In the south-eastern part, a strip with a width of 4–6 km overlaps Priority area SN10 of ROP 2021. Furthermore, Shipping route SN17 (and thus Priority area for shipping SN17) in the northern part of Area N-14 crosses that area once. As described above, these changes are based on the results of investigations and international consultations on the closure of Shipping route SN17 and the modification of Shipping routes SN10 and SN15. A deviation procedure is required for these three reorganisations of the priority areas for shipping.

For Area N-16

Area N-16 of the SDP is extended to the south-east and overlaps (over a width of up to around 12 km) with Priority area for shipping SN10, which also requires a deviation procedure. Area N-16 is also partially located in Priority area for shipping SN17 of ROP 2021. This change in planning is a result of the international coordination between Denmark, the Netherlands, and Germany to close Shipping route SN17. As part of the joint Formal Safety Assessment (FSA), various investigations were carried out in 2023 and 2024. These were recognised as a good working basis. In this context, no concerns regarding the safety and ease of navigation were identified at this time for the route preferred by Germany. For this reason, this SDP includes this preferred option.

For Area N-17

Area N-17 of the SDP deviates in a north-westerly direction from part of Reservation area for wind energy EN17 of the ROP 2021 – at the same time, Area N-17 overlaps Priority area for shipping SN16 of ROP 2021 over almost the entire width of the shipping route and the length of Reservation area for wind energy EN17. A deviation procedure is required with regard to the overlap of Priority area for shipping Sn16. The reason for the change in the layout of Area N-17 is that the course of Shipping route SN16 is to be shifted to the north-west. This contributes considerably to increasing the safety of shipping traffic in this maritime area. For this reason, the part of Reservation area for wind energy EN17 of ROP 2021 in the SDP is not planned with a site that is currently located north-east of Shipping route SN16. Moreover, Area N-17 of the SDP does not extend all the way to the south-eastern tip of the south-eastern sub-area of the reservation area for wind energy EN17 of ROP 2021. The reason for this is the slightly changed course of Shipping route SN15. There was international coordination with Denmark and the Netherlands on this and on the update to Shipping route SN16 as part of an external expert report. In these investigations, an optimal course of Shipping routes SN15 and SN16 was agreed in principle with the neighbouring states.

## 7.3 Legal assessment

### 7.3.1 Procedurallegal requirements

Admissibility of the proceedings

For deviations in the SDP from designations within the meaning of Item 2.1 (1) of the designations of ROP 2021, a deviation procedure according to Section 19 sentence 1 ROG in conjunction with Section 6 para. 2 ROG is permissible. Priority areas for shipping (Item 2.1. (1) of the designations of ROP 2021) have the legal character of maritime spatial planning objectives in accordance with the introduction of the designations of ROP 2021 (under Item 2 of the designations of ROP 2021). The same applies according to 2.2.3 (3) of the designations of ROP 2021 for gates to the territorial sea.

It is characteristic of the proceedings to obtain permission to deviate from a planning objective that the binding effect of the objective is not generally called into question but rather that it is deviated from only within the framework of a limited individual case. This is the case here, especially because the scope of the areas in which deviations from the objectives of the ROP are designated in the SDP are relatively small: Priority areas for shipping are designated for Areas SN1 to SN18 as well as SO1 to SO4. The deviations from the aforementioned ROP 2021 designations set out in this SDP affect only certain areas for shipping. These are not particularly extensive compared with all priority areas for shipping. For these areas, the underlying objective no longer applies. This does not change the objective of ensuring the safety and ease of navigation by designating priority area for shipping in the ROP. The deviation procedure is also admissible in this respect.

Application, responsibility

The wording of Section 6 para. 2 sentence 2 ROG and Section 19 ROG generally provides for an application for the deviation procedure. It is not clear from the explanatory memorandum whether an application is required for the present case in which the applicant authority coincides with the deciding authority. In any case, it is clear from the previous internal correspondence with the authorities and from the participation in the draft SDP of 7 June 2024 that – if this were classified as necessary – a corresponding application would have been submitted. The BSH would also be authorised to apply for this within the meaning of Section 6 para. 2 sentence 2 ROG because the objective of ROP 2021, from which deviation is to be made for the areas concerned, must be observed in principle in the context of the update and revision of the SDP in accordance with Section 4 para. 1 No. 1 ROG and in accordance with Section 5 para. 3 No. 1 WindSeeG.

The BSH is responsible for deviation procedures for maritime spatial plans for the German EEZ according to Section 17 para. 1 ROG. The Federal Ministry for Housing, Urban Development and Building was involved in the planning process and had the opportunity to comment so that the consultation required under Section 19 S. 2 ROG was established with the Federal Ministry of Housing, Urban Development and Building.

Public participation and environmental assessment

There is no independent requirement for an environmental assessment in the deviation procedure according to Section 6 para. 2 ROG. In particular, Section 7 para. 7 ROG (according to which the regulations of the ROG on the preparation of maritime spatial plans also apply to their amendment, supplementation, and revocation) does not refer to the proceedings to obtain permission to deviate from a planning objective. As part of the update and revision procedure for the SDP, an SEA was carried out in accordance with Sections 6 and 8 WindSeeG. In this procedure, the environmental impact of all deviations from ROP 2021 described and to be examined here was investigated. The SEA concludes that no additional or other significant environmental impacts are to be expected as a result of the designations in the SDP that deviate from the objectives of the ROP.

Design of the procedure

The deviation procedure was carried out in accordance with Section 19 sentence 2 ROG as part of the revision of the SDP. The ROG does not contain any further provisions on the design of the proceedings to obtain permission to deviate from a planning objective. For reasons of transparency and the fact that the deviation procedure is connected to the update and revision procedure of the SDP, the public as well as authorities whose area of responsibility is affected by the proceedings to obtain permission to deviate from a planning objective were nevertheless

informed about the planning and given the opportunity to comment.

### 7.3.2 Substantive legal requirements

The deviations pursued with the deviation procedure are justifiable from a spatial planning perspective and do not affect the basic principles of planning (Section 6 para. 2 sentence 1 ROG).

Justifiability in terms of spatial planning

In terms of spatial planning, deviations of objectives are justifiable if, in principle, they could have been planned with regard to the purpose of setting objectives. This is indicated by the fact that the reasons for the deviation from the objectives were not already the subject of the planning approval procedure of ROP 2021 and that no conscious decision was made there against the planning pursued with the deviation from the planning objective. An indication of justifiability in terms of spatial planning can also be a slight deviation from the definition of the objective in terms of area. The aforementioned criteria for the justifiability of a deviation from the objectives in terms of spatial planning are fulfilled in the case of the planned deviations. In detail:

- Area N-5 of the SDP overlaps with Priority area for shipping SN8 of ROP 2021. Because of the widening of SN7 and the knowledge gained in the meantime from the assessments and consultations with the neighbouring states on the overall traffic situation in the inner German Bight and the traffic leaving the inner German Bight, SN8 is no longer necessary. In this respect, too, it can be assumed that the designations of ROP 2021 would take this change into consideration if these now changed facts and new findings had already been available at the time of the revision procedure for ROP 2021. The overplanning of the priority areas for divers is justifiable from a spatial planning perspective because it is small-scale and it has been determined that the use of wind energy is compatible with the use intended for the divers. Section 7 para. 3 sentence 2 No. 1 ROG defines maritime spatial planning priority areas in such a way that other spatially relevant functions or uses are to be excluded in this area if they are not compatible with the prioritised functions or uses. As described above, according to the aggregated map of the spatial distribution of the sensitivity of seabirds to offshore wind farms (Dierschke, et al., 2024), the area in which Area N-5 overlaps the priority area for divers according to the new layout is not of outstanding importance for seabirds and resting birds. The new layout also takes into consideration an appropriate distance to Area II of the “Sylt Outer Reef – Eastern German Bight” nature conservation area in the east and to the newly added Sub-area III[31] in the south. In addition, the closure of Shipping route SN8 and the newly included Planning principle 7.1.4 are expected to mitigate the scaring effects on seabirds and resting birds in the main concentration area of divers. The more recent findings and developments in the area suggest that wind energy use in the overlap area is compatible with the priority area of divers. These are also innovations that were not yet known at the time of the revision of ROP 2021. Because of the fact that compatibility with the priority use of divers can be assumed, that the reasons for this deviation from the objectives were not the subject of the revision procedure for ROP 2021 and there was no conscious decision against the planning pursued with the deviation from the objectives, it can also be assumed in this respect that the basic principles of the planning are not affected.

[31] cf. particular Sections 1, 2, and 5a NSGSylV.

- With regard to all newly defined sub-areas of areas of the SDP, sites of the SDP or sub-areas of sites of the SDP that lie within Priority area for shipping SN10 (namely: N-9.4, N-9.5, N-12.4, N-12.5, N-12.6, and N-13.4 as well as the sub-areas of Areas N-14 and N-16), the same applies: Recent developments in international coordination and investigations into the safety and ease of navigation (see in detail in particular II.1 and III.1 as well as under VI.1) form the basis for the new planning of sub-areas and sites in Priority area for shipping SN10. In this respect, too, it can be assumed that a corresponding adjustment of the designations for Priority area for shipping SN10 would have been designated in ROP 2021 if these new consultations and investigation results had already been available or completed at the time of the revision of ROP 2021. In addition, the reasoning of ROP 2021 and the designation of the temporary reservation areas for shipping in SN10 already stipulate that sites for wind energy can be made available in the entire area of SN10 following coordination with neighbouring countries. Only the assumption indicated in ROP 2021 that this could probably take place in the middle of the SN10 ("central strip") has proven to be disadvantageous in terms of traffic compared with a "side strip solution" after closer assessment and consultation with neighbouring states.
- With regard to the overplanning of Priority area for shipping SN15 of the ROP 2021 by parts of Sites N-12.6, N-13.4 and a small area of Area N-5 of the SDP, the overplanning of Priority area for shipping SN15 is also based on a current internationally coordinated, slight shift of Shipping route SN15. In this respect, too, it can be assumed that an adjusted designation of Priority area for shipping SN15 would have been specified in ROP 2021 had these changed facts been available.
- The allocations of Areas N-14 and N-16 of the SDP also partially overlap Priority area for shipping SN17. As described above (and in detail under II.1), there was an international vote to close Shipping route SN17. Consequently, this is also a more recent development that was not yet foreseeable at the time of the revision procedure of ROP 2021 and with which Priority area for shipping SN17 would not have been designated in ROP 2021.
- Area N-17 overlaps priority area for shipping SN16 of ROP 2021. The reason for this is that the course of Shipping route SN16 has been shifted to the north-east as part of international coordination. This helps to increase the safety of maritime traffic. This is therefore a development that was not yet apparent during the revision procedure for ROP 2021. There is no reason to assume that the planner of ROP 2021 would not have included a corresponding adjustment in the designations for Priority area for shipping SN16 had these new votes been available.

As a result, it is not evident that the target deviation planned at the level of the SDP would not have been taken into consideration accordingly at the level of ROP 2021 if the changed situation of shipping traffic in the aforementioned areas had been known earlier.

The basic principles of planning are not affected

The basic principles of the plan are not affected by the planned target deviations because neither a significant adverse effect on the objectives from which deviations are to be made nor a conflict with other objectives of the plan because of the deviations is evident. The basic principles of planning are affected in particular if the deviation gives rise to new conflicts that can be resolved only by amending the plan. Furthermore, the basic principles of planning are regularly affected if they conflict with the basic planning concept.

No significant adverse effect on the objectives of ROP 2021

The conclusion that there is no significant adverse effect on the objectives of ROP 2021 is based on the following reasons:

The deviations of ROP 2021 set out in the SDP with regard to all priority areas for shipping in ROP 2021 are based on international consultations (taking into account the results of investigations into the safety and ease of navigation) on the closure (SN17, SN8) and modified course (SN16, SN15, SN10) of shipping routes. These developments were not yet foreseeable at the time of the revision procedure for ROP 2021, and they do not contain any objectives that conflict with the those of ROP 2021.

With regard to the total area of the priority areas for shipping defined in ROP 2021, all planned target deviations from the objectives with regard to the priority areas for shipping are comparatively small-scale areas that are now being planned for offshore wind energy. With regard to SN10, reference should also be made to the reasoning of ROP 2021 for this priority area, which already explains that parts of Priority area SN10 should possibly be made available for offshore wind energy if corresponding investigations into the safety and ease of navigation support this. Even though the idea of a developed central strip in SN10 was still being discussed at the time, the reasoning of ROP 2021 at this point shows that the abandonment of parts of Priority area SN10 in favour of offshore wind energy was generally supported by the planning authority provided that this would not be detrimental to the safety and ease of navigation. Because the safety and ease of navigation has also been examined and ensured as part of the planned development of SN10, there is no significant adverse effect on the objectives of ROP 2021 in this respect either.

With regard to the overlapping of Area N-5 with the priority area for divers, the non-designation of the existing Dan Tysk and Butendiek sites means that the priority area for divers will not be affected. As a result of this and the changes relating to the closure of Shipping route SN8 and the newly included planning principle of the transport logistics concept (7.1.4), the situation for this area of the priority area for divers is different from the one that existed at the time of the revision procedure for ROP 2021. In addition, the aforementioned current findings from the aggregated map of the spatial distribution of the sensitivity of seabirds to offshore wind farms (Dierschke, et al., 2024) do not indicate any outstanding importance for the area of Area N-5. The objective of protecting the divers is not undermined by the overplanning in this area.

No new conflicts with objectives of ROP 2021

There are no indications of any deviations from the priority areas for shipping in ROP 2021 or from the priority area for divers in ROP 2021 that the deviations in the SDP would create new conflicts with the objectives of ROP 2021 that could be resolved only by amending ROP 2021.

Individual case requirement and atypicality

It is clear from the omission of the individual case requirement from the wording of Section 6 para. 2 ROG that the approval of deviations from objectives is not linked to this requirement. It can also be concluded from this that the requirement of an atypical case should no longer be defined by the legislator as a requirement for adeviation. Even in the event that an atypical individual case would be required despite its deletion from the wording of Section 6 para. 2 ROG, this requirement is met. One reason for this is that the deviations from the objectives of ROP 2021 set out in the SDP, as described above, affect certain, comparatively small-scale areas of the shipping routes of ROP 2021 and have resulted from international, current agreements on the closure or changed course of the respective shipping routes. The purpose of shipping in these areas has either been discontinued (in the case of the planned closures of SN17 and SN8) or partially

cancelled (in the case of the planned changes to the course and dimensions of SN10, SN16, and SN15). Only where new sites become available as a result of changes to or the elimination of shipping routes are the deviations specified. Consequently, these are not general deviations from the aim of ensuring the safety and ease of navigation in the EEZ of the North Sea.

The overplanning of the priority areas for divers by a sub-area of Area N-5 is also an atypical individual case: As described above, new findings on sensitivity and the planned closure of Shipping route SN8 as well as the newly introduced transport logistics concept mean that it can be assumed that this sub-area of the priority area for divers is compatible with the priority use of divers. This situation did not yet exist at the time of the revision of the ROP 2021; instead, it is an atypical individual case because of previously unforeseeable findings and developments with regard to other environmental influences in the immediate vicinity.

With regard to the changes to the priority areas for shipping in ROP 2021, if the SDP overplans these priority areas, the purpose of the priority areas for shipping will no longer apply in individual cases because of new circumstances after the entry into force of ROP 2021. The areas affected by the target deviation of the SDP from ROP 2021 are therefore individual cases that recognisably deviate from the usual specific circumstances for individual objectives that were foreseeable during the planning of ROP 2021. The designations of priority areas for shipping in ROP 2021 are not to be generally changed by the planned deviations.

The deviations from the ROP 2021 designated in the SDP are, therefore, individual cases that were not foreseen. Because they were not foreseeable beforehand but rather have arisen because of new, additional facts, these individual cases are also to be categorised as atypical. Even if several similar cases are affected, a deviation is atypical if it remains a special case in terms of its basic orientation and does not represent a regular case. This is the case for the present deviations because the deviations are strictly limited to the changes resulting from the changed facts with regard to the shipping routes. The deviations described have been designated in the SDP only because of these unforeseen changes and not because of a generally different approach to the affected objectives of ROP 2021.

### 7.4 Decision

Both the formal and material prerequisites of Section 19 in conjunction with Section 6 para. 2 ROG are met for the deviations from ROP 2021 defined in this SDP. The designations described in the SDP, which deviate from maritime spatial planning objectives in selected areas, are therefore approved. The designations for the deviations from ROP 2021 are therefore permissible for Sites N-9.4, N-9.5, N-12.4, N-12.5, N-12.6, and N-13.4 and for Areas N-4, N-5, N-14, N-16, and N-17.

# V. Transitional arrangement

For approval procedures for offshore WT, the standard technical principles and planning principles in the current version of the SDP, which was last published at the time of the award of the contract for the site, apply.

For approval procedures for OGCS, the standardised technical principles and planning principles in the current version of the SDP, which is published at the time of the announcement of the first tender procedure for the procurement of the converter platform or submarine cable for the respective offshore connecting cable according to Section 3 No. 5 WindSeeG for the part of the project located in the EEZ, must be applied.

If the procurement process for the converter platform or the submarine cable is based on a framework agreement, the time of the call-off from the framework agreement or, in the case of competitions for participation according to Section 19 para. 2 sentence 1 of the Ordinance on the Award of Public Contracts in the Field of Transport, Drinking Water Supply and Energy Supply (Sector Ordinance), the time of the invitation to tender shall be decisive.

If the procurement process for the converter platform or the submarine cable is not a procurement according to Article 1 Directive 2014/25 on procurement by entities operating in the water, energy, transport, and postal services sectors[32] or a public contract, a framework agreement, or a competition according to Section 103 GWB[33], the time of conclusion of the agreement for the procurement of the converter platform or the submarine cables for the respective offshore connecting cable cables within the meaning of Section 3 No. 5 WindSeeG is decisive for the part located in the EEZ.

The TSO must provide the BSH with evidence of the respective date by submitting suitable documents at the latest when submitting the application documents according to Section 68 para. 1 WindSeeG.

Notwithstanding the above, the current version of the published SDP is to be applied in the approval procedure in the following cases:

- for planning principles of the respective published SDP in the current version with explicit reference to the state of the art or state of the art in science and technology;
- for planning principles of the respective published SDP in the current version, the aim of which is to avert the occurrence of the offences in numbers 1 to 5 of Section 5 para. 3 sentence 2 WindSeeG.

The current version of the published SDP shall apply to procedures for major changes and the removal of authorised offshore structures and their ancillary facilities.

If a technical or planning principle determines its own transitional regulation, this takes precedence.

The possibility of permitting deviations from standardised technical principles and planning principles remains unaffected by this.

[32] Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport, and postal services sectors and repealing Directive 2004/17/EC, OJ L 94.

[33] Act against Restraints of Competition, as amended by the announcement of 26 June 2013, Federal Law Gazette, I p. 1750, 3245, and last amended by Article 25 of the Act of 15 July 2024 (Federal Law Gazette 2024 I no. 236).

# VI. Summary consideration

In addition to the reasoning, this section summarises the main submissions from the consultation as part of the procedure for the revision and update of the SDP, including the on-line consultation, the additional on-line video conference on 2 November 2023, and the discussion hearing on 4 September 2024 as well as how the BSH dealt with them.

There were several opportunities to comment during the proceedings. All submissions were reviewed, processed, and, if necessary, weighed up as part of the process. The results of the consideration are shown in the plan itself. In particular, the main demands and comments submitted by the consultation participants that were not included in the plan, including reasoning, are named, justified with regard to the decision on which the plan is based, and – if there were divergent demands or concerns – explained with respect to the decision in favour of the predominant demand/concern.

As part of the revision procedure, the documents were repeatedly amended after implementation of the respective consultation step. The following consideration generally relates to concerns and claims that have not been resolved in the ongoing process.

The designations of the SDP are an expression of a planning process with room for manoeuvre.

Public and private concerns must be identified, taken into consideration, assessed, and offset as part of the planning consideration within the framework of the legal requirements.

The public and private concerns affected by planning must be weighed up fairly against each other and in consideration of the legal framework. The overriding public interest in the construction of WT and OGCS and their importance for public health and safety according to Section 1 para. 3 WindSeeG was taken into consideration.

In addition to the legal framework (including Sections 4 and 5 WindSeeG), the consideration is based primarily on the comments and remarks submitted as part of the public and authority participation process, including the responses to the consultation questions formulated in the draft documents.

The comments received, including the responses to the consultation questions and the reports on the investigations commissioned by the BSH as part of the procedure, were published on the BSH website on an ongoing basis during the procedure.

## 1 Areas and sites

Scope of the designations

The spatial definition scope contained in Section II.1 deviates from the scope of the draft SDP of 7 June 2024. The reason for this deviation is the decision to initially make designations for sites and OGCS in the eastern part of Shipping route SN10 in Areas N-9, N-12, and N-13. In the upcoming update and revision procedure of the SDP, which is expected to be initiated in 2025, an in-depth assessment will be carried out to designate areas and OGCS for Areas N-14, N-16, N-17, and N-19 as well as Area N-20 (under review) to the west of Shipping route SN10. The main reason for these in-depth assessments are suggestions made during the consultation on the draft SDP. The main objective of the ideas is to increase the efficiency of OGCS and thus reduce costs and increase the full load hours on the designated sites. These suggestions have already been jointly investigated by the BSH and the FNA in terms of their principles and possible effects on the designations in the SDP. Nevertheless, there are a number of technical, planning, and legal issues that need to be addressed, examined, and consulted on in the upcoming update and revision procedure.

The procedure also called for the expansion targets for offshore wind energy to be achieved with

additional sites in order to reduce wake effects and achieve “yield-optimised” site planning. To this end, sites in neighbouring EEZ should be considered, or further potential sites should be developed through multiple use for offshore wind energy.

The BSH prepares the SDP based on the WindSeeG with the objective of achieving the expansion targets according to Section 1 para. 2. S. 1 WindSeeG. Designations are made by the SDP for the German EEZ and can also be made for the territorial sea according to an administrative agreement with the responsible state. The WindSeeG does not provide for the consideration of sites outside the territorial sea or the German EEZ. These can therefore not be taken into consideration for the sectoral planning of the SDP in order to reduce wake effects.

The SDP makes further designations with the objective of expanding electricity generation in a spatially organised and space-saving manner and ensuring the orderly and efficient use of the OGCS as formulated in the WindSeeG. It also takes into consideration that the development of offshore wind energy should be cost-efficient. In this context, the expected full load hours for the individual areas and sites are included, among other things. The BSH closely monitors its planning process through yield modelling for various planning variants.

However, the statutory expansion targets must be achieved with the sites available for wind energy generation. These are limited by the size of the EEZ and the other existing uses. Even the overriding public interest in the construction of offshore WT does not fundamentally change this fact, contrary to the opinion expressed in comments: The areas for shipping are already considerably reduced by the designations in this plan compared with ROP 2021 and thus opened up for offshore wind energy. For all other relevant areas, there is competition either because of their importance for nature conservation or their use as military training areas. The BSH therefore does not share the assessment put forward in various comments that additional areas can be developed for wind energy in the planning area of the SDP that would enable the realisation of the expansion targets with considerably higher expected full load hours.

The BSH also takes into account the generation potential of the sites to be defined as an essential planning parameter for its planning in addition to the sites that are reliably available at the respective planning time and the gradual expansion targets. In the present procedure, the expected generation capacity in Sites N-9.4 and N-9.5 was considerably reduced compared with the draft (for details, please refer to the justification of the designation and the reasoning below). The amended Planning principle 7.11.1 is also intended to increase the use of the OGCS.

In connection with the other proposals for optimising the expansion of wind energy, it was suggested that the expansion targets for offshore wind energy be changed from the existing capacity targets (GW) to working targets or energy yield targets (TWh/a). The BSH prepares the SDP based on the WindSeeG. According to Section 1 para. 2 sentence 1 WindSeeG, the expansion targets are defined as an increase in the capacity to be installed of offshore wind energy converters. There is no legal basis for including an energy yield target in the SDP. A work target does not have a steering effect that would lead to higher full load hours.

In order to safeguard the expansion target of at least 70 GW in the long term, the BSH assumes that sites with a total theoretical potential for an installed capacity of around 78 GW will be required because it will not be possible to feed electricity into the grid on some of the sites at times because of the dismantling and construction of new installations (see Chapter I). Contrary to what is stated in some comments, the BSH does not consider this to be an increase in targets but rather an initial planning assumption for the forward-looking consideration of additional

space requirements for the long-term safeguarding of existing expansion targets. The assumption for the additional space requirement is to be examined in more detail, discussed, and, if necessary, updated in the upcoming revision procedure.

Area size

Several comments were received on both the preliminary draft and the draft regarding the size of the site and the directly associated expected generation capacity per site. In their comment on the preliminary draft, representatives of the OWF operators argue that, for reasons of efficiency, sites with an expected generation capacity of at least 1,000 MW should be designated. Other comments on the preliminary draft argue in favour of the designation of several sites per 2,000 MW-OGCS and thus in favour of smaller sites because this could lead to an increase in the diversity of players. Most comments on the draft argue in favour of the designations of sites with an expected generation capacity of 1,000 MW or up to 1,000 MW and thus in favour of the designation of two or more sites per OGCS. The reasons given include an expected increase in the diversity of players, a reduced risk of project failures, and doubts about additional efficiency gains in the construction of a wind farm with a capacity of 2,000 MW compared with the construction of a wind farm with a capacity of 1,000 MW. In contrast, in its comment, one company argues in favour of the designation of sites with an expected generation capacity of 2,000 MW, justifying this with positive economies of scale and a reduction in the interfaces between wind farm operators and grid operators. This comment questions the increase in the diversity of players through smaller sites. Taking into consideration all the comments submitted, some of which are contradictory, the BSH assumes that the designation of large sites with the resulting reduction in individual sites and OWF projects will, in principle, contribute to increased efficiency. Therefore, for every 2,000 MW OGCS, a maximum of two sites are planned for grid connection. The frequently expressed demand for several sites per grid connection system is met to the extent that the connection of two sites with the same expected generation capacity is specified for individual OGCS. To this end, the site shown in the draft SDP as N-12.4 with an expected generation capacity of 2,000 MW was divided into two sites for the final version of this SDP, each with an expected generation capacity of 1,000 MW. These will be jointly connected via OGCS NOR-12-3. By reducing the number of OGCS for the grid connection of Sites N-9.4 and N-9.5 from two to one compared with the assumptions in the draft SDP, the expected generation capacity for these sites is also lower. For the additional OGCS NOR-12-4, Site N-12.6 to be connected is designated. This will result in a diversification of the site sizes with expected generation capacities of 1,000–2,000 MW.

Coordination with Denmark and the Netherlands

Representatives of the OWF operators have stated in comments that in order to reduce shadowing losses, the designation of wind energy areas in the centre of Shipping route SN10 (central strip development), as outlined in ROP 2021, is preferable to the expansions on the edge of Shipping route SN10 (peripheral development) designated in this SDP. The option of central strip development presented in ROP 2021 also reflected the status of discussions with neighbouring countries at the time. However, the reasoning for ROP 2021 contains a reference to the further coordination still to be carried out with Denmark and the Netherlands. The designation of areas and sites in the area of Shipping route SN10 is based on the results of the trilateral investigations in which variants of a central strip and, as an alternative, variants of a peripheral development were considered. For reasons of the safety and ease of navigation, the only feasible option that emerged from the international

consultation process was the perimeter development. Peripheral development can greatly expand the areas available for wind energy use. This makes a considerable contribution to achieving the objectives.

The comment from the Danish Maritime Authority Søfartsstyrelsen points out inconsistencies in the routing of shipping routes resulting from the SDP designations with the spatial designation of shipping routes in the Danish maritime spatial plan in force since 24 June 2024. Because of the political decision-making process required to adapt the Danish maritime spatial plans, the Danish authorities do not intend to do so in the near future. To avoid inconsistencies in spatial planning, the BSH involved the Danish authorities at an early stage in the assessment of different variants for the routing of international shipping routes. In a joint statement on 11 June 2024, the results of the study produced as part of this consultation were recognised by Denmark, the Netherlands, and Germany as a good basis for work. In this context, the Danish authorities did not raise any major technical concerns about the preferred option of the BSH, which forms the basis for the designations in this SDP. The BSH therefore sees no substantive basis for adjusting the spatial designations in this SDP.

In their comment, the Dutch authorities state that if Shipping route SN17, as defined in the spatial designations of the SDP, is not continued, possible negative effects on the safety and ease of navigation and the expansion plans for offshore wind energy in the Dutch EEZ must be taken into account. With reference to the investigations that have already been carried out (vgl. ABL Group, MARIN, 2024), the effects of closing Shipping route SN17 on the safety of shipping in Dutch waters is considered to be low in this comment. In the overall assessment, it therefore does not appear necessary to make spatial adjustments here.

A joint submission to inform the International Maritime Organisation (IMO), an “INF paper”, as called for in comments by the GDWS and BMDV, is not necessary from the point of view of the BSH at the present time. This SDP implements the recognised work results from the trilateral working group with Denmark and the Netherlands. Depending on the progress of possible further votes, an “NF paper” may be submitted jointly with Denmark and the Netherlands at a later date.

One comment points out that the course of Shipping route SN16 will be adjusted to the north compared with the designation in ROP 2021 in order to enlarge this part of Area N-17. This would shift the use of shipping to the Dogger Bank nature conservation area. The postponement of Shipping route SN16 is the result of trilateral coordination with the Netherlands and Denmark. The primary purpose of priority areas for shipping is safeguarding the necessary, safe, and coherent route network free of obstacles. As a result, the priority areas for shipping or planned adjustments (as in the case of SN16) are orientated primarily towards existing traffic. Freedom of shipping applies inside and outside the priority areas for shipping.

Expansion of Areas N-9, N-12, and N-13

Various comments were received on the expansion of Areas N-9, N-12, and N-13 as well as on the designation of the expected generation capacity for the sites defined in these area expansions. Individual comments call for the expansion of Areas N-9 and N-12 to be dispensed with in order to avoid shading neighbouring sites. This requirement cannot be met because the area expansions are necessary to achieve the statutory expansion targets. The intended designation of these areas was already referred to in the Annex to SDP 2023 and thus prior to the tender of the directly neighbouring sites. As an option for reducing shadowing effects, the designation of a reduced power density for the sites in the aforementioned area expansion compared with the representations in the preliminary draft of the SDP and draft SDP is required. For Sites

N-9.4 and N-9.5 in Area N-9, which is expected to be particularly affected by wake effects, the expected generation capacity was reduced compared to the figures in the draft SDP. For the expansions of Areas N-12 and N-13, the total output already intended in the draft SDP will be retained because an output designation of this scope is considered necessary to achieve the expansion targets.

For Site N-13.4, it was requested that a designation be made subject to the proviso that the dimensions of Shipping route SN7 are appropriate for traffic. The BSH has not yet received any concrete indications that the development capability of Shipping route SN7 would be restricted by the designation of Site N-13.4. The spatial designations for N-13.4 and N-5 already take into consideration a possible significant widening of SN7. In the view of the BSH, this also represents sufficient dimensioning for future developments and does not justify a reservation.

Designation of Area N-14

The Dutch Waterways and Shipping Administration Rijkswaterstaat comments on Area N-14. It points out that the WT constructed on sites in Area N-14 could have effects on existing and planned mining activities in the Dutch EEZ to the west of the area: These could restrict safe helicopter approaches to mobile drilling platforms or platforms yet to be constructed. This is determined by the distance between the WT and the platform as well as the height of the WT. Affected existing or planned platform sites are not transmitted.

At present, there are no indications that the aforementioned aspects conflict with the principle designation of Area N-14.

Prior to the approval of installations on a site, the Netherlands will once again be involved on a cross-border basis if the site is located accordingly. The effects of the proposed wind farm on the aforementioned activities in the Dutch EEZ can be re-examined.

Overlap area reservation area for fishery for Norway lobster FiN1 with Sites N-12.6 and N-13.4 as well as Area N-16

FiN1 is a reservation area for fishery for Norway lobster of ROP 2021 with a total size of approx. 616 km². Section 7 para. 3 No. 2 ROG reservation areas as areas to be reserved for certain spatially significant functions or uses to which particular weight is to be attached when considering then against competing spatially important functions or uses. The maritime spatial plan, which includes the designation of the reservation area for fishery for Norway lobster FiN1, came into force on 1 September 2021. The legal designation of the current national expansion targets and the associated need for further sites for offshore wind energy took place only afterwards, as did the legal regulation that the construction of WT and OGCS is in the overriding public interest and serves public health and safety (Section 1 para. 3 WindSeeG).

The new offshore wind energy area results in overlap areas between the Reservation area FiN1 and Site N-12.6 (approx. 54 km²), Site N-13.4 (approx. 43 km²), and Area N-16 (approx. 13 km²). Of these overlap areas, only Site N-12.6 is time-ranked and is expected to be tendered in 2029 and commissioned in 2034. Because this is a centrally pre-investigated site, the suitability assessment, in which all available data for the site is checked, is carried out by the BSH prior to the tender.

In the consideration between the use of offshore wind energy and fishery for Norway lobster in the Reservation area FiN1 for the overlap area with N-12.6, the BSH has come to the conclusion in the current revision of the SDP that the interest in the development of offshore wind energy in this area prevails. In the absence of sufficiently safe, practicable, promising, and proportionate options, no designations can be made for the WT and in-farm cabling of N-12.6 in favour of fishery. As part of the consultation, various parties saw the implementation of feasibility studies as an

important first step that could provide insights into the realisation of this multiple use in the overlap area.

With regard to questions and comments concerning the design of safety zones and navigation regulations for fishing vessels in OWF, it is pointed out that these are regularly carried out by the GDWS at the level of OWF enforcement procedures.

Subsequent use

During the revision procedure, various stakeholders commented several times on the topic of subsequent use and, in this context, on specific issues relating to the deconstruction of installations. The present SDP does not make any designations regarding the timing of the subsequent use of sites because this is not expected until around 2040.

A more detailed discussion of the topic of subsequent use is planned for the next revision of the SDP.

In preparation for this revision, the BSH awarded a contract at the end of 2024 to provide expert support for site development planning on the topics of deconstruction and subsequent use. In addition to the formal participation in the SDP process, at least one public workshop is also planned to present and discuss the ongoing work as well as the results of the contractor.

Spatially, Areas N-4 and N-5 are designated for subsequent use. Area N-5 is designated in a modified layout compared with the existing wind farms. The comments address the relationship between the designations for subsequent use and the existing OWF and OGCS. There is no time designation for subsequent use. The relevant questions can therefore not yet be addressed in this procedure. This remains reserved for the next revision. The same applies to the reservations expressed about reef occurrences within Area N-5. Known reef occurrences will be taken into consideration in the revision of the concrete layout of sites in the area. The current zoning still leaves some room for manoeuvre. The request from the consultation to enlarge the area at the western edge and reduce it at the eastern edge in order to increase the distance to Sub-areas II and III of the “Sylt Outer Reef – Eastern German Bight” nature conservation areas cannot be realised. This is due to requirements from the shipping sector for an expansion of Shipping route SN7. In addition, the current results of (Dierschke, et al., 2024) for Area N-5 do not show any particular sensitivity for seabirds.

## 2 Acceleration site

Many comments were received on the acceleration sites as part of the participation process. The SDP does not yet have a legal basis for the designation of acceleration sites and the associated designations.

Mitigation measures:

With regard to the sites shown for information purposes, which the legislator has declared to be acceleration sites according to Section 8a WindSeeG, mitigation measures have been designated as a precautionary measure so that it is also clear for these sites that mitigation measures will be applied and will be immediately available as soon as the directive has been fully implemented.

In response to the objection that the catalogue of measures must contain effective mitigation measures, it was clarified that some measures are not yet concrete actions but rather rules for future measures. In addition, it makes sense for the SDP to allow scope for technical developments and adaptability to the actual plans of the project developer. In addition, openness is a good idea because the large time frame to be covered and the growing level of knowledge and development. It is assumed that all measures will be effective when implemented and, where nec-

essary, specified. This also applies if the resulting arrangements are issued only at the approval level.

With regard to the comments on the mitigation measure of bird collision monitoring, please refer to the consideration of the planning principle.

## 3 Subsea cables and pipelines

Gate

With regard to the designation of gates, it was expressed that these should not be limited to only power cables but rather also applicable to pipelines. However, the WindSeeG does not provide for such a designation. At present, there is also a shortage of cross-border corridor capacities in order to achieve the long-term expansion target for offshore wind energy of at least 70 GW or to be able to connect this capacity to the land. Reference is made to the corresponding coordination process with the federal states and other stakeholders. There is thus currently no recognisable capacity on gates for pipelines. If sufficient gate capacity becomes available so that pipelines can also be routed through gates and the law provides for a corresponding designation, this restriction can be lifted.

Grid connection systems

In the comments relating to the designation of OGCS, it was pointed out, among other things, that the deconstruction and subsequent use of existing OGCS should also be taken into account in the long-term perspective of designations in Zones 4 and 5 when it comes to the subsequent use of existing routes. The connection can be confirmed in principle, and BSH intends to consider not only the sites but also the OGCS in future SDP revision procedures for deconstruction and subsequent use, making designations as needed. Another topic – also in response to a consultation question from the BSH – was the question of whether converter platforms should generally be positioned at the edge of a site or in the centre of it. The topic also came up at the discussion hearing. Overall, the comments were clearly in favour of a central placement, in particular because of the better cable routing options and the overall shorter cable lengths of the in-farm submarine cables. As a result, the OGCS locations designated in this plan are therefore all centred within a site or centred between two sites to be connected.

Interconnectors

In the absence of sufficiently concrete planning, a lack of cross-border corridor capacities to the territorial sea in conjunction with the pending assessment regarding inclusion in the GDP, and the Federal Requirements Plan, it was not possible to include route corridors for the interconnectors HansaLink and XLinks submitted in the consultation – at least not in the current revision.

In the Baltic Sea, the TSO proposed designating two further routes for interconnectors between Gates O-XII and O-XIII. To date, a system between the existing Nordstream and Nordstream 2 pipelines has been designated in SDP 2023. After assessing the proposals with regard to the other concerns, no further routes between Gate O-XII and Gate O-XIII are designated in this plan. This decision is based primarily on the concerns of military and alliance defence. The established route between the existing pipelines remains in place. In the event of a conceivable reduction in the distances in a parallel position, a further route between the pipelines might be possible.

Cross connections

The main content of the comments on the cross connections between platforms was the question of whether and how a route for these connections should be designated in the SDP. The previous procedure stipulated that OWF project developers for sites affected by a cross connection must consider areas for a possible route in their respective layout planning. In addition, transfer areas should be designated at the area boundary through which the cross connections would

be routed. In their comment, the TSO suggested that the routes for the cross connections should be designated as binding in the SDP so that they can be taken into consideration in the OWF layout planning. This proposal was also discussed at the discussion hearing. The OWF operators criticised the TSO proposal as being too rigid and suggested sticking with the previous procedure. No cross connections are designated in this plan.

## 4 Designations for the territorial sea

No comments were received on the designations for the territorial sea.

## 5 Central site investigation and calendar years of tender and commissioning

Calendar years of tender and commissioning

As part of the consultation, it was proposed that Sites N-9.4 and N-9.5 as well as N-12.4 and N-12.5 (of the preliminary design and draft) should be spatially designated but that development should not be planned until later. This was justified in particular by the expected effects of building on the Sites N-9.1, N-9.2, and N-9.3 and Sites N-12.1, N-12.2, and N-12.3, which have already been awarded and are neighbouring to the south-east. The proposal was examined but not pursued as a result.

If this proposal were to be implemented and the sites in question did not go into operation at the beginning of the 2030s, as has now been designated, other sites would have to be designated for these years of commissioning. In any case, these would be further away from the coast. In order to designate Sites N-9.4 and N-9.5 as well as N-12.4, N-12.5, and N-12.6 with a total installed capacity of 6,000 MW, additional Sites would be required in the aforementioned handling. In view of the conditions for the other areas and sites under consideration, only sites in Areas N-14, N-16, N-17, N-19, and N-20 (under review) were considered. These sites would therefore have a significantly greater distance from the coast. This would be accompanied by greater logistical challenges at an earlier point in time. The costs for the OGCS, which increase with increasing distance from the coast, must also be taken into consideration. Furthermore, the development of sites in a spatial context is also advantageous in terms of a coordinated expansion but also with a view to later deconstruction or the possible subsequent use of spatially contiguous sites. Finally, the effects on broadband traffic on Shipping route SN10 in the form of a narrowing between Area N-14 and Area N-9 would occur much earlier. This would require a reassessment of the risks and possibly an earlier deployment of risk-minimising measures (e.g. additional emergency towing capacity) as well as further coordination, particularly with the Netherlands.

In order to mitigate the effects of further development on already allocated sites, particularly in Area N-9, the expected generation capacity on Sites N-9.4 and N-9.5 was reduced by 50% each compared with the draft SDP. Even taking into consideration the additional development set out in Planning principle 7.11.1, this step results in power densities that are considerably below the average of the other designated sites. In addition, the yield modelling by Fraunhofer IWES commissioned by the BSH shows that the reduction in the expected generation capacity leads to a better yield situation for the neighbouring sites compared with the designations presented in the draft SDP (Vollmer & Dörenkämper, 2025).

With regard to the quarters usually specified for cable feed-in and commissioning, the problem was pointed out that with the designation of commissioning of the OGCS in QIII or QIV of a year, there are usually six months left for the commissioning of 95% of the WT. Because of the resulting season, there may be weather-related delays. As a consequence, at least two quarters

should always be allowed between cable installation and commissioning. In principle, this time period is reflected in the designations, although deviations may occur if the commissioning of OGCS is delayed. However, the objection will be taken into consideration in future designations.

In their comment, the TSO pointed out that at least 1 GW from an OWF would have to be connected for a 2 GW OGCS to be properly commissioned. This requirement was also discussed at the discussion hearing. It became clear that the demand of the TSO is directed at sectoral planning in that it should be avoided that an OWF with a capacity of 500 MW is designated for commissioning before an OWF with a greater capacity. This is taken into consideration in the designations in the SDP.

## 6 Standard technical principles

Due to the need for clarification during the consultation on the timing of the conversion of the voltage level of the in-farm cabling from 66 kV to 132 kV, the designations in this regard are described in more detail and, in some cases, with explicit reference to individual projects and dates. In addition, the introduction of the 132 kV voltage level of the in-farm cabling specified in SDP 2023 for commissioning from 2032 has been postponed by one year to 2033.

In addition, it is made clear without additional regulatory content in which areas the SDP can set requirements and where it cannot intervene.

No additional prerequisites have been designated for cross connections between platforms because it has also been confirmed in response to a consultation question that there is no need for this. Adjustments have been made to the wording of the technical principle to make it clear that such cross connections should potentially be made possible on all platforms but are designated explicitly for individual projects.

The possibilities for deviating from the standardised technical principles have been grouped into a separate chapter to make it clear that they apply across the board. At the suggestion of the TSO, foreseeable technical innovations were included as a reason for an exception in order to enable their use – even if it was not possible to take this into consideration in the revision procedure of the SDP.

Particularly against the background of standardisation and the timely commissioning of OGCS, options are not included in the SDP (e.g. different voltage levels for the in-farm cabling).

In this sense, superconductors are not included in the SDP because of the current and foreseeable state of the art and expected availability.

The installation of communication technology on the converter platform of the TSO is made possible in principle with this SDP. Because of the highly individual spatial and technical requirements of the various systems and the different requirements of the participants and users, it was decided not to make designations that are too specific and detailed. It is possible that the regulations will be further detailed in a future revision. The knowledge gained from initial experience with bilateral agreements on the installation of different systems can also help here.

## 7 Planning principles

No threat to the marine environment

*Observance of environmental and nature conservation framework conditions*

As far as possible, comments on the environmental and nature conservation framework conditions are dealt with on a topic-specific basis under the planning principles and the sub-item on the environmental report.

With regard to the comments on biotope protection, the law does not prohibit avoidance. Legally

protected biotopes were and are taken into consideration and avoided as far as possible. Reference is made to Section 72 para. 2 WindSeeG.

Some comments focussed on the assessment of environmental concerns, construction time windows, and laying procedures in the territorial sea. This is not the subject of the SDP. A corresponding environmental assessment is the responsibility of the relevant state authorities.

*Overall time coordination of the construction and installation work and maintenance and repairs works*

With regard to Planning principle 7.1.2, it was argued, among other things, that the crossing of the grid connection cables through the Wadden Sea is associated with intensive encroachments in nature and that even with the best possible coordination, these encroachment are expected to exceed the FFH significance threshold because of cumulative effects. The increased expansion targets and their accelerated implementation were enacted by law in full knowledge of the capacity situation and environmental concerns. All available alternatives were examined with regard to the grid connection of OWF in the EEZ. This assessment has led to the current designation. In the absence of available alternative routes, crossing sensitive areas in the territorial sea is unavoidable in order to achieve the statutory expansion targets. Environmental concerns are addressed in the best possible way through the designation of planning principles.

*Noise protection in the foundations and operation of installations*

It was requested that the planning principle be expanded to include the topic of munitions and blasting. Because no coordinated munitions guidelines exist to date and the responsibility has not been conclusively clarified, no further explanations are provided except for Planning principle 7.1.3 (h). The principle that blasting can take place only if all other options have been exhausted remains valid.

The use of alternative start-up methods is to be anchored even more firmly in the SDP. Planning principle 7.1.3 (a) stipulates that the foundations must be carried out as quietly as possible; the foundation method that is the quietest according to the state of the art or the state of the art in science and technology must be selected. The BSH considers it essential to promote the further development of low-noise, alternative foundation methods so that they reach the necessary state of the art to ensure that the development of offshore wind energy can continue to be environmentally compatible.

The preferred use of low-noise foundation methods is already taken into account in the bidding process in pre-investigated sites and does not require any further anchoring in the Site Development Plan because in accordance with the planning principle, the quietest possible working method or construction process is to be used for the foundations and installation of an installation according to the prevailing circumstances. The use or further development of foundation methods that are not yet state of the art is to be welcomed as part of research projects or pilot installations.

Comments call for a noise protection concept to be submitted with the planning documents. It is not yet possible to present the noise protection concept with the planning documents because the design of the piles has not yet been finalised. A noise forecast for the loudest case to be assumed (maximum diameter) must still be submitted. The noise protection concept must be submitted 12 months before the start of construction. This provision should be met in order to be able to make possible changes to the noise protection measures if it is not demonstrated with sufficient certainty that the dual limit value criterion can be reliably met.

The demand to generally use low-noise foundation methods cannot be accepted in this gener-

alised form because low-noise foundation methods have not yet been successfully tested in the Baltic Sea.

*Traffic logistics concept*

The concerns of the shipping authorities that such a regulation should not adversely affect safe ship's command were taken into consideration by a corresponding textual addition to the planning principle.

While some comments called for a temporal and spatial extension of the planning principle to the protected asset harbour porpoise, a number of other comments were in favour of limiting the planning principle to the protected asset divers and the main resting period of the divers. The requirement to extend the planning principle to the main concentration area of the harbour porpoise and its sensitive breeding season was implemented because the measures to control service traffic can not only reduce potential disturbances in the main concentration area of the divers but also potential disturbances in the main concentration area of the harbour porpoise. There have been various calls for the planning principle to be applied across the board to all nature conservation areas. There is currently no technical need for this.

The request for the designation of a maximum speed from various comments will not be implemented. This is because a generalised assessment of noise reduction through speed reduction is not possible because different types of ships do not necessarily become significantly quieter as soon as the speed is reduced. However, it is added to the planning principle that the areas should be travelled through as slowly as possible.

*Prevention and mitigation of emissions*

With regard to other forms of energy generation, it was requested that Planning principle 7.1.5 (a) make it clear that brine from electrolysis processes is unavoidable, whereby the emissions permitted as a result should be determined up to a generally applicable threshold value or one to be set in individual procedures.

Planning principle 7.1.5 (a) designates the principle that emissions should be avoided or – where unavoidable – mitigated. Assessments with regard to the "unavoidability" of individual emission paths are not yet provided for here; these, including corresponding preventive measures, are to be presented in the approval and enforcement procedure. According to the BSH, there are currently still too many uncertainties regarding the regulation of threshold values in the SDP for the possibly unavoidable discharge of brine from electrolysis processes.

In its comment, the BfN calls for the planning principle of avoidance or mitigation of emissions to be supplemented by the obligation to implement a lighting concept. The current SDP principle already stipulates that lighting should be as environmentally friendly as possible, taking into consideration the requirements of safe shipping and air traffic and occupational safety (Planning principle 7.1.5 (d)). The BSH does not currently consider it necessary to arrange a lighting concept as proof/documentation as part of the implementation for all converter platforms at the sectoral planning level. First, the findings from the individual proceedings in which the submission of a corresponding concept has already been ordered in current proceedings will be analysed.

In addition, the BSH is examining whether a concept in which the project developer demonstrates how the light emissions from the platform are to be minimised should be required as part of the planning documents. Coordination with the specialised authorities is also to take place for this purpose.

*Minimisation of scour and cable protection measures*

The main requirement of the BfN for minimising scour and cable protection measures includes

giving priority to natural stone and avoiding concrete (mattresses). In the view of the BSH, there are no principle technical reasons for excluding the use of other inert materials (e.g. plastic-free and pollutant-free concrete mattresses) provided that material emissions and abrasion of plastic particles can be ruled out.

With regard to the regulation that the use of CPS should be limited to what is absolutely necessary, it was requested that the use of plastics should be completely prohibited that the use of plastics should not be permitted in priority areas for shipping. As things stand at present, it is not possible to completely dispense with plastic CPS in the cable entry area of the individual WT for technical reasons. Plastic cable protection systems can lie open on the sediment or be in the water column only in the area of the intake in installations. For potential use in crossing constructions, the plastic content in the CPS systems is located below the surface layer of a crossing construction.

*Sediment warming*

With regard to the planning principle of sediment warming, it was pointed out that compliance with the 2 K criterion is mandatory and must be checked regularly. According to Section 17d para. 1b EnWG, the 2 K criterion is a target provision. The planning principle refers to the legal regulation. The need for comprehensive heat monitoring was also emphasised. Several comments suggested equipping in-farm cables with a distributed temperature sensing (DTS) measurement system. This technology can be used to measure the cable temperature in the cable itself (e.g. to identify critical operating conditions and protect the cables). In order to derive a statement about the temperature in the surrounding sediment or in the reference point for the 2 K criterion from these measured values, detailed knowledge of the local seabed properties and, in particular, the thermal conductivity of the sediment is required. However, this knowledge based on boreholes is available only selectively in sites or on routes. A comprehensive “measurement” of the 2 K criterion is therefore not possible. Instead, a model-based estimate with assumptions is possible and is also practised as part of the approval procedure. However, the equipment and publication of data required here cannot contribute to “heat monitoring” and is therefore not being pursued.

*Bird collision monitoring*

Several comments on the planning principle were received. In part, these comments overlap with regard to the designation of bird collision monitoring as a mitigation measure and a rule for mitigation measures for acceleration sites so that these issues are dealt with together here. In addition to welcoming the principle of bird collision monitoring in principle, it was noted that threshold values and switch-off requirements should be added. In this context, it was also pointed out that bird collision monitoring is not a mitigation measure but rather only a prerequisite for any mitigation measures that may be derived from it. The BSH agrees that bird collision monitoring in itself is not a mitigation measure. However, the planning principle is a rule for a possible future mitigation measure. The regulation consists of bird collision monitoring as a first step to review the impact assessment against the background of existing uncertainties. If the bird collision monitoring determines that there is a proven significantly increased risk of collision, site-specific switch-off conditions can be determined, and corresponding switch-off orders implemented as part of the enforcement procedures. Because the planning principle for bird collision monitoring included in the SDP is a rule for a mitigation measure, and a possible necessity or shut-down conditions must first be determined on a project-specific basis, the BSH has not followed the request to include threshold values at the level of the SDP.

The comments also stated that there is no state-of-the-art technology for the survey of the monitoring described in the planning principle. To the

knowledge of the BSH, the detection systems (radar, camera systems, weather sensors) listed in the planning principle for collision monitoring are already in use in the offshore sector and are available on the market. In combination, these systems can be used to survey the probable (rotor area) and actual collisions. From the point of view of the BSH, these monitoring systems should make it possible to gather knowledge on the site-specific risk of collision. Ongoing bird collision surveys in wind farms in the territorial sea of the Baltic Sea and monitoring programmes soon to be launched in the EEZ of the Baltic Sea show that the necessary technology for such surveys is available.

With regard to the duration of the monitoring, it was controversially stated that a duration of 10 years in principle was to be welcomed and adapted. The specified period of 10 years is intended to provide a rough framework for such monitoring. This is not a blanket designation of 10 years. If a significantly increased risk of collision is identified, it can be assumed that the monitoring and any measures derived from it must be continued beyond the ten-year period. If the monitoring provides proof that there is no significantly increased risk of collision, a decision can be made on any applications to update the bird collision monitoring as part of the enforcement procedures. The wording of the planning principle has been amended to clarify this. This makes it possible to approve exceptions to this principle within the framework of proportionality so that there is no need to adjust the time frame to be applied in principle.

In addition, it was suggested that adjustments or retrofitting of the monitoring systems should be carried out in the event of changes to the state of the art. During the discussion, this aspect was critically assessed by the operator and a possible disproportionality was pointed out if a new system is to be installed during operation. In the view of the BSH, this is understandable. However, it must be ensured that necessary methodological adjustments remain possible within the framework of proportionality in order to ensure that the monitoring objective described in the planning principle can be achieved. For this reason, a more specific passage was included in the reasoning for Planning principle 7.1.8.

An addition to the planning principle was proposed. According to this, bats surveyed using camera or radar data as part of bird collision monitoring must be documented. The BSH follows this suggestion and has included the following addition in the planning principle: If bats or collisions of bats are detected during bird collision monitoring, these events must be documented and the results included in the reporting and in the enforcement procedure.

<u>Consideration of the requirements of the BfN for additional environment-related planning principles</u>

The BfN proposes that the instrument of independent environmental construction monitoring be included in the SDP as a planning principle. The BSH does not recognise any considerable added value in this because the monitoring of the construction phase regulated in StUK4 in connections with the measuring instructions for underwater noise are already effective monitoring instruments. The need to provide for additional environmental construction monitoring will be examined in greater detail as part of the next revision.

<u>Bat monitoring</u>

As part of the comments, it was requested that a planning principle for bat monitoring be introduced. According to the studies available, the sites defined in this SDP or the sites covered by the transitional regulation under these planning principles, are of low importance for bat migration. Operational monitoring for bats is therefore not necessary in the opinion of the BSH. Nevertheless, the planning principle on bird collision

monitoring states that also bats should be recorded as part of this monitoring and the results included in the enforcement procedure. In this way, the concerns of bat protection are taken into consideration within the framework of proportionality.

No adverse effect on the safety and ease of navigation

In its comment on the draft SDP, the GDWS pointed out that anchoring is no longer possible when laying subsea cables and pipelines in priority areas for shipping in ROP 2021. Because these are priority areas for shipping, other uses are excluded. If there is sufficient depth (covering over) of subsea cables and pipelines, laying is possible. From a spatial planning perspective, the laying of subsea cables and pipelines is also necessary in priority areas for shipping. The laying of the pipeline parallel to a shipping route as defined in the plan also involves laying on the edge of a priority area or shipping route. There are no concrete current findings that the minimum cover of 1.5 m is no longer sufficient for the North Sea. It is therefore still assumed that the covering over of 1.5 m which is applicable to the North Sea and which was designated on the basis of anchor drag tests in the maritime area, among other things, is still adequat to sufficiently exclude any adverse effect on the safety and ease of navigation.

Based on a comment by the GDWS on the preliminary draft of the SDP, it was added to the planning principle under (b) that structures must be designed in such a way that they do not fall onto the ship in the event of a collision. These requirements can be found analogously in the design standard, which is also referred to here. The inclusion in the planning principle of the SDP is therefore merely for the purpose of concretisation; it is not a new requirement.

Various comments were made on the timing and responsibility requirements for the additional towing capacity in the area of Shipping route SN10. The adapted designations address most of the points (e.g. regarding the date on which the obligation arises). In addition, it must be clarified that even if a converter platform was to be constructed in front of a WT, the obligation lies only with the OWF project developers and not with the TSO. With regard to overall responsibility, it is also pointed out that this lies with the OWF project promoters for all sites in Areas N-9, N-10, N-11, N-12, and N-13 individually and jointly, even if individual sites are not directly adjacent to Shipping route SN10. The decisive factor here is that it is a contiguous area built up with WT and therefore all OWF project developers in the area contribute to the risk and benefit from additional towing capacities. The designated joint liability means that all OWF project developers of a site in the areas mentioned are fully liable for the provision of the additional towing capacity but that the provision of the additional towing capacity is required only once and can be carried out jointly.

No adverse effect on the safety and ease of air traffic

The draft plan contained comments on the airspace structure in the reasoning of the planning principle. The airspace structure describes, in particular, danger zones and helicopter route networks. For the determination of the suitability of a site and for the specific planning approval or planning permission of installations on a site, it is checked whether the safety and ease of traffic is not adversely affected. This assessment also includes air traffic and thus the airspace structure above the specific site.

Parallel to the SDP procedure, approval procedures in the Amsterdam Flight Information Region (FIR) raised the question of whether restrictions on the maximum height of WT would result from the existing helicopter route network. Against this background, various stakeholders in the SDP process have argued that there should be no restriction on installation height in the

SDP. A corresponding restriction – via a planning principle – was not included in the draft documents. The objective of the statements in the reasoning was simply to highlight one aspect of the further assessment of safety and ease of air traffic concerns following the SDP. To avoid misunderstandings, the relevant passage is not included in the present plan. The plan in question does not contain any restrictions on installation heights.

For installations in the area of the Amsterdam FIR, the Netherlands announced in November 2024 that the previously communicated concerns for installations up to 400 m would be withdrawn.

Comments were made both in writing and at the discussion hearing on letter (d), changes to the obstacle profile. In this regard, the apparently ambiguous wording of the draft status has been adjusted to make it clear that any necessary adjustments to the obstacle limitation areas affect only new or considerably changed projects.

The TSO state that they do not prefer their own access or independent installation of the installations on the third-party property for the realisation of the tower beacons but rather execution by the OWF project developer. The BSH can understand the corresponding demand in principle. However, further investigations and coordination with the OWF operators are also required for a corresponding amended regulation. The point is to be taken up again in the upcoming SDP process.

Removal of devices

The BfN proposes an addition to the planning principle. According to this, the assessment of the reuse or subsequent use of individual existing (installed) components within the framework of repowering should be provided for even before deconstruction. Other concerns (e.g. the importance of the site from a nature conservation perspective) must be taken into consideration. However, the BfN was unable to assess the technical feasibility of such further use of individual WT components. The concern to continue using components as part of the subsequent use of a site or beyond, where this makes sense, is shared in principle. The planning principle already contains the order of priority for waste management stipulated in the Closed Substance Cycle Waste Management Act according to which the reuse of components to be disposed of should be sought first wherever possible. However, investigations carried out by Fraunhofer IWES as part of the scientific monitoring of the SDP process also led to the conclusion that, because of the significant further technical development regularly expected, the continued use of existing foundation elements (considered as “partial repowering” in the consultation project) appears to be hardly feasible (Dörenkämper, et al., 2023). The inclusion of the proposed addition over and above the proposed regulation therefore does not appear necessary. At the same time, the BWO considers the reuse of components – rotor blades are cited as an example – to be unrealistic and is therefore in favour of rejection. The planning principle does not contain any judgement as to which measures apply in individual cases. The fact that recycling of individual components – such as rotor blades – may appear to be ruled out does not yet argue in favour of completely eliminating reuse.

Determination and consideration of objects

Various comments, some of them contradictory, were received on the planning principle of identifying and taking properties into consideration. The industry associations and TSO called for clarifications on the (limited) scope of the identification of objects in the planning principle. The BfN, in turn, called for a complete survey of munitions found on sites – and not just in relation to installations. As a result, it was clarified in the planning principle that objects are to be determined as part of the respective installation-related subsoil investigation and route exploration

according to the BSH standard for subsoil exploration.

Clearing and even detecting munitions found in the sea is a challenge. A “complete survey of found ammunition and not just installation-related” would require a great deal of effort – especially in terms of time – and considerable costs.

Among other things, hydrographical investigations are carried out as part of the subsoil investigations. Various measurement methods are used to survey both the seabed surface (sidescan sonar, multibeam echosounder) and the uppermost area of the seabed (magnetometer, subbottom profiler). However, these are not investigations to map suspected munitions. The magnetometer investigations carried out in this context provide an overall view of magnetic structures such as superficial channel systems (sediment with ferromagnetic components). Individual objects can be mapped only if they have a certain size, are close to the surface or exposed, and are passed over directly with the measuring device. Depending on the prevailing water depth, the distances between the profile lines used in these investigations were around 75 m.

A survey of the seabed using a magnetometer, which is suitable for the comprehensive detection of magnetic anomalies, requires both a narrow grid with profile spacing of at least 5 m and a speed of 4 knots, with the measuring device being trawled 2–3 m above the seabed.

Even for the hydrographic survey as part of the central site investigation with profile distances of approximately 75 m, the BSH expects an offshore period of several months for a 2 GW site. This period would be multiplied for a complete survey using a magnetometer. A comprehensive magnetometer investigation would detect numerous magnetic anomalies because these are not caused only by found ammunition. Every anomaly surveyed must be evaluated and categorised accordingly. Further offshore investigations on site would then be necessary for actual confirmation.

A suspicion-independent and non-event-related complete area mapping therefore does not appear proportionate.

In addition, the assessment that further exploration after construction of the wind farms will be made much more difficult is not shared: Although it will not be possible to investigate directly around the installations, the relevant investigations for munitions are already being carried out there by the respective project developers. According to the BSH, an investigation of the areas between the WT with the ships and towed measuring devices regularly deployed will not be greatly impeded.

Consideration of cultural assets

One comment on the preliminary draft called for the principle definition of the size of the exclusion area (of 50 m) to be deleted. The distances should be agreed on a case-by-case basis so that also distances of less than 50 m are possible. The 50 m serve as a uniform provision. Because of the wording “in principle”, smaller distances are also possible in individual cases as required.

COMMUNICATION AND MONITORING

The planning principle was adapted in Section 7.9 (a) in response to comments on the preliminary draft to the effect that systems for communication with shipping do not necessarily have to be installed at peripheral facilities as long as other, more centralised locations continue to ensure sufficient range.

In the planning principle, Section 7.9 (b) prescribes the operation of a mobile phone network. The contribution of a mobile network for safety in the vicinity of OWF was welcomed in several comments. In comments on the preliminary draft, however, representatives of the OWF operators

argued that the responsibility for operating a mobile network should lie with the TSO and not with the OWF project developers. Arguments in favour of TSO responsibility included the fact that the TSO converter platform was found to be particularly suitable for the installation of mobile radio technology because of its central location and height as well as the resulting independence from OWF operation with regard to commissioning times and downtime periods. There has been no change in responsibility in this planning principle. The main reasons for this are that the feasibility of installing mobile communications systems on TSO platforms with completion by 2031 cannot be guaranteed and that the regulation of responsibility already took place with SDP 2023 and were therefore taken into account for bids in the tenders for sites in 2023 and 2024. However, because the installation of mobile communications technology on TSO platforms appears possible in principle, an addition has been included in the reasoning of the planning principle. According to this, the installation of mobile communications technology can also take place on TSO platforms under certain circumstances.

Comments on the draft SDP were again received from representatives of the OWF operators, most of whom reject responsibility for the operation of a mobile network and instead refer to the mobile network operators responsible in their view. In this case, too, the existing rules on responsibility are maintained. In contrast to OWF project developers and TSO, mobile network operators do not have their own installations to accommodate mobile communications technology within OWF sites and their immediate surroundings. The planning principle leaves open the possibility of commissioning a mobile network operator by the OWF project developer.

Clarification was also requested on the required geographical coverage of the mobile phone network. This has been done with a clarification of the planning principle.

Consideration of all existing, approved, and designated uses

*Subsea cables*

Because of the current shortage of gate capacities, which are absolutely necessary for the long-term expansion target of offshore wind energy of at least 70 GW or the grid connection of this capacity to the land, several consultation participants, including the Lower Saxony Ministry of Food, Agriculture, and Consumer Protection, called for the efficient use of space for the planning of submarine cables in some areas such as north of the Gate N-III along Reede and along the priority area for shipping, and the Weser military submarine diving area. The comment of one environmental organisation called for the cables to be bundled more closely together. When laying submarine cable systems in parallel, the SDP designates a distance of 100 m and 200 m alternately to be maintained (e.g. to provide sufficient space for laying an “omega loop” in the event of cable damage during repairs). With this distance, a smaller distance is designated for the shallower water depths of up to 45 m in the planned area compared with corresponding internationally agreed industry guidelines, which apply for water depths of up to 75 m. In addition to the water depth, the geopyhsical properties of the seabed are also factors to be taken into consideration when designating the distances between subsea cables.

It has been shown that the specified distances are necessary with the equipment currently available for repair work on subsea cables in order to reduce the risk of damage or other negative influences on neighbouring subsea cables.

The standardised distances are also necessary to allow protected biotopes to be bypassed as part of the fine routing. As a rule, a distance of 50 m from marine boulders and cable systems is aimed for and realised as far as possible in the course of fine routing. In addition, the BSH is of

the opinion that the concern of greater environmental impacts with greater installation distances is unfounded. Because of the staggered laying of cable systems planned in parallel, no cumulative effects on the environment are to be expected because cable laying work usually has temporary effects on the marine environment and significant operation-related impacts are not to be expected.

In its consideration of the possible reduction in area because of reduced distances between the subsea cables north of Gate N-III and the guarantee of proper repair work, taking into account neighbouring subsea cables and the possibility of changes in the course of fine routing, the BSH comes to the conclusion that the distances cannot be reduced if the cables are laid in parallel.

*Wind turbines and other forms of energy generation*

A new paragraph 7.10.5 (b)was added; this regulates the distance of WT from the centre line between neighbouring sites or areas for other energy generation after a corresponding proposal by the BSH in the preliminary draft was supported in the comments. According to the request made in the comments, the centre line is provided by the BSH via the GeoSeaPortal for information purposes.

The newly added paragraph 7.10.5 (d) clarifies how WT in neighbouring sites or other energy generation areas are to be taken into consideration when designating an OWF layout and deciding on the design loads of the WT by the project developer. Comments called for this paragraph to be deleted from the wording of the draft SDP because it would not be possible to take account of future WT within neighbouring sites and other energy generation area if the exact turbine types and locations were not known. The wording of the paragraph was adapted as a result, but the paragraph is retained in principle because of the clarification that supplements the other paragraphs.

Specific planning principles for subsea cables

*Crossing of shipping lanes*

In its comment, the GDWS demands that not only TSZ and the Kiel Baltic Sea route should be crossed by the shortest route but that this provision should be extended to all regional transport routes with high traffic volumes. This requirement cannot be met in full. First, it is unclear what exactly is meant by a high volume of traffic and how it can be measured, and this needs to be defined. In addition, the requirement to cross on the shortest possible route is already taken into consideration in the planning and designation of subsea cables and pipelines in the SDP. This also applies to transport routes that are not TSZ or the Kiel-Baltic Sea route. In individual cases, other concerns may also have to be included in the consideration. These include the overall length of the subsea cables and pipelines, which has an influence on the resulting encroachment on the marine environment and the costs of the pipeline. There is thus no need for a general planning principle in this plan that predetermines its decisions.

*Crossings*

Subsea cables and existing pipelines were previously crossed at right angles over a total length of 500 m on both sides of the pipeline. The consultation showed support for a more efficient use of space. This was accompanied by proposals to designate a more flexible crossing angle of between 90° and 45°, thereby dispensing with a right-angled crossing over a section of 500 m on each side of the pipeline. In the draft SDP of 7 June 2024, the handling of such a crossing was adapted so that the cable is brought considerably closer to the pipeline, and a right-angled crossing was implemented in an area of 30 m to the left and right of the pipeline.

Because of the critical feedback regarding the technical feasibility of the laying radius to be applied here, taking into account the use of marine

space and current coordination at the project approval level, this proposal was adapted from the draft, and a sinusoidal crossing was planned. If deviations are necessary on the planned route in the area of the crossing over a pipeline because of existing anodes, a slight deviation of a 90° angle is possible.

As part of the consultation, the TSO expressed concerns about a possible delay in the commissioning of subsea cables when implementing construction-free crossings for reasons of geological feasibility as well as market availabilit (e.g. of installation equipment). Because the decision on the implementation of a structure-free crossing is made on a case-by-case basis in the approval procedure and a deviation is possible in justified cases, the wording is retained.

*Minimally disruptive cable laying procedure*

In its comment, the BfN calls for a supplement to the planning principles, according to which a crossing of (other) legally protected biotope types should be avoided by optimising the route. According to Section 72 para. 2 WindSeeG, significant adverse effects on biotopes should be avoided as far as possible. This provision and the particular sensitivity of the reefs to the expected effects are already taken into consideration by the designation of the planning principle. An extension to all (other) biotopes is not required here.

*Covering over*

Various comments relating to fishery criticised the fact that the specifications on covering over were too vague and offered scope for interpretation. Safe overfishing must be guaranteed. In addition, it was requested that a covering over of at least 1.5 m be designated for all submarine cables within the park. In contrast, there was another comment that demanded that a requirement for minimum overlap within sites, including in overlap areas of sites with the reservation areas for fishery for Norway lobster in ROP 2021, should be implemented only if the measure is proportionate.

The planning principle specifies the minimum overlap in a binding manner, leaving no room for interpretation or vague wording. A minimum cover of 1.5 m applies to all areas in the North Sea outside of sites for offshore wind farms. There is no fishery within sites and a general navigation ban applies, meaning that a minimum cover of 1.5 m cannot be specified for in-farm submarine cables. The expected sediment warming is decisive for the designation of the covering over of in-farm submarine cables.

## 8 Pilot offshore wind turbines

No comments on the designations for pilot offshore wind turbines were received

## 9 Areas for other energy generation

Other energy generation in the German EEZ is still designated for the other energy generation area SEN-1. In the likely event that hydrogen is produced here, close coordination is taking place with the Important Project of Common European Interest (IPCEI) AquaDuctus. Discussions on the route with the project participants have taken place and are ongoing. The extent to which additional other energy generation areas are designated and how they can be connected is not part of the current SDP revision because of the limited spatial conditions in the EEZ of the North Sea as well as the many use interests and the priority given to offshore wind energy.

## 10 Transitional regulation

In principle, the introduction of a transitional regulation was welcomed, but the relevant date for the OGCS was criticised as being too late because essential trades had already been commissioned at the time of the application. The start of the commissioning processes proposed by

the TSO was not accepted because it was too unspecific and because of internal actions that were not comprehensible to the BSH. Instead, depending on the type of procurement, a date was chosen for the start of the commissioning process because this addresses the problems described in the comments and can also be transparently verified. Several comments also stated that the transitional regulation was not compatible with the principles of grandfathering. As a matter of principle, the protection of existing buildings is assumed only once a permit has been granted or a structure has been constructed. The dates chosen in the SDP are far earlier, and it is still possible to submit deviation requests to counter disproportionate situations.

## 11 North Sea Environmental Report

Marine mammals

The requirement for precise provisions for deterrence or the submission of a noise protection concept with the planning documents cannot yet be made at this stage because both deterrence and noise protection are project-specific and site-dependent. A noise forecast must always be submitted for the largest diameter to be assumed in the event of impulse pile driving as well as for alternative foundation methods (e.g. vibration). In Planning principle 7.1.3, the SDP designates that the foundation methods with the lowest noise emissions should be used in the given circumstances. These should correspond to the state of the art or the state of the art in science and technology. The BSH also encourages the further development of alternative foundation methods. This is to take place within the framework of test piles and pilots in order to achieve the required state of the art. For these piles, an adaptation of the deterrence and noise protection concept is necessary. Particular attention must be paid to noise-minimising measures, especially in sites where there is a high occurrence of harbour porpoises or calf sightings but which are not necessarily located in the designated main concentration area.

Limiting the duration of pile driving is in line with standard enforcement requirements. This is intended to prevent the fulfilment of prohibitions under species protection law and to restrict parallel pile driving. This prevents an injury to the noise protection concept of the BMU and thus the realisation of the prohibition of disturbance.

The reaction of harbour porpoises to operational noise or ship noise is presented in the environmental report. The continuous sound level at stations within wind farms and along shipping routes is also analysed. It should be noted that the stations in the wind farm are not noisier than the stations on the shipping routes. It can thus not necessarily be assumed that the distribution of harbour porpoises is dependent on service traffic. In addition, service traffic accounts for only 30% or 20% of total maritime traffic depending on the time of year. A reduction of underwater noise emitted by ships is not necessarily possible through speed limits because the propeller design is tuned to the optimal operating condition so that an effective reduction of continuous noise emissions from vessels probably requires a more complex solution. This is still being analysed in research projects (e.g. METHODS 2).

Cumulative effects of parallel construction sites are discussed in detail in Section 4.17.3 of the North Sea Environmental Report. The focus here is on Zone 3 because this is where the corresponding sites are designated. Areas N-17 and N-19 are also considered because they border on the Dogger Bank nature conservation area. The cumulative assessment of the effects is based on the noise protection concept and can therefore be transferred from harbour porpoises to less sensitive species (e.g. seals). The deterrence of minke whales and the effect of construction work on minke whales is largely unexplained. Minke whales are mainly found in the EEZ in Areas N-17 and N-19; because no sites

have been designated for expansion here, the effects on minke whales cannot yet be assessed in depth.

With regard to the required munitions recovery, reference is made to Planning principle 7.6 as well as the lack of a guideline and the unresolved responsibility for munitions in the EEZ.

Avifauna

In various comments, reference was made to current findings on the avoidance behaviour of some seabird species (in particular guillemots in autumn) towards offshore wind farms in the EEZ of the North Sea. It was argued that a significant adverse effects on the guillemot within the meaning of Section 44 para. 1 No. 2 BNatSchG could be assumed. In this regard, please refer to the assessment in the North Sea environmental report, Section 5.2.2.2. Among other things, there was a call for alternatives to be considered at the planning level when selecting and designating areas and sites for the further development of offshore wind energy.

With regard to the examination of alternatives, reference is made to the examination of reasonable alternatives in Chapter 9 of the North Sea Environmental Report in which an assessment of reasonable alternatives is carried out in accordance with Section 40 para. 1 sentence 2 UVPG. In addition, reference is made to the examination of reasonable alternatives under species protection law in Section 5.2.2.2 of the North Sea Environmental Report.

No alternatives are apparent. Another location with no or less impairment of the guillemot is not available. The designation of Sites N-12.4, N-12.5, and N-12.6 as well as the designation of Areas N-14 to N-20 (under review) are absolutely necessary to achieve the expansion target of 70 GW stipulated by law in Section 1 para. 2 sentence 1 WindSeeG because there is only limited space available in the German EEZ. The current SDP already goes beyond ROP 2021 with the designation of sites and areas in Shipping route SN10. Sites outside the main areas of distribution of the guillemot identified are available to a greater extent only in nature conservation areas and reservation areas for defence. However, according to the BfN and the Bundeswehr, these are currently not suitable for development with wind farms. If the designation of sites were to be waived in favour of a designation to the west of Shipping route SN10, the expansion target could not be achieved. This also applies in the same way to a renunciation of the south-eastern part of Area N-16. In addition, it must also be taken into consideration that from 2040 onwards, there will be a significant deconstruction of wind farms, the capacity of which will no longer count towards the expansion target. The specific layout of Areas N-12 and N-16 results, among other things, from the designations of ROP 2021 and the spatial requirements of other forms of use such as shipping. In particular, the layout is the result of trilateral coordination between Germany, Denmark, and the Netherlands on the compatibility of offshore wind energy with the concerns of shipping in the area of Shipping route SN10. There are therefore currently no options for spatial adjustments.

Seabed, benthos, biotopes

Various comments pointed out that no protected biotopes may be located in sites to be developed by OWF and that the designation of Area N-19 is therefore inadmissible. Against this background, the legal framework does not exclude the development of legally protected biotopes from the outset. Section 72 para. 2 WindSeeG stipulates that Section 30 para. 2 sentence 1 BNatSchG shall be applied to projects under the WindSeeG with the proviso that a significant adverse effect on biotopes within the meaning of Section 30 para. 2 sentence 1 BNatSchG shall be avoided as far as possible. The purpose of this regulation is to harmonise the concerns of the development of offshore wind energy and nature conservation. In the case of legally protected biotopes, the

significance of the adverse effect is therefore assessed and, in the event of a positive assessment result, the question of whether this can be avoided as far as possible within the meaning of Section 72 para. 2 WindSeeG when the plans are further specified at the subsequent planning or project levels.

With reference to the special functions of silt biotopes as carbon reservoirs, the inclusion of a planning principle on biodiversity and climate protection was proposed.

The BSH is fundamentally open to such a planning principle; further clarification will be possible in the subsequent SDP revision procedure.

## 12 Baltic Sea Environmental Report

The information on the category of the protection status of harbour porpoise and the distribution of the harbour porpoise population in the central Baltic Sea has been adopted.

# VII. Summarised environmental statement and monitoring measures

## 1 Summary declaration according to Section 44 para. 2 No. 2 UVPG

Environmental considerations have been incorporated into the plan in various ways. In addition to the consideration of environmentally relevant comments, the designations of the SDP were investigated in detail within the framework of the accompanying SEA. Based on the consultation, a separate environmental report has been prepared for each of the two marine North Sea and Baltic Sea in accordance with Section 40 UVPG and the criteria of Appendix I of the SEA Directive. The scope and level of detail of the SEA for the present SDP was discussed with representatives of authorities, associations and private individuals as part of an online consultation with an additional online video conference on 2 November 2023. On 5 June 2024, the scope was designated. The environmental assessment was carried out on this basis.

In accordance with Section 5 para. 3 sentence 7 WindSeeG, the environmental assessment is to be limited to additional or other significant environmental impacts as well as to necessary updates and elaborations. Within the framework of the SEA on the present SDP, it was examined in detail whether there are any updates or elaborations with regard to the state of the environment. Insofar as no updates or elaborations are required in comparison to the environmental reports for ROP 2021 (BSH, 2021a; BSH, 2021b) or SDP 2023 an SDP 2020 (BSH, 2023a; BSH, 2023b) (BSH, 2020a; BSH, 2020b), reference is made to the corresponding statements in the environmental reports for ROP 2021 as well as SDP 2020 and SDP 2023.

This SDP is the result of the previous SEA. The results determined in the SEA with regard to the importance of individual spatial sub-areas for protected assets were used as a basis for decision-making when designating areas and sites, mitigation measures for acceleration sites in accordance with Section 8a WindSeeG, locations for platforms, and routes for subsea cables. At the same time, the environmental impacts of the designations of the SDP were continuously investigated during the preparation of the plan. The significant effects predicted in the environmental reports from the designations of areas and sites as well as from platforms and subsea cables were countered with designations of planning principles in the SDP to avoid and mitigate these effects as far as possible.

No areas or sites were designated in nature conservation areas. The requirements of Section 5 para. 3 No. 5 WindSeeG are thus fulfilled. Accordingly, a designation is inadmissible if the area, the site, or other energy generation area is not compatible with the protective purpose of a protected area ordinance issued according to Section 57 BNatSchG. The exclusion of the “Butendiek” offshore wind farm for any subsequent use represents an important preventive measure. The area of the Dan Tysk OWF is also not designated as an area for subsequent use. Areas N-4 and N-5 (in the new layout) are designated for subsequent use. A minimum distance of 5.5 km from Sub-areas II and III of the “Sylt Outer Reef – Eastern German Bight” nature conservation area will be maintained for the new layout of the subsequent use of Area N-5.

The laying of subsea cables can be made as environmentally friendly as possible by bypassing nature conservation areas and known protected biotopes, among other things. Avoiding crossings of subsea cables with each other as far as possible also serves to prevent negative impacts on the marine environment, in particular on the protected assets seabed, benthos, and biotope types.

According to Section 8a WindSeeG, the SDP sets out planning principles and mitigation measures for acceleration sites to prevent and mitigate significant negative effects. These include Planning principles 7.1.2 on overall time coordination, 7.1.3 on noise protection, 7.1.4 on the traffic logistics concept, 7.1.5 on emission reduction, 7.1.6 on scour and cable protection measures, 7.13.5 on gentle cable laying procedures, and 7.1.7 on sediment warming. Principle 7.1.1 on compliance with environmental and nature conservation framework conditions provides for, among other things, preventive and mitigation measures for migratory birds within the bird migration corridors designated in ROP 2021. In Principle 7.1.8, monitoring of bird collisions with WT is planned for all sites designated in the SDP. Compared with SDP 2023, Planning principle 7.1.8 was further concretised, and a monitoring objective was defined. In addition, it was included in the planning principle that bats in the rotor area or collisions of bats recorded as part of the monitoring will be analysed and the results included in the enforcement procedure. Planning principle 7.1.4 on traffic logistics concept was newly included in the current SDP and is intended to help mitigate disruption caused by project-related service traffic from OWF, OGCS, and other energy generation areas.

The SDP defines only areas that, according to the impact assessment in the environmental report and on the basis of current knowledge, do not have significant effects on the nature conservation areas in terms of their components relevant to the conservation objectives and the protective purpose within the meaning of Section 34 para. 2 BNatSchG and which are not expected to fulfil the prohibitions under species protection law in accordance with Section 44 BNatSchG or the prerequisites for an exception according to Section 45 BNatSchG. In the adjacent protected areas of the neighbouring countries and the territorial waters, no significant effects on the respective nature conservation areas and their components relevant to the conservation objectives or the protective purpose within the meaning of Section 34 para. 2 BNatSchG are discernible. There is no in-depth assessment of possible routings outside the German EEZ; only the remote effects of the designations are considered.

All comments received during the participation rounds were published and centrally screened. In the course of reviewing the contents of all comments and remarks, the arguments put forward were discussed and taken into consideration both positively and negatively in the overall plan. The consultation on environmental concerns focused in particular on demands regarding the designation of acceleration sites provided for in the draft and the question of the effects on marine mammals caused by wind farm-related maritime traffic as well as aspects of noise protection and the avoidance behaviour of guillemots.

Extensive additions have already been made to the cumulative effects of pile driving noise and operational noise on marine mammals in the North Sea Environmental Report for SDP 2023 and have been further supplemented in this environmental report. Based on the results on impact noise, Planning principle 7.1.3on noise protection was adjusted. The current findings on avoidance behaviour, especially of the guillemot, have all found their way into the SEA. Species protection concerns were comprehensively examined. These assessments can be found in Section 4.8.1 and Section 5.2.2.2 of the North Sea Environmental Report. New findings will be taken into consideration.

As part of the summarised consideration, it can be seen how and in what way the main concerns arising from the comments have been taken into consideration for key topics of participation.

Reasoning of the overall plan decision

The development of offshore wind energy plays a key role in meeting the climate protection and

energy policy objectives of the German government. This is also reflected in the statutory expansion targets for offshore wind energy (Section 1 para. 2 sentence 1 WindSeeG). In accordance with the explanatory memorandum to the WindSeeG, there is no alternative to the development of offshore wind energy (BT printed pages 20/1634, p. 60). The consideration of alternatives within the framework of the designations of the SDP is thus limited by the expansion targets to be achieved under the WindSeeG and by the priority and reservation areas for offshore wind energy specified in the spatial development plan for the EEZ or the prerequisites for deviation procedures or the designation of other uses.

Accordingly, the designations also had to be within this framework. The scope for an examination of reasonable alternatives is thus limited. In contrast to the draft SDP of 7 June 2024 , only sites up to Zone 3 are initially designated for the area east of Shipping route SN10. Only areas are designated for Zones 4 and 5. This will help to achieve the expansion targets by 2030 and make it possible to better take future knowledge into consideration in planning. This may concern technological progress or environmental knowledge.

Within the framework of the SEA, an examination of reasonable alternatives was also carried out on the basis of Article 5 para. 1 sentence 1 SEA Directive in conjunction with the criteria in Appendix I SEA Directive and Section 40 para. 2 No. 8 UVPG. The main focus was on strategic and spatial alternatives.

The zero alternative (i.e. not implementing the SDP) is not a reasonable alternative because the orderly yet accelerated development of offshore wind energy as designated in Section 1 para. 1 WindSeeG (with regard to the expansion targets) and in Sections 2, 2a WindSeeG is imperative for achieving the national climate protection targets. Without this development, drastic consequences – also for the marine environment – are threatened by climate change. The purpose and objective of introducing a sectoral plan with not only spatial but also temporal designations and standardised technology and planning principles is the precautionary and orderly control of the development of offshore wind energy. A strategic alternative (e.g. with regard to the targets of the federal government on which the planning is based) is not currently being considered for the SDP because the expansion targets of the federal government represent the planning horizon for the SDP. The expansion targets result from the legal provision in Section 1 para. 2 sentence 1 WindSeeG.

Spatial alternatives are not available in view of the underlying territorial context of ROP 2021 and against the backdrop of the considerably increased expansion targets. In order to minimise the area required, a comparatively high power density is assumed for all sites. For some sites, this was considerably increased in SDP 2023 compared with the designations in SDP 2020. From an environmental and nature conservation point of view, an increase in power density seems preferable to the alternative of having to develop additional and possibly environmentally sensitive areas.

In summary, with regard to the planned areas and sites, platforms, and submarine cable routes, the orderly, coordinated overall planning of the SDP will minimise impacts on the marine environment as far as possible. By adhering strictly to preventive and mitigation measures, in particular for noise mitigation during the construction phase, significant effects can be prevented by implementing the planned sites, areas, and platforms.

## 2 Listing of monitoring measures according to Section 44 para. 2 No. 3 UVPG in conjunction with Section 45 UVPG

The potential significant impacts on the environment due to the implementation of the plan

should be monitored in accordance with Section 45 UVPG. This is intended to enable unforeseen negative effects to be identified at an early stage and suitable remedial measures to be taken. Monitoring is the responsibility of the BSH because this is the authority responsible for the SEA (see Section 45 para. 2 UVPG). In this context, as intended by Article 10 para. 2 SEA Directive and Section 45 para. 5 UVPG, existing national and international monitoring programs can be used to avoid duplication of monitoring work. In accordance with Section 45 para. 4 UVPG, the results of the monitoring are to be taken into consideration in the revision of the SDP.

With regard to the planned monitoring measures, it should be noted that the actual monitoring of the potential impacts on the marine environment can begin only when the SDP is implemented (i.e. when the designations made within the framework of the plan are implemented).

With regard to the measures envisaged to prevent, reduce, and offset any major negative effects of the SDP on the marine environment, please refer to the statements in Chapter 7 of the North Sea Environmental Report and Chapter 6 of the Baltic Sea Environmental Report. The investigation of the potential environmental impacts of areas and sites for offshore wind energy as well as areas for other forms of energy generation, platforms, and subsea cables and pipelines is to be carried out at the secondary project level, on the basis of the standard “Investigation of effects of offshore wind turbines (StUK)” and in coordination with the BSH. Monitoring during the construction of foundations by means of pile driving involves measuring underwater noise and acoustic recordings of the impacts of pile driving noise on marine mammals using POD measuring devices. The data are quality-checked and processed in the specialist information system for underwater noise (MarinEARS) of the BSH.

The monitoring also includes results from research projects (e.g. on possible impacts on individual protected assets as well as on the development of norms and standards). The results from the ongoing projects will be directly incorporated into the development of the revised StUK.

New in the current SDP is the concretisation of the planning principles on bird collision monitoring (cf. Planning principle 7.1.8). The newly included planning principle on accompanying environmental research 7.1.9 may also serve as an additional monitoring measure.

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# Appendix

## 1 Map section

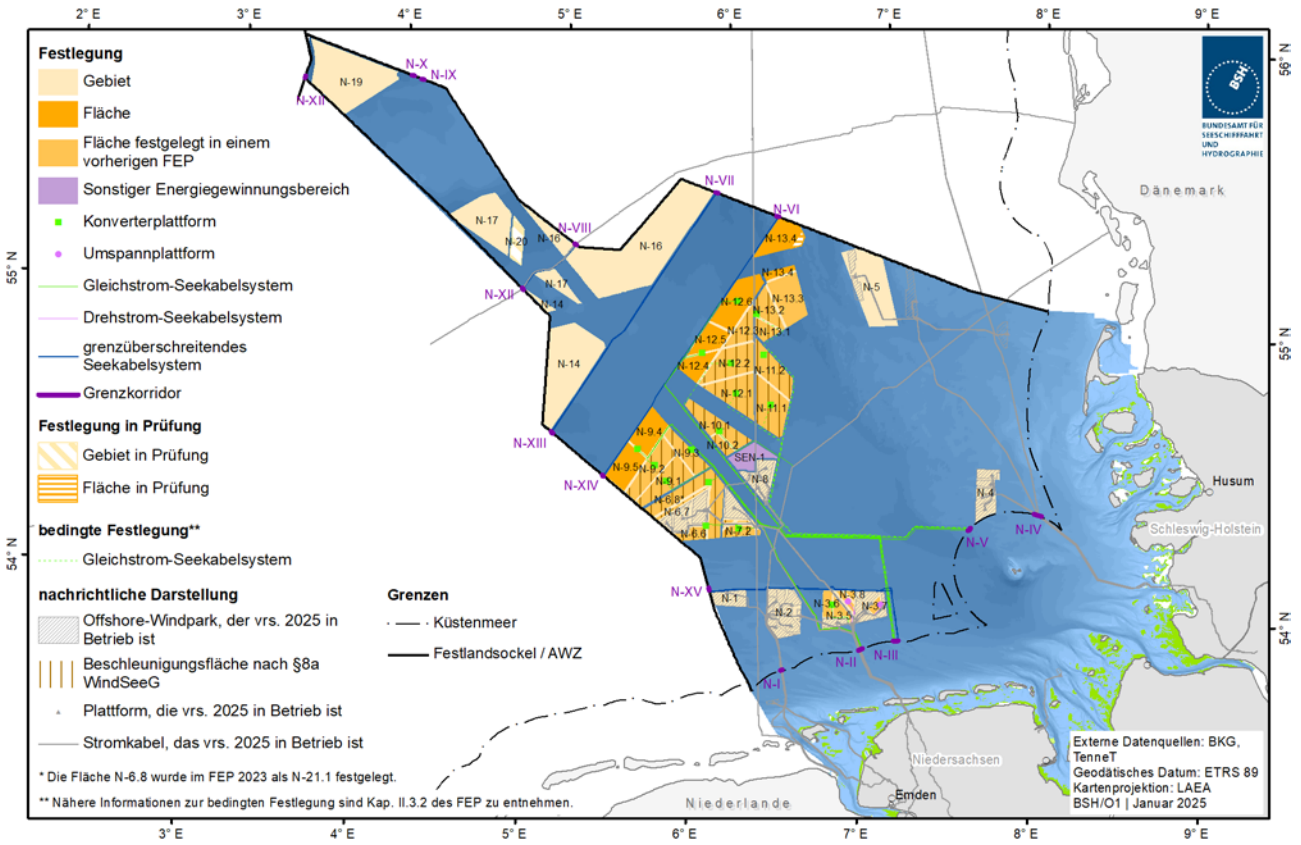



Figure 8: Designations for North Sea

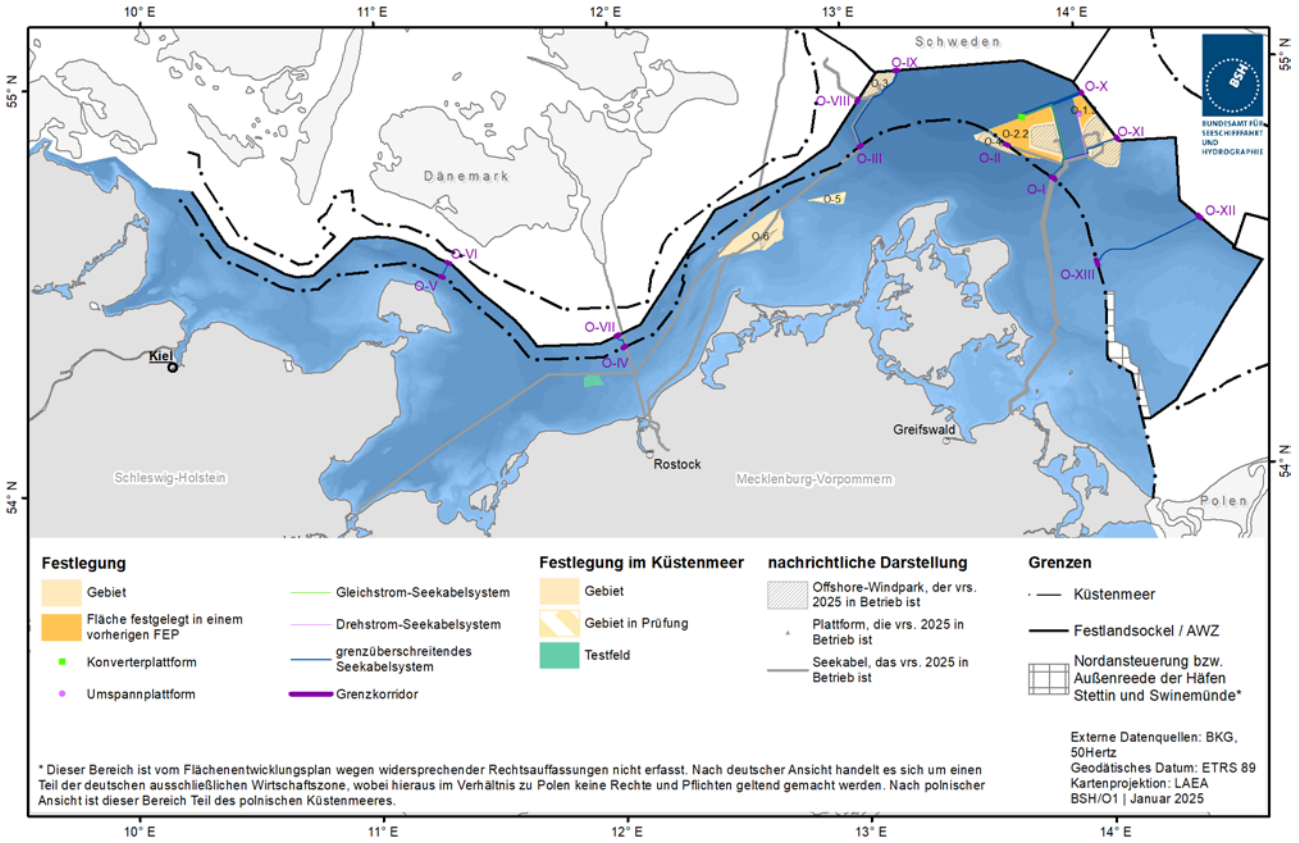



Figure 9: Designations for Baltic Sea

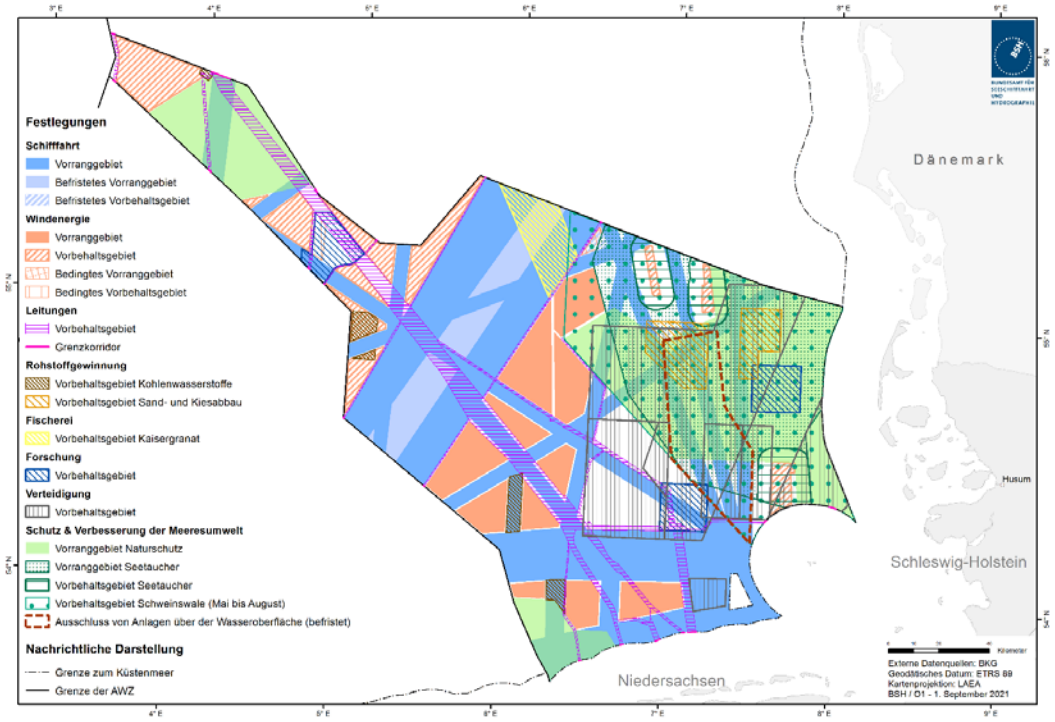



Figure 10: Maritime spatial plan for the German exclusive economic zone in the North Sea and the Baltic Sea – map section North Sea

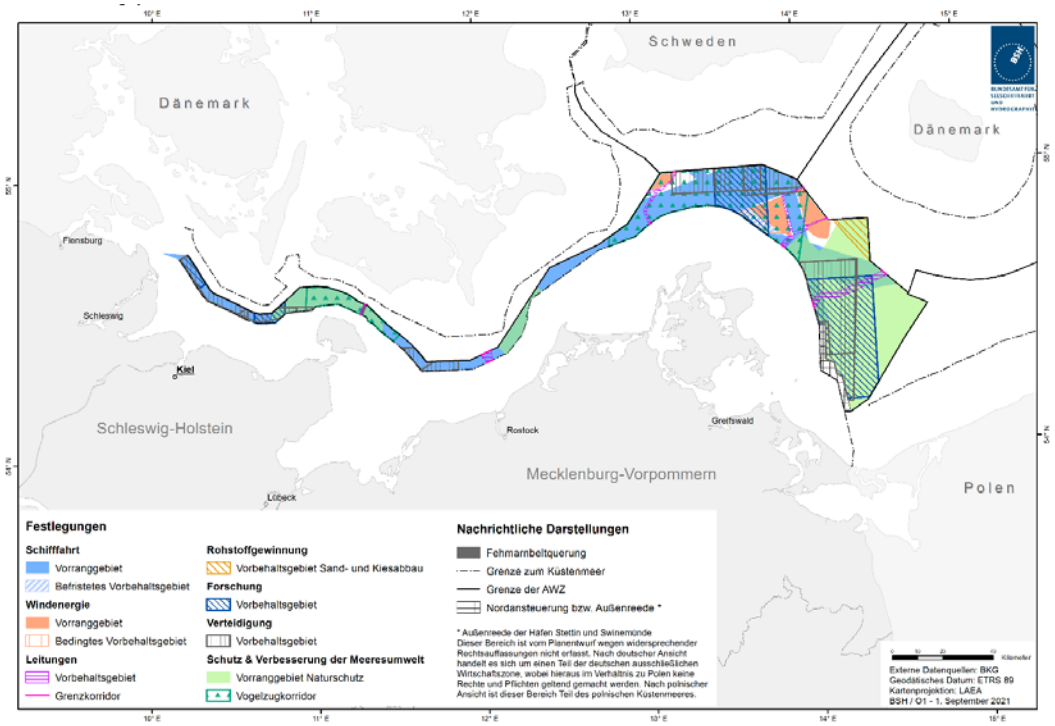



Figure 11: Maritime spatial plan for the German Exclusive Economic Zone in the North Sea and in the Baltic Sea – Baltic Sea map section

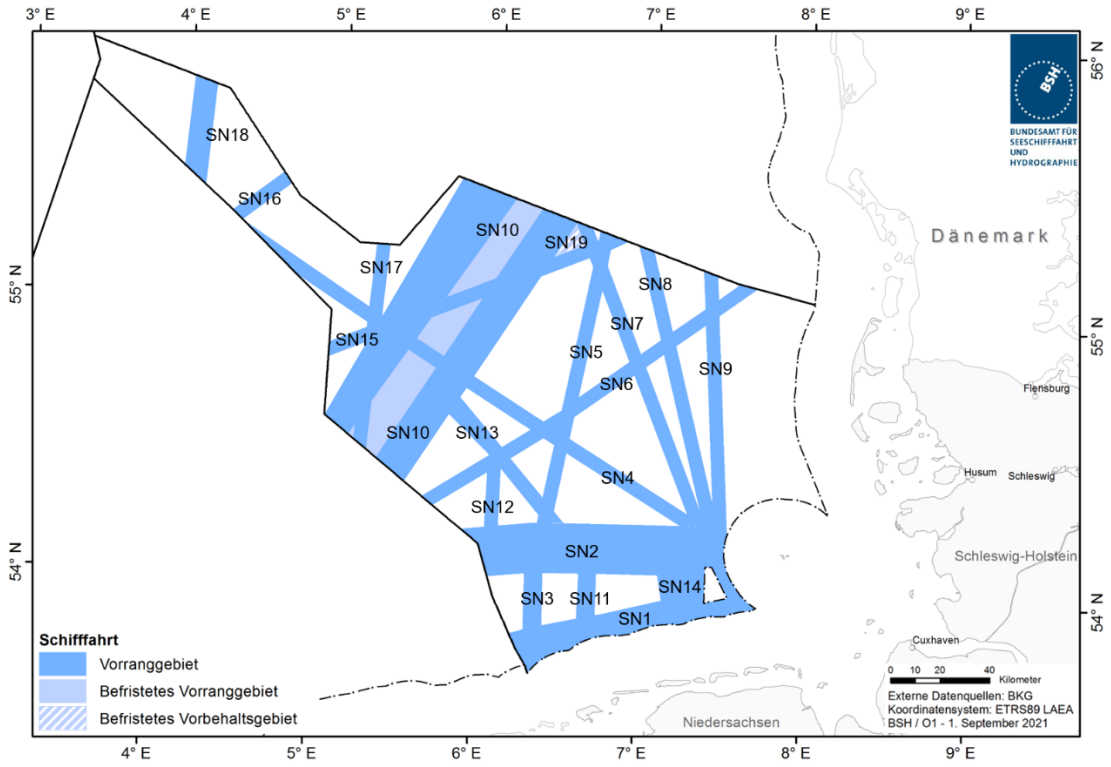



Figure 12: Maritime spatial plan for the German exclusive economic zone in the North Sea and the Baltic Sea – priority and reservation areas for shipping in the North Sea.

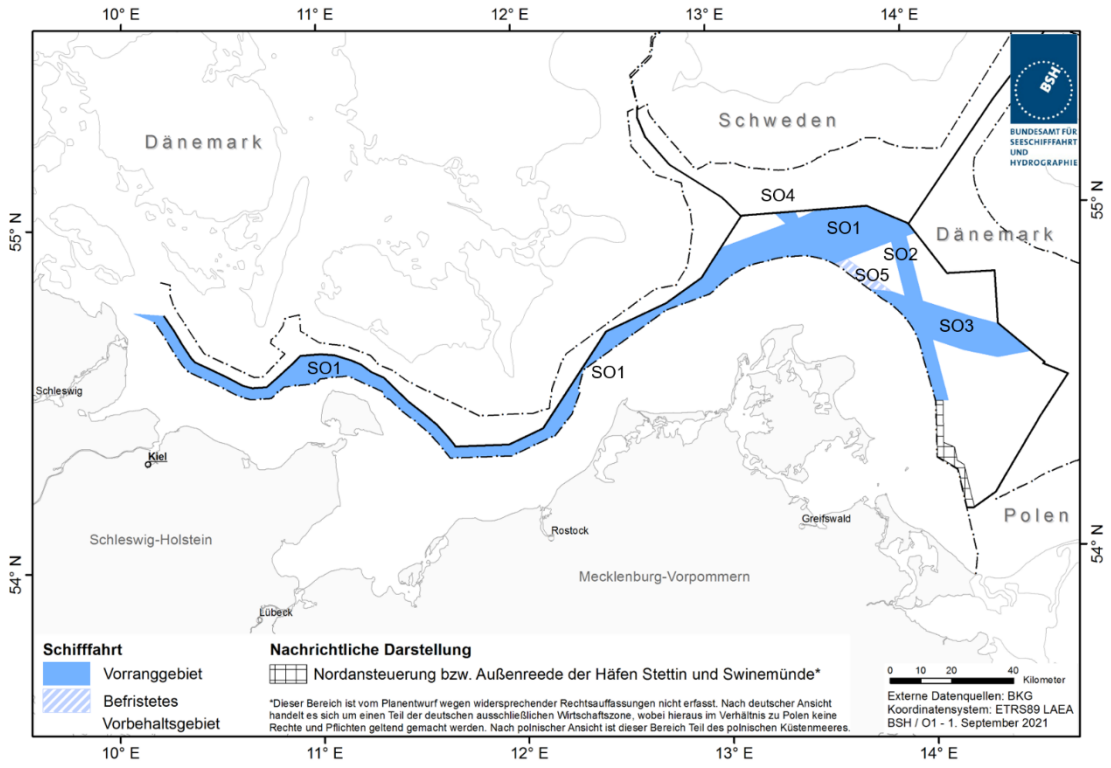



Figure 13: Maritime spatial plan for the German exclusive economic zone in the North Sea and the Baltic Sea – priority and reservation areas for shipping in the Baltic Sea

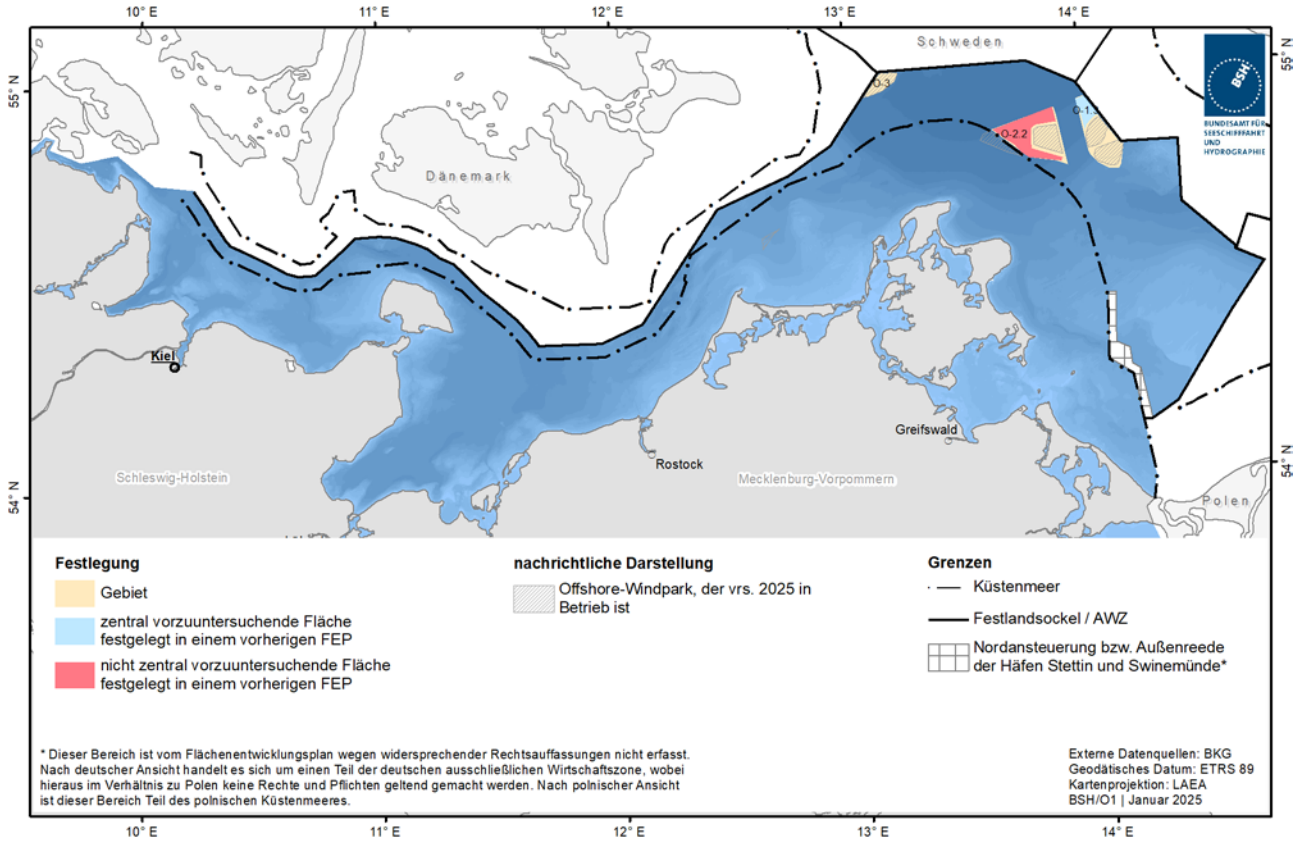



Figure 14: Differentiation of the designated areas with regard to the type of site investigation in the EEZ of the Baltic Sea (a corresponding figure for the North Sea is included in section 5)

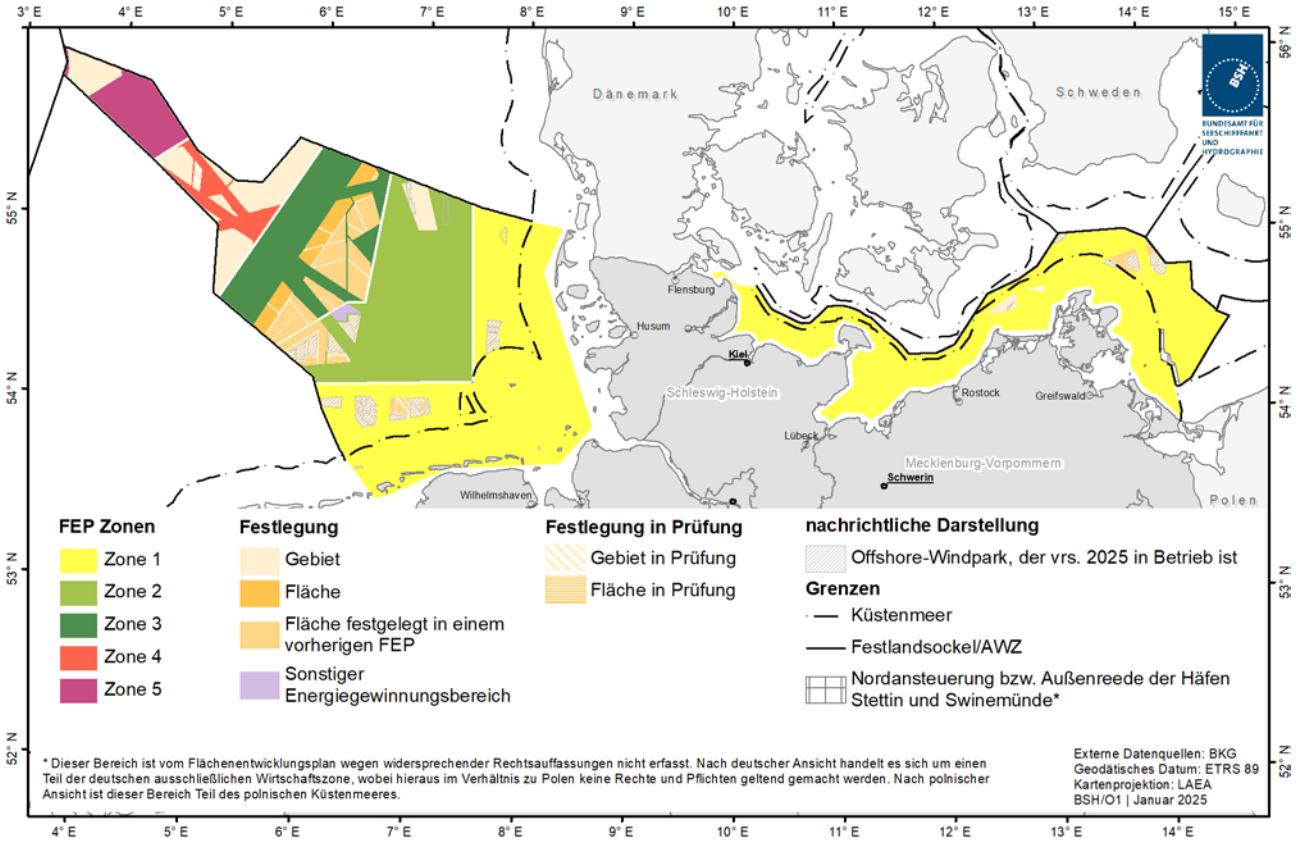



Figure 15: SDP zones (new layout)

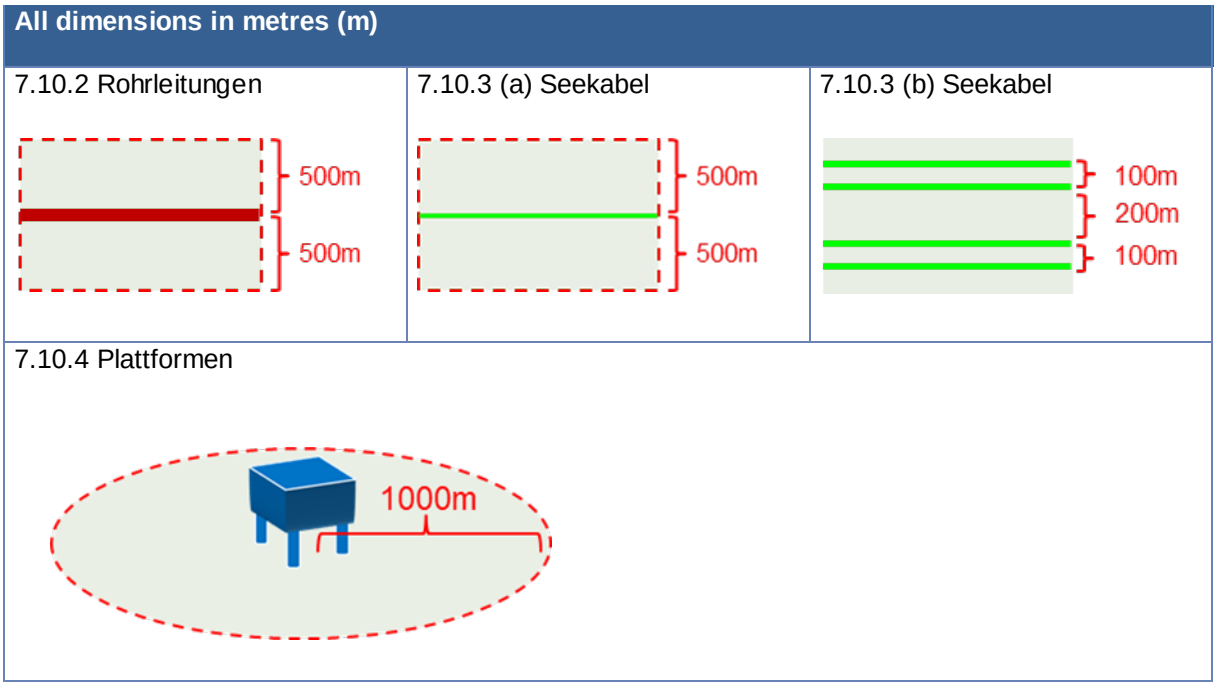
## 2 Overview table for Planning principle 7.10 Berücksichtigung aller bestehenden, genehmigten und festgelegten Nutzungen

Table 12: Overview table for Planning principle 7.10 Berücksichtigung aller bestehenden, genehmigten und festgelegten Nutzungen

| Use/installation | Distance to be maintained (m) | Explanation of distance | Requirement/reference | Planning principle |
|---|---|---|---|---|
| Pipeline | 500 | Both sides | Centre line of the pipeline | 7.10.2 |
| Subsea cables, third-party | 500 | Both sides | Centre line of the route | 7.10.3 |
| Subsea cables parallel | 100-200-100 | Alternating | Centre line of the route | 7.10.3 |
| Platform, converter | 1,000 | Radius | Centre of the location | 7.10.4 |
| WE to WT of neighbouring areas or areas for other energy generation | At least 5 x Ø rotor | Diameter | The larger rotor of the neighbouring WT is relevant; the distance refers to the centres of the neighbouring installation locations | 7.10.5 |
| WT to the centre line between sites and/or other energy generation areas | At least 2.5 x Ø rotor | Diameter | The rotor of the respective WT is relevant, the distance refers to the centre point of the installation location | 7.10.5 |

Table 13: Figures to explain the distances to be maintained.

Please refer to Planning principle 7.10 Berücksichtigung aller bestehenden, genehmigten und festgelegten Nutzungen.




# 3 Informational representation of a variant of future designations in Zones 4 and 5 of the EEZ of the North Sea

## 3.1 Introduction

The spatial definition scope contained in Chapter II deviates from the scope of the draft SDP of 7 June 2024. The reason for this deviation is the decision to initially make designations for sites and OGCS in the eastern part of Shipping route SN10 in Areas N-9, N-12, and N-13. In the upcoming update and revision procedure of the SDP, which will be initiated in 2025, an in-depth assessment will be carried out for the designation of sites and OGCS for Areas N-14, N-16, N-17, and N-19 as well as Area N-20 (under review) to the west of Shipping route SN10. The main reason for these in-depth assessments are suggestions made during the consultation on the draft SDP. The main objective of the ideas is to increase the efficiency of offshore network expansion and thus reduce costs and increase the full load hours on the designated sites. These suggestions have already been jointly investigated by the BSH and the FNA in terms of their principles and possible effects on the designations in the SDP. Nevertheless, there are a number of technical, planning, and legal issues that need to be further addressed, examined, and consulted on in the upcoming update and revision procedure.

The ideas are aimed primarily at reducing costs by saving OGCS and comprise three sub-aspects:

- First, an increase in the transmission capacity of OGCS to 2.2 GW,
- second, a reduction in power density on individual sites to limit wake effects, and
- third, a reduction in the grid connection capacity in relation to the wind farm output (peak capping).

The preliminary analysis concludes that implementation of the proposals offers potential for optimisation compared with the previous approach. This informational appendix to the SDP therefore presents current considerations regarding an implementation variant and addresses open questions. These are explicitly not

designations or planned designations. The objective of this approach is to make the principle direction of the considerations transparent even before the upcoming amendment and revision procedure. In addition, individual aspects can also be incorporated into the parallel process of the network development plan.

### 3.2 Background and motivation

Use of the OGCS

In the past, offshore wind farms were often assumed to have a high use of 4,000 full load hours per year and more. Evaluation of the real feed-in data from offshore wind farms in the German Bight show that in some cases the full load hours fall far short of these expectations and that some connection systems are fully utilised for only a few hours a year. This is due, in particular, to the increasing volume of curtailments because of redispatch measures.

In addition, the increasing expansion of offshore wind farms in the German EEZ is also leading to a reduction in the electricity yield because of wake effects between the wind farms. Modelling commissioned by the BSH shows that the average use would be reduced to around 3,200 full load hours per year with a complete expansion of 70 GW. Depending on the location of the wind farms and the density of development, the full load hours in some areas are as low as 2,500 h/a or less. The SDP currently designates a grid connection capacity for sites, each in the amount of the expected generation capacity.

Proposals for increasing the use of OGCS

This correspondingly low use of the OGCS is offset by relatively high investment costs, which increase with the distance of the wind farms from the coast and the length of the land route and are ultimately passed on to the electricity end customers via the offshore grid levy. Against this background, the TSO have developed proposals on how to increase the use of the OGCS and thus achieve cost savings and submitted them to the authorities. In essence, the following measures are proposed:

- Increase in technical transmission capacity from 2 GW to 2.2 GW
- Reduction of grid connection capacity in relation to wind farm output (peak capping)

Increase in technical transmission capacity

According to TenneT, an increase in technical transmission capacity from 2 GW to 2.2 GW is technically possible in principle by utilising flat-rate reserves to a greater extent than before. The model is the OGCS NOR-7-2 (BorWin6), for which the transmission capacity was increased from the original 900 MW to 980 MW.

The TSO are currently reviewing the options for increasing capacity for the converter platforms and the submarine cables in separate studies. It has not yet been possible to provide a clear answer to the question of the year from which such an increase in capacity would be possible. The TSO merely pointed out that the OGCS already commissioned with commissioning up to and including 2031 would not be eligible for the increase.

Based on a cost estimate provided by the manufacturer, the TSO point out that an additional cost of around EUR 200 million must be assumed for a capacity increase of 200 MW. A further concretisation of this cost estimate was requested but is not yet available.

An increase in OGCS transmission capacity is to be welcomed in principle. This could reduce the number of OGCS required and save or reduce both costs and space as well as the need to encroach in the marine environment. A correspondingly adapted planning of the sites to be connected from Zone 4 onwards would be necessary as part of the SDP. However, for such an adjustment, both the timing and the scope of the capacity increase must be reliably determined. Such a commitment cannot be made by the TSO at this time and is dependent on the aforementioned ongoing studies. For the informational

representations shown in this appendix, it is assumed that an increase in capacity to 2.2 GW can be realised for all OGCS built to the west of Shipping route SN10. If an increase in capacity cannot be realised or cannot be realised to the same extent, the plans would have to be adjusted accordingly in the upcoming update and revision procedure, and more OGCS would be required to achieve the expansion targets.

Reduction of grid connection capacity in relation to wind farm output (peak capping)

The second proposal of the TSO concerns the ratio of the installed capacity of the OWF to the transmission capacity of the OGCS as a percentage. This ratio has always been 100% in Germany. This means that every kilowatt hour potentially generated by an OWF can also be transported onshore. An exception to this is the already possible increase in installed OWF output above the allocated grid connection capacity (i.e. overplanning; see also Planning principle 7.11.1). However, the TSO are now proposing that the OWF output to be installed should always be greater than the OGCS capacity. In this case, generation peaks in strong wind phases would have to be reduced to the actual maximum or allocated grid connection capacity. At the same time, the increased number of turbines increases the use in the partial load range of both the OWF and the OGCS.

An adjusted connection ratio of OGCS capacity to OWF output has potential for optimisation. A comprehensive adjustment of the planning of sites and OGCS would also be necessary in this case compared with the presentation in the draft SDP of 7 June 2024. There is also the question of implementation within the current regulatory framework.

The BSH has investigated various scenarios for a combination of grid connection capacity and OWF output. The extent of the peak capping depends on the connection ratio, which is defined here as follows:

$$Connection\ ratio\ = \frac{OGCS\ nominal\ output}{OWF\ nominal\ output}$$

For example, with a nominal output of the OGCS of 2 GW and an OWF output of 2.4 GW, the connection ratio is 2 GW/2.4 GW × 100% = 83.33% (see above). The connection ratio is therefore a measure of the extent to which the capacity of the grid connection is reduced compared with the maximum possible output of the connected offshore wind farms. If the theoretically available output of the offshore wind farms exceeds the capacity of the grid connection, it must be temporarily curtailed to the allocated grid connection capacity.

The peak capping would thus open up additional degrees of freedom in the designation of the expected generation output to be installed in the individual areas and sites with a connection ratio that is variable to a certain extent because this is not fixed at a multiple of the standard grid connection capacity. In order to limit the shadowing effects of the wind farms and the amount of energy curtailed by peak capping, the following framework parameters were used as a basis for the following informational representation of the OWF output and grid connection capacity in the individual areas based on initial analyses:

- Grid connection ratio: at least 83% (e.g. no less than 2 GW connection for 2.4 GW output to be installed)
- Corrected power density of the wind farms: maximum 10 MW/km²

### 3.3 Areas and sites

The following representations are based on the areas defined in Section II.1. For Areas N-14, N-16, N-17, and N-19 as well as Area N-20 under review, possible sites are shown below for information. The sizes of the possible sites range between approx. 70 km² and approx. 160 km² (mean approx. 115 km²). According to the above, based on initial analyses, it is assumed that additional development of up to 20% is possible on

the sites (corresponding to a connection ratio of 83%). Furthermore, it is generally assumed that two sites are connected to an OGCS with a transmission capacity of 2.2 GW. The potential output on the sites is therefore 1.1 GW, assuming a 50/50 split, plus an additional 20% development, resulting in 1.32 GW. No additional development was assumed for the sites in Areas N-13 and N-17 as well as Area N-20 under review because of the high power density. The output on the sites shown in Abbildung 16 is currently assumed to be 1–1.6 GW. It is intended to further examine the actual sites sizes in the upcoming amendment and revision procedure of the SDP and to submit them for consultation.

For Sites N-13.3 and N-13.4, which have already been defined with 2 GW each but have not yet been chronologically ranked, no additional development is initially assumed.

In total, 21 additional sites with a potential output of approx. 26.5 GW could be realised in the areas west of Shipping route SN10 under the assumptions presented. If Sites N-13.3 and N-13.4 are added with 2.2 GW each according to the assumption of increased transmission capacity, this results in a potential output of approx. 30.9 GW.

The possible effects of the measures described in this Section on the expected energy yields and the resulting full load hours were investigated in two exemplary scenarios as part of the scientific monitoring of the SDP (Vollmer & Dörenkämper, 2025). The comparison of Scenarios S20 and S25 shows that if the output assumption for the areas west of Shipping route SN10 is reduced by 10% from 29.5 GW to 26.5 GW, the expected theoretical energy yield of the wind farms for these areas is reduced by 5% from 101 TWh/a to 96 TWh/a. The lower power densities can reduce shadowing losses, which leads to an increase in the average expected full load hours of the wind farms in these areas by around 5% from around 3,400 h/a to around 3,600 h/a (full load hours are based on the installed output of the wind farms without peak capping). By reducing the capacity of the OGCS compared with the connected wind farm output, as assumed in this implementation variant, the full load hours of the OGCS in these areas could be increased to around 3,700–4,400 h/a (on average around 3,900 h/a) (full load hours in each case in relation to the installed capacity of the OGCS). However, as a result of peak capping, around 7–10% of the potential wind energy yield in the selected areas (or around 6 TWh/a), could not be dissipated via the affected OGCS.

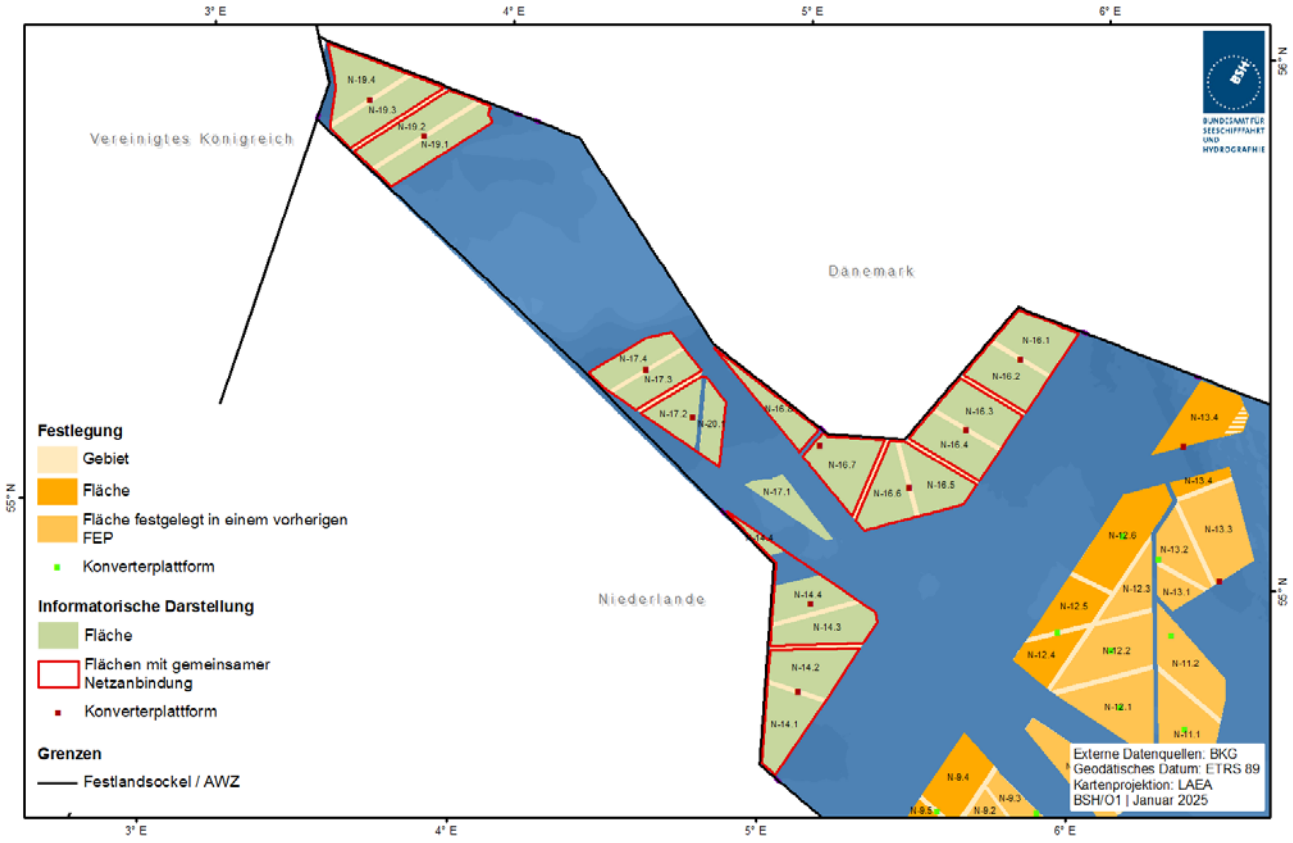



Figure 16: Informational representation of sites and converter platforms in the implementation variant described

### 3.4 Subsea cables and pipelines

In total, 10 OGCS would be required for the grid connection of the sites described and illustrated in Abbildung 16 according to the estimates of the BSH and assuming a transmission capacity of 2.2 GW each. In addition, two OGCS would be required for Sites N-13.3 and N-13.4 already designated so that in total 12 additional OGCS would be required for the grid connection of further sites in the EEZ of the North Sea. The possible OGCS converter locations are shown in Abbildung 16. The red outline also shows which sites could be connected together to a converter platform placed in the centre.

In the confirmation of GDP 2037/2045, OGCS NOR-9-5 and 16 other OGCS for the EEZ of the North Sea were confirmed with reservations (NOR-x-1 to NOR-x-16) in addition to the OGCS contained in the designation part of this plan. The basis for this confirmation of the GDP was the statutory expansion target of at least 70 GW by 2045 and the assumption of a total output of 76 GW required to achieve this target in the long term – even with deconstruction and subsequent use.

With the implementation variant presented here, the number of required OGCS would therefore be reduced by five compared with the confirmation of GDP 2037/2045, thereby resulting in a total transmission capacity of approx. 69 GW.

Cross connections between the converter platforms were provided for in the draft SDP of 7 June 2024. Because of the conceivable adjustments presented here, no such cross connections are currently shown. It is expected that the upcoming GDP process will examine which GCP and thus which OGCS should be most sensibly linked. The spatial designations for these cross

connections could then be made in the upcoming amendment and revision procedure of the SDP.

### 3.5 Tenders and commissioning

In order to assess which of the sites shown in Abbildung 16 could be put out to tender or go into operation in which year, it is first necessary to categorise them with regard to the implementation of a central site investigation. Such a classification has not yet been carried out at the level of this informational representation but would have to be carried out in more detail in the upcoming update and revision procedure of the SDP. The current legal regulation in Section 2a para. 1 Nos 2 and 3 WindSeeG stipulates the annual tender volumes. Accordingly, an annual volume of 4,000 MW is to be provided for from 2027 onwards. Taking this as a basis, it can be assumed that approx. 48 GW could be in operation in 2035 and approx. 68 GW in 2040. Based on the current implementation variant, it is also not yet possible to clearly determine the chronological sequence of the required OGCS. However, it is expected that if this variant is implemented, one to two OGCS with a transmission capacity of 2.2 GW would have to go into operation per year in order to achieve the expansion figures mentioned or the legal requirements. In spatial terms, it is currently assumed that, with the exception of Area N-13, development of the areas will continue to take place depending on the distance from the coast. Accordingly, Areas N-14 and N-16 will be developed before Areas N-17 and N-20 (under review) and finally Area N-19. Sites N-13.3 and N-13.4 are not to be developed until after Area N-19.

### 3.6 Current estimate of the effects on the overall expansion

According to Section 1 para. 2 WindSeeG, at least 70 GW of offshore wind energy should be installed by 2045. Without having already embarked on an in-depth assessment of the effects of deconstruction and subsequent use on this objective, it can be expected that significant deconstruction will begin from the early 2040s. The OWF that are then dismantled must be “compensated” in order to achieve and maintain the statutory expansion target in the long term. The actual scope of this additional output, which exceeds 70 GW, is not yet known and depends largely on the operating time of an OWF and an OGCS but also on the periods for decommissioning and, if necessary, new construction. To date, the BSH assumes that sites that enable a total output to be installed of approx. 78 GW must be available (cf. Section II.1).

It is expected that a total output of 11 GW will be installed by the end of 2025. With the designations of SDP 2023 (excluding Site N-13.3 because of the lack of chronological order), totalling 24.7 GW, and the Gennaker OWF in the territorial sea of Mecklenburg-Western Pomerania, expected for 2028 with 0.9 GW, a total installed output of 36.6 GW can be expected by the early 2030s. In this update and revision procedure, additional sites with an expected generation output of 6 GW are designated and prioritised so that this results in an expected total output of approx. 42.6 GW for 2034 (see also Tabelle 14). In a future revision, further sites could be designated for commissioning in 2034 and later.

With the conceivable sites shown in Section 3.3 of this annex, an additional total of approx. 30.9 GW could be achieved, thereby resulting in a total output of 73.5 GW. The grid connection capacity for this total installed output would amount to 69 GW according to the explanations in Section 3.4 of this appendix and would therefore be 4.5 GW or 6.1% below the total wind energy output.

The theoretical target of 78 GW mentioned above could therefore not be achieved with the proposed boundary conditions and the sites shown on the map. However, this does not take into consideration further potential that could contribute to achieving this. On one hand, this is

a net addition after deconstruction and subsequent use in areas where OWF are already in operation. For example, it is expected that the subsequent use of Area N-5 could result in a net addition of around 3 GW. In addition, the development of the “Dogger Bank” nature conservation area with WT according to the provisions of ROP 2021 is being examined by the responsible federal ministries. According to ROP 2021, Dogger Bank could provide an additional potential of 4–6 GW. In addition, the TSO regularly point out further potential in the territorial sea of Mecklenburg-Western Pomerania.

The investigations carried out as part of the accompanying scientific report for the North Sea result in an expected energy yield of 226 TWh/a (Scenario 25, including SEN-1) (Vollmer & Dörenkämper, 2025)for the wind farms, and an additional 13 TWh/a for the Baltic Sea (Dörenkämper et al., 2023). Assuming an output to be installed of 0.9 GW for the Gennaker OWF and assuming full load hours of approx. 3,300 h/a, a further 3 TWh/a are added.

In total, this would result in a theoretical total energy yield of approx. 242 TWh/a for this scenario for the development of offshore wind energy. Assuming that on average around 10% of the sites (cf. Section II.1) cannot be fed into the grid because of deconstruction and new construction , this results in an expected total annual energy yield of 218 TWh/a. Because of peak capping of around 6 TWh/a and other yield-reducing effects such as downtimes for repair and maintenance, electrical transmission losses, and grid congestion-related curtailments because the model assumes full availability and does not take any further losses into account, a further reduction in the energy yield available on land is to be expected.

A current further development of the modelling approach leads to a higher yield estimate compared with the model used to date. This was investigated as an example for scenario 25 as part of the accompanying scientific report with the result of a 5.8% increase in the calculated total energy yield (Vollmer & Dörenkämper, 2025). For better comparability, the above results are based on the modelling approach used to date.

### 3.7 Summary and central questions

The implementation variant described in the previous chapters is one of many conceivable options. The basis for the considerations is the objective of increasing both the efficiency of the OGCS and the full load hours of the OWF and to be able to save costs overall by reducing the number and increasing the use of the OGCS. Compared with previous designations in the SDP, the implementation variant is accompanied by a fundamental departure from the logic of the 1:1 ratio of OGCS transmission capacity to the installed output of an OWF. Overall, the following results can be summarised for the implementation variant presented:

- The calculated total output of the OWF shown is approx. 73.5 GW (of which approx. 69 GW is in the North Sea). The transmission output of the OGCS deviates from this and totals approx. 69 GW (of which approx. 65 GW is in the North Sea).
- Compared with the confirmation of GDP 2037/2045, five OGCS could be saved by 2045. On the one hand, taking into consideration a 30-year service life, this could save costs in the double-digit billion range. In addition, the use pressure on route corridors in the territorial sea could be reduced, although further routes still need to be identified to achieve the statutory expansion targets.
- Assuming full availability and without taking further losses into consideration, a theoretical total energy yield of 242 TWh/a for offshore wind energy can be derived from the investigations carried out as part of the accompanying scientific report. Assuming that on average around 10% of the sites cannot

be fed into the grid because of deconstruction and new construction (cf. Section II.1), this results in an expected total annual energy yield of 218 TWh/a.

- Peak capping would mean that around 6 TWh/a of the theoretical energy yield of the wind farms in the North Sea could not be dissipated via the grid connection. Temporary unavailability because of repair or maintenance measures and other yield-reducing effects (e.g. electrical transmission losses or grid congestion-related curtailments) are likely to result in an additional reduction in the energy yield available on shore.
- This results in theoretical average full load hours of around 3,200 h/a for the wind farms in the North Sea and around 3,300 h/a for the wind farms in the Baltic Sea. For the areas west of the SN10 considered in informational representation, considerably higher full-load hours of around 3,600 h/a on average can be assumed. If the amount of energy reduced by peak capping is related to the total OGCS capacity, the average full load hours for the North Sea are around 3,300 h/a. For the areas west of SN10, the full load hours of the OGCS averaged around 3,900 h/a.

Core elements of the implementation variant presented are based on assumptions that need to be examined, consulted, and assessed in depth. The key open questions can be summarised as follows:

- Is it technically possible and sensible to increase the standard transmission output of OGCS from 2.0 GW to 2.2 GW? If so, from what point in time can the switch to 2.2 GW be made?
    - With regard to the GDP and SDP planning instruments, a decision on the switch to 2.2 GW is required in summer 2025, in particular in order to adequately reflect the effects in the GDP.
- How can a reorganisation of the GCP and the cross connections between OGCS based on this look?
    - A sensible and balanced distribution of the OGCS among the TSO should be sought.

How do those involved in the SDP process rate the principles of the approach and the conceivable versions of the implementation variant presented? How is the presented approach of peak capping assessed in principle?

## 4 Overview table

Table 14: Overview table for designations for sites and OGCS

| Commissioning calendar year | Designation Site | Tender calendar year | Calendar year/quarter Commissioning | Expected to be installed Output [MW] | Commissioning per calendar year [MW] | Designation of OGCS | Calendar year/quarter Commissioning | Transmission capacity [MW] | Gate to the territorial sea |
|---|---|---|---|---|---|---|---|---|---|
| 2026 | N-3.7 | 2021 | 2026 (QIII) | 225 | 958 | NOR-3-3 | n/a | 900 | N-II |
| | N-3.8 | 2021 | 2026 (QIII) | 433 | | | | | |
| | O-1.3 | 2021 | 2026 (QIII) | 300 | | OST-1-4 | 2026 (QIII) | 300 | O-I |
| 2027 | N-7.2 | 2022 | 2027 (QIV) | 980 | 980 | NOR-7-2 | 2027 (QIV) | 980 | N-V |
| 2028 | N-3.5 | 2023 | 2028 (QIII) | 420 | 1,800 | NOR-3-2 | 2028 (QIII) | 900 | N-II |
| | N-3.6 | 2023 | 2028 (QIII) | 480 | | | | | |
| | N-6.6 | 2023 | 2028 (QIV) | 630 | | NOR-6-3 | 2028 (QIV) | 900 | N-II |
| | N-6.7 | 2023 | 2028 (QIV) | 270 | | | | | |
| 2029 | N-9.3 | 2024 | 2029 (QIV) | 1,500 | 1,500 | NOR-9-3[d)] | 2029 (QIV) | 2,000 | N-III |
| 2030 | N-10.2[d)] | 2025 | 2030 (QIII) | 500 | 6,500 | | | | |
| | N-9.1 | 2024 | 2030 (QIII)[a)] | 2,000 | | NOR-9-1 | 2030 (QIII)[a)] | 2,000 | N-III |
| | N-12.1 | 2023[b)] | 2030 (QIII) | 2,000 | | NOR-12-1 | 2030 (QIII) | 2,000 | N-III |
| | N-12.2 | 2023[b)] | 2030 (QIV) | 2,000 | | NOR-12-2 | 2030 (QIV) | 2,000 | N-V |
| 2031 | N-9.2 | 2024 | 2031 (QIV)[a)] | 2,000 | 9,000 | NOR-9-2 | 2031 (QIV)[a)] | 2,000 | N-III |
| | O-2.2 | 2023[b)] | 2031 (QII)[a)] | 1,000 | | OST-2-4[c)] | 2031 (QII)[a)] | 2,000 | O-I |
| | N-10.1 | 2025 | 2031 (QIII)[a)] | 2,000 | | NOR-10-1[c)] | 2031 (QIII)[a)] | 2,000 | N-II |
| | N-11.2 | 2024[b)] | 2031 (QIV)[a)] | 1,500 | | NOR-11-2 | 2031 (QIV)[a)] | 2,000 | N-III |
| | N-13.1[b)] | 2026 | 2031 (QIV)[a)] | 500 | | | | | |
| | N-12.3 | 2024[b)] | 2031 (QIII) | 1,000 | | NOR-13-1 | 2031 (QIII) | 2,000 | N-III |
| | N-13.2 | 2026 | 2031 (QIII) | 1,000 | | | | | |
| 2032 | N-11.1 | 2023[b)] | 2032 (QIV)[a)] | 2,000 | 5,000 | NOR-11-1 | 2032 (QIV)[a)] | 2,000 | N-V |
| | N-6.8 | 2027 | 2032 (QIII) | 2,000 | | NOR-6-4 | 2032 (QIII) | 2,000 | N-II |
| | N-9.4[e)] | 2025[b)] | 2032 (QIII) | 1,000 | | NOR-9-4[d)] | 2032 (QIII) | 2,000 | N-III |
| 2033 | N-12.4 | 2026[b)] | 2033 (QIII) | 1,000 | 3,000 | NOR-12-3 | 2033 (QIII) | 2,000 | N-V |
| | N-12.5 | 2026[b)] | 2033 (QIII) | 1,000 | | | | | |
| | N-9.5[d,e)] | 2028 | 2033 (QIII) | 1,000 | | NOR-9-4[d)] | 2032 (QIII) | 2,000 | N-III |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2034 | N-12.6 | 2029 | 2034 (QIII) | 2,000 | 2,000 | NOR-12-4 | 2034 (QIII) | 2,000 | N-V |
| Total designations of SDP[f] | | | | 6,000 | | | | | |
| Total SDP 2023[f] | | | | 24,738 | | | | | |
| Projected park population 2025 | | | | 11.000[g] | | | | | |
| Gennaker OWF (territorial sea of Mecklenburg–Western Pomerania) | | | | 900 | | | | | |
| Total | | | | 42,638 | | | | | |

Colour coding: Designation in a previous SDP | Designation in a previous SDP with changes | New designation

[a] Update to SDP 2023 because of an expected completion date of the OGCS announced by the responsible TSO in deviation from the designation of SDP 2023 in accordance with Section 17d para. 2 sentence 3 EnWG.
[b] These tenders are issued as invitations to tender for non-centrally pre-investigated sites. The period between tender and commissioning is extended accordingly.
[c] Spatial change.
[d] The responsible TSO should announce a separate, site-specific expected completion date for sites for which the SDP designates a commissioning year that is after the year of commissioning of the associated OGCS. This site-specific expected completion date is intended to take into consideration the later date of commissioning of the site compared with the commissioning of the OGCS and should generally be in the quarter and year that the SDP designates for the commissioning of the WT on the respective site.
[e] For Sites N-9.4 and N-9.5, the actual capacity to be installed should exceed the allocated grid connection capacity by 20% (see SectionII.7.11.1).
[f] The designated Sites N-13.3 and N-13.4 were not included in this total because no time frame is designated for them.
[g] The expected population in 2025 (rounded) was adjusted compared to the assumption in SDP 2023 because of the additional capacity allocations made (Section 14a WindSeeG).