

# 1 Non-technical summary

## Benthos

The species inventory of the Baltic Sea EEZ is to be considered average, with about 250 species of macro-zoobenthos. The benthic communities are also typical of the Baltic Sea EEZ and for the most part have no special features. According to the currently available studies, the macro-zoobenthos of the Baltic Sea EEZ is also considered average due to the proven number of Red List species. Studies of macro-zoobenthos within the framework of the approval procedures for offshore wind farms and grid connections from 2002 to 2015 have confirmed this assessment. The species inventory previously found and the number of Red List species indicate that the study area for benthic organisms is of average importance.

The deep foundation work for wind turbines and platforms will result in small-scale and short-term disturbances of the seabed, sediment turbulence and formation of turbidity plumes. The re-suspension of sediment and subsequent sedimentation may lead to impairment or damage to the benthos in the immediate vicinity of the foundations for the duration of the construction activities. However, these impairments are expected only to be small-scale and short-term. Local land sealing and the introduction of hard substrates in the immediate vicinity of the structure as a result of construction work may lead to changes in the species composition. As the colonisation of artificial hard substrates is associated with an accumulation of organic material, the biological degradation process may lead to local oxygen deficiency.

Due to the laying of the subsea cable systems, only small-scale disturbances of the benthos due to sediment turbulence and turbidity plumes are to be expected in the area of the cable route. Possible effects on the benthos are dependent on the installation methods used and the geological and hydrographic conditions. With comparatively unobtrusive laying using the injection method, only minor disturbances of the benthos in the vicinity of the cable route are to be expected. Local sediment shifts and turbidity plumes are to be expected while the subsea cable systems are being laid. In more cohesive substrates, the cable systems are laid in trenches or laid using a heavy plough. These procedures are also associated with disturbance of the sediment and benthic fauna, as well as sediment turbulence.

In areas with a lower proportion of fine matter, most of the sediment released will settle relatively quickly in the immediate vicinity of the cable route. In areas with soft sediments and correspondingly high proportions of fine matter, currents close to the bed are relatively low, so only temporary, local effects can be expected for these areas too. In the short term, pollutants and nutrients may be released from the sediment into the bottom water. The possible release of pollutants from the sandy sediment is negligible. There may be a significant release of pollutants from the sediment into the bottom water in the vicinity of silty and clay-like seabeds. These pollutants usually adhere to sinking particles which, due to the low currents in the Baltic Sea basins, scarcely drift over long distances and remain in their usual environment. In the medium term, this remobilised material will be redeposited in the silty basins.

Benthic habitats will be directly built over in the vicinity of rockfills required for cable crossings, or if laying cable sections on the seabed becomes necessary at a local level. The resulting loss of habitat is permanent, but small in scale. This will result in a non-native hard substrate that may cause small-scale changes to the species composition.

Warming of the upper sediment layer of the seabed may occur directly above the cable system due to operation, and this may lead to impairments of benthic communities. With the planning principle for sediment warming, the Site Development Plan specifies that the 2K criterion must be adhered to. According to the assessment by the Federal Agency for Nature Conservation, this precautionary value ensures, with sufficient probability, that significant negative effects of cable warming on the marine environment will be prevented.

As things stand at present, the planned transformer and collector platforms and subsea cable routes are not expected to have any significant effects on the factor Benthos if the 2K criterion is met. Only very small areas outside protected areas will be used. Rapid re-population is very likely due to the usually rapid regeneration capability of populations of benthic organisms with short generation cycles and their widespread distribution in the German Baltic Sea.

### **Biotopes**

Wind turbines, platforms and subsea cable systems may possibly affect the factor Biotopes due to direct use of protected biotopes, possible covering by sedimentation of material released during construction and potential habitat changes. Direct use of nature conservation areas is essentially not permitted for wind turbines and platforms. According to the planning principles of the Site Development Plan, known occurrences of protected biotopes are to be bypassed as far as possible in accordance with section 30 of the Federal Nature Conservation Act or treated as particularly important within the framework of the specific approval procedure. In addition, the planned routes bypass the currently known occurrence of reef sites and suspected contaminated reef sites.

Given the predominant sediment composition in areas in which protected biotopes can be expected to occur, impairments due to coverage are likely to be small-scale as the released sediment will settle quickly. Given the predominant low currents close to the seabed, turbidity plumes can only be expected in areas with soft sediments up to a distance of approx. 500 m which clearly exceed natural suspended matter maxima. The released material remains in the water column for long enough to be distributed over a large area, so barely detectable thicknesses of the deposited material are to be expected due to the comparatively small volumes. Simulations show that the sediment released will have resettled after a maximum of 12 hours. Thus, according to the current state of knowledge, the impairments will generally remain small-scale and temporary.

Permanent habitat changes are limited to the immediate area of the foundations and rockfills required for cable crossings and when laying cables on the seabed. These rockfills will permanently provide a hard, non-native substrate. This will offer a new habitat for benthic organisms and may lead to a change in the species composition. Significant effects on the factor Biotopes due to these small-scale regions are not to be expected. Moreover, the risk of negative impact on the benthic sediment community due to species atypical for the area is low, as recruitment of the species is very likely to take place from the natural hard substrate habitats.

### **Fish**

According to previous knowledge, fish communities typical for the habitat occur in the German EEZ. The pelagic fish community, represented by herring, sprat, salmon and sea trout, has been identified; as has the demersal fish community, consisting of large fish species such as cod, plaice, flounder and dab. The fish fauna is of average importance with regard to its specific characteristics on account of the fish communities typical for the habitat.

In the eastern part of the EEZ, a total of 45 fish species have been identified in various studies, including six Red List species. According to current knowledge, the planned locations are not a preferred habitat for any of the protected fish species. Consequently, fish stocks in the planning area are of no overriding ecological importance compared to adjacent marine areas. According to the current state of knowledge, the planned construction of wind farms and the associated converter platforms and subsea cable routes is not expected to significantly effect the factor Fish. The effects of the construction of wind farms, converter platforms and subsea cable systems on fish fauna are limited both spatially and temporally. Sediment turbulence and the formation of turbidity plumes during the construction phase for the foundations and converter platforms and the laying of the subsea cable systems may lead to small-scale and temporary impairments of fish fauna. The turbidity of the water is expected to decrease rapidly due to the prevailing sediment and flow conditions. Thus, according to the current state of knowledge, the impairments will remain small-scale and temporary. Overall, small-scale impairments can be assumed for adult fish. Moreover, the fish fauna is adapted to the natural sediment turbulence caused by storms that are typical here. During the construction phase, fish may also be temporarily scared away by noise and vibrations. Noises from the construction phase are to be reduced by means of suitable measures. Further local effects on fish fauna may be due to the additional hard substrates introduced owing to a possible change in the benthos. Likewise, sediment warming and the magnetic fields that could emanate from subsea cables are not expected to have any permanent effects on the mobile fish fauna.

### **Seabirds and resting birds**

The individual areas for offshore wind energy in the Baltic Sea EEZ are of differing significance for seabirds and resting birds. Overall, area O-1 is expected to be of medium importance for seabirds. The area borders on the extensive resting habitats of the Pomeranian Bight and the Adlergrund to the south and south-east. Overall, the area has a medium seabird population and a medium incidence of endangered species and species that are particularly worthy of protection. According to current knowledge, areas O-2 and O-3 are of low importance as feeding and resting habitats for seabirds. Both areas have a low incidence of endangered species and species that are particularly worthy of protection. These are not among the main resting, feeding and wintering habitats of species included in Annex I of the Birds Directive. All three areas are of low importance as feeding grounds for diving sea ducks due to the depth of the water and the seabed composition. Just like divers, these birds predominantly use the areas for transit purposes. The areas are of no particular importance as feeding grounds for breeding birds due to the distance from the breeding colonies on the coast.

In the first instance, disturbances for seabirds and resting birds during the construction phase will be caused by light emissions and visual upheaval. These may cause varying degrees of deterrence and barrier effects, depending on the species. Direct disturbances during the construction phase are only to be expected locally and for a limited time. Significant effects can be excluded with a high degree of certainty due to the high mobility of birds. During the temporary construction phase, neither the construction of the planned wind turbines and platforms nor the laying of the planned subsea cable systems are expected to have any significant effects on seabirds and resting birds, according to current knowledge. Any deterrence caused by construction will be local and not exceed the disturbances generally associated with slow ship movements.

For certain bird species, wind farms and platforms will cause permanent but – according to current knowledge, insignificant – disturbances and deterrence. A possible collision risk for species at risk of collision can be excluded with the required certainty by means of species-specific behaviour and possible system configurations. The exclusionary effect of wind farms and platforms at Natura 2000 sites means that habitat losses in important habitats are reduced.

As a result, substantial effects caused by the construction or installation of platforms, wind turbines and subsea cable systems, and by their operation, on the factor Seabirds and resting birds, can be excluded with the necessary certainty.

### **Bats**

Migration movements of bats across the Baltic Sea are documented to varying extents, but to date no specific information is available on migratory species, migration corridors, migration heights and migration concentrations. The only information to date confirms that bats, especially species that travel long distances, fly over the Baltic Sea. On the basis of previous observations, it is assumed that bats tend to migrate across the sea in concentrations (swarms), probably at considerable altitudes and on migratory routes that are used regularly.

There may be hazards for bats during the operating phase of wind turbines and platforms. The sensitivity of bats to onshore structures and the associated risk of collisions is well known, as is the risk of collisions with wind turbines. Furthermore, possible barrier effects as well as habitat or attraction effects are known on land. However, the effects of offshore structures are largely unknown.

A cumulative assessment of the hazard risk is currently not possible due to the lack of reliable data sources.

### **Air quality**

The construction and operation of the platforms and the laying of subsea cable systems as part of the implementation of the Site Development Plan will have no measurable impact on air quality.

### **Biodiversity**

Biodiversity involves the diversity of habitats and communities, the diversity of species and the genetic diversity within species (Art. 2 of the Convention on Biological Diversity, 1992). Public attention is focused on biodiversity.

With regard to the current state of biodiversity in the Baltic Sea, there is a wealth of evidence of changes in biodiversity and species patterns in all systematic and trophic levels of the Baltic Sea. These are mainly due to human activities, such as fishing and marine pollution, or to climate change. In this regard, Red Lists of endangered animal and plant species have an important control and warning function as they indicate the state of populations of species and biotopes in a region. Possible effects on biodiversity are discussed in connection with the individual factors in the environmental report. In summary, it can be stated that according to current knowledge, the planned expansion of offshore wind energy and the accompanying grid expansion are not expected to have any significant effects on biodiversity.

### **Interrelationships**

In general, effects on a factor lead to various consequences and interrelationships between the factors. The essential interdependence of the biotic factors results from the food chains. Possible interactions during the construction phase will result from sediment shifts and

turbidity plumes, as well as noise emissions. However, these interrelationships will occur only very briefly and be limited to a few days or weeks.

Construction-related interrelationships, e.g. due to introduction of hard substrate, will indeed be permanent but are only to be expected locally. This could lead to a small-scale change in the food supply. Furthermore, the areas and sites included in the Site Development Plan are not regarded as feeding grounds of particular importance for factors of the higher food web stage.

Interrelationships can only be described very imprecisely due to the variability of the habitat. In principle, it can be stated that according to the current state of knowledge, no interrelationships are discernible that could endanger the marine environment.

## **Cumulative effects**

### **Soil, benthos and biotopes**

A significant proportion of environmental effects on soil, benthos and biotopes due to the areas and sites, platforms and subsea cable systems will occur solely during the construction period (formation of turbidity plumes, sediment shifts, etc.) and over a limited area. Cumulative environmental effects due to construction are unlikely, particularly due to the step-by-step implementation of the construction projects.

Possible cumulative effects on the seabed, which could also have a direct impact on the factor Benthos and specially protected biotopes, result from permanent direct area use due to the foundations of the wind turbines and platforms, as well as from the installed cable systems. The individual effects are essentially small-scale and local.

In order to estimate the direct area use, a rough calculation is made on the basis of the areas/sites, platforms and subsea cable systems planned in the Site Development Plan in conjunction with existing installations and planning within the framework of the transitional system. The calculated area use is based on ecological aspects; in other words, the calculation is based on the direct ecological loss of function or the possible structural change of the site due to the installation of foundations and cable systems. In the area of the cable trench, however, the impairment of the sediment and benthic organisms will essentially be temporary. Permanent impairment could be assumed when crossing particularly sensitive biotopes such as reefs.

On the basis of a model assumption, the planning of the Site Development Plan and the transitional system, and the actual inventory of wind turbines, subsea cables, rockfills and platforms, mean that a total site of approx. 90 ha will be taken up or, in the case of subsea cables, will be temporarily impaired. This corresponds to well below 0.2‰ of the total EEZ site. In comparison, about 55% of the Baltic Sea EEZs are protected. As construction of wind turbines and platforms is generally not permitted in nature conservation areas, use of the protected areas is limited to subsea cable routes. No statement can be made on the use of specially protected biotopes according to section 30 of the Federal Nature Conservation Act due to the current absence of a sound scientific basis. Area-wide sediment and biotope mapping of the EEZ currently being carried out will lead to more reliable information in the future.

Besides the direct use of the seabed and hence the habitat of the organisms living there, the foundations and intersections will lead to an additional supply of hard substrate. The benthic fauna adapted to soft substrates will also lose habitat on account of the hard substrate. However, as the area use for both the grid connection systems and the wind farms

will be in the ‰ (per-mille) range, according to current knowledge no significant impairments are to be expected in the cumulation that would endanger the marine environment with regard to the seabed and the benthos.

### **Seabirds**

Vertical structures such as platforms or offshore wind turbines may have different effects on resting birds, such as habitat loss, an increase in the risk of collision, or deterrence and barrier effects. For resting birds, habitat loss due to the construction of several structures may be particularly significant.

In particular, vulnerable and disturbance-sensitive seabird species such as divers are to be taken into account with regard to cumulative effects. For disturbance-sensitive species, the effects of shipping traffic (including maintenance and operation of cable systems and platforms) should be included in addition to offshore wind farms and platforms.

As all previous findings for the areas and areas included in the Site Development Plan indicate low importance for species contained in Annex I of the Birds Directive, there are no apparent obstacles to the enforceability of the plan according to the current state of knowledge. Disturbance of wintering birds in the nature conservation area "Pomeranian Bight – Rönnebank" can be excluded due to the distance of the areas from the conservation area itself. This is also applicable to any disturbances caused by shipping traffic in connection with the operation and maintenance of subsea cable systems, platforms and wind turbines. As the Baltic Sea is used intensively for shipping traffic, no additional disturbance of sensitive species is to be expected due to the increase in shipping traffic during the construction phase or for repair and maintenance purposes. Significant disturbances within the nature conservation area can be excluded by preventing the use of Natura 2000 sites.

### **Assessment of the implications**

#### **Assessment of the FFH compatibility of the planned cable routes**

Possible effects of subsea cable systems are usually limited to the laying phase and are therefore limited both temporally and spatially. Effects on the nature conservation areas in their component parts relevant to the conservation objectives or conservation objective are only to be expected if the cable routes run through or in the immediate vicinity of protected areas; according to the current state of knowledge, no remote effects on legally protected biotopes or FFH habitat types are assumed.

Considerable impairment of marine mammals can be ruled out, in particular because of the small size of the area and the short duration of the installation work. With regard to possible operational effects, no significant effects are to be expected on the basis of the cable configurations specified in the Site Development Plan and the planning principle for sediment cover. Possible significant adverse effects on bird sanctuaries in their constituent parts significant to the conservation objective from the installation and operation of subsea cable systems should also be excluded. Cable laying work only takes a few days and is only associated with noise and scare impacts typical for ships. Considerable impairments due to sediment drifting during the construction phase are excluded on the basis of current knowledge. Known occurrences of legally protected biotopes and FFH habitat types in the protected areas lie outside the drift distances discussed in the technical literature.

## **Transboundary impacts**

This strategic environmental assessment comes to the conclusion that as things stand at present, the rules of the Site Development Plan have no significant effects on the areas of neighbouring states bordering on the German EEZ in the Baltic Sea.

Substantial transboundary impacts can be excluded in principle for the factors Soil and water, Plankton, Benthos, Biotopes, Landscape, Material assets and Human beings, including human health. Possible substantial transboundary impacts could only arise if considered cumulatively in the area of the German Baltic Sea, for the highly mobile biological factors Fish, Marine mammals, Seabirds and resting birds, as well as Migratory birds and Bats.

The SEA comes to the conclusion that, according to the current state of knowledge, the implementation of the Site Development Plan is not expected to have any substantial transboundary impacts on the factor Fish, since on the one hand the areas for which the Site Development Plan defines rules have no prominent function for fish fauna, and on the other the discernible and predictable effects are small-scale and temporary in nature.

This also applies to the factors Marine mammals and Seabirds and resting birds. These use the areas predominantly as transit areas. There will be no significant habitat loss for strictly protected seabird and resting bird species. According to current knowledge and taking into account measures to minimise impact and limit damage, substantial transboundary impacts can also be ruled out. Thus the installation of the foundations of wind turbines and platforms in the specific approval procedure is only permitted with the use of effective noise mitigation measures (see e.g. planning principle 4.4.1.7 of the Site Development Plan). In view of the particular vulnerability of the separate Baltic population of harbour porpoise, intensive monitoring measures are to be carried out during implementation and, where appropriate, the noise mitigation measures are to be adapted or construction work coordinated in order to exclude any cumulative effects.

For migratory birds, the wind turbines and platforms erected in Site Development Plan sites may constitute a barrier or present a risk of collision. The risk of collision must be minimised by taking appropriate measures to prevent attraction by the lighting. As regards the barrier effect, a final cumulative consideration is not possible given the current state of knowledge.

Nor is a cumulative assessment of the hazard risk for bat migration possible at this time, as there is still insufficient information on migration routes, migration heights and migration intensities. It can generally be assumed that any significant transboundary impacts from the rules of the Site Development Plan will be prevented in the same way by appropriate prevention or minimisation measures as are to be applied to bird migration.

## **Measures to prevent, mitigate and offset significant negative effects of the Site Development Plan on the marine environment**

The measures planned in order to prevent, mitigate and – as far as possible – offset significant negative environmental effects resulting from the implementation of the Site Development Plan are presented in accordance with the requirements of the SEA Directive.

In principle, the provisions of the Site Development Plan prevent negative effects on the development of the state of the environment of the EEZ in the Baltic Sea. If the plan were not implemented, the uses would develop without the space-saving and resource-conserving steering and coordination effect of the Site Development Plan.

In specific terms, the Site Development Plan defines spatial and textual rules which, according to the environmental protection objectives set out in chapter 1.4 of the environmental report, serve to prevent or mitigate significant negative effects in the marine environment due to implementation of the Site Development Plan. This essentially concerns textual rules in respect of space-saving planning, preventing the use of protected areas and structures in accordance with section 30 of the Federal Nature Conservation Act, noise mitigation, compliance with the 2K criterion, dismantling of structures and consideration of best environmental practice and the relevant state of the art.

Mitigation and prevention measures are specified and ordered by the competent licensing authority at project level for the planning, construction and operation phases. With regard to the planned sites for wind turbines and platforms, this applies in particular to noise mitigation and noise prevention measures, as well as eco-friendly lighting during operation of the structures. Measures for prevention and mitigation of possible effects of subsea cable systems must be taken into account during the route planning and technical design stages. The Site Development Plan includes a planning principle relating to sediment warming so as to prevent considerable negative effects of cable warming on the benthos.