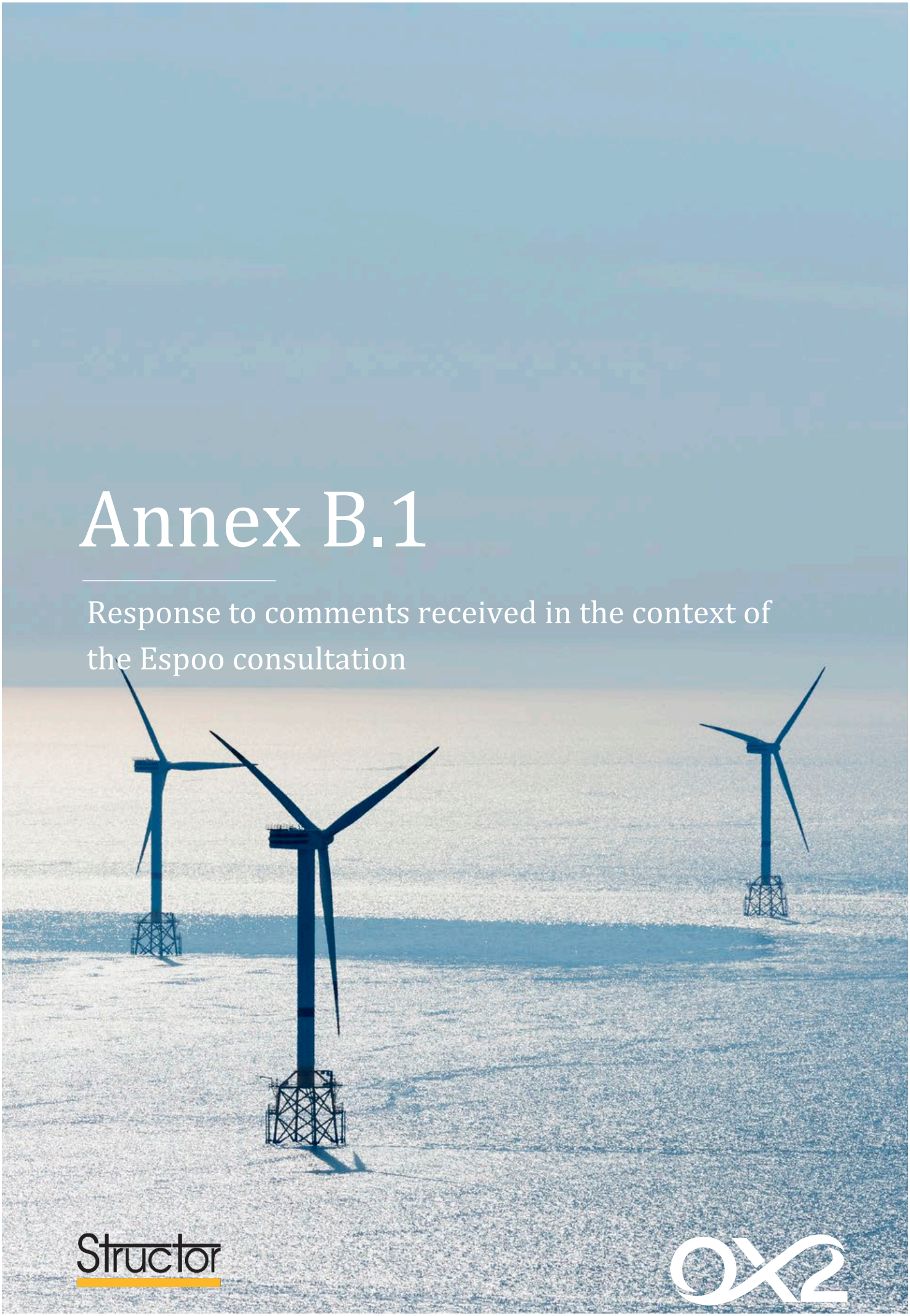
Annex B.1

Response to comments received in the context of the Espoo consultation



Structor

OX2

1 Consultation comments and responses

1.1 Estonia

1.1.1 Keskkonnaamet

1. **Keskkonnaamet considers that the Ran offshore wind farm may have a negative impact on migratory birds, with some species migrating through Estonia passing through the Gotland area. Based on the draft EIA for the Swedish maritime spatial planning, the development of the Ran wind farm is expected to have a major impact on migratory birds.**

   The majority of seabirds travelling to the Russian tundra for breeding (known as the Arctic migration route) pass through a wide area of the Baltic Sea between the Gulf of Finland in the north and the coast of Germany and Poland in the south. Within this wide area, it is difficult to delineate species-specific flight paths that the birds always follow year after year. Since 2022, in several OX2 projects being planned in the Baltic Sea, the company has conducted surveys in the Baltic Proper using vertical and horizontal radar to follow the Arctic's spring and autumn migration. However, the inventories carried out prior to the permit application show that the Ran wind farm is not considered to be part of the main routes for the majority of the species that pass through Gotland in the spring, but there are bird species that can migrate through the area in large numbers, such as the barnacle goose. The report on birds, prepared as part of the project, has included breeding and/or migrating populations from other countries that may use the project area for resting or foraging. The report showed that the collision risk is very low for migrating and/or breeding populations. The impacts are therefore assessed as negligible, and it is concluded that there will be no transboundary impacts on birds. For further information regarding the impact on birds, please refer to section 7.4 of the Espoo Report.

2. **Keskkonnaamet also notes that bats may pass through the Gotland area during migration from the west coast of Estonia and Saaremaa.**

   The bat species nathusius' pipistrelle has been detected in inventories carried out by the Company for the Ran wind farm and the neighbouring Pleione energy park, indicating that bats may migrate through the park area. Precautionary measures will therefore be taken by installing equipment on the wind turbines to detect the possible presence of bats and, if necessary, applying operational regulation of wind turbines when the wind farm is in operation. There is an increased risk of collision during spring and autumn migration. In addition, a survey programme will be carried out over three years to investigate the movement patterns of bats through the wind farm and the risk of collision with the rotor blades of the wind turbines. Based on the survey programme, operational regulation of the wind turbines can be adjusted if necessary to protect migrating bats. With the precautions taken, the impact on bat fauna in the area is assessed to be negligible and no transboundary impacts occur. For further description see section 7.5 and chapter 9 of the Espoo report regarding conditions and impacts on bats and protective measures respectively.

3. **Keskkonnaamet mentions that the proposed wind farm could have a significant impact on harbour porpoises as the Baltic Sea population is a whole.**

In the park area, the presence of harbour porpoises has been studied using harbour porpoise detectors during the period June-December 2023. During the six-month survey with four harbour porpoise detectors, detections of harbour porpoises have only been made during one day with two detection-positive minutes. The results show a low probability of detection of harbour porpoises and are consistent with the results of the SAMBAH study (SAMBAH 2016). LIFE Project Number: LIFE08 NAT/S/000261 FINAL Report Covering the project activities from 01/01/2010 to 30/09/2015. Location: Baltic Sea), which showed that the areas around the Ran wind farm had low densities and low probability of detection of harbour porpoises. Harbour porpoises may occur sporadically in the park area for short periods, but the area is not particularly important for harbour porpoises. The presence of marine mammals has also been investigated through eDNA sampling in June and September 2023, the survey did not generate any hits on harbour porpoises. Impact on harbour porpoises has been extensively investigated both at the individual and population level within the project (Reference Report R.3) and is further described in section 7.3 of the Espoo Report.

1.1.2 Eestimaa Looduse Fund (ELF)

4. **ELF considers that offshore wind energy has a significant cumulative impact. For example, impacts on fish and marine mammals during the construction phase and impacts on birds and bats during the operational phase will be transboundary. This is because many of the populations concerned are migratory and not restricted to national waters.**

In the assessment of cumulative effects, the starting point has been to include existing projects and projects with the required permits that are in the vicinity of the park area, and which could potentially contribute to cumulative effects arising together with Ran wind farm. The assessment of cumulative effects has also taken into account the nearby planned Pleione energy park, which is also planned by a project company of OX2. It can be noted that the permit application for Pleione energy farm was rejected after the environmental impact assessment was prepared. The cumulative assessments made are therefore very conservative as it is unlikely that Pleione energy farm will be established.

Cumulative effects on fish and marine mammals may occur during the construction phase as a result of the underwater noise generated during pile driving. Piling works will not be carried out simultaneously in the Ran wind farm and Pleione energy park, which is why transboundary impacts from cumulative effects regarding underwater noise are not expected to occur. Cumulative effects will also not arise with any other parks.

Adjacent shipping lanes already give rise to underwater noise today. Noise from the additional vessel transports (during maintenance) and wind turbines as a result of the Ran wind farm and Pleione energy park is deemed to only contribute to a negligible increase in underwater noise compared with existing traffic. The cumulative effects that may arise for marine mammals from underwater noise during the operational phase are assessed as negligible. No transboundary impact is therefore assessed to arise.

The bat and bird surveys conducted under the project consider both long-distance migratory bats and bird populations breeding in other countries. The cumulative effects arising from an increased

collision risk are not considered to be of such magnitude that they risk affecting the maintenance of viable bird and bat populations, not least because the Pleione energy park will also apply the necessary protective and precautionary measures to reduce the collision risk.

The investigated offshore wind farms Bockstigen 1 and Kårehamn are also located within the same migration route as the Ran wind farm. Overall, this may entail a longer flight distance for birds passing through the migration route. However, the increased energy consumption required has an insignificant impact on the bird species in relation to the total flight distance. With regard to the risk of collision, birds that are nesting, roosting or wintering (i.e. spending a longer time in a certain area) are at greater risk of being killed by collisions with wind turbines than those that only pass the area actively flying during migration (Rydell et al. 2011). The study on birds, conducted on behalf of the Company, shows that very few individuals of the species that can utilise the wind farm area are at risk of being killed, which is why the overall impacts are assessed as negligible. Transboundary impacts are therefore not expected to arise as no impact is expected at population level (as very few individuals are at risk of being killed). For a further description of cumulative effects, see Chapter 8 of the Espoo report.

5. **ELF argues that, given the large number of protected areas in the area and their importance for biodiversity, it is justified to examine the impacts on the Natura 2000 network and on benthic biota and fish, as well as marine mammals, birds and bats.**

There are two types of Natura 2000 sites: sites designated under the Habitats Directive (SCIs) and sites designated under the Birds Directive (SPAs). Sites designated under the Birds Directive aim to protect habitats important for specially designated bird species, as well as habitats important for breeding, resting and wintering migratory birds. The risk assessment carried out (Reference Report R.4) shows that there is only a risk of significant impact on designated species within the Swedish SPAs Ryssnäs, Skenholmen and Asunden. All are located at approximately 12-18 kilometres from the Ran wind farm. The Company has thus submitted an application for a permit under the Natura 2000-legislation that is limited to these areas, within the framework of which the impact has been further investigated. However, the applied activity is not deemed to risk significant disturbance to designated bird species or other conservation values in these Natura 2000 areas. The operation is also deemed to have a negligible impact on all bat and bird species that are deemed to be able to pass through the park area. The proposed protective measures have been taken into account in the assessment.

Natura 2000 sites that are important for marine life, such as Hoburg Bank and the Midsjöbankarna, and Gotska Sandön-Salvorev are at such a long distance (approximately 81 and 22 kilometres respectively) from the Ran wind farm that designated species and habitats (such as porpoises and seals) are not affected.

Overall, there is no risk of significant environmental effects on any Natura 2000 site in the European network.

The impacts of the activities on fish, marine mammals, birds and bats are described in more detail in sections 7.2-7.5 of the Espoo report. Impacts on benthic flora and fauna have also been assessed. However, these are not described in more detail in the Espoo report as the influence factors affecting benthic flora and fauna have been dismissed as these are localised and short-term (see section 6.2 of the Espoo report), thus no transboundary impacts arise.

6. **ELF considers that the content of the assessment of impacts on protected areas and biodiversity, as well as the choice of methods for the assessments, remains largely a matter of conjecture. The association emphasises that both Estonia and Sweden are parties to the European agreement on the conservation of European bat habitats EUROBATS and are therefore committed to complying with the relevant decisions and guidelines. ELF considers it necessary that impact assessments for both the proposed wind farms are carried out in accordance with the relevant guidance.**

   The Company does not share the organisation's views. The Company's impact assessment has been based partly on literature and desk studies regarding bat migration in the Baltic Sea, and partly on its own inventories of bats conducted in the park area. Inventories from boats have been carried out at the park area in order to detect bats during both spring and autumn. The impact assessment, as well as the design of the surveys, has taken into account the recommendations of EUROBATS. However, the Company has not carried out continuous monitoring at sea as recommended by EUROBATS. This is partly due to difficulties in locating equipment within the wind farm area, and partly because bats' migration patterns may change once the wind farm is built. Therefore, it has not been deemed necessary or relevant to conduct long-term monitoring within the park area. It is only when the wind turbines are installed that it is possible to investigate whether bats are present in the park area and, if so, to what extent. In light of this, the Company has undertaken to carry out a survey programme over a three-year period and to take precautionary protective measures in the form of operational control to avoid collisions, see section 7.5 of the Espoo Report.

7. **Furthermore, ELF states that there is a need for greater clarity on the methods for assessing impacts on other species. It should be emphasised that seals should also be considered when they are on land (haul-out sites) as they spend a very large part of their lives in the water. The factors that may affect them when they are on land are very different from those that affect seals when they are in the water. The role of the wind farm in relation to the critical ecological needs of grey seals needs to be clarified.**

   Grey seals are the most common seal species in the Baltic Sea and in the park area. Harbour seals and ringed seals may also occur in the park area. The grey seal population is assessed as least concerned (LC) according to the Swedish Red List (SLU Artdatabanken 2020).

   Documented terrestrial haul-out sites for grey seals are located on both Öland and Gotland. The closest haul-out sites to the Ran wind farm are located along the east coast of Gotland, approximately 13 kilometres from the park area. The nearest known haul-out sites for harbour seals are along the east coast of Öland, approximately 170 kilometres from the park area (HELCOM 2023a). Harbour seals are relatively stationary and do not usually move great distances from their haul-out sites, so the probability of their occurrence in the park area is considered to be low. Ringed seals occur in the Gulf of Bothnia, Gulf of Finland and Gulf of Riga. Single individuals from the latter subpopulation can potentially occur in and around the park area during the ice-free period as they can swim long distances between different foraging sites (HELCOM 2023b, SLU Artdatabanken 2023).

   Underwater noise during the construction phase is the influence factor that could potentially affect marine mammals, including seals. To assess the potential impact of the wind farm on marine mammals, site-specific underwater noise modelling has been carried out for those activities that

may generate high levels of underwater noise, such as geophysical surveys and foundation pile driving.

No noise impacts from the surveys during the construction phase the will reach any known haul-out sites of the seals. When soft start-up and ramp-up are applied, the sensitivity of seals to the impact of the geophysical surveys is assessed to be low. Seals are expected to avoid the immediate area during pile driving of foundations within the wind farm as observed in several studies (Russell et al. 2016). The park area is also not considered to be a more important area than surrounding waters for seals. There are no established thresholds for behavioural impacts on seals. However, seals are considered to be less sensitive to noise impacts than harbour porpoises and they are able to keep their heads above water if the noise is loud, which also reduces their sensitivity to disturbance. Therefore, the modelled impact distance for harbour porpoises can also be used as a conservative assumption for behavioural impacts on seals. Seals are most sensitive to behavioural impacts during the time they are suckling their pups and spend a lot of time on land. See also section 7.3 of the Espoo Report.

1.2 Finland

1.2.1 Finnish Environment Institute

8. The Finnish Environment Institute states that all influence factors need to be identified, and their impacts assessed to ensure that the decision on the implementation of the project is based on good knowledge of its impacts and on the best possible solutions.

The influence factors arising from the planned activities are presented in Chapter 6 of the Espoo report. A demarcation of influence factors is also presented in Chapter 6. These have been investigated, but are not described further in the impact assessments, as they are considered to have a local impact and thus do not entail any transboundary impact. The influence factors that are assessed to have a potential transboundary impact are considered in the environmental assessment and the relevant influence factors for each environmental aspect are assessed in Chapter 7 of the Espoo report.

9. The Finnish Environment Institute considers that since the cumulative effects of several offshore energy parks can potentially be ecologically significant, it is important to examine cumulative effects as widely as possible.

In the assessment of cumulative effects, the starting point has been to include the existing projects and projects with the required permits that are in the vicinity of the park area, and which could potentially contribute to cumulative effects arising together with the Ran wind farm. The assessment made shows that it is only for a few environmental aspects where a cumulative effect is deemed to be able to arise, and then to a limited extent. See response to Opinion 4 for a further description of the approach to assessing cumulative effects.

1.2.2 Finnish Transport and Communications Agency (Traficom)

10. Traficom believes that the establishment of a large-scale offshore wind farm may have a significant impact on maritime safety and mobility in the Baltic Sea.

A traffic analysis has been carried out for the Ran wind farm, which shows that there are relatively few vessels travelling along the shipping lanes around the park area. Ran wind farm is planned between three shipping langes, *Slite–Öland southern cape*, *Salvorev—Slite* and *Öland southern cape–Gulf of Finland*. The traffic passing through the area consists mainly of large cargo ships. Based on current vessel traffic, it is estimated that most vessels will be able to pass the wind farm without adjusting their position when the wind farm is established. The number of passages through the wind farm area was 687 during the period studied, corresponding to just under two passages per day.

For the shipping lanes in the vicinity of the Ran wind farm, it can be noted that there is a large distance between the traffic and the nearest planned wind turbines; the distance from the outer edge of the recommended traffic lane to the nearest wind turbine in the wind farm's example layouts is approximately 4.1 kilometres long. Taking into account the location of the Ran wind farm and the fairways and shipping lanes that occur in national interests for shipping, it is assessed that the establishment will not lead to the need for route diversions or entail longer distances for traffic.

Once Ran wind farm has been established, vessels will have good opportunities to maintain distances that ensure that they can position themselves in a way that complies with the international COLREG rules of the sea. This taken into account the distances that exist between Ran wind farm and the nearest shipping lanes around the park area. Nor is the establishment of Pleione energy park, planned in the vicinity of the Ran wind farm, expected to have any cumulative effects that entail significant changes in traffic patterns. For a more detailed description of the impact on shipping, see section 7.8 of the Espoo report.

11. Traficom states that it is important to take into account shipping lanes, including outside the established fairways and route systems, when delimiting planned offshore wind farm projects. This is to ensure that the operational and safety conditions of shipping are taken into account in the planned wind farm area.

Vessel types and traffic flows within the planned wind farm and in its vicinity have been analysed using Automatic Identification System (AIS) data. The wind farm will be designed with distances to the shipping lanes *Öland southern cape–Gulf of Finland, Salvorev–Slite* and *Slite–Öland southern cape.* These distances are longer than the safety distances recommended in PIANC (2018), taking into account the types of vessels and traffic flows. In summary, the shipping lanes have been taken into account in the project. This is further described in section 7.8 regarding shipping in the Espoo Report.

12. Traficom also states that the potential cumulative effects of offshore wind projects in the vicinity of the project on shipping in the area should be thoroughly investigated during further planning and taken into account in the impact assessment. Large and closely located wind farms can concentrate and change shipping routes compared to existing ones.

Cumulative effects have been studied in the affected part of the Baltic Sea between OX2's two nearby planned wind/energy farms, Ran wind farm and Pleione energy park. There are no existing wind farms in the immediate area, so only the those mentioned above have been included.

If both Ran wind farm and Pleione energy park are built at the same time, vessel traffic in the area will increase more during the construction and operational phases than if only one park is built. It can be noted, as described above, that the permit application for Pleione energy park has been rejected and it is therefore highly unlikely that the energy park will be established at the same time as the Ran wind farm. Moreover, the additional vessel traffic around the Ran wind farm is considered to be insignificant in relation to the existing traffic in the area. A supplementary risk analysis will be carried out prior to the construction phase.

During the operational phase, no impact is expected to arise from the parks individually on the frequencies of ship grounding or collision. There will therefore be no impact for regular maritime traffic if both parks are built that are greater than the impact from each park separately.

The increase in the number of wind turbines means that the frequency of allision will increase in relation to the number of turbines if both wind farms are built. This risk is however not greater than the impact of the wind farms individually.

In conclusion, the cumulative effects of the establishment of several parks in the area do not pose any additional risks beyond those identified when analysing the parks individually. No cumulative effects in terms of accessibility and maritime safety for maritime traffic in the area have been identified. See Chapter 8 for the cumulative effects assessed for shipping in the Espoo Report.

13. **Traficom points out that in the planning of wind farms and individual wind turbines, the use of radar as the primary navigation and collision avoidance tool for ships and its central importance for traffic management should be taken into account. Wind turbines can cause shadowing or reflection effects on maritime radar systems, which in the worst case can make it difficult to interpret radar signals. Wind turbines can also affect the satellite positioning of ships, i.e. the Global Navigation Satellite System (GNSS), by reflecting satellite signals through the wind turbines, leading to incorrect positioning of the ship using the system.**

    Traficom also mentions that the location of wind turbines should take into account the potential impact on maritime and coastal radio systems. The impact of the wind farm on the operation of radar, radio navigation equipment and other radio equipment important for navigation and traffic management should be considered and ensured. Traficom also considers it important to take into account the following issues: the operation of radio links travelling in the maritime area requires a completely clear area between the transmitter and the receiver. Coastal and offshore electronic communications services rely on radio systems and therefore it is important to ensure that mobile services, radars and radio links are sufficiently interference-free to operate in maritime areas. Even small changes in the location of wind turbines can have a crucial impact on the operation of radio systems in the area.

    As a starting point, the impact on ship radar and other navigation equipment is expected to be limited for traffic not travelling directly adjacent to the park. The interference that may

nevertheless occur is not expected to affect the ability of ships to navigate safely. Vessels are equipped with several navigation systems based on different technical solutions, which together provide sufficient information to determine the position, direction and distance to obstacles such as wind turbines, even if one or more systems provide incorrect information or are inaccessible.

VHF is the most common radio frequency used in shipping for communication, including distress calls, both with analogue and digital signals (DSC). According to PIANC (2018), the establishment of offshore wind farms affects the coverage area of VHF when vessels are beyond a wind turbine. There are studies confirming interference with VHF, which under certain circumstances can affect not only analogue radio voice communications, but also DSC and AIS signals. However, the significance of the interference to VHF communications including AIS is considered to be negligible according to studies carried out (The Maritime and Coastguard Agency, 2004).

The wind farm is considered to be a very clear point of navigation, and the wind turbines will also be marked out. During normal daytime conditions, the wind farm will be visually visible from vessels travelling in the surrounding traffic lanes. The outer wind turbines will be illuminated in accordance with the legislation in force at the time of construction. This is to increase visibility and orientation. The wind turbines will also be equipped with obstruction lighting.

In conclusion, the probability that interference from wind turbines at this distance will provide such misleading information that it leads to an accident is negligible compared to other causal factors. The risk of interference with radar and other navigation equipment causing vessels to inadvertently navigate into the wind farm and collide with a wind turbine is thus estimated to be acceptable.

Prior to finalising the design of the wind farm, a supplementary nautical risk analysis and an evaluation of radar interference will be carried out. The Company will inform the authorities of the timetable and execution well in advance of the construction work and consult with the Swedish Maritime Administration and the Swedish Transport Agency on measures to improve maritime safety and equipment needed to protect against interference with vessels' navigation equipment. The installation of reference buoys, in established traffic lanes, and other measures to reduce the risk of radar interference shall be considered and decided before deciding on the final design of the wind farm.

1.2.3 Ministry of Transport and Communications

14. The Ministry of Transport and Communications states that it would be useful, from Finland's perspective, to obtain more information on, for example, the studies used to support planning and practice, particularly in the coordination of maritime transport and offshore wind power.

The operator can only propose conditions in the individual permit application to enable the planned operation to coexist with neighbouring activities and the surrounding area. However, the operator cannot be held responsible for ensuring that coordination takes place; this is the responsibility of the relevant authorities. With regard to this issue, the relevant authorities, such as the Swedish Agency for Marine and Water Management and the Swedish Maritime Administration, should be consulted for further information on planning and practice related to the coordination of maritime transport and offshore wind energy.

1.2.4 Finnish Meteorological Institute

15. **The Finnish Meteorological Institute states that it carries out observation activities in connection with the monitoring of the Baltic Sea, both with automated measurement methods (such as Argo buoys) and measurements carried out from ships. The construction of the wind farm complicates the use of automated measurement methods in the area, as their manoeuvrability is limited (e.g. Argo buoys are free floating). Although the Ran wind farm will be built in a shallow area where Argo buoys are not normally used, their route cannot be guaranteed.**

    The department also mentions that due to the impacts related to marine observation, Finland should be involved in the EIA to ensure good accessibility for marine observations also during the construction of the park – for example by adding an observation station in connection with the park.

    The expected minimum distance between wind turbines is four rotor diameters, which for the smallest turbines corresponds to approximately one kilometre. The wind turbines occupy a very small part of the park area and most of the sea area will thus continue to be available for measurements. The Company is in favour of discussing possible solutions in the wind farm to facilitate marine observations.

1.2.5 Centre for Economic Development, Transport, and the Environment of Southwest Finland

16. **The Centre for Economic Development, Transport, and the Environment of Southwest Finland considers that the greatest cumulative effects will be on birds, fish and marine mammals. The Central Baltic Sea region is an important wintering, breeding and feeding area for many seabird species, and a large number of seabirds migrate through the area. Bird species breeding in Finland may also use Swedish marine areas during migration periods and significant migration routes may be located in the vicinity of the project area. The project may therefore have an impact, particularly on migratory birds in Finland. Possible cumulative effects with other offshore wind energy projects planned in the Baltic Sea region are also considered important.**

    As explained above in section 1.1.2 in the response to Opinion 4, the migration routes through Ran wind farm are not considered to be part of the main routes for the majority of species that pass through Gotland during migration. Furthermore, the risk of collision is considered to be very low for the migrating and breeding populations that may pass through the wind farm. The impact on all bird species concerned is therefore assessed as negligible. There are therefore no transboundary impacts with regard to birds.

    Similarly, no cumulative effects giving rise to transboundary impacts are expected to occur, as discussed in section 1.1.2 in the response to the Opinion 4 above.

17. **The Centre for Economic Development, Transport, and the Environment of Southwest Finland states that the consultation document should assess the environmental impacts in relation to the indicators of good environmental status of the sea and take into account the Marine Spatial Plan and its objectives. In addition, the impacts of cable corridors and marine dumping areas on the integrity of the seabed and extensive habitats should be considered.**

    The phases of the operation that may affect environmental quality standards for coastal waters are mainly the construction and decommissioning phases. During these phases, temporary and short-term turbidity and dispersion of fine material originating from the seabed occurs, as shown by the sediment dispersion modelling performed by DHI (2023). A detailed assessment has been made of each affected coastal water body based on physico-chemical, hydromorphological and biological quality factors for ecological status and priority substances for chemical status. The overall assessment for all coastal water bodies concerned is that the status classification will not change or deteriorate during any of the phases of the wind farm (construction, operation or decommissioning phases).

    A detailed assessment has also been made of the impact on the environmental quality standards based on qualitative descriptors (with associated criteria and indicators) for Biodiversity, Alien species, Commercial fish and shellfish, Marine food webs, Eutrophication, Seabed integrity, Persistent changes in hydrographic conditions, Concentrations and effects of hazardous substances, Hazardous substances in fish and other marine food, Marine litter and Underwater noise and Biodiversity. Overall, the assessment is made that the planned activities do not affect the possibility of achieving or maintaining the overall environmental quality standard of good environmental status for the Baltic Sea.

    The marine spatial plan has been taken into account by planning the wind farm area in an area where the wind farm is deemed to be able to coexist with other uses identified in the existing marine spatial plan.The Company will initiate a dialogue with the relevant parties to the extent that is deemed necessary.

    An overall assessment has been made of the impact of the connection cables, which is mainly considered to be local and thus not transboundary. The impact will be investigated in more detail within the framework of the forthcoming permit process for the cables when the connection point has finally been selected. Any surplus masses in the project can be handled by placing the masses in a suitable location on the seabed or by handing over the masses to recipients who hold the necessary permits for handling the masses. If necessary, the Company will apply for an exemption from the general prohibition of dumping masses in accordance with current legislation. The consequences will then be investigated in more detail.

18. **Furthermore, the Centre for Economic Development, Transport, and the Environment of Southwest Finland considers that noise modelling should be used to determine the impact of the wind farm on underwater noise in the marine area during operation compared to current levels.**

    A modelling of underwater noise has been carried out on behalf of the Company. As described in the Espoo report, it is mainly during the construction phase that underwater noise can occur at levels that exceed current noise levels. This mainly concerns noise generated in connection with surveys and piling work. As far as sound propagation from the wind turbines is concerned, this is

limited. The sound level emitted by wind turbines is generally lower than from vessels in the same frequency range.

As regards additional vessel traffic due to the construction of the wind farm, and maintenance during the operational phase, this traffic is deemed to be of limited significance. This since there already is intensive vessel traffic in the Baltic Sea, not least as a result of the nearby shipping lanes. As a result, the noise generated by the establishment of the wind farm will not be as prominent.

Further discussion on this topic can be found in the Espoo report, specifically in section 6.1, where the methodology employed for underwater noise modelling is outlined. Additionally, sections 7.2 and 7.3 present the impact assessments conducted on fish and marine mammals, respectively, which have been identified as potentially affected by underwater noise.

19. **The Centre for Economic Development, Transport, and the Environment of Southwest Finland considers that it is important that assessments of impacts on bird populations take into account the location of migration routes in relation to wind turbines and that the significance of these impacts should be assessed. They also consider it important to identify resting and foraging areas for migratory birds and the species most sensitive to wind turbines. Surveys must be carried out in an appropriate manner using the best possible methodology. Available satellite monitoring data can be used to complement the impact assessment. The authority adds that mitigation measures and opportunities to compensate for impacts should also be considered.**

As outlined above in section 1.1.1 in the response to Opinion 1, the migration routes through the Ran wind farm are not considered to be part of the main routes for the majority of the species that pass through Gotland during migration.

The species included in the assessment of impacts on birds have been selected based on a number of factors, including their documented sensitivity to wind power, their occurrence in the area in question, population trends and their behaviour. This to provide a summarised but representative picture of the impacts that may occur. The species that may use the Ran wind farm area for resting and foraging are mainly gulls and terns from breeding colonies along the north-eastern coasts of Gotland.

Knowledge of the occurrence of birds in and around the area of the Ran wind farm has been obtained from factual data and research as well as the inventories carried out in the area by the County Administrative Board of Gotland, the Swedish Environmental Protection Agency's environmental monitoring and inventories conducted on behalf of the Company. In addition, the results obtained from inventories of Pleione energy park are reported where the results are deemed relevant for Ran wind farm. A dialogue has also been conducted with bird experts and a collision risk modelling has been carried out according to the Band model. The investigation of impact on the bird populations concerned can thus be considered to be based on a solid foundation and carefully investigated using recognised methods and based on the best possible knowledge so that reliable assessments could be made.

The risk of collision for all species concerned is assessed to be low. Nevertheless, as a protective measure, the Company has undertaken to apply a clearance equivalent to 30 metres between the tip of the rotor blades and the sea. In addition, as an additional precautionary measure,

operational control will be applied in order to protect night migrating small birds. For further description of the impact on birds, please refer to section 7.4 of the Espoo Report.

20. Finally, the Authority states that it is necessary to consider the cumulative effects on a large scale and that the challenges and uncertainties directly linked to the assessment must be identified.

An assessment of the cumulative effects has been carried out. For the majority of the environmental aspects, the cumulative effects are assessed to be negligible, but for commercial fisheries the cumulative effects are assessed to be very small negative. The assessment for the aspects fish, marine mammals, birds, bats and shipping, has been described above in section 1.1.2 in the response to Opinion 4. For the assessment of cumulative effects for all environmental aspects, reference is made to Chapter 8 of the Espoo Report.

1.2.6 Centre for Economic Development, Transport, and the Environment of Southwest Finland - Fisheries Authority

21. The Centre for Economic Development, Transport, and the Environment of Southwest Finland - Fisheries Authority states that the construction and ongoing activities may affect fishing, fishing opportunities, the value and availability of landings, fish migration routes, reproductive success and pollution concentrations, and thus Finland's fisheries.

Finnish fishing activity has been examined on the basis of data requested from the Finnish authorities. According to a compilation of Finnish fisheries in the Baltic Sea carried out by the Finnish Natural Resources Institute ("Fishing areas of the Finnish trawl fleet in the Baltic Sea in 2010 - 2022" [original title: Suomen troolilaivaston kalastusalueet Itämerellä vuosina 2010-2022]. LUKE), Finnish fisheries are concentrated in the Bothnian Sea and the Gulf of Bothnia. Finnish landings in ICES Divisions 44G9 and 43G9 between 2017-2023 have been around 500 tons per year and consist almost exclusively of herring and sprat. Ran wind farm occupies 5 % of the total area of the statistical grids and an analysis of Finnish fishing vessels' WMS data shows that the Finnish fishery spends around 10% of the fishing time within Ran, mainly in the north-eastern corner of the park area. Finnish fishing activity within Ran between 2017-2023 corresponds to around 27 hours of trawling per year and it is estimated that between 0 and 150 tons of sprat and herring are landed per year. It is also clear from ICES data that Finnish commercial fishing is extremely limited in the entire larger sub-area 27.3.d.28.2 (Eastern Gotland Sea) that includes Ran wind farm. Finnish commercial fisheries have only accounted for an average of 4 % of total European fisheries over the last decade (Figure 3, Reference Report R.3). Commercial fisheries in the Eastern Gotland Sea are dominated by Sweden, Latvia and Denmark, which together account for 78 %. At the same time, Sweden dominates landings along the entire Gotland coast, including within the Ran wind farm (see Figure 22 in Section 7.6.1 of the Espoo Report), while other nations fish further east (Figure 24 in Section 7.6.1 of the Espoo Report). Thus, Finnish fisheries are not expected to be affected by the construction of Ran wind farm. As restrictive fishing quotas and declining stocks control the uptake of herring in the Baltic Sea, the Ran wind farm, and the loss of fishing grounds it causes to other EU countries, is not expected to have any impact on Finland's future fishing opportunities, availability of fishing grounds, or the value of its landings.

Ran wind farm is not considered to be an important migration route or feeding area for migratory fish such as salmon and brown trout, as described in section 7.2 of the Espoo report. As no

significant migration is expected to take place within the wind farm area, only a negligible impact on the migration of individual fish is expected to occur.

A temporary impact on the reproductive success of fish spawning in the area may occur during the construction phase due to noise and sediment dispersion. In the case of Ran wind farm, this includes in particular sprat, which potentially spawns within the project area, as well as herring and Baltic flounder, which spawn in the immediate area closer to the coast of Gotland. The area of species' spawning grounds that may be disturbed by these activities is small in relation to the total spawning grounds in the Baltic Sea and no effect at population level is expected. Additionally, the effect is temporary and limited to the construction phase. Overall, the Ran wind farm is assessed to give rise to negligible to very small impacts on fish spawning and recruitment.

Contaminant dispersion can occur during construction and decommissioning activities, resulting in the release of sediments from the seabed, which then become available for absorption by fish. However, the park area is largely composed of mixed sediment, not clay and silt where contaminants are usually found. In addition, sediment dispersion modelling indicates that sediment dispersion is localised to the park area, as is contaminant dispersion. Therefore, high levels of contaminants are unlikely to be dispersed on a significant scale during works within the Ran wind farm. In addition, these activities are limited in time and fish are expected to avoid areas with elevated turbidity levels.

Overall, the establishment of Ran wind farm is not expected to have a significant impact on Finnish fisheries as there is no active Finnish fishing in the area, and the impact on commercial fish species moving in the area is expected to be very limited. For further reasoning on impacts on fish and commercial fisheries, see section 7.2 and section 7.6 of the Espoo report, respectively.

22. **The Authority considers that there is a risk that the project will have cumulative effects and permanently alter the marine environment. It is therefore important that cumulative effects are considered in the environmental assessment.**

    The environmental impact assessment submitted with the permit application provides a detailed account of the cumulative effects. The environmental aspects that have been examined with regard to cumulative effects are as follows: shipping, fish and marine mammals, birds, bats and commercial fishing. In the assessment of cumulative effects, the existing and permitted activities in the vicinity of the park area were included as a starting point, given the potential for these activities to contribute to cumulative effects in conjunction with the Ran wind farm. During the construction phase, no cumulative effects are identified apart from those pertaining to commercial fishing, which are deemed to be insignificant from a transboundary perspective. In the operational phase, no cumulative effects are identified from a transboundary perspective, apart from those pertaining to commercial fishing, which are deemed to be minor. Further information on cumulative effects can be found in Chapter 8 of the Espoo Report.

23. **The Authority also states that the consultation document identifies reasonably well the importance of the project area for fisheries and the fisheries operating in the area. Finnish fisheries in the immediate area are not recognised. The consultation document states that fishing will cease completely in the project area of the wind farm, but there is no more in-depth analysis of the effect of this. Furthermore, there is no detailed information on**

fishing, which means that the effects cannot be assessed. The company does not present any proposals to limit the impact on fishing.

As mentioned above (see response to Opinion 21), Finnish landings in ICES Divisions 44G9 and 43G9, where the Ran wind farm constitutes 3 % of the total area, are less than 500 tonnes per year over the last decade (LUKE 2023). It is primarily Swedish commercial fisheries that will be directly impacted by the construction of the Ran wind farm, as further detailed in section 7.6 of the Espoo Report. Pelagic fishing is conducted within the wind farm, which is not subject to area restrictions given that pelagic fish species have extensive geographical ranges for foraging and spawning. It is therefore possible to redistribute fishing activities to other areas. Moreover, the Swedish government has proposed an expansion of the trawl limit around the coast and a relocation of this limit to a distance of twelve nautical miles from the coast. However, no formal decision has yet been taken on this proposal. This would entail a trawling ban within Ran wind farm irrespective of whether the wind farm is constructed or not. Overall, the construction of the Ran wind farm is therefore assessed to mainly give rise to local effects on individual fishermen and fishing trips, and no significant transboundary impact on commercial fishing in the region.

There is extensive research on the effects of wind farms on fisheries, including academic studies and government reports. Based on this material, it has been assessed that the impact on fish populations and stocks is small to negligible, despite the worst-case assumption. See further discussion in section 7.6 of the Espoo report on commercial fisheries.

The Company is in dialogue with several interest groups for Swedish commercial fishing on strategies to increase the opportunities for coexistence between Ran wind farm and commercial fishing. For example, the distances between the turbines will be over one kilometre, which may enable some trawling to take place in parts of the park area. The location of cables and other components can also be adapted to enable fishing in certain areas. The Company is also exploring the possibility of implementing various nature-positive measures that could increase marine biodiversity in wind and energy parks, which may include, for example, artificial structures and materials. This could have positive effects on fish populations and also local fisheries in the vicinity of the wind farm. However, any assumptions about the possible coexistence of commercial fishing activities and wind farms are currently subject to considerable uncertainties. It is not the wind farm developer (i.e. the Company), or the owner, but the Swedish Maritime Administration that makes decisions on restrictions on shipping and fishing within the wind farm based on risk assessments and current legislation.

24. **Furthermore, the authority points out that the document does not take a position on the fact that a significant part of the project area in the Swedish MSP is designated for commercial fishing (national interest for commercial fishing), not for energy production. According to the MSP, fishing vessels must be able to fish in these areas (Conditions for conducting commercial fishing must be maintained. Good accessibility for commercial fishing vessels to harbours and fishing areas suitable based on variations over seasons and years shall be taken into account), which is contrary to the establishment of wind power.**

The marine spatial plans provide guidance based on which sectoral interests are to be considered in decisions on the use of society's common marine areas. However, they are not legally binding. Ran wind farm overlaps the national interest Salvorev/Midsjöbank (RI YF 7) to an area of 153 km^2, which is 2.1 % of the entire national interest. Since Ran wind farm only

constitutes a very small part of the entire national interest area and the boundaries are in practice variable and more diffuse (depending on how the fish stocks move) between fishing years, the establishment is not deemed to have a significant impact on future commercial fishing within and closest to the designated Salvorev/Midsjöbank national interest. The possibility for commercial fishing vessels to navigate through the wind farm will not be restricted either, and thus the accessibility of harbours or fishing areas outside the Ran wind farm is not expected to be significantly affected.

25. **The Authority considers that the following issues need to be thoroughly clarified:**
    a. **It is necessary to find out the current fishing utilisation in the area for all EU countries and how the project will affect fishing opportunities.**

The potential environmental impact of commercial fishing in the Eastern Gotland Sea has been evaluated as part of the environmental impact assessment process. It is not justified or necessary to analyse each nation's fishing activity in the area to describe the impact on commercial fishing. Pelagic fisheries are conducted with similar equipment and methods regardless of nation. Therefore, high-resolution geographical data from the most active fishing nations is considered to provide a representative picture of the fishing activity around Ran wind farm. See section 7.6 on commercial fishing in the Espoo report.

    b. **Potential trawl routes and haul-out sites will be identified (through VMS data and interviews).**

Analysing ICES commercial fisheries data in sub-area 27.3.d.28.2 (Eastern Gotland Sea), Sweden, Latvia, Denmark, and Lithuania were identified as the most active fishing nations in the area, accounting for >90 % of the landings. An analysis of VMS data from these four nations shows that only Sweden,Denmark and Finland have fished within Ran wind farm during the years 2019-2021, and that Sweden landed 90 % of the herring and sprat landings (section 7.6 of the Espoo report). The Company has been in contact with the Finnish authorities about high geographical resolution data but has not received any response. Neither did Germany, Poland and Estonia provide data from which landing positions could be deduced. Since Sweden dominates local fishing in the area around the Ran wind farm, the analysis of how Swedish fishing is conducted should be transferable to the corresponding fishing activity of other nations in the area, as analysed and described further in section 7.6 of the Espoo report.

In summary, fishing activity is highest in the north-eastern part of the Ran wind farm. The trawl track runs parallel to the Gotland coast and follows the bottom topography.

    c. **Areas where trawling becomes impossible must be labelled. The way in which fishing can be enabled (e.g. through trawl corridors or changes to project area boundaries) should be described where appropriate.**

The assessments of the impact on commercial fishing have been based on a worst-case scenario where no trawling will be possible during the construction and operational phases of the wind farm. The company intends to maintain a continuous dialogue with commercial fishing producer organisations regarding possible amendments to the design of the wind farm.

    d. **The long-term consequences of a possible decommissioning or disaster must also be considered. The decommissioning capacity of power plants and other structures**

must be assessed. In the Authority's view, the technical conditions for safe trawling do not exist when the distance between the wind turbines is less than three kilometres.

The risks associated with the activity have been described in the environmental impact assessment and the Espoo report, see section 7.7 of the Espoo report. The activity is not considered to give rise to any unacceptable risk from a transboundary perspective, provided that the proposed protective measures are followed.

The decommissioning phase is so far in the future that the method for decommissioning the wind farm cannot be predicted. Decommissioning will be carried out in accordance with the practices and legislation in force at the time of decommissioning. Wind turbines, foundations and transformer/inverter stations will be dismantled and the sites where the foundations have been laid will be remediated to the required extent.

Even after the wind farm has been decommissioned, parts of the wind farm area may be inaccessible to demersal bottom trawl fishing where parts of the foundations, buried cables and pipelines, and erosion protection are left in place after decommissioning. However, pelagic fishing is likely to resume as the positions of the foundations are known even when dismantled, and as the foundations will be separated by about one kilometre.

Opinions are divided on the distance required for pelagic trawling to take place within a wind farm and three kilometres is a relatively long distance. According to Koehler and Bergström (2023), based on the current size of trawls and fishing vessels, it is possible to operate at a distance of around one kilometre (Koehler & Bergström 2023).

e. **The Authority considers that modelling of the passage of sediment clouds caused by construction works should be carried out and the impact on the chemico-physical conditions of the water (e.g. O_2 and nutrients) should be assessed, both in terms of the construction activities and the subsequent changes in the bottom profile.**

Sediment modelling has been carried out regarding sediment dispersion that may occur during construction work. The sediment modelling is based on a worst-case scenario, which means a scenario where the greatest possible sediment dispersion could occur, which is during the drilling of foundations and the laying of cables. The results of the sediment modelling show that sediment dispersion is very localised from the park area and that the sediment plumes that spread outside the park area, according to the analyses, are very short-lived and contain lower concentrations than within the park area. The amount of nutrients within the park area will therefore have a very limited spread and the impact on oxygen levels will be limited. The overall assessment for all coastal water bodies is that the activity will not lead to any deterioration in the status of the physico-chemical quality factor. For further description of the sedimentation modelling, see section 6.2.1 of the Espoo report.

f. **Timing options for expected sediment discharges should also be presented so that disturbances can be related to other future projects. Based on this, an assessment of the harmfulness to the spawning grounds, benthic fauna and oxygen status of the bottom waters in the affected area shall be made.**

No cumulative effects will arise as sediment dispersion from the Pleione energy park and Ran wind farm is localised and short-lived. In addition, to further prevent cumulative effects with other possible planned projects, the Company has proposed an undertaking that the operator will submit an installation plan to the supervisory authority describing how cumulative effects with other projects will be minimised, if necessary.

No significant impact is expected on spawning areas, benthic fauna and oxygen conditions in the bottom waters in the areas concerned.

g. **Where appropriate, proposals should be made on how to avoid overloading sensitive areas (e.g. technical solutions, construction strategies such as construction interruptions).**

Based on the response to Opinion 25f, no significant impact is deemed to occur on spawning areas, benthic fauna and the oxygen status of the bottom water in the areas concerned. As sediment dispersion is localised and short-lived, the impact is deemed to be negligible, and no sensitive areas will be overloaded.

h. **Changes in flow conditions and stratification: the wind farm area is large enough to allow for effects on surface flows (wind weakening, swelling and subsidence). These can affect water stratification, temperature and nutrient concentrations, salt, and oxygen at different depths. In theory, stronger stratification can alter nutrient concentrations in surface waters, causing changes in fish production and blue-green algal blooms.**

The altered wind field in the wake of the park may lead to some reduction in surface currents and wave heights. In the area of interest, this is only expected to affect mixing in the upper part of the water mass above the halocline. This impact is most relevant during summer when there is temperature stratification. However, the impact is assessed to be small and not to lead to any significant change in the aquatic environment. Regarding primary production in relation to hydrographic conditions, any changes are assessed to be mainly redistributive, i.e. primary production increases locally in one area while decreasing locally in another, but that there will be no significant difference overall on a regional scale and thus not for algal blooms or fish reproduction either. The hydrographic changes are not considered to contribute to any transboundary impact and are therefore not described further in the Espoo report, see further description in section 6.2.4 and on the hydrography and meteorology of the wind farm area in section 3.3.3 of the Espoo report.

i. **Environmentally hazardous releases and potential for accumulation in fish: A list of substances/compounds, estimated release rates and time intervals, and an estimate of their accumulation in commercial fish shall be kept. At least the following shall be considered as possible sources: sediments, drilling chemicals, protective paints, lubricants for turbines and moving parts, coolants for transformers.**

The risk assessment considers and analyses a number of chemicals, including diesel and transformer oils, which are classified as Seveso chemicals. The focus of the assessment is on the measures that would be required to manage a potential accident. It is not considered that a minor leak would pose a significant environmental risk. However, a major accident involving a large release of diesel and transformer oils has been assessed as having the potential to impact a

larger area. Consequently, requirements have been established regarding leakage protection that can handle the entire contents of the tank. Furthermore, procedures and equipment will be available on maintenance vessels to delay and limit an environmentally hazardous spill while awaiting the arrival of the Swedish Coastguard.

Protective paints and lubricants can emit PFAS, but both the Swedish Society for Nature Conservation and the Swedish Environmental Protection Agency estimate that wind farm activities constitute an insignificant part of all emissions of PFAS into nature (Swedish Society for Nature Conservation 2023, Swedish Environmental Protection Agency n.d.). According to the Swedish Environmental Protection Agency, PFAS from wind turbines do not end up in drinking water or food such as meat, eggs and fish to which people are exposed.

Coolant is needed for the gearbox (if present), generator and electronics. Common coolants are water and glycol mixtures or biodegradable synthetic esters. The majority of coolants are collected in the event of a leak. In case of a leakage of coolants present in the engine room, these are collected in the engine room. For those coolants that cannot be collected, coolants authorised for release to the environment are selected.

Within the wind farm, drilling fluids may be involved mainly during foundation drilling or geotechnical investigations involving drilling. Drilling fluids are needed, for example, to lubricate and cool the drill head and stabilise the borehole. For offshore drilling, mainly water-based non-toxic and inert fluids such as bentonite or xanthan gum are used and mixed with water. These drilling fluids are widely used for drilling in the marine environment. Other biodegradable and non-toxic substances, such as guar gum, may be used in drilling.

The platforms are usually designed to collect chemicals in case of leakage. The capacity for collection is equivalent to or greater than the maximum amount of chemicals present. The probability of an external leakage during normal operation is therefore very low.

The Swedish National Food Agency carries out regular inspections and random sampling of wild-caught fish in the Baltic Sea intended for human consumption. The toxins measured are dioxin-like PCBs and dioxins, which can accumulate in fatty fish such as herring and salmon. Commercial fishing in Ran wind farm is focused on forage fish and the landing is thus not intended for human consumption. In addition, there is not much commercial fishing in the area, on average 11-12 times per year, which means that any accidents or spills have a chance to be detected in time and a possible fishing ban or extra sampling of fish can be introduced before the next fishing takes place in the area. The main Swedish salmon fishing in the Baltic Sea currently takes place in the Bothnian Sea and the Gulf of Bothnia in connection with the large spawning rivers.

Contaminants may be present in sediments on the seabed which are loosened and dispersed by currents during construction and decommissioning of the wind farm. This is mainly the case if the seabed consists of soft accumulation seabed with finer sediments. The seabed substrate within the wind farm area is dominated by mixed substrate, which minimises the accumulation and dispersion of contaminants during wind farm works. See section 3.3.2 of the Espoo report on seabed substrates and contaminants in and around the park area.

In conclusion, it is considered that sufficient measures are in place to prevent the release of chemicals into the environment, and it is therefore considered unlikely that the project will lead to a significant spread or accumulation in fish of chemicals.

j. Accidents also occur and, for example, the potential release scenarios for sabotage (worst case) need to be assessed in terms of their impact on fisheries.

The potential impacts of the planned activity on commercial fisheries have been evaluated throughout the construction, operational and decommissioning phases of the wind farm, in accordance with established best practice. A risk analysis has been conducted for the project in order to identify any unplanned events that may occur during the aforementioned phases and to ascertain the measures that can be taken in order to minimise the risks associated with such occurrences. Potential risks may include environmental risks (e.g. oil or other chemical spills), accident risks (e.g. tower falls or explosions) and risks resulting from external events. Risks that may arise from the activities will be continuously managed and minimised through, among other things, detailed risk analyses, and the implementation of various protective measures and procedures. Examples of such measures are the equipment that will be in place to collect spillages of oil and other liquid chemicals from wind turbines and substations. With the proposed measures, the planned operation is not considered to give rise to any unacceptable risks. Reference is also made to the contingency and rescue plan that will be drawn up after consultation with the relevant authorities and that will prepare the organisation for possible emergency situations.

k. Research-based assessment of the impact of wind farm structures and possible artificial reefs on ecosystem structure and fish stocks (reef effect): The positive reef effect mentioned in the document is a theory that needs to be proven in relation to the site-specific conditions prevailing in the park area. The document also mentions that there are no significant populations of relevant species due to the depth of the area. The reef effect is an alteration of natural ecosystems that must be managed primarily according to the precautionary principle.

A number of studies have demonstrated that wind turbine foundations have the effect of creating reefs, which in turn lead to an increase in the number of fish and species in the vicinity of the turbines. For the Lillgrund wind farm, for example, a control programme was conducted over the course of 2002-2010. Overall, no negative impact on fish communities was observed in Lillgrund. Instead, a redistribution of fish and an increased occurrence in the vicinity of individual wind turbines compared to 100 metres away was noted, particularly of eel (yellow eel), cod, goldsinny wrasse, and shorthorn sculpin (SwAM, 2013). A number of fish species observed in and around the Ran wind farm may benefit from a reef effect created by wind turbines and erosion protection, including cod and seaweed. However, the depth of the area, the low salinity and the relatively long distance between foundations mean that any reef effect will be localised and limited in scope. Nevertheless, these structures can enhance biodiversity by increasing the attractiveness of the area for a number of species compared to the homogeneous environment that currently exists. For further description of artificial reefs and the reef effect, please refer to sections 4.3.7 and 6.2.4 of the Espoo report, respectively.

l. Alien species strategy: The Baltic Sea is sensitive to alien species, which can also have a negative impact on fish stocks. If other wind energy projects are realised, it is likely that construction and dredging vessels and foundations will be imported from

other countries outside the Baltic Sea. Such equipment may be a more suitable platform for the establishment, survival and settlement of various organisms than regular commercial vessels. The project manager must have an understanding of the threat of invasive species and a strategy to deal with it. "The 'stepping stones' effect of the park's artificial structures must be taken into account, for example, when choosing different building materials. The thermal and reef effects (localised eutrophication) should also be assessed in this context. Permanent species monitoring is desirable.

The majority of components for the wind and energy park will be transported from a final assembly harbour in the Baltic Sea directly to the park area. This eliminates the potential risk of introducing alien species in connection with these shipments. Nevertheless, it is possible that some components may be shipped from international manufacturers directly to the park area. All ships engaged in international voyages are subject to the provisions of the Ballast Water Management Convention, which was established with the objective of preventing the spread of alien organisms. Furthermore, this is also regulated in Swedish legislation through the Ballast Water Act (2009:1165), the Ballast Water Ordinance (SFS 2017:74) and the Swedish Transport Agency's regulations on the handling and control of ships' ballast water and sediment (TSFS 2022:19). The legislation includes regulations on the handling of ballast water and limits on the number of living organisms that may be discharged. The brackish water conditions of the Baltic Sea render the area of the wind farm an unsuitable habitat for the majority of marine and freshwater species. The likelihood of the activity contributing to the introduction of non-native species is considered low, and the magnitude and extent of the impact is considered insignificant. For further details, please refer to section 6.2.5 of the Espoo Report.

1.2.7 The Association of Bothnian Bay Fishing Communities

26. The Association of Bothnian Bay Fishing Communities states that massive offshore wind energy projects are currently planned in the northern parts of the main basin of the Baltic Sea and in the entire Gulf of Bothnia, including the Gulf of Bothnia, both on the Swedish and Finnish side, and especially in the Exclusive Economic Zone. The effects of these on migratory fish or local fish stocks and commercial fisheries have not been sufficiently researched and assessed. For example, how large an area of sea will offshore wind farms close off to commercial fishing?

The establishment of wind farms does not in itself imply fishing prohibition zones. It is, however, accurate to state that certain fishing methods may be subject to restrictions for reasons of safety, including pelagic and bottom trawling. With regard to the Ran wind farm, it should be noted that pelagic trawling represents the predominant fishing method, with the result that fishing can be relocated to surrounding areas (see response to Opinion 23). Furthermore, the wind farm area represents only a limited portion of the total area in which active commercial fishing is conducted. The transboundary impact of commercial fishing in terms of displacement is assessed as negligible to very small. A cumulative assessment has been carried out with regard to commercial fishing, from which it can be concluded that the impacts, both locally and transboundary, will be very small. See section 7.6 of the Espoo report.

There are not considered to be any important migration routes within the Ran wind farm. Nor is the park area an important feeding area for migratory fish such as salmon and trout. The assessments are based on ICES fish data (so-called BITS surveys) and the field surveys that

NIRAS, on behalf of the Company, has conducted and the studies cited therein. Since no significant migration is expected to occur within the park area, only a negligible impact is deemed to arise in relation to the migration of individual fishes. Thus, there will be no impact at the population level.

27. **Furthermore, the Association of Bothnian Bay Fishing Communities states that the cumulative effects of the project have not been assessed at all. Cumulative effects must be objectively assessed and critically scrutinised, so that the same thing does not happen in marine areas as with hydropower development.**

    In the assessment of cumulative effects, the starting point has been to include the existing and permitted activities that are in the vicinity of the park area, and which could potentially contribute to cumulative effects arising together with the Ran wind farm. In the assessment made by the Company regarding cumulative effects that may arise on fish, other existing, ongoing and permitted activities have been considered. Overall, no impact is deemed to arise at population level and the cumulative impact on fish, including migratory fish, is deemed to be negligible. In this context, it can also be mentioned that wind farms can have a positive impact on fish by restricting commercial fishing within the wind farm. This can, in the long term, improve the stock status of several commercial fish species. In the long term, this could also benefit commercial fishing in surrounding areas.

    For a more detailed description of the assessment for fish, please refer to section 7.2 of the Espoo Report and for the cumulative effects to chapter 8 of the Espoo Report.

28. **The Association of Bothnian Bay Fishing Communities points out that most of the annual stocking of migratory fish (sea salmon, trout and Baltic salmon) takes place in the mouths of constructed rivers in the Bothnian Bay. In addition, the most important rivers for the natural reproduction of Atlantic salmon in the whole Baltic Sea region (Torne River and Simo River (Simojoki)) are located in the Bothnian Bay. The migratory fish mentioned above forage as far as the main basin of the Baltic Sea, travelling through offshore wind energy areas in search of food and returning to spawn in their home rivers in the Gulf of Bothnia. At present, there are no reliable research data on the effects of offshore wind farms and their power cables on migratory fish. These need to be investigated before wind power is built uncontrolled in marine areas. The studies should be commissioned by an impartial party (e.g. SLU and Luke) at the expense of the project promoter.**

    The assessments in the environmental impact assessment also cover migratory fish, see section 7.1 of the Espoo report. Ran wind farm is not considered to be an important migration route or feeding area for migratory fish, see the response to Opinion 26 above.

    It is true that only a few studies have examined the impact of offshore wind energy on migratory fish. Several species of fish are magnetosensitive and use the geomagnetic field for navigation. Electromagnetic fields are generated around power cables, which these fish species are able to sense. However, the studies that have investigated how migratory magnetosensitive fish species such as eel and various salmonids are affected by wind farms and/or power cables have not found that the migration of the fish species has been significantly affected (see, for example, Dunlop et al. 2016, Bergström et al. 2013, Lagenfelt et al. 2012, Wyman et al. 2018). Based on these studies, Ran wind farm is not considered to constitute an obstacle to migration. Nor are

foraging opportunities deemed to be affected for fish that actually migrate through Ran wind farm between the Gulf of Bothnia and the Southern Baltic Sea.

It is not feasible to conduct site-specific investigations into the potential impact of the Ran wind farm on the migratory behaviour of migratory fish prior to the construction of the wind farm. Based on the available studies, the transboundary effects are considered to be negligible, with no impact at the population level. Consequently, there is no need to conduct a site-specific study for Ran wind farm following construction.

1.2.8 Finnish - Swedish Transboundary River Commission

29. **The Finnish-Swedish Border River Commission points out that the project may have an impact that extends to the Torne River through impacts on migratory fish. Torne River salmon migrate all the way to the southern Baltic Sea and are thus likely to cross the project area or undersea cables carrying generated electricity to shore. The purpose of the Boundary Waters Agreement states that special attention shall be paid to the protection and sustainable use of fish stocks (Art. 2.2.d). Given the large amount of planned offshore wind energy in the Baltic Sea and the Gulf of Bothnia, the Boundary Rivers Commission considers it important to act according to the precautionary principle and to thoroughly investigate the possible combined and cumulative impact on migratory fish stocks of all planned wind energy projects in the entire Baltic Sea area as a whole. The Commission emphasises that it should be considered a stakeholder in the matter, as marine activities such as large-scale offshore wind energy could potentially affect migratory fish stocks.**

Ran wind farm is deemed to have no more than a negligible impact on the migration of individual fishes, see response to Opinion 26 above. Cumulative effects have been considered in the assessment. The overall assessment is that cumulative effects on fish, including migratory fish, are deemed to be negligible, see response to Opinion 27 above.

1.2.9 The Finnish Professional Fishermen´s Association (SAKL)

30. **SAKL notes that a large number of offshore wind industry areas are currently planned for the Bothnian Sea, the Gulf of Bothnia and the northern parts of the Baltic Sea main basin without much coordination and analysis of cumulative effects. In practice, the project areas will become no-fishing zones.**

In the assessment of cumulative effects, the starting point has been to include the existing and permitted activities that are in the vicinity of the park area, and which could potentially contribute to cumulative effects arising together with the Ran wind farm. This is because wind power projects in earlier stages of development are associated with inherent uncertainties in terms of e.g. design and feasibility. It is therefore difficult to predict and assess the environmental impact. The cumulative effects that could arise are described in Chapter 8 of the Espoo Report.

As indicated in the Swedish Environmental Protection Agency's report, "Ecologically Sustainable Wind Power in the Baltic Sea," an expansion of approximately 90 TWh, as requested by the Swedish government, may necessitate the utilization of a total sea area of approximately 3,500 km², representing 1% of the Baltic Sea surface (Isæus et al., 2022). Given the dynamic nature of pelagic commercial fishing for herring and sprat within the Ran wind farm, it is anticipated that this

activity can be redistributed to surrounding areas where wind farms have been constructed, even if this represents up to 1 % of the surface area.

The establishment of wind farms does not in itself imply fishing prohibition zones. It is, however, accurate to state that certain fishing methods may be subject to restrictions for reasons of safety, including pelagic and bottom trawling. With regard to the Ran wind farm, it should be noted that pelagic trawling represents the predominant fishing method, with the result that fishing can be relocated to surrounding areas. Furthermore, the wind farm area represents only a limited portion of the total area in which active commercial fishing is conducted. The transboundary impact of commercial fishing in terms of displacement is assessed as negligible to very small.

31. **SAKL mentions that the above-mentioned sea areas are important for the Finnish fishing industry. In November 2023, Luke published the report "Fishing areas of the Finnish trawl fleet in the Baltic Sea in 2010 - 2022". The effects of a possible offshore wind farm (Ran) on fish landings (especially herring, sprat and salmon) and Finnish fisheries need to be thoroughly investigated. The long-term importance of the project area for commercial fisheries should be assessed. It is particularly important that the cumulative effects of the project with other planned offshore wind farm areas are examined.**

According to the cited compilation of Finnish fisheries in the Baltic Sea by the Finnish Natural Resources Institute (LUKE 2023), Finnish fisheries are concentrated in the Bothnian Sea and the Gulf of Bothnia. Finland is not considered to be affected by the wind farm, either alone or taking into account other projects. Please, see the response to Opinion 22 for further description of Finnish fisheries and cumulative effects.

1.3 Latvia

1.3.1 The Nature Conservation Agency

32. **The Nature Conservation Agency states that the project may not cause a significant negative impact on seabirds in the Latvian territorial sea, however, the possible long-term effects of the different reactions of birds to wind farms at the population level are difficult to estimate. Accurate and systematic assessments are needed to maintain a reliable and justified view.**

Knowledge of the presence of birds in and around the Ran wind farm area has been obtained from factual data and research as well as the inventories carried out in the area by the County Administrative Board of Gotland, the Swedish Environmental Protection Agency's environmental monitoring and inventories conducted on behalf of the Company. The Company's inventories have been carried out over several seasons and years to take account of interannual variations. In addition, the results obtained during inventories of the Pleione energy park are reported where the results are deemed relevant to the Ran wind farm. A dialogue has also been conducted with bird experts and collision risk modelling has been carried out according to the Band model. The work has thus been carried out in a systematic way to assess whether the wind farm risks affecting long-term satisfactory population levels. Overall, the assessment has been made that the impact of the activity on assessed bird populations is negligible from a transboundary perspective, with regard to collision risk, displacement and barrier effect. To further minimise the impact in terms of collision risk, precautionary measures will be taken in the form of operational regulation for nocturnal migratory small birds and the application of 30 metres of clearance. The

impact of the operation on nocturnal migratory birds will also be monitored as part of a survey programme. For further description of the impact on birds, please refer to section 7.4 of the Espoo Report.

33. **Furthermore, the Nature Conservation Agency considers that special attention should be paid to the aspects of bird behaviour and geographical distribution in the EIA of the project:**
    a. **It needs to be established which bird species occur in the park area, partly to what extent the park area is used for foraging during both winter and summer.**
    b. **A survey of migratory birds is required to determine how they choose their routes in relation to the planned park area, including direction and altitude.**
    c. **An assessment must be made of the potential barrier effect that may occur as well as possible avoidance strategies and the risk of collision.**
    d. **Analyse the cumulative effects that may occur with regard to the long-term operation of the wind farm.**

    In the environmental impact assessment for Ran wind farm, assessments have been made of the impact on birds, considering the risk of impact as a result of barrier effects, displacement and collisions. The assessments have been based on a solid foundation consisting of existing research, inventories carried out by the County Administrative Board of Gotland, the Swedish Environmental Protection Agency's environmental monitoring and inventories in the project area conducted on behalf of the Company.

    Through this data, the presence of bird species (including foraging bird species) as well as migration patterns, direction and altitude have been mapped. The Company refers to what is described in section 7.4 of the Espoo Report.

    As far as cumulative effects are concerned, it can be concluded that the project, neither alone nor together with other projects, is not expected to give rise to more than negligible impacts at the population level, see Chapter 8 of the Espoo Report.

34. **The Nature Conservation Agency considers that there is a potential transboundary impact for fish and marine mammals. Hence, the EIA of the project should assess and minimise the impact of wind energy construction on fish and marine mammals.**

    Ran wind farm could potentially have a transboundary impact on fish and marine mammals. An assessment has therefore been made in, please see sections 7.2 and 7.3 of the Espoo Report. Protective measures will be taken where deemed necessary to avoid, minimise or mitigate any impact. For example, for fish and marine mammals, protective measures in the form of soft start-up, double big bubble curtain (DBBC) and Hydro Sound Damper (HSD) will be applied. With the proposed measures, no impact on population level is expected to occur. Thus, the wind farm will not give rise to any transboundary impacts on these aspects.

35. **The Nature Conservation Agency also points out that it is important for the EIA of the project to make a cumulative assessment of (existing, permitted, planned) wind energy developments in the Baltic Sea.**

    In the assessment of cumulative effects, the starting point, in accordance with current legislation, has been to include the existing and permitted activities that are in the vicinity of the park area,

and which could potentially contribute to cumulative effects arising together with Ran wind farm. Wind power projects in earlier stages of development are associated with such uncertainty in terms of design and feasibility that it is difficult to predict the environmental impact.

In its response to Opinion 4 above, the Company has described the cumulative assessment carried out for the preparation of the environmental impact assessment and the Espoo report. For the majority of the environmental aspects, the cumulative effects are assessed to be negligible, but for commercial fishing, the cumulative effects are considered to be very small negative. For the aspects of fish, marine mammals, birds, bats and shipping, this has been described above in section 1.1.2 in the response to the Opinion 4. For the assessment of cumulative effects for all environmental aspects, reference is made to Chapter 8 of the Espoo Report.

36. The Nature Conservation Agency also urges that the new proposed Natura 2000 sites in Latvian waters should be considered in the EIA.

The three new proposed Natura 2000 sites within the Latvian EEZ are located approximately 60 kilometres, 100 kilometres and 150 kilometres from Ran wind farm. The values identified within each Natura 2000 site are mainly linked to the marine environment. Due to the large distance between each Natura 2000 site and the Ran wind farm, it is assessed that the planned activity will not have any impact on the values that the Natura 2000 sites are intended to protect. For a more detailed account of the transboundary impact of the activity on the marine environment, see sections 7.2, 7.3 and 7.4 of the Espoo report regarding fish, marine mammals and birds, respectively, where seabirds are the ones affected in this case.

1.3.2 The Kurzume Planning Region

37. The Kurzume Planning Region considers that the planned wind farm may have an effect on existing maritime safety, areas and navigation in the Baltic Sea, on accessibility to/from Latvian harbours and that in case of accidents or ship collisions, there are potential risks of marine pollution, possibly affecting the already heavily polluted Baltic Sea and its natural habitats.

The wind farm is planned in an area that is located between the shipping lanes where vessel traffic normally travels. Vessels will therefore not have to change their routes significantly compared to today. The wind turbines will be built at a distance from the shipping lanes so that there is time and space for evasive manoeuvres and emergency measures in the event of danger.

A nautical risk analysis (Reference Report R.7) has quantified the probability of various accidents, including collisions that could lead to oil spills. In evaluating the risks, no risks have been deemed unacceptable. The wind farm will have bilges that can be quickly deployed and contain spills, and the wind farm vessels can also be used for this purpose.

To prevent the risk of accidents and limit the impact in the event of an accident, a contingency and rescue plan will be drawn up after consultation with the Coast Guard and other authorities. The plan will describe, among other things, accessibility in the event of accidents or spills, as well as the possibility of cleaning up oil spills or releases of other chemical products that may have an impact on the surroundings. The impact of the wind farm in relation to risk and safety is described

in section 7.7 of the Espoo report. Furthermore, all protective measures to be taken are described in Chapter 9 of the Espoo Report.

2 References

2.1 Reference reports produced within the project

Reference report R.1 Fish in the Baltic Sea and offshore wind energy. Ran Wind Farm. NIRAS.

Reference report R.2 Ran OWF, Underwater noise prognosis. Construction and operation. NIRAS.

Reference report R.3 Marine mammals in the Baltic Sea and offshore wind energy. Ran Wind Farm. NIRAS.

Reference report R.4 Species protection investigation bird Ran. An offshore wind farm east of Gotland. Calluna.

Reference report R.5 Assessment of the impact on bat fauna at the proposed Ran offshore wind farm, north-east of Gotland. Eidolon Ecology.

Reference report R.6 Wind farm Ran. Commercial fishing in the Eastern Gotland Sea. NIRAS.

Reference report R.7 Nautical risk assessment. Ran offshore wind farm. SWECO.

Reference report R.8 Traffic analysis. Ran offshore wind farm. SWECO.

2.2 Text references

Bergström, L., Westerberg, H., Olofsson, H., Axenrot, T., & Sköld, M. (2007) Review of the state of knowledge on the effects of wind power on fisheries and fish stocks.

DHI (2016) Infauna Report for Swedish Waters in 2015: Environmental Baseline Survey of Seabed Sediments, Hydrological Conditions, Benthic Fauna and Chemical Warfare Agents in Sweden and Denmark. Nordstream 2. Project No.: 150814.

Dunlop, E. S., Reid, S. M., & Murrant, M. (2016). Limited influence of a wind power project submarine cable on a Laurentian Great Lakes fish community. Journal of Applied Ichthyology, 32(1), Article 1. https://doi.org/10.1111/jai.12940

Finnish Natural Resources Institute (LUKE), (2023). Lappalainen et.al. Fishing areas of the Finnish trawl fleet in the Baltic Sea in 2010 - 2022" [original title: Suomen troolilaivaston kalastusalueet Itämerellä vuosina 2010-2022.

SwAM (2013). Fish surveys at Lillgrund wind farm - Final report on the control programme for fish and fishing 2002 - 2010. rapport-hav-2013-18-lillgrund-20150312.pdf (Retrieved 2024-10-22).

HELCOM, (2023a). Population trends and abundance of seals - Harbour seals. HELCOM core indicator report. Online. [https://indicators.helcom.fi/indicator/harbour-seal-abundance/]. ISSN 2343-2543.

HELCOM, (2023b) Population trends and abundance of seals - Ringed seals. HELCOM core indicator report. Online. [https://indicators.helcom.fi/indicator/ringed-seal-abundance/]. ISSN 2343-2543.

Isæus, M., Beltrán J., Isæus S. E., Öhman C. M., Andersson-Li M., (2022) Ecologically sustainable wind power in the Baltic Sea: Final report for the project Marin MedVind - Basis for large-scale sustainable offshore wind power. Swedish Environmental Protection Agency.

Kikuchi R (2010). Risk formulation for the sonic effects of offshore wind farms on fish in the EU region. Marine Pollution Bulletin 60: 172-177.

Koehler, B., Bergström, L. (2023). Offshore Wind Power in Coexistence with Fisheries, Aquaculture and Nature Conservation?: An Initial Knowledge Synthesis. 2023:4.

Lagenfelt, I., Andersson, I., & Westerberg, H. (2012). White cabbage migration, wind power and alternating current fields, 2011 Stockholm: Swedish Environmental Protection Agency.

The Maritime and Coastguard Agency, (2004) Results of the electromagnetic investigations and assessments of marine radar, communications and positioning systems at the North Hoyle wind farm by QinetiQ and the Maritime and Coastguard Agency. EU1 QuinetiQ effects_of_offshore_wind_farms_on_marine_systems-2.pdf (utexas.edu) [Retrieved: 2024-09-13]

Swedish Society for Nature Conservation (2023). *Common myths about wind power.* Do wind turbines release microplastics into nature? (naturskyddsforeningen.se) [Retrieved: 2024-09-30].

Swedish Environmental Protection Agency (n.d.). *Questions and answers about wind power*. Questions and answers about wind power (naturvardsverket.se) [Retrieved: 2024-09-30].

Pangerc T, Theobald PD, Wang LS, Robinson SP, Lepper PA (2016). Measurement and characterisation of radiated underwater sound from a 3.6 MW monopile wind turbine. J. Acoust. Soc. Am. 140:2913-2922.

PIANC (2018). MarCom WG 161: Interaction Between Offshore Wind Farms and Maritime Navigation. PIANC.

Russell, D. J. F., Hastie, G. D., Thompson, D., Janik, V. M., Hammond, P. S., Scott-Hayward, L. A. S., Matthiopoulos, J., Jones, E. L. & McConnell, B. J. (2016), Avoidance of wind farms by harbour seals is limited to pile driving activities. J Appl Ecol, 53: 1642–1652 [https://doi.org/10.1111/1365-2664.12678]

Rydell, J., Engström, H., Hedenström, A., Kyed Larsen, J., Pettersson, J. & Green, M. (2011). The impact of wind power on birds and bats. Report 6467, Swedish Environmental Protection Agency.

SAMBAH (2016). Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise (SAMBAH). Final report under the LIFE+ project LIFE08 NAT/S/000261. Kolmårdens Djurpark AB, SE-618 92 Kolmården, Sweden. 81pp.

SLU Artdatabanken (2020). Red-listed species in Sweden 2020. SLU, Uppsala.

SLU Artdatabanken (2023). Artfakta - Vikare *Pusa hispida.* https://artfakta.se/artinformation/taxa/pusa-hispida-100104 [Retrieved 2023-11-22].

Tougaard J, Hermannsen L, Madsen PT (2020). How loud is the underwater noise from operating offshore wind turbines? The Journal of the Acoustical Society of America 148: 2885.

Wyman, M. T., Peter Klimley, A., Battleson, R. D., Agosta, T. V., Chapman, E. D., Haverkamp, P. J., Pagel, M. D., & Kavet, R. (2018). Behavioural responses by migrating juvenile salmonids to a subsea high-voltage DC power cable. Marine Biology, 165(8), 134. https://doi.org/10.1007/s00227-018-3385-0