Deep Wind Offshore

Offshore Wind farm
Erik Segersäll

Consultation Document

March 2022

Consultation for wind farm Erik Segersäll

Deep Wind Offshore is investigating possibilities for building an offshore wind farm, called Erik Segersäll, in Sweden's economic zone (SEZ) and is now conducting consultations. The consultation process gives authorities, organisations, individuals and the general public the opportunity to contribute with information and comments (consultation statement). A written statement is requested no later than May 16, 2022. You can visit the project's website here: https://www.deepwindoffshore.com/erik-segersll-vindkraftpark.

In the consultation document, the company provides information about the planned operations and wishes to obtain views on the project, e.g. regarding its location, design, scope and whether there are specific aspects that should be taken into account in the environmental impact assessment (EIA).

Erik Segersäll covers an area of about 1100 km^2, which is estimated to be able to accommodate a maximum of 240 25 MW wind turbines with a maximum height of 370 metres or a maximum of 300 20 MW turbines with a maximum height of 350 metres, which could be a reasonable turbine size when the wind farm is estimated to be realised. The consultation therefore concerns a maximum of 300 wind turbines with a maximum height of 370 metres. Considering the water depth at the site, the wind farm is planned to be developed on floating foundations moored to the seabed. Other equipment includes substations for electricity transmission and possibly also equipment for energy storage systems. Whether these will be floating or bottom fixed will be decided at a later stage of the project.

The area is not situated within any protected area for the natural environment, cultural environment, fishing or shipping. The area adjoins a Defence Naval Exercise Area to the southwest. Shipping lanes adjoin the area's northeastern and northwestern boundaries. The distance to Gotska Sandön is just over 30 km, and to Fårö almost 70 km. The Stockholm archipelago is more than 40 km away. Visibility from land is limited by the large distance between the wind farm and the viewer and by the fact that visibility is largely obscured by the terrain between the mainland and the project area. Investigations and inventories regarding the impact on both the natural environment, cultural environment, business, outdoor life and other interests will be described in the forthcoming environmental impact assessment, which is an appendix to the permit application.

Consultation statements are submitted to the e-mail address eriksegersall@deepwindoffshore.com, or by letter to:

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1 BACKGROUND

1.1 Introduction

Deep Wind Offshore plans to establish an offshore wind farm in the Northern Baltic Sea north of Gotland County and off the coast of Stockholm County in Sweden's economic zone (Figure 1). The planned wind farm is called Erik Segersäll.

Sweden's energy policy goal is that Swedish electricity production should be 100% renewable by 2040 and that no net emissions of greenhouse gases should be made to the atmosphere by 2045. To adapt to this, more and more companies and industries are switching to fossil-free production and operations, which means that the demand for both renewable electricity and fossil-free fuels is increasing. Electrification and thus electricity demand are also increasing in the transport sector and in society in general. A forecast for Sweden's future electricity demand for 2045 amounts to between about 240 TWh and about 310 TWh per year, compared with today's needs of about 140 TWh per year (Energiforsk, 2021).

Swedish Wind Energy has compiled a report in which it is estimated in a main scenario that the need for electricity will triple by 2050 and by then amount to 370 TWh per year. In addition, a 50 percent increase in electricity demand is expected already within this decade, when electricity demand is expected to rise to 207 TWh by 2030 (Swedish Wind Energy, 2021).

Today, renewable electricity production accounts for about 60%, with the majority coming from hydropower. Since Sweden's goal is for electricity production to be 100% renewable by 2040, the Swedish Energy Agency estimates that an addition of 100 TWh of renewable electricity production will be needed by the 2040s. Partly to replace existing electricity generation that reaches its economic lifetime and partly to meet the expected increasing electricity use. In the period up to 2045, several of the existing electricity generation facilities will reach the end of their design lifetime. In southern Sweden, for example, a number of nuclear reactors are due to be decommissioned. The possibilities for supplying renewable electricity from northern Sweden (mainly hydropower) are limited by a strained transmission capacity in the transmission network, as well as by an increasing demand for renewable electric power also in the north. Offshore wind power built in strategic locations off the coast of southern Sweden can offer a competitive production of electric power that can be directed directly to southern Sweden to meet electricity demand where it is largest (Swedish Energy Agency, 2018).

The Swedish Energy Agency states that offshore wind power by 2045 will account for at least 20% of the increased energy demand, while Svensk Vindenergi in its report points out that an expansion of offshore wind power of just over 40 GW by 2050 would be reasonable.

Wind Europe has estimated the need for 450 GW of offshore wind power if Europe is to reach its zero emissions targets by 2050. Further, this has been broken down into relevant targets by country, where the scenario for Sweden is 20GW offshore wind power by 2050 (Wind Europe, 2019).

1.2 Offshore wind power

Offshore wind has great potential to help meet the increasing demand for competitively priced renewable electricity. Out at sea, the winds are stronger, more stable and more frequent than on land, while at the same time larger and more wind turbines can be installed. The Erik Segersäll wind farm is expected to have a total installed capacity of 5000–6000 MW and to be able to produce over 20 TWh of electricity per year, which roughly corresponds to the entire Stockholm County's electricity consumption in 2020. The establishment of the park will probably be divided into several stages.

Offshore wind power can also be used to produce hydrogen or other so-called e-fuels for supply of fossil-free fuels for industry, transport and agriculture. The development of these technical solutions for energy conversion is advancing rapidly, in Sweden and in the rest of the world, which in the long term will enable energy storage and a more stable and secure electricity supply.

Offshore wind power is a young industry with great opportunities to ensure Sweden's and Europe's long-term value creation. The Swedish supplier industry has good conditions for asserting itself internationally. However, this requires a domestic market with wind farms of sufficient size. Increased production of renewable energy is also a crucial prerequisite for securing a sufficient amount of renewable energy for both existing and new power-intensive industries. The impact of developing offshore wind power is therefore great in terms of jobs, value creation and a greener future.

Wind power creates jobs both offshore and onshore, first during construction and then during operation and maintenance. Studies show that offshore wind power can create 1,500–4,000 annual jobs in Sweden by 2030 and up to 10,000 annual jobs by 2050. In total during the period 2025–2050, offshore wind power is estimated to give rise to 165,000 annual jobs (Swedish Vindenergi, 2021).

1.3 About Deep Wind Offshore

Deep Wind Offshore is a developer and owner of offshore wind farms, with projects under development in Norway as well as in South Korea and other countries on several continents. The company has strong backing from industrial owners in shipping/offshore and electric power, who together represent complementary and crucial competencies to develop large offshore energy projects. The company has a project portfolio of about 10 GW and aims to be a future full-fledged independent power producer (IPP). The company currently has about twenty employees.

Deep Wind Offshore aims to be the local developer wherever we work in the world, which means that we create a strong local platform where we establish ourselves. Deep Wind Offshore is not tied to any specific technical solution but is free to choose the one that is best suited for the specific area. We have a strong focus on technology development, and we work to optimize local participation in the supply chain for the various projects. We have solid knowledge of areas of offshore wind farms and other offshore technologies and we are convinced that dialogue and cooperation with various stakeholders in offshore industries is the key to success.

The company has an organisation that has been built up with the purpose of developing and operating offshore wind power projects. Deep Wind Offshore is led by an experienced management team that has established a number of what could be the world's first industrialised floating offshore wind project. The majority shareholders in Deep Wind Offshore are Knutsen Group, Haugaland Kraft and Sunnhordaland Kraftlag (SKL). The expertise and resources of our owners are actively used within Deep Wind Offshore, which gives the company high competence and long experience in a number of key areas. Deep Wind Offshore has main offices in Haugesund, Norway and offices in Korea and Sweden.

Knutsen Group is the world's second largest operator of shuttle tankers and among the world's largest in LNG transport. Knutsen Group has a strong technology environment and great expertise in project development with a demonstrated ability to deliver complex industrial projects. Haugaland Kraft is a regional network/infrastructure company whose main activity is the transmission and sale of electric power, as well as the development/operation of fiber networks. SKL is a power company that owns, operates and develops power plants. The company has solid experience throughout the value chain from project development to licensing processes and impact assessments, through development with follow-up of environmental requirements, to technical and economic operation of power generation in an international power market.

Deep Wind Offshore and EDF Renewables recently announced a partnership with 50/50 co-ownership of the offshore wind power calls in Norway: Utsira Nord and Sørlige Nordsjø II. The aim is to bid for these projects, as well as to develop, build and operate the wind farms. Together, Deep Wind Offshore and EDF Renewables have solid expertise in the marine sector as well as in the development and operation of large-scale electric power projects. EDF Renewables is a leading developer and operator of both bottom-fixed and floating offshore wind power while Deep Wind Offshore's owners operate a variety of hydroelectric power plants.

The company also participates in several research and development projects together with other companies and organizations:

- "Next generation offshore wind farm", a project awarded NOK 10 million from Enova to reduce the cost of offshore wind farms, with Deep Wind Offshore as project manager.

- "Ocean grid", where SINTEF Energy Solutions is leading the project received NOK 85 million from the Norwegian government to enable the development of a transmission network in the North Sea.
- "Impact wind", a project awarded NOK 28 million by the Research Council of Norway to streamline the application process, where NORCE leads the project.

2 CURRENT LEGISLATION AND CONSULTATION

2.1 Consultation procedure

The purpose of consultation is to inform about the project at an early stage and to obtain comments for further planning. The consultation documentation describes the project's purpose, background, scope, design and expected environmental impact. The delimitation consultation is carried out with the county administrative boards, municipalities, authorities, organisations, associations, other stakeholders and the general public that can be expected to be affected by the activities, see further under "Proposal for circle of consultation" in section 10 and in Appendix 1.

2.2 Delimitation of the consultation

This consultation document has been prepared for the purpose of licensing in accordance with the Act on Sweden's exclusive economic zone (1992:1140) 5 § for the construction and operation of the wind farm and associated facilities and permits under the Continental Shelf Act (1966:314) 3a for the laying of the internal cable network, as well as any infrastructure for energy storage, in Sweden's economic zone.

The associated facilities consist primarily of energy transmission and servicing equipment described in the technical description and may also include any facilities for storing energy produced offshore or onshore.

In the examination, Chapter 2-4, Chapter 5, 3 §, and Chapter 16, 5 § of the Environmental Code shall also be applied and an environmental impact assessment shall be produced in accordance with Chapter 6 of the Environmental Code. Any Natura 2000 permit under Chapter 7 of the Environmental Code must also be applied for if impact on any Natura 2000 site could arise. Permits under Sweden's economic zone and the Continental Shelf Act are issued by the government.

According to 6 § of the Environmental Assessment Ordinance (2017:966), the planned activity is assumed to have significant environmental impact, which means that exploration consultations do not need to be carried out and that the consultation procedure therefore must begin with a delimitation consultation.

This consultation document and the forthcoming environmental impact assessment are intended to be common to the applications under Sweden's exclusive economic zone and the Continental Shelf Act and are limited to the planned activities (i.e. the wind farm, the internal cable network, OSS (offshore substations) and any facility and infrastructure for energy storage and distribution of stored energy and related activities) within Sweden's exclusive economic zone.

This consultation document does not cover the laying of export cable in the Swedish exclusive economic zone and the territorial sea in accordance with the Continental Shelf Act (1966:314) 3a §. This consultation document also does not include permits under Chapter 11. of the Environmental Code for laying cables within the territorial sea. The necessary permits for the export cable will be applied for at a later stage.

The connection of the wind farm to the transmission network on land and the installation of an electric power export cable in accordance with Chapter 2. of the Electricity Act (1997:857) is a separate permit process, so-called network concession for electric line, and is not affected in this consultation.

This consultation also does not concern permits under MB, PBL or other applicable legislation for the plant that will need to be built on land for the storage of components, the assembly of wind turbines and other equipment, and the towing of the turbines to the project area.

3 PROJECT DESCRIPTION

3.1 Localisation

The planned Erik Segersäll wind farm is located in Sweden's economic zone in the Baltic Sea, see Figure 1. The area is estimated to have favourable conditions for the establishment of a wind farm with an average wind of approximately 9.6 m/s (150 m above sea level). The area contains no islands but consists entirely of open sea.

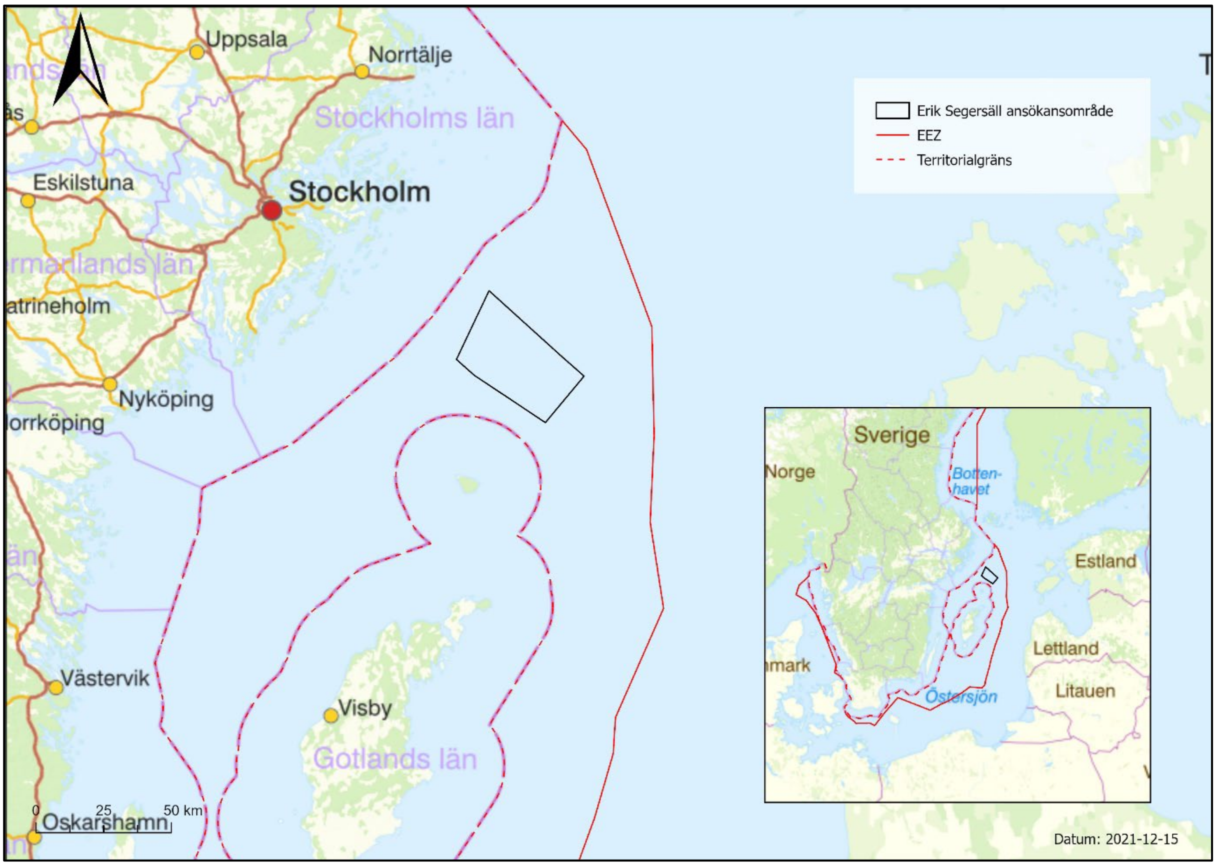

Figure 1. Overview map of the location of the planned Erik Segersäll wind farm.

The entire area of Erik Segersäll is about 1098 km2 and the water depth varies between about 100 and 200 metres. The bottom structure is dominated by clay. The nearest shoreside location is Huvudskär, about 42 km west of the project area and the distance to Gotska Sandön in the south it is 32 km, see Figure 2.

As the area is large and will be able to accommodate 5000-6000 MW in total, it is expected to be developed in phases, for example three phases of 2000 MW each. The distance between the planned wind turbines will be relatively large, about 2-2.5 km, which makes it easy to navigate in the area for, for example, service vessels.

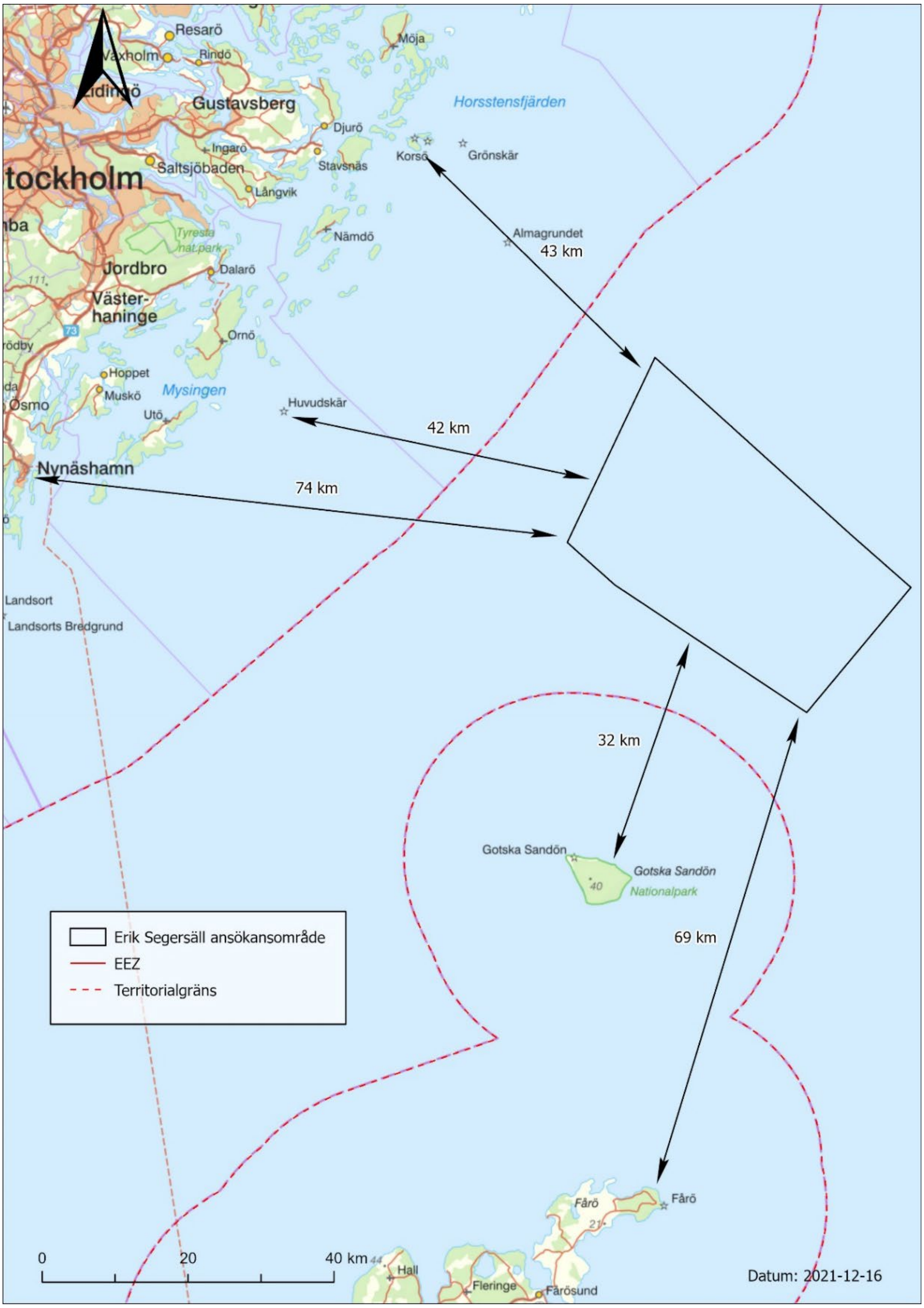

Figure 2. Distance to the nearest land locations.

3.1.1 Location of connection to the main grid

Svenska Kraftnät has been commissioned by the government to investigate an expansion of the transmission network to provide opportunities to connect offshore wind power at sea. This means that it is currently unclear whether there will be any such offshore connectivity in the vicinity of the current wind farm and therefore a separate consultation of this part of the project (export cable) will be held at a later stage.

To strengthen the opportunities for offshore wind power in the Baltic Sea, surrounding countries have jointly started the Baltic Offshore Grid Initiative, which will develop joint plans on electricity grids in the Baltic Sea and between the different countries on the Baltic Sea. The project area for Erik Segersäll is strategically well placed with possible future links to most countries.

3.2 Overview of planned activities

The planned wind farm will include approximately 240–300 wind turbines as well as one or more masts or buoys for wind measurement, see Figure 3.

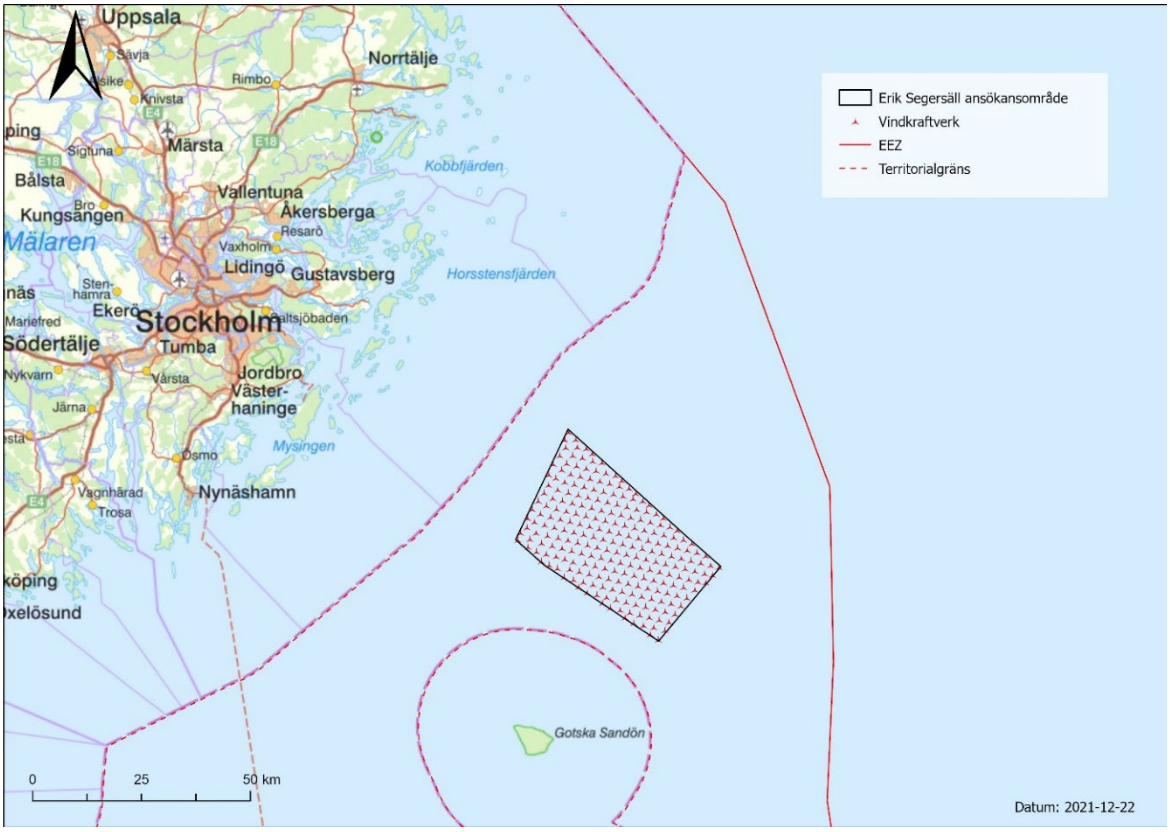

Figure 3. Example layout for planned wind farm. Within the area, there will also be space for wind measurement masts and other peripherals. Location for this is not identified in the layout.

The wind turbines will be connected by an internal cable network to a number of offshore substations (OSSs) containing the necessary electrical equipment such as transformers and switches. From these, the electricity is then transmitted via cables to the appropriate connection point(s) on land.

In figure 4, a sketch of a wind turbine is shown to illustrate specified dimensions. Technical data are given in Table 1.

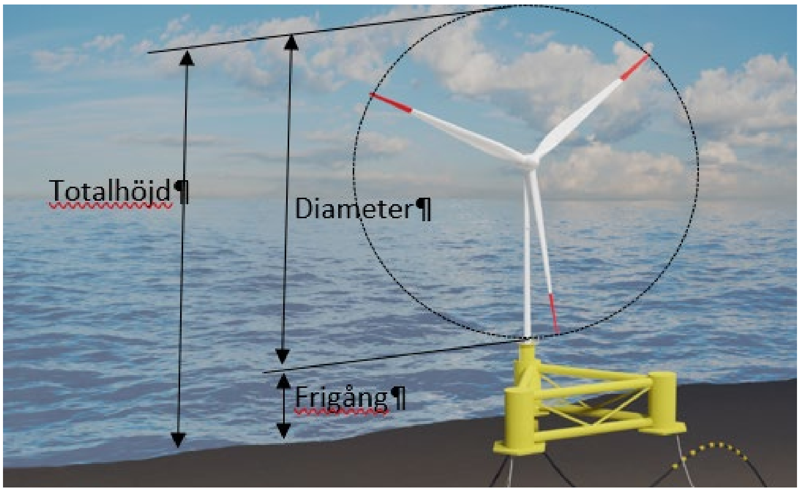

Figure 4. Illumination of wind turbines.

Table 1. Summary data for the planned wind farm.

Parameters	
Number of wind turbines	240-300 pcs
Installed power per wind turbine	20-25 MW
Maximum overall height of wind turbines	370 m
Rotor diameter of works (maximum)	350 m
Clearance approx.	20 m
Approximate area of the wind farm	1098 km^2
Estimated total installed power	5000-6000 MW
Estimated Annual Electricity Generation (AEP)	20-26 TWh

3.3 Technique

3.3.1 Wind farm design

Erik Segersäll will consist of wind turbines on floating foundations (platforms) that are held in position via anchor lines to anchors on the seabed. The electricity produced by each wind turbine is transmitted via an internal cable network to one or more OSSs (Offshore Substation). The internal cable network also serves as a communication link between the respective wind turbines using a built-in fiber optic cable. In the OSS, the electricity is transformed to a higher alternating voltage (HVAC) or directed to high-voltage direct current (HVDC) before being sent via connecting cables to the connection point ashore and out into the transmission network, see Figure 5.

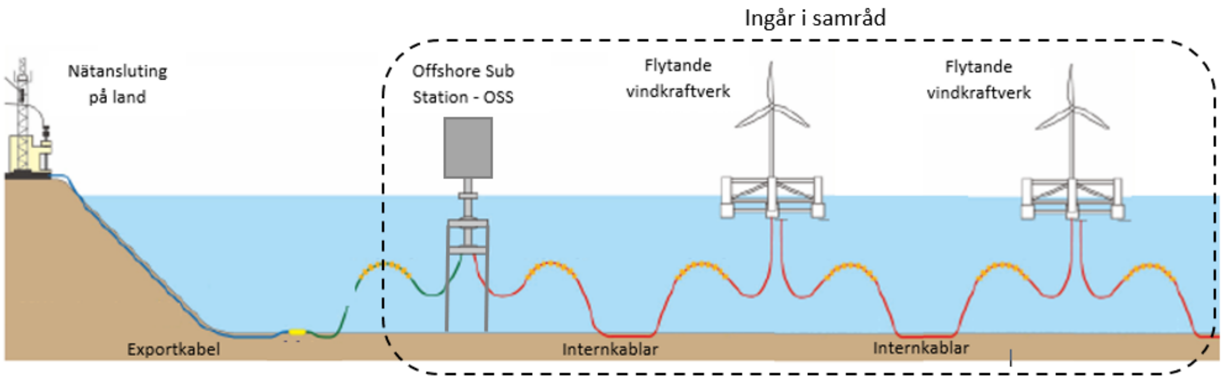

Figure 5. Outline of principles for different parts of an offshore wind farm and which parts are covered by the consultation.

Designing and establishing a wind farm is a long process, see the preliminary timetable in section 3.4. Technology is advancing rapidly, making more cost- and environmentally efficient technology available. In recent years, for example, the size of wind turbines has increased, which enables greater electricity production in the same area as before. Also, the foundations are being developed, as well as technologies for electricity transmission to land.

Several possible designs will be analyzed during the project to optimize electricity production and economy while minimizing environmental impact. The design options for the wind farm presented in this document take into account future technology developments so that the largest wind turbines that exist could be used to provide the conditions for a fair assessment of a future park with maximum dimensions.

As a complement to a traditional grid connection, the possibilities of establishing energy storage and/or energy conversion platforms are also being explored in order to convert the electricity produced into e-fuels such as hydrogen or ammonia. One such technology, so-called "power-to-X technology", is under development in the industry.

3.3.2 Wind turbine

Wind turbines can be either vertical or horisontal axis with two or more rotor blades. A horisontal-axis wind turbine has its rotor downwind or upwind in relation to the wind turbine's machine house. Normally, the same type of wind turbine is used throughout the wind farm. The type of wind turbine that has developed the fastest and of which the most has been erected so far is three-bladed horizontal-axis upwind wind turbines, see Figure 6.

A wind turbine's blades are normally made of mainly fiberglass, while the towers are usually made up of sections of steel pipes. The wind turbine is expected to produce electricity at wind speeds from about 3 m/s and achieve maximum production at wind speeds between 10 and 14 m/s. When the winds exceed about 30 m/s, the wind turbine is taken out of production to automatically start again when the conditions are right. The wind turbines that are relevant at the time of procurement and construction of the Erik Segersäll wind farm are expected to have a lifespan of at least 30–35 years.

Wind power plant manufacturers are constantly presenting new and larger wind turbines, especially in the field of offshore wind power. The largest wind turbines to be delivered as of January 2021 are 9.5 MW (Vestas V164), while 12 MW (GE Haliade-X) are to be installed at Dogger Bank A in 2023. SiemensGamesa is currently testing a 14 MW turbine that is expected to be in serial production by 2024 and the GE Haliade-X 14 MW is planned to be installed at Dogger Bank C in 2024. The latter are reported to have a rotor diameter of just over 220 m and will be able to reach up to 260 metres above sea level. The rapid development in turbine technology is expected to continue until the Erik Segersäll project reaches an investment decision. It is believed that even larger wind turbines will then be available. An offshore wind turbine of 15 MW has already been presented, which is scheduled to be in serial production in 2024. The rotor diameter here is 236 m (Vestas V236-15). See the development of offshore wind turbines in Figure 6.

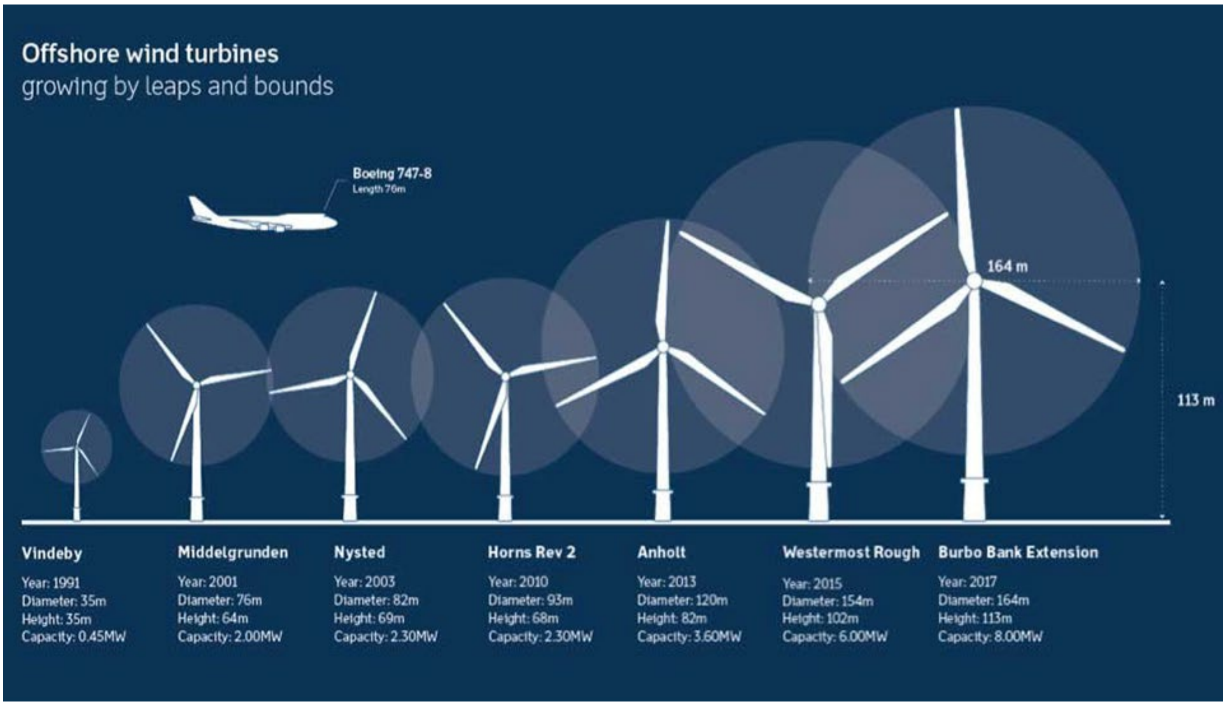

Figure 6. The development of wind turbines in size historically (Open Ocean, 2017).

Based on the rapid development of technology, it is expected that at the start of construction of Erik Segersäll there will be available wind turbines in the size range of 20 – 25 MW. The choice of the appropriate turbine type will be further investigated in the environmental impact statement. Based on the technological developments that have taken place so far, as well as the manufacturers' forecasts, a wind turbine is expected to have an output of about 20 MW in 2025 and in 2028 about 25 MW. Examples of the number and sizes that may be relevant are shown in Table 2 and Figure 4.

Table 2. Examples of dimensions for wind turbines.

Power per wind turbine	**20 MW**	**25 MW**
Approximate total height (m) approx.	340 m	370 m
Approximate rotor diameter of works approx.	320 m	320-350 m
Clearance approx.	20 m	20 m

3.3.3 Foundation

Due to the water depth of the selected site, about 100-200 m, project Erik Segersäll will most likely be developed with floating foundations moored to the seabed with anchor lines and anchors, see Figure 7. The basic technical solution in floating offshore wind power is largely based on proven technologies from the offshore oil and gas extraction.

Figure 7. Different types of foundations: from the left: monopile, jack, IBGS, semi-submersible, TLP and SPAR buoy, (NREL 2014-2015 Offshore Wind Technologies Market Report).

For Erik Segersäll, Deep Wind Offshore currently believes that a semi-submersible design is the most likely choice for the project. This is based on cost-effectiveness and flexibility in both the assembly and installation phases as well as in the dismantling phase. In addition, this type of solution is likely to be the first choice in both shallow and deeper offshore wind areas globally, which will lead to a rapid development towards an economically optimized design. Later in the project, the choice of platform may of course be revised, as new facts or new technologies may exist. Example of floating foundation (platforms) with wind turbine for the project see Figure 8.

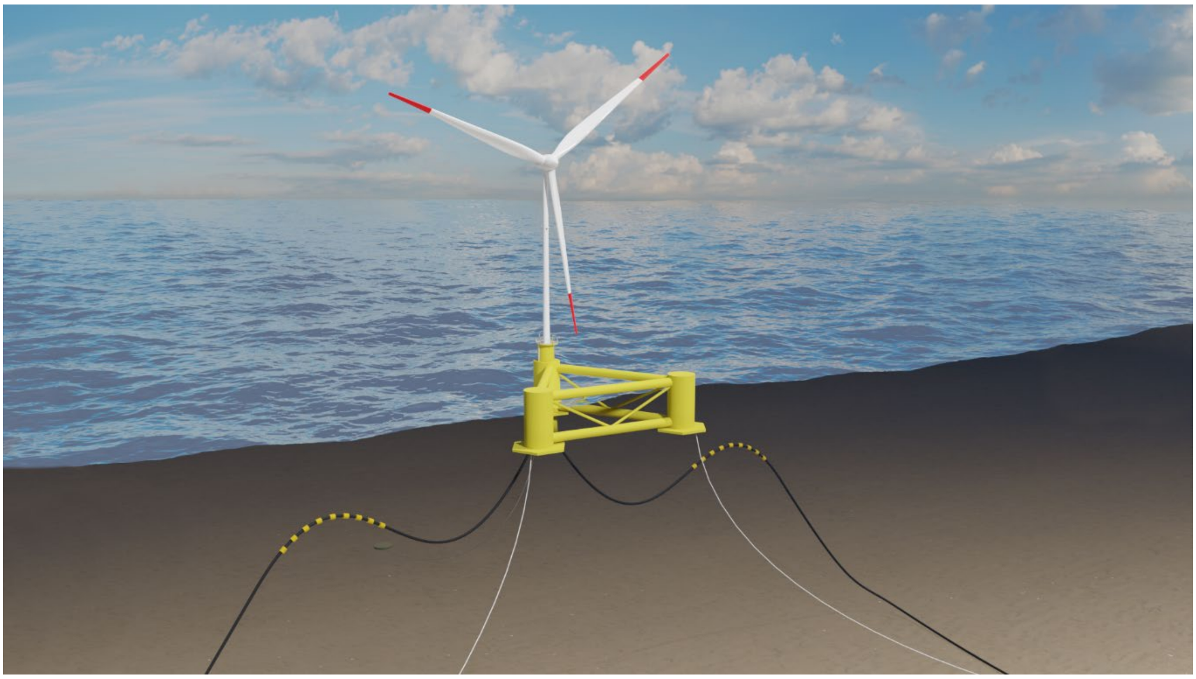
Figure 8. Generic semi-submersible platform, with wind turbine, anchorage and internal electrical cables (Deep Wind Offshore/Norconsult, 2021).

Based on the water depth of Erik Segersäll, a conventional mooring solution with three mooring lines is a relevant solution. This is already a well proven solution, in the North Sea and elsewhere, for both temporary and permanent mooring of platforms and provides flexibility in relation to the choice of anchors. The mooring solution does not affect the stability of the platform, but is designed to keep it in the correct position to avoid damage to the electric submarine cables. Given the size of the wind turbines, the mooring system may be reinforced with additional lines, which will be carefully analysed in the detailed design phase of the project.

The anchor solution is expected to be either sucker anchors or drag embedding anchors. A suction anchor is a very robust solution where the seabed is largely based on clay and is a well-proven technology widely used in the offshore oil and gas industry. Figure 9 shows a typical installation of suction anchors.

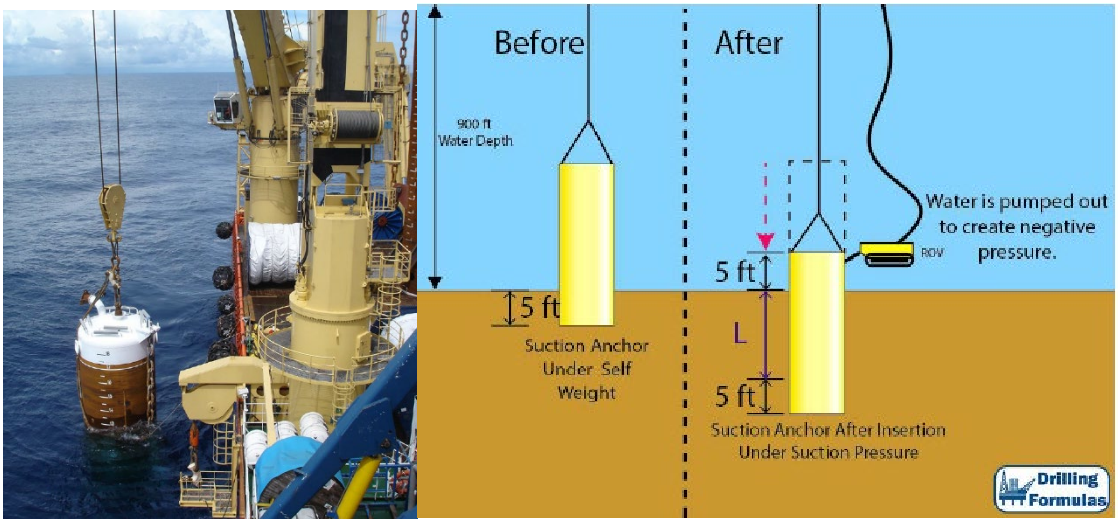

Figure 9. Installation of suction anchors (Drilling Formulas).

Figure 10 shows drag embedding anchors and their installation.

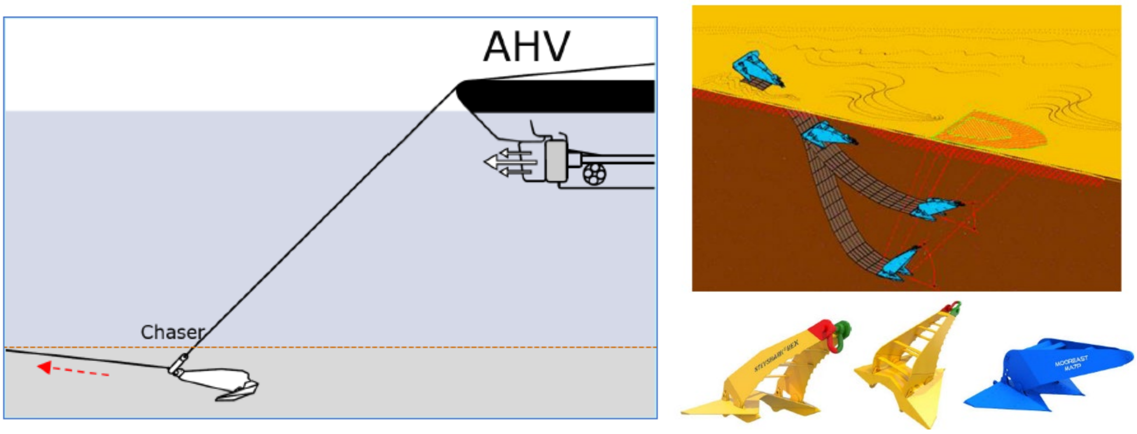

Figure 10. Installation of drag embedded anchors (Mooring System Engineering).

3.3.4 Electricity transmission overview

The transmission of electricity from the wind turbines to shore is described in general here but is not covered by this consultation. Electricity transmission takes place through three main systems: internal cable network, so-called offshore substation (OSS) and export cable to land (export cable is not included in this consultation). Via the internal cable network, the electricity is transferred from each turbine to an OSS where it is transformed up to a higher voltage level, alternatively redirected to direct current, to minimize losses as the electricity is transferred to land via the export cable, see Figure 11.

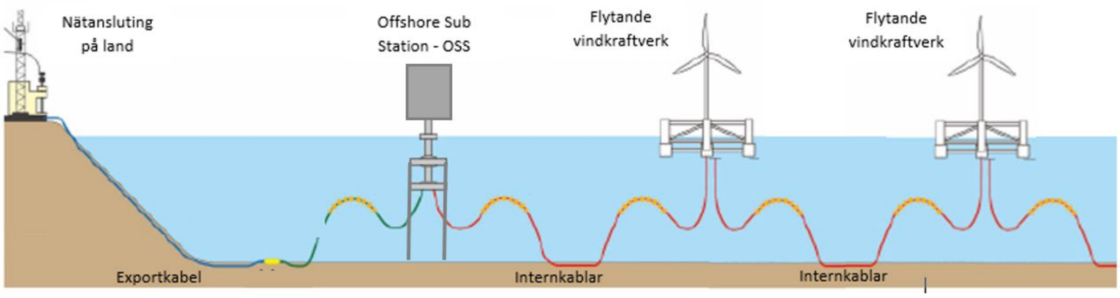

Figure 11. Principle sketch electricity transmission from offshore wind power to onshore. The picture is the same as Figure 5.

Depending on the design of the park and its total capacity, the voltage level in internal cable networks and the local electricity demand on land, one or more OSSs and export cables in a park may be relevant.

3.3.5 Internal cable networks

The extent of the internal cable network depends on the voltage level, power and number of wind turbines. These factors influence the choice of cables and cable type because it determines how many wind turbines can be connected via the same radial (branching). For floating foundations, the internal cable network consists of two main types of cables: dynamic and static cable.

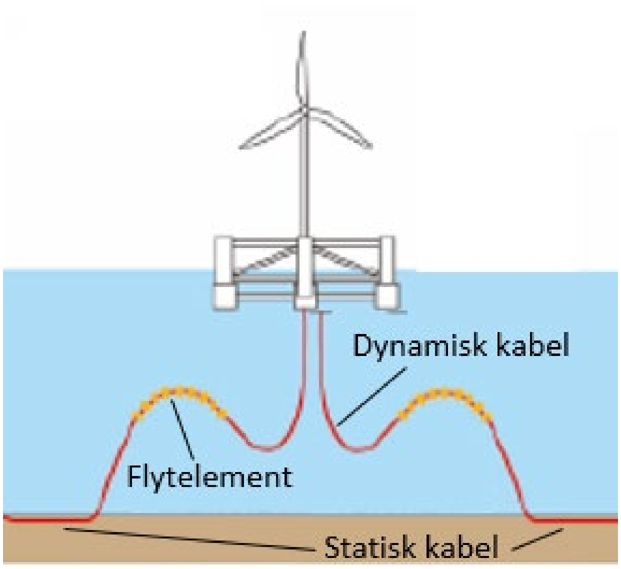

Figure 12. Principle sketch internal cable mesh for floating foundations.

The static part of the cable will be laid on the seabed or dug/flushed into the seabed to lie there permanently, while the dynamic part is designed to withstand the forces of the platform's movements. This is usually accomplished by hanging the cable in a "lazy-wave" configuration by attaching buoyancy modules in the appropriate place to the dynamic cable, see sketch in Figure 12.

This configuration allows the cable to be extended/shortened to keep up with the movements of the platform.

The definitive cable configuration between the wind turbines will be developed in a detailed design phase, where power losses, costs and redundancy level will be optimized. A relevant option is for the marine cables to be connected between the floating wind turbines in a chained configuration where typically 5-8 wind turbines are connected in radials. The voltage level in internal cables is expected to rise with the size of wind turbines in the coming years. However, with the knowledge we have now, it is expected that each submarine cable consists of three 66/132 kV conductors that send the alternating current from the wind turbine to an offshore substation (OSS) in the field (see section 3.3.6), a fiber optic cable for communication, as well as the necessary element to absorb forces, protect the cable and avoid water penetration. Since there will be different loads on the cables depending on where in the radial they are, 2-3 different cable cross-sections will be required in the wind farm.

Where there is a need to protect the cables from external damage, for example from anchors and fishing gear, the cables will be flushed, plowed or buried in the seabed, normally to a depth of about 1.5 metres. Which method is chosen depends on the seabed conditions. In places where the cable cannot be placed in the seabed due to geological conditions, it can be protected by means of covering stone or concrete mats, or alternatively placed in pipes. To take this into account, a width of about 3 m is assumed for the cable path. The route of the cables depends on several factors, including the layout of the wind farm, the location of the substation (OSS), as well as bottom conditions and consequences for the environment. This will be investigated in the context of the Environmental Impact Assessment (EIA).

3.3.6 Offshore substation (OSS) and connecting cables

The electrical power from the wind turbines is transferred in dynamic/flexible marine cables, or with a combination of static and dynamic cables, to an offshore substation (OSS) for the field. Since Erik Segersäll is a large field, several OSSs will be needed. As mentioned earlier, the field is expected to be expanded in several phases, of 1.5-2 GW per phase. It is therefore natural to design an offshore substation in each phase/part of the field. The OSSs can either be substations or converter substations. In a substation, the current is transformed into a higher alternating voltage (HVAC), while in a converter station it is also directed to high-voltage direct current (HVDC). This is done to increase transmission capacity and reduce energy losses during transport by export cable from the OSS to the connection point in the transmission network on land. It will be investigated whether there will be a need for reactive compensation in the substation due to reactive production from the cables from the wind farm.

So far, exclusively bottom-fixed foundations have been used, but the wind power industry has begun to investigate floating CISs for greater water depths. Which type will be used on Erik Segersäll will be investigated in the detailed construction phase, but at present the installation of the bottom-fixed jacket foundation is possible at a depth of up to 140 metres of water.

3.3.7 Measuring equipment

Although there is data on weather conditions at sea, there is a need for some physical measurements during the course of the projects. These are done partly to determine the wind resource directly linked to electricity production, and partly to calibrate models and adapt the design of the wind farm (in particular foundations, anchorages and cables) to the local conditions. These measurement campaigns usually last for 1-2 years early in the project.

An established method for measuring the wind resource is to use anemometers on a measuring mast out in the sea. The mast is mounted at well-chosen locations in the field, with measurement sensors at the height of the wind turbine hub. In recent years, the use of floating buoys with measuring equipment has increased for offshore wind projects. These floating Lidar Buoys measure the wind resource at different altitudes above sea level using lasers (Lidar stands for "light detection and ranging"). These measurement methods will be evaluated during the project. The choice of type and number of measuring equipment will consider the available technology and the conditions on site.

3.3.8 Establishment

Erik Segersäll wind farm will probably, as mentioned earlier, be built in several stages over several years. The construction phase for each stage includes steps that concern both site preparation, pre-installation of cables and mooring systems, as well as the installation of foundations, wind turbines and OSSs, as well as the installation of foundations, wind turbines and OSSs with connection of anchor lines and cables.

This consultation deals with the activities within the area of the wind farm itself and the elements that can be linked to this, which are listed below:

- Possible preparation of the seabed
- Installation of anchors and mooring lines/chains on site
- Installation of electrical cables on site
- Connection of the platforms to the mooring system
- Connection of electrical cables to wind turbines/platforms
- Installation and connection of OSS

Of these activities, several will take place in parallel.

Ancillary activities

The activities at the construction stage of a floating wind farm are partly different from those of a bottom-fixed wind farm. The main difference is that the wind turbines are assembled and installed on the platform at quayside and then towed out to the site where they are connected to pre-installed cables and mooring lines. This means that heavy and high lifts, which is both costly, weather dependent and risky are avoided at sea. Installation work is, as far as possible, carried out continuously during the summer season, without interruption to avoid work at sea during the winter period when the weather is worse. A base for material handling, assembly of wind turbines and installation of wind turbines on the platforms will need to be established, containing a port for freight transport, warehouses and assembly halls as well as assembly/equipment berths.

The ancillary activities that will be carried out during the construction of a floating wind farm which will take place outside the area of the planned wind farm and are therefore not included in the current consultation are:

- Installation of export cable to land
- Assembly and installation of the wind turbines on the platforms at the quayside
- Towing the platforms to site

Of these activities, several will take place in parallel.

3.3.9 Operation

The wind turbines will be equipped with obstacle lights in accordance with the regulations in force at the time of installation of the wind turbines. At present, the Swedish Transport Agency's regulation TSFS 2020:88 applies, which states that wind turbines on the outer edge and central parts of the wind farm must be equipped with white flashing light and other turbines are equipped with a low-intensity red light. In addition, according to TSFS 2020:88, the towers must be equipped with fixed low-intensity light in three directions at half the height of the tower for wind turbines where tower height including machine house (nacelle) is higher than 150 metres above ground or water surface, see Figure 13.

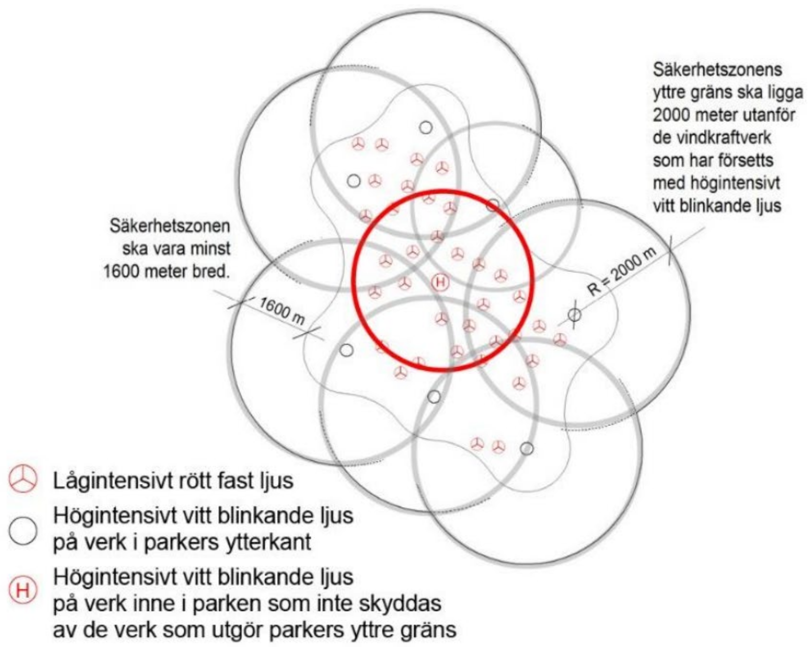

Figure 13. Principle sketch for marking of wind turbines with a total height above 150 metres (TSFS 2020:88).

3.3.10 Decommissioning

The wind farm is expected to have a design lifetime of approximately 30 - 35 years, after which it will be decommissioned, and the area will be restored to the extent required. Decommissioning will take place according to the same principle as during installation, but in the reverse order, so that the wind turbines on their floating platforms (foundations) are disconnected from the mooring and cables and towed away for dismantling at the quay while the OSS and its foundations, as well as mooring systems and cables, are dismantled on site and removed. If for some parts it would mean greater environmental impact to remove them than to leave them in place, it can consider leaving these. The plan for decommissioning is made in consultation with the regulatory authority.

The decommissioning will take place in accordance with the practice and legislation in force at the time of decommissioning. As the state of technology and knowledge changes rapidly, the detailed decommissioning of the wind farm will be planned in dialogue with the regulator. Since the wind farm is planned to be built in several phases, its decommissioning is also likely to take place in different phases.

3.4 Preliminary schedule

The preliminary schedule for the project is presented in Figure 14 below. The schedule, as well as the division of stages/phases, may at this stage be regarded as highly preliminary. Several factors may affect the schedule, which means that it may need to be adjusted during the project. For example, the permit process may be shorter, it may be necessary to build several different stages in parallel, etc. The construction of the wind farm, from the start of phase 1 until the wind farm is fully expanded, is estimated to take about 9 years. The planned wind farm is expected to be fully operational by 2036.

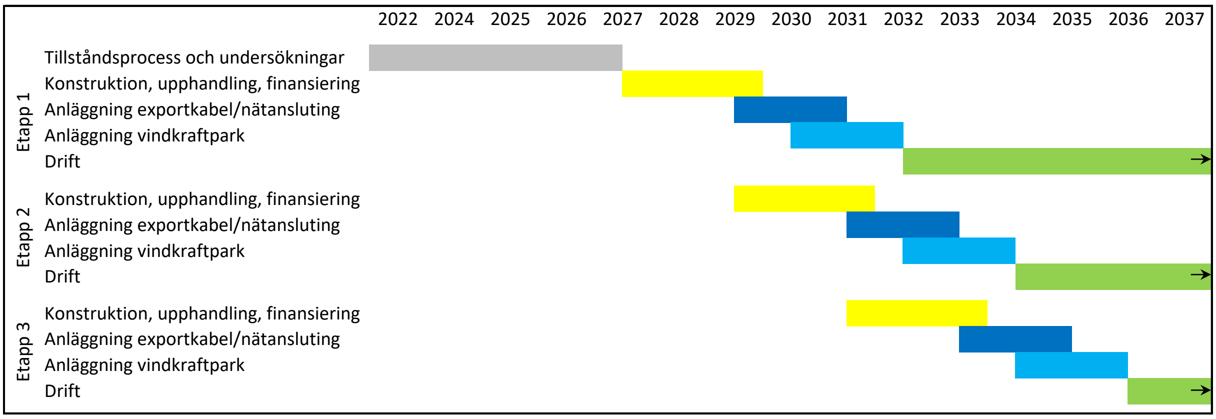

Figure 14. Preliminary schedule.

4 LOCALISATION AND DESIGN OPTIONS

4.1 Main option

This consultation process refers to a wind farm of a maximum of 300 wind turbines with a maximum height of 370 metres. It is likely that if the choice of larger wind turbines with a larger rotor diameter is made, fewer turbines will be accommodated within the wind farm. It is the maximum installed power that can be connected to the grid that finally determines the maximum number of turbines that can be planned within the application area. This optimisation process has not yet started. The main alternative involves the construction of the wind farm as described in Section 3. Deep Wind Offshore's planned wind farm Erik Segersäll has the potential to produce about 20-26 TWh annually. The construction work is expected to last for two to three years per stage/phase.

4.2 Zero option

The zero option shall describe the conditions if the wind farm in question is not built. Thus, no environmental impact will arise as a result of the project, nor will the operations contribute to the urgent need for a large-scale expansion of renewable electricity production in Sweden.

In the EIA, the consequences for the zero option will be compared with the consequences for the planned activities.

4.3 Alternative localisation

For an activity or measure which uses an area of land or water, a site shall be chosen which is suitable for the purpose of achieving the objective with the least intrusion and inconvenience to human health and the environment. To find the place that provides the best conditions, various factors must be considered, such as technology, safety, environmental conditions and possible impact on the surroundings.

Deep Wind Offshore has carried out an extensive identification and screening process of possible areas for the establishment of a large-scale offshore wind farm, which has resulted in the location of Erik Segersäll. The selection process has been based on good conditions for electricity production, such as wind resources, appropriate water depth and distance to land, opportunities for network connection, etc., while also taking into account the presence of valuable natural environments and species, national interests and activities that could be affected by a wind power establishment, such as defense interests, vessel traffic, commercial fishing and aviation. Natura 2000 sites and navigable waterways have been given a high weight in the evaluation of suitable locations, as such sites should be avoided as far as possible. In order to limit the visual impact, it was chosen to study areas far from the coast, resulting in suitable areas in the exclusive economic zone (at least twelve nautical miles from the coast, i.e. about 22 km).

The Swedish Agency for Marine and Water Management’s (HaV) proposed marine spatial plans for Sweden show the state's overall view of how the sea should be used. The proposal for a maritime spatial plan submitted to the Government at the end of 2019 has not yet been decided, but has nevertheless been used for indicative purposes in the screening process. A larger number of possible sites have been studied in the process, which has then been reduced to a dozen alternatives, of which Erik Segersäll was the highest rated site.

Alternative locations will be described in more detail in the forthcoming EIA.

5 AREA DESCRIPTION

5.1 Geology and seabed conditions

The planned wind farm is located within an area where the seabed substrate is dominated by clay, see Figure 15.

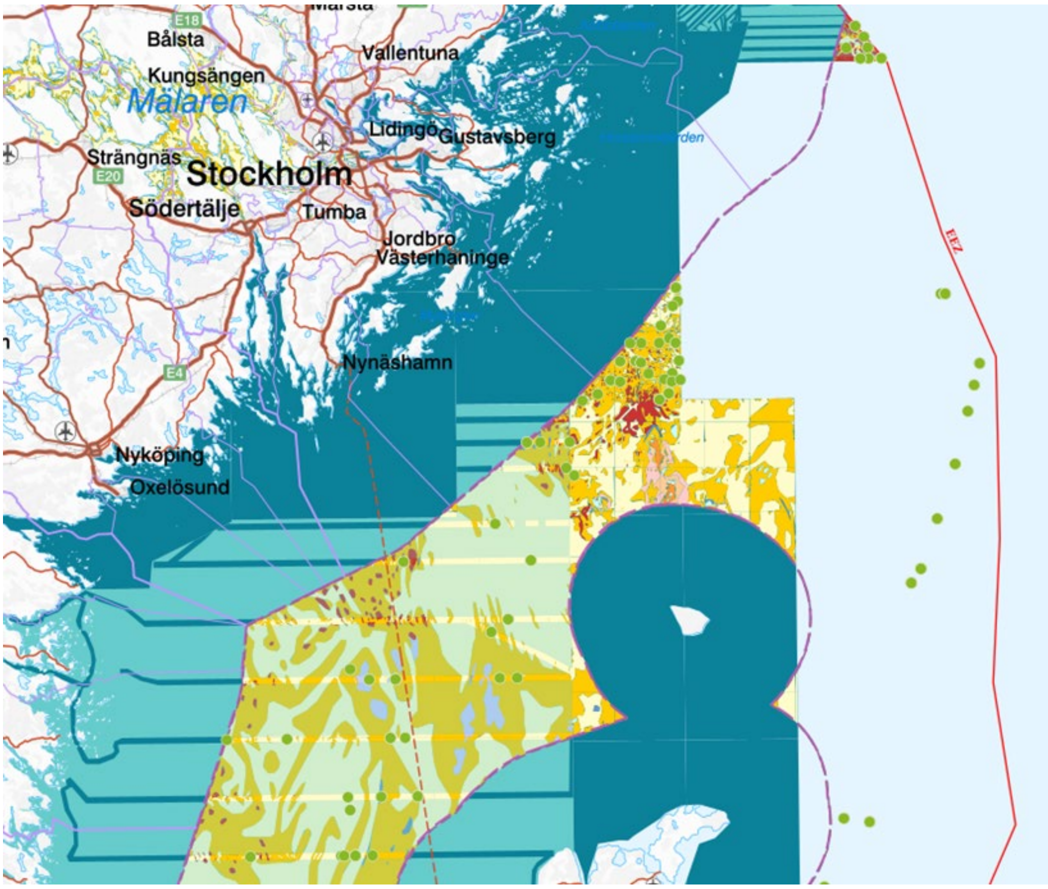

Figure 15. Seabed conditions within the area in question - orange/yellow parts represent different types of clay sediments in the bottom layer (Geological Survey of Sweden, 2022).

The water depth in the area is between 101-197 metres and there is large variation in the bathymetry (the physical shape of the terrain under water), see Figure 16.

Figure 16. Variations in bathymetry within the area in question (Baltic Sea Bathymetry Database, 2022).

5.2 Meteorology

The average wind speed is estimated to approximately 9.6 m/s at 150 metres above sea level within the current project area. The prevailing wind direction in the area is winds from the west-southwest, see Figure 17.

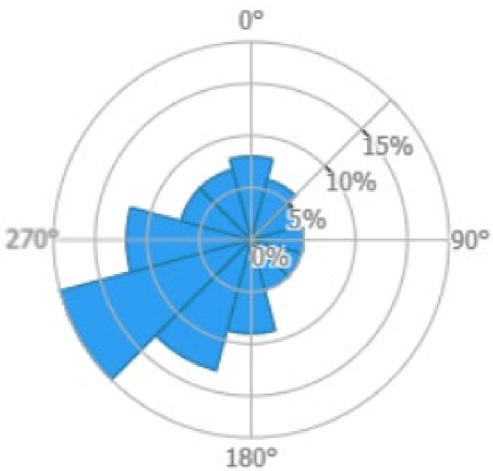

Figure 17. Prevailing wind direction in the area in question.

5.3 Hydrography

The nearest measuring station for oceanographic observations is called Huvudskär ost buoy and is located just west of the planned wind farm. The significant wave height at the measuring station is averages just under one metre with a maximum of 5.5 metres (calculated for the period May 2001 to

December 2021), while the maximum wave height for 30 minutes averages 1.5 metres with a maximum of nine metres during the same period (SMHI, 2021).

The current direction at the current measuring station is on average 180º (southerly) and the current speed is on average 10 cm/s at two and at a depth of 90 metres (calculated for the period May 2001 to December 2021). At a depth of 40 metres, the current speed is on average 20 cm/s (SMHI, 2021).

5.4 Areas of national interest

Areas of national interest are listed in Chapter 3 and 4 of the Environmental Code. Designated areas of national interest have a protection against measures that can significantly harm the purpose or values of the national interest. The provisions of the Environmental Code generally state whether an area may be of national interest for a specific purpose such as cultural heritage conservation or outdoor recreation. However, the provisions regarding national interests only have a guiding function in connection with the examination of development companies that provide a change in land and water use (HaV, 2020).

The Erik Segersäll wind farm is adjacent to areas of national interest for communications – shipping in accordance with Chapter 3, Section 8 of the Environmental Code. The national interest in shipping is to protect the function of the shipping lane and consists of the navigable waters of the shipping lane, which is limited by depth and a buffer zone. The national interest areas must be protected against measures that may significantly impede the access or use of the facility (shipping lane).

The wind farm is bordered by two existing shipping lanes: the southern tip of Öland - Svenska Björn which is a shipping lane for merchant vessels (class 2) to the west and the Gulf of Riga – Almagrundet (no shipping lane classification) to the northeast, see Figure 18. About 16 kilometres east of the park the shipping lane Gedser - Svenska Björn is located which is the main shipping lane for merchant ships (class 1).

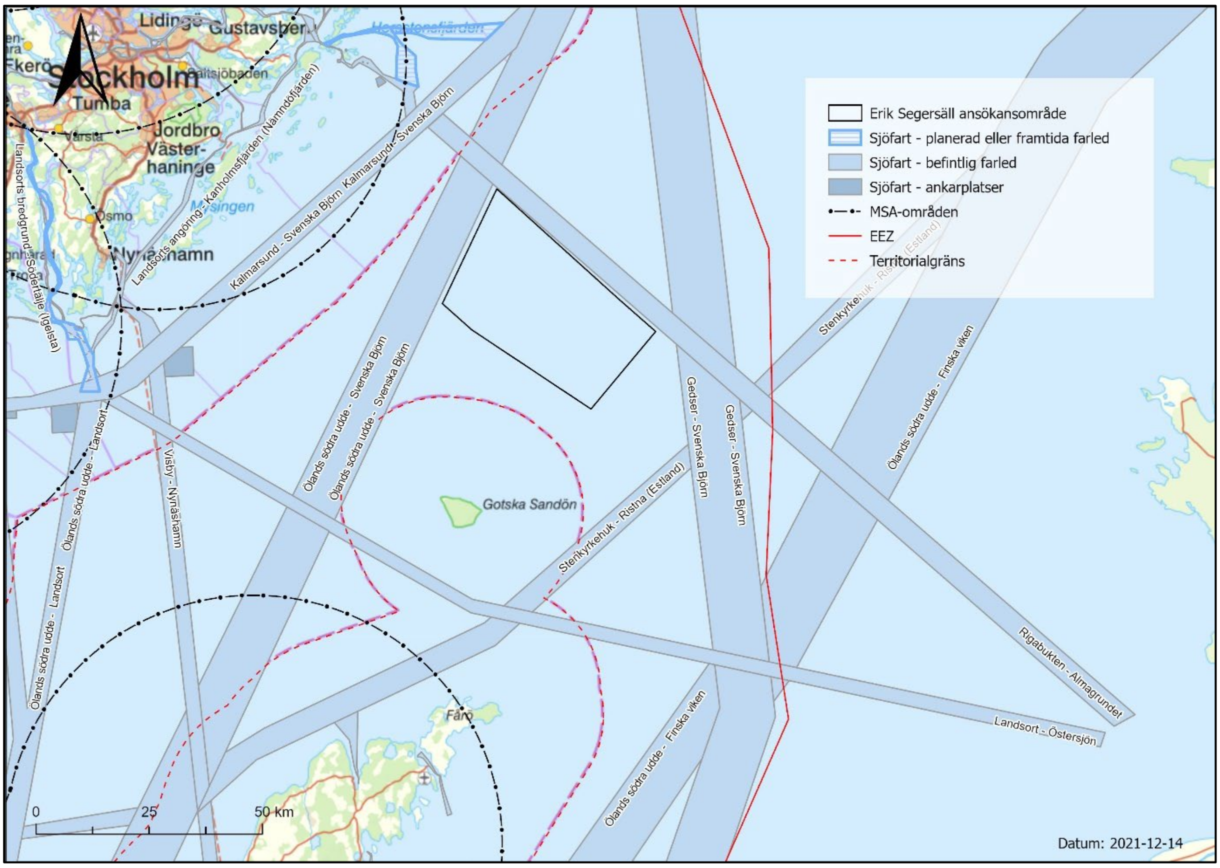

Figure 18. National interest in communications – shipping and MSA areas in the area in question.

The Swedish Armed Forces have designated national interests for the total defense in accordance with Chapter 3, Section 9 of the Environmental Code in the vicinity of the area in question, see Figure 19. In addition to the designated national interest areas, the Armed Forces also have additional national interest areas that are under security classification, which could potentially be located in or near the application area.

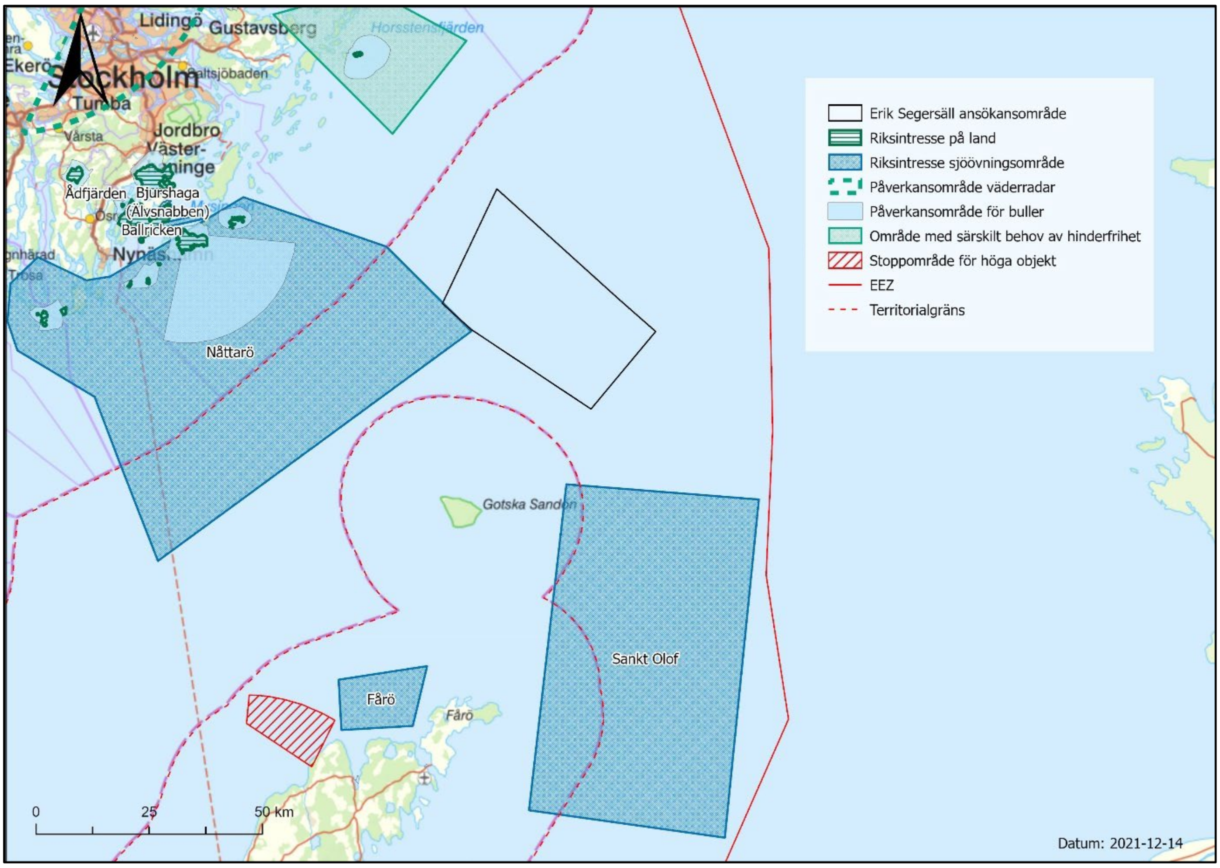

Figure 19. The national interests of the Armed Forces in the area concerned.

The Erik Segersäll wind farm borders a naval exercise area within Stockholm County called Nåttarö, which is of national interest. The naval firing ranges are needed to achieve and maintain the total defense capability for armed combat over, on and under the water. Another naval exercise area of national interest is located about 17 km south of the planned wind farm. About 26 km northwest of the project area there is also a national interest in the total defense with a special requirement for the area to be free from obstacle.

Furthermore, there are a number of other areas of national interest in the vicinity of the Stockholm archipelago and Gotland. These areas shall be protected against measures that can significantly harm nature, culture or the values of outdoor recreation. Areas of national interest for nature conservation, cultural heritage conservation, outdoor recreation, mobile outdoor life and highly developed coastline are closest to about 10 km from the planned wind farm, see Figure 20.

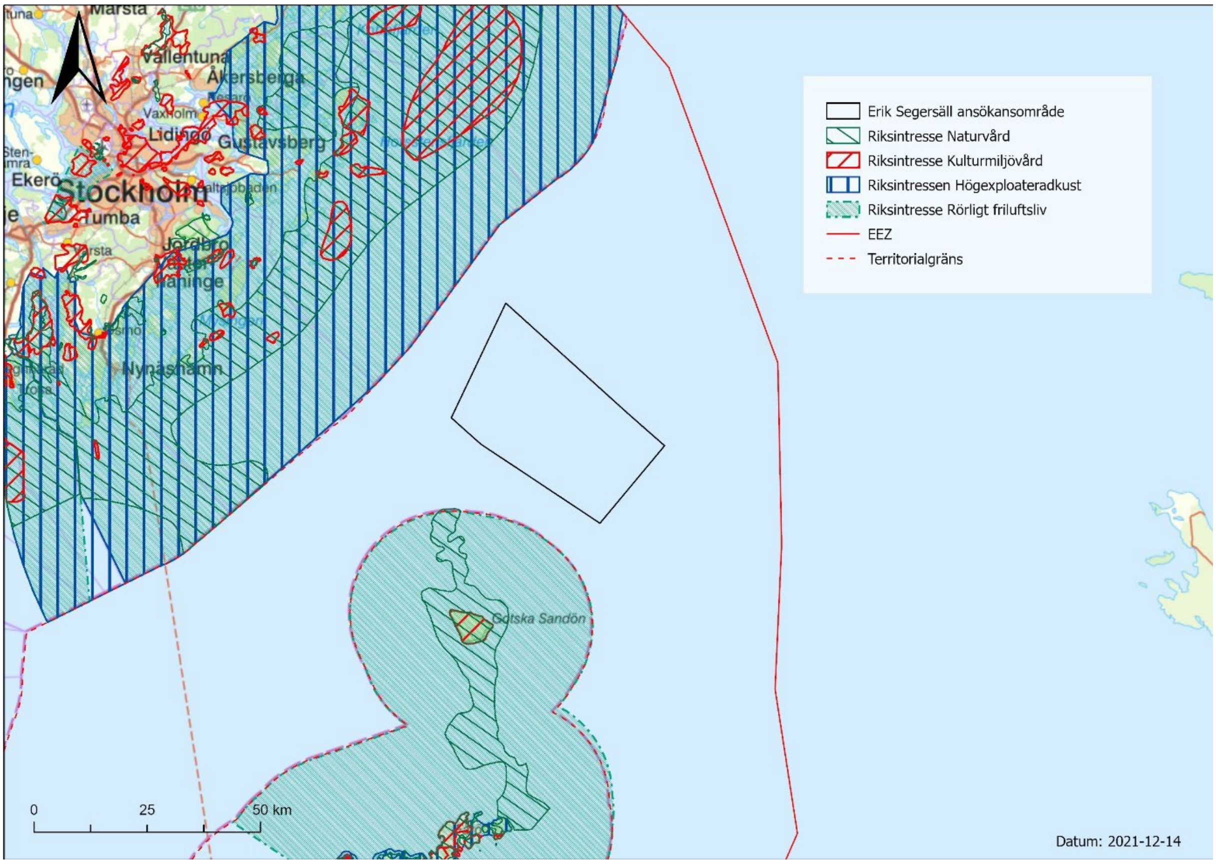

Figure 20. National interests of nature conservation, cultural heritage conservation, outdoor recreation, mobile outdoor life and highly developed coast within the area concerned.

Below are some of the designated national interest areas:

- **National interest of nature conservation (*Gotska Sandön*)** - Peculiar, isolated island with dunes and partially parched pine forest. Distinctive insect fauna and interesting flora. Known as a good stretch bird localisation.
- **National interest mobile outdoor life (*Gotland*)** - The interests of Turism and outdoor life, primarily the mobile outdoor life, shall be taken into account in particular when assessing the admissibility of development companies or other interventions in the environment.
- **National interest mobile outdoor life and highly exploited coast (*Coastal areas and archipelago in Stockholm County*)** - Stockholm County's coastal and archipelago area is in its entirety of national interest. One of the most valuable landscapes in the country with particularly great natural and cultural values and importance for outdoor recreation and tourism.

Furthermore, there are national interests of commercial fishing in the Baltic Sea region, within which the planning for the use of land and water areas is to ensure the fishing sector's access to catching areas in both the sea and inland waters. The nearest areas of national interest for commercial fishing are located about 40 km west of the park and at Gotska Sandön about 28 km south of Erik Segersäll, see Figure 21.

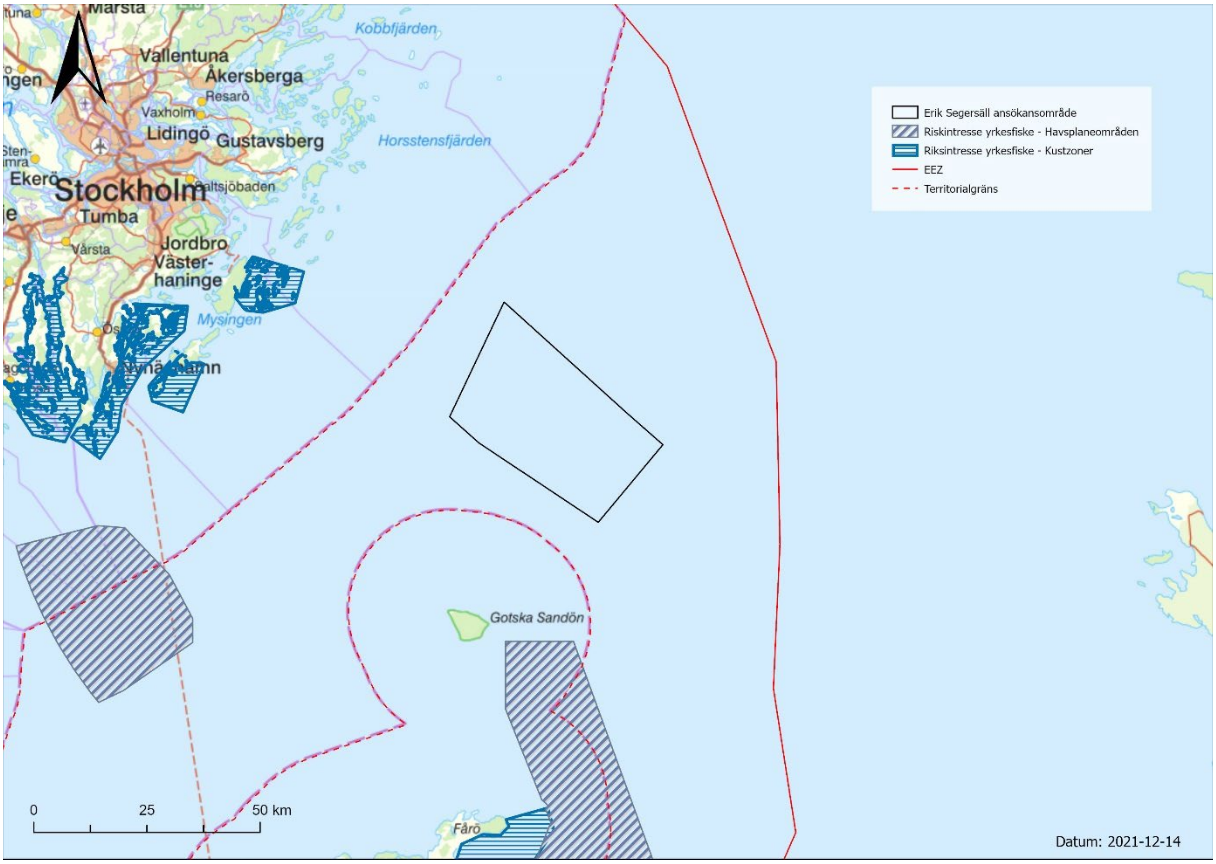

Figure 21. National interests of commercial fishing in the area in question.

5.5 Natura 2000 sites

The planned wind farm is not located directly adjacent to any Natura 2000 site. The nearest Natura 2000 area is located south and west of the planned wind farm, see Figure 22. The Natura 2000 area Gotska Sandön-Salvorev (SE0340097) is located about 15 kilometres south of Erik Segersäll while the areas bullerö-Bytta (SE0110088), Fjärdlång (SE0110086) and Huvudskär (SE0110111) are located about 35-40 kilometres west of it. All Natura 2000 sites are designated under the Habitats Directive (SCI). Designated habitat types and species in the conservation plans for nearby Natura 2000 sites are presented in Table 3.

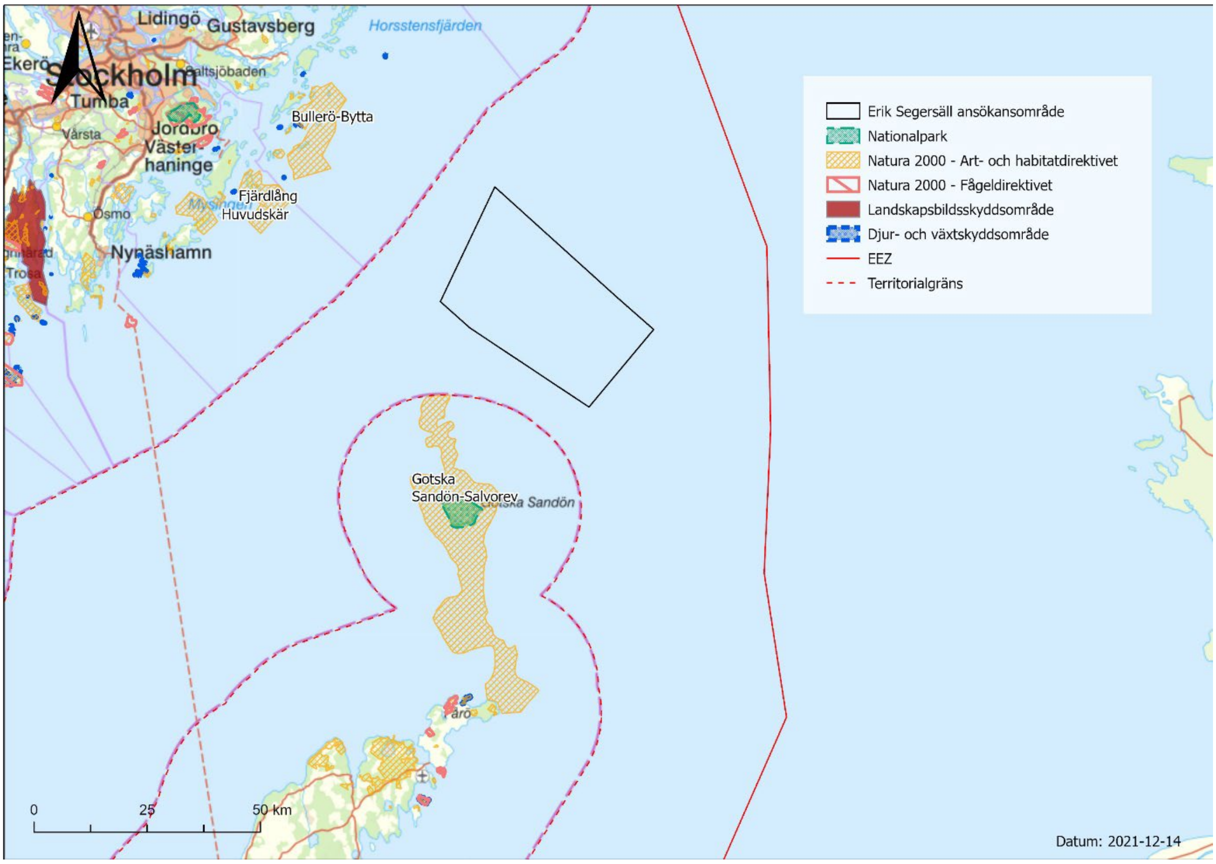

Figure 22. Natura 2000 sites and other protected areas adjacent to the site in question.

- ***Gotska Sandön-Salvorev*** - Priority for conservation is the island's rich presence of wood-dwelling insects as well as the species-rich sandy soils. Also prioritized to preserve the population of gray seals. According to the conservation plan, there must be no physical interventions in the marine area that may alter habitats or processes, such as wave impacts or sediment movements, that have an impact on the values of the habitat. Emissions of oil and chemicals or leakage from boat traffic in the Baltic Sea can also cause great damage to both plant and animal life in the sea and on land.

- ***Bullerö-Bytta, Fjärdlång, Huvudskär*** - The priority habitats of the areas are lagoons, reefs as well as skerries and small islands in the Baltic Sea. The habitats of the areas can be adversely affected by, for example, spills of oil and chemicals or leakage from boat traffic.

Table 3. Designated habitat types and species for Natura 2000 areas in the planned wind farm's vicinity (County Administrative Board Gotland County, 2017; Stockholm County Administrative Board, 2016).

* Priority habitat – conservation is considered to be a high priority within the EU.

Natura 2000 site	Habitats	Species
Gotska Sandön-Salvorev	1110 - Sandbanks 1170 - Rev 1640 - Sandy beaches on the Baltic Sea 2110 - Pre-Dunes 2120 - White Dunes 2130 - Grey Dunes 2180 - Tree-clad dunes 2190 - Dune Wetlands 6510 - Lowland Mower Meadows 6530 - Deciduous Meadows	- 1364 – Grey Seal (Halichoerus grypus) - 1920 - Slender Shadow Beetle (*Boros schneideri)*
Bullerö-Bytta	1110 - Sandbanks 1150 - *Lagoons 1170 - Rev 1620 – Skerries and small islands in the Baltic Sea 1630 - *Coastal meadows on the Baltic Sea 6270 - *Silicate Grasslands 9070 – Wooded pasture	- 1364 – Grey Seal (Halichoerus grypus)
Fjärdlång - Wikipedia	1110 - Sandbanks 1150 - *Lagoons 1170 - Rev 1620 – Skerries and small islands in the Baltic Sea 8220 – Silicate slopes 9010 – *Taiga 9080 - *Deciduous swamp forest 91D0 - *Wooded bog	- 1166 – Greater water salamander (*Triturus cristatus*) - 1364 – Grey Seal (Halichoerus grypus)
Main cut	1170 - Rev 1620 – Skerries and small islands in the Baltic Sea	

5.6 Other protected areas

Within the relevant project area for Erik Segersäll there are no protected areas, see Figure 22. The nearest protected area is, in addition to the above-mentioned Natura 2000 areas, a national park located on Gotska Sandön, 32 km south of Erik Segersäll.

5.7 Natural environment

After the Black Sea, the Baltic Sea is the world's largest brackish water sea, which means that the water is neither salty nor sweet but brackish. Salt water enters the Baltic Sea through so-called saltwater inflows, which occur on average every ten years. The salinity of the Baltic Sea has meant that marine life has adapted its physical and biological properties and thus has completely unique characteristics (Baltic Eye, 2021). Furthermore, the Baltic Sea has a permanently layered water mass that means that surface and deep water do not mix and oxygen deficiency is common in deep areas. This also affects the plant and animal life of the Baltic Sea (Life in the Sea, 2021).

The Baltic Sea is also heavily influenced by man, including through agriculture and fisheries. Some problems that have been particularly noted in recent decades are eutrophication, overfishing and environmental toxins. On average, it takes 25-30 years for the water in the Baltic Sea to be replaced by new ones, so toxins and nutrients remain there for a long time. This is partly due to the fact that the Baltic Sea is both shallow and brackish while having low water turnover. The Baltic Sea has high conservation values but at the same time constitutes a sensitive and fragile marine ecosystem with relatively few species (Wikipedia, 2021).

In the Baltic Sea there are a number of protected natural areas but also a unique plant and animal life with several threatened and red-listed species (HaV, 2021).

5.7.1 Bottom-dwelling animals and plants

The current area is within an area dominated by deep soft bottoms. Deep soft bottoms are generally made up of a thick layer of sludge (mainly organic matter from dead phytoplankton and other organisms) underlaid by clay. The environment is dark (at best, the light reaches down to about 20 metres in the Baltic Sea) and the temperature is around 4 degrees all year round. At the bottom there are no plants, but the soft-bottom community is dominated by animals that either live on the bottom or that burrow into the sediments. Here, among other things, Baltic mussels, white terns and scab dominate, but there are also other mussels, gastropods and crustaceans, as well as few and sea brush worms. There may also be some flatfish such as turbot and plaice, but also eels.

In the Baltic Sea there are also large areas with oxygen-poor bottoms, mainly in deep cavities, where instead the bottom is covered by a yellowish-white layer of sulfur bacteria because the other animals cannot cope with the low oxygen content. The oxygen-poor bottoms are formed as the leap layer between the sweet and salt water prevents stirring of the water masses so that the acid does not reach the bottom while the decomposition of organic matter from, for example, algal blooms contributes to the oxygen at the bottoms running out (Baltic Eye, 2021; Life in the Sea, 2021). According to SMHI, the majority of the bottoms in the relevant area are oxygen-free, see Figure 23.

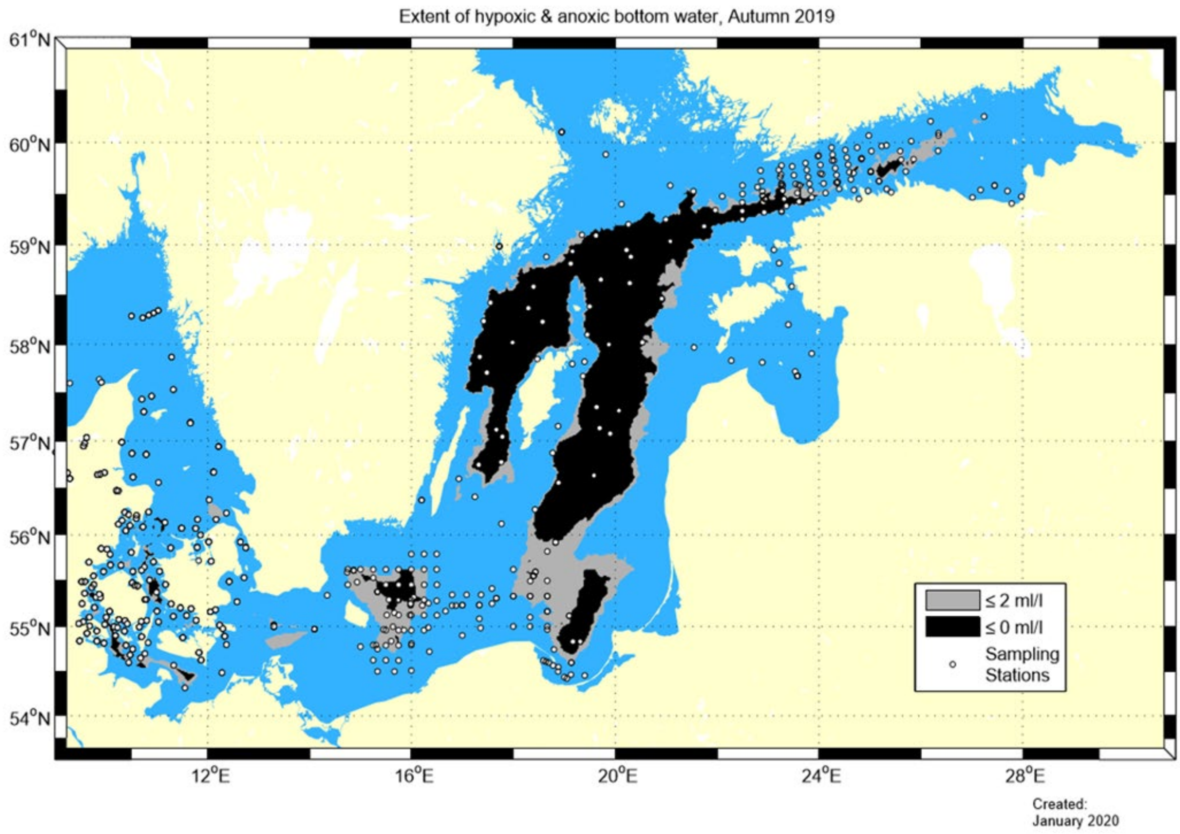

Figure 23. The distribution of oxygen-free bottoms in the Baltic Sea (SMHI, 2020).

5.7.2 Marine mammals

In Swedish waters there are four species of marine mammals, porpoises, grey seals, chubby seals and bay seals, which are found all year round in Swedish waters and have their young here. Of these, only the grey seal and its own population of porpoises are found in the Baltic Sea. Occasionally, other species of marine mammals can also visit Swedish waters, such as killer whales, minke whales and various dolphin species, but on occasion also sperm whale and humpback whale (HaV, 2021).

The Baltic Porpoise moves from east of Bornholm and up to the Stockholm archipelago, that is, throughout the southern Baltic Sea. Areas of particular importance to the species are found at Hanö Bay, Midsjöbankarna and Hoburgs bank, as well as the area around northern and southern Öland. The porpoise moves by itself or in smaller groups and orients itself and hunts for food using echolocalisation (Species Data Bank, 2020). The Baltic Porpoise is critically endangered, and the population consists of about 100 - 1100 individuals. Signs of a positive population trend exist, but in order to have a viable porpoise population, protective measures are required. The small population in the Baltic Proper is particularly sensitive to human influences as only few individuals remain. However, there is a lack of data on Baltic Sea porpoises (Swedish Institute for the Marine Environment, 2019).

The grey seal is found along the entire east coast of Sweden, but the majority of the seals are found in the archipelagos of Stockholm and Södermanland. Half of the 30,000 grey seals identified in the Baltic Sea are found in Swedish waters. The grey seal has gone from being near threatened (NT), largely as a result of the hunting that took place in the 20th century, to viable (LC) according to the latest update of the Swedish Red List. As the grey seal is one of the Important Predators of the Baltic Sea, knowledge of the species and its distribution is important for the management of the fish stock and management decisions regarding the hunting of the species (HaV, 2021).

No information regarding the presence of grey seals and porpoises in the current project area has been found but will be studied further in the continued permit process.

5.7.3 Fish

The Baltic Sea hosts a total of 82 fish species, which is a mixture of freshwater and saltwater species, but it is generally a species-poor sea when it comes to fish and is therefore particularly sensitive to various forms of impact. Cod is one of the Baltic Sea's main key species, which means that the presence of cod in turn affects the presence of a variety of other species from other fish species such as herring and sprat down to animal and phytoplankton. If cod disappears from the Baltic Sea, the entire ecosystem risks being affected.

Otherwise, fish species such as herring, sprat, various salmonids (trout, salmon.m, etc.) various flatfish (flounder, plaice, turbot, .m.), various perchfish (perch, walleye), pike, beaked pike and eel also occur. Different species are linked to different habitats and species occurrence is controlled by factors such as nutrient availability, currents, salt and/or oxygen content, light and bottom conditions (Baltic Eye, 2021; HaV, 2021; Life in the Sea, 2021). At present, there is no information on which fish species occur in the area in question, but this may be investigated further in the continued permit process.

Probability of potential spawning grounds for cod, sprat and herring is shown in Figure 24, Figure 25 and Figure 26. The Project Area Erik Segersäll is located within an area with a high probability of a spawning area for sprat, while no spawning grounds for cod or sprat are affected.

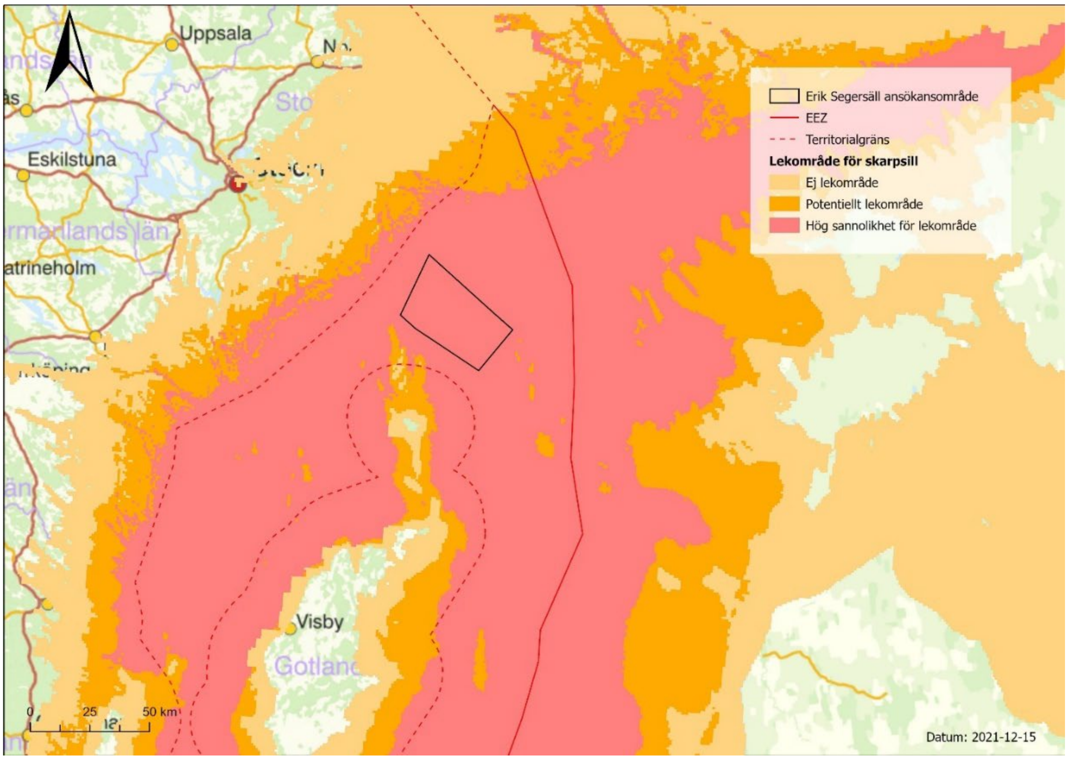

Figure 24. Map of the likelihood of spawning grounds for sprat in the area of the planned wind farm.

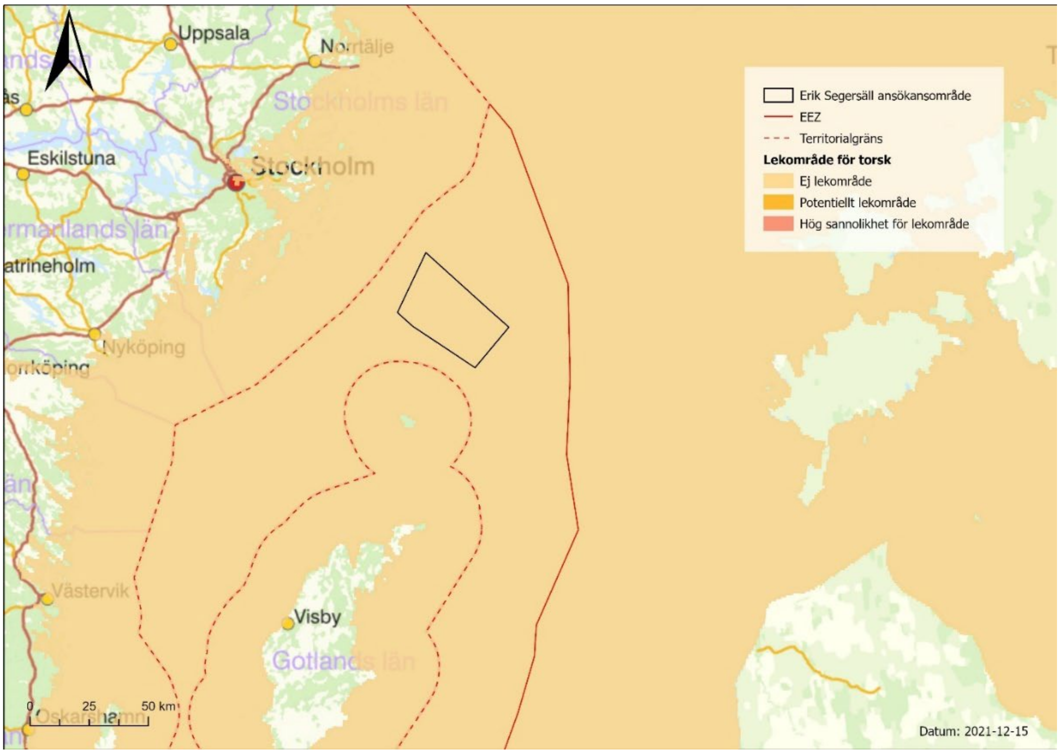

Figure 25. Map of the likelihood of spawning grounds for cod in the area of the planned wind farm.

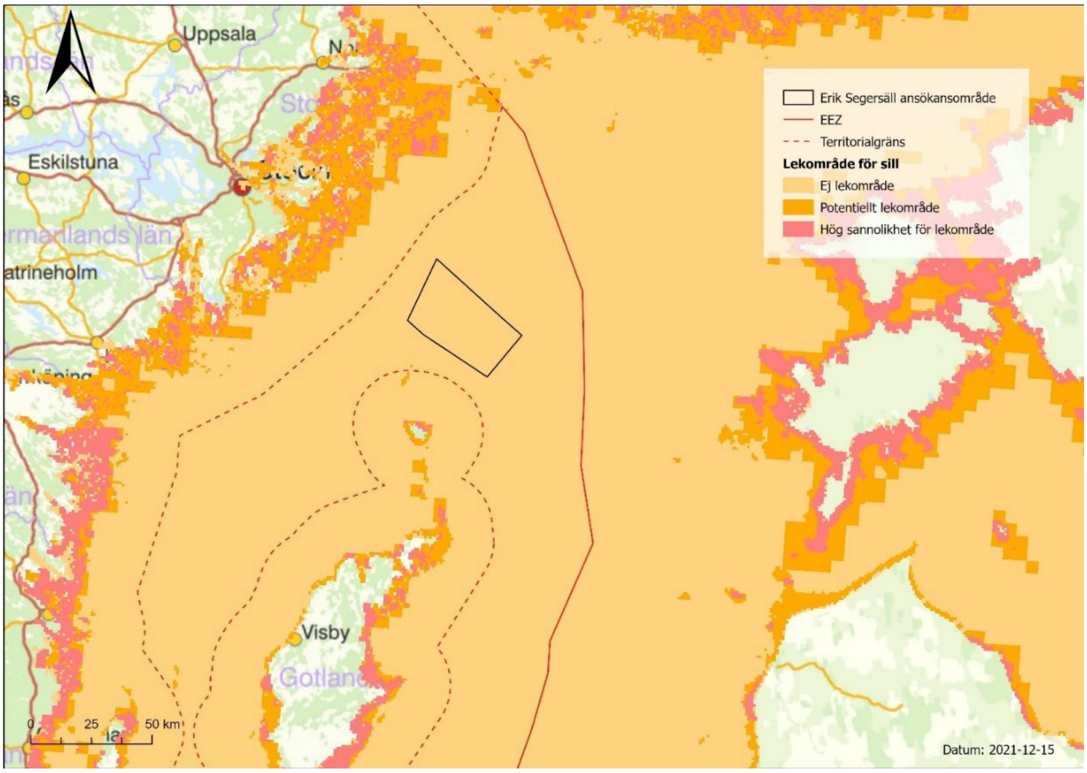

Figure 26. Map of the likelihood of spawning grounds for herring in the area of the planned wind farm.

5.7.4 Birds

The Baltic Sea also hosts a large number of bird species that are either marine, linked to its archipelago or beaches, or that use the sea area for foraging, resting and or migratory routes. The seabird species that live on the Baltic Sea can be roughly divided into three groups: those that live on fish and other animals in the water mass, those that eat plants in shallow water, and those that dive mainly for mussels and other bottom-dwelling animals. The bird species that feed on fish and plants generally harbor stable or increasing populations. For example, herbivorous species such as ducks, swans and coots develop stably or even positively in the Baltic Sea, but fish-eating birds such as herring pigs, cormorants and rattles also have a stable development. In contrast, many bird species that live on bottom animals are declining. Examples of such species include eiders, alder birds and sea sors, whose populations are declining due to, among other things, a lack of nutritious food, mainly mussels, human impact (fishing, oil spills, hunting, etc.) and a changing sex ratio (deficit of females) (Ottvall, 2021; Sea View, 2012; Life in the Sea, 2021).

In general, however, marine birds are found high up in the food chain, which is why changes in habitat as a result of climate change, fishing and eutrophication are reflected in the behaviour of seabirds. Changes in the behaviour of birds are therefore an important indicator of what is happening in the Baltic Sea, and research projects concerning a number of bird species (alder bird, herring pig, cormorant.m, etc.) are ongoing, which contributes to knowledge about how the Baltic Sea should be managed in the long term (Baltic Seabird Project, 2021).

There is no specific information on the presence of bird species in the relevant project area or whether the area is used as a nesting, foraging, wintering and/or resting area for different bird species. The rather large water depth (> 100 metres) makes it likely that eiders, alder birds and other species that live on bottom-dwelling animals are unlikely to use the area to any great extent. Said species occur in shallower waters, with depths down to 30–40 metres. However, fish-eating species may use the area.

Furthermore, various bird species cross the central Baltic Sea on a broad front during their migratory periods. Exactly where the route goes depends on weather conditions, both locally and on a larger geographical level. However, one of the more main route routes can be said to concern the northwestern part of the area, see Figure 27. In practice, however, there are likely to be stretch movements through other parts of the area as well.

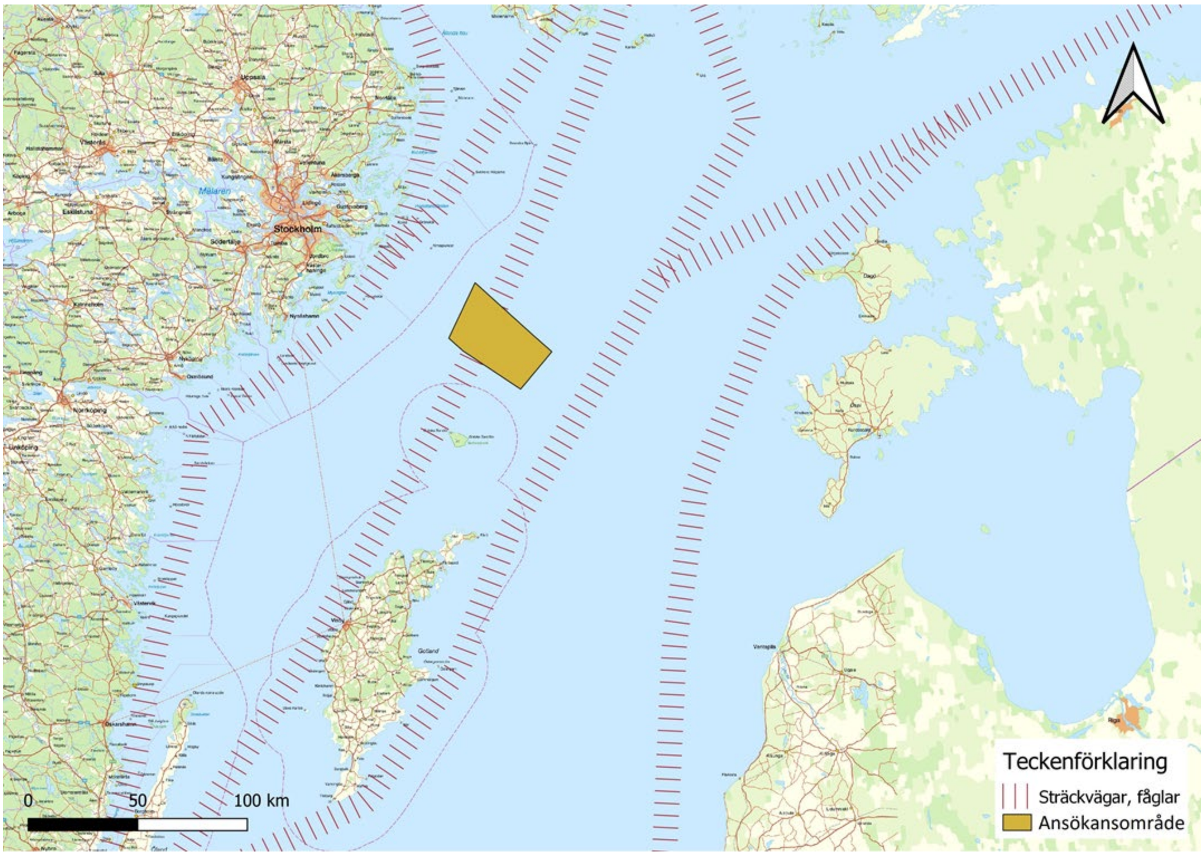

Figure 27. Stretch roads for birds in the area in question (Swedish Environmental Protection Agency, 2013; Artportalen, 2022).

However, the planned Wind Farm Erik Segersäll is not located within any known bird wintering area, see Figure 28.

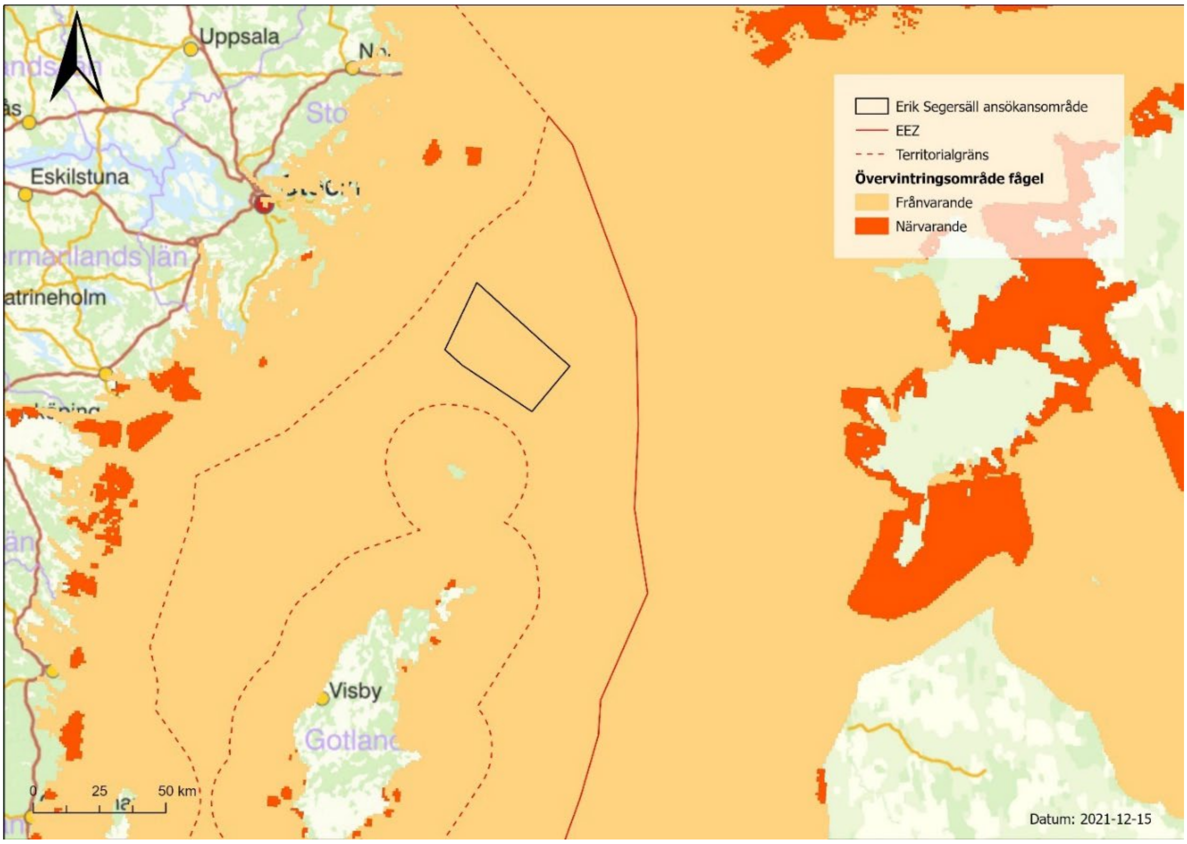

Figure 28. Bird wintering area within the area of the planned wind farm (Marine Observation and Data Network (EMODnet).

5.7.5 Bats

Bats can move over large areas, even at sea. Conducted studies have shown findings of ten different species, two of which, water bat (*Myotis daubentonii)* and pond bat (*Myotis dasycneme)* were identified up to 10 km from the coast. The studies have been carried out over the sea and at islands at Kalmar Strait and Öresund. Migratory species, for example, fly freely across the sea between Denmark and Sweden. Bats mainly venture out over the sea to hunt insects and then return to the mainland. Most species of bats fly mainly under good weather conditions with weaker winds (<5 m/s)," with the exception of the species dwarf bat and large bat, which have been seen flying at winds up to 9-10 m/s. The bat generally flies at altitudes below 40 metres above sea level, only the single individual has been observed at higher altitudes (Swedish Environmental Protection Agency, 2007).

There are no known sightings of bats within or near the planned Erik Segersäll wind farm.

5.8 Landscape image

The area where Erik Segersäll is planned is dominated by open sea with long sight lines. The distance is large between the project and any buildings is. The nearest land area with settlement is located in the Stockholm archipelago 55 km west of Erik Segersäll as the nearest land area, Gotska Sandön, has no permanent residents.

5.9 Cultural environment

The cultural environment refers to the part of the environment that is affected by people and that to varying degrees has been characterized by various human activities and activities. The cultural environment is part of the cultural heritage and includes both the physical content of the landscape and intangible phenomena such as names of places. A cultural environment may include, for example, a larger landscape section but also an individual remains or facilities (RAÄ, 2021).

The project area does not concern any areas of national interest for cultural heritage conservation. Within the project area, there are also no registered cultural-historical remains in the Swedish National Heritage Board's database Fornsök. The nearest remains are situated outside Gotska Sandön, about 13 kilometres south of Erik Segersäll, see Figure 29.

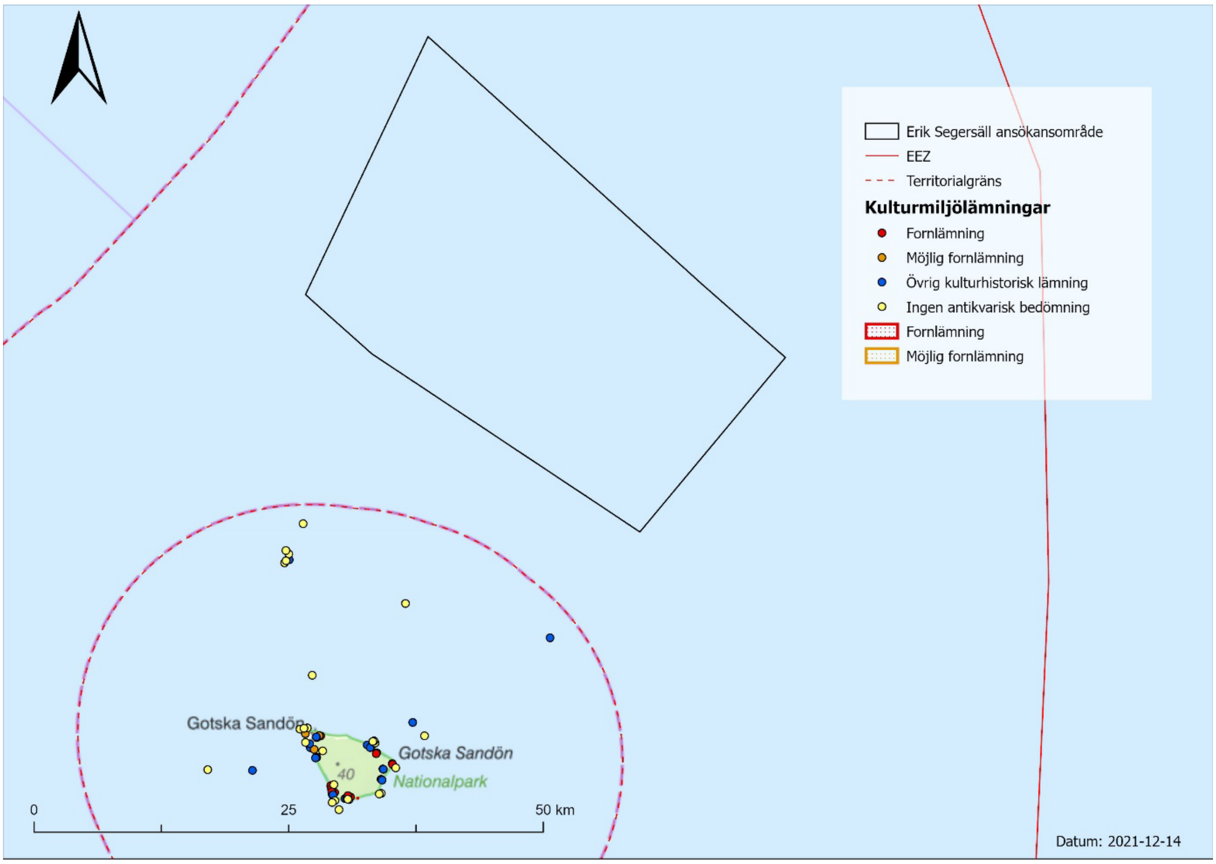

Figure 29. Cultural-historical remains in the area concerned.

5.10 Recreation and outdoor life

The basic conditions for outdoor life are that nature is accessible in different ways and that it has a certain quality. Outdoor recreation contributes to understanding of nature and to regional development and also provides health (Swedish Environmental Protection Agency, 2021). Recreation is an activity that has a positive impact on people's well-being. Access to recreational areas, mainly green areas, has been shown to have a great value for mental and physical health (Boverket, 2021).

Since the wind farm is located far out at sea, it does not affect any designated areas of national interest for outdoor life and mobile outdoor life. However, the area is suitable for recreation and outdoor activities, such as sailing, recreational fishing and other activities on water, although it occurs to a lesser extent.

5.11 Natural resource management

The current project area is not located in any areas designated as important for the extraction of natural resources such as sand extraction.

5.12 Environmental quality standards

Environmental quality standards are provisions on the quality of air, water, soil or the environment in general. Environmental quality standards for water cover groundwater and surface water, i.e. lakes, streams and coastal waters. The purpose of the norms is to ensure Sweden's water quality (Water Authorities, 2021).

Environmental quality standards are specified per body of water and specify the quality requirement that the water must achieve at a given time. All bodies of water must achieve the standard of good status or good potential status and the status must not deteriorate (VISS, 2021).

As Erik Segersäll is located in Sweden's economic zone, the project area does not overlap with any surface water bodies covered by environmental quality standards.

5.13 Climate

Open sea areas regulate the climate by absorbing large amounts of excess heat and carbon dioxide from the atmosphere. According to the IPCC report from 2019, more than 90% of excess heat and up to 30% of carbon dioxide sloops have been absorbed by the oceans. Coastal ecosystems, with vegetation such as seagrass meadows and mangroves, contribute to mitigating climate change by binding carbon (Swedish Society for Nature Conservation, 2021).

The oceans are also affected by climate change through rising sea levels as a result of melting of glaciers and inland ice combined with increased warming, which increases the volume of seawater. Warming of the oceans leads to surface water bringing heat down to deeper water, which in turn affects ocean circulation. The Baltic Sea is the sea in the Northern Hemisphere that warms up the fastest. The impact on the physics and chemistry of the oceans in turn also affects the oceans' ecosystems and species, which can, for example, lead to more fish stocks moving towards the poles and changing the range of species (Swedish Society for Nature Conservation, 2021)..

As wind power is a renewable energy source, an offshore wind farm contributes to the transformation of the energy system. Wind power is today the energy source used on a commercial scale, which has the lowest climate impact. The IPCC has calculated life-cycle greenhouse gas emissions from various electricity generation technologies and has shown that offshore wind power has lower emissions than both onshore wind power as well as solar cells and nuclear power. Mainly the climate impact occurs in the manufacturing of the plant itself (Swedish Society for Nature Conservation, 2021).

5.14 Business and infrastructure

To the west, north and east of the planned wind farm are well-trafficked shipping lanes, see Figure 18. Furthermore, there are a number of designated MSA areas belonging to nearby airports west and south of the Project Area Erik Segersäll. The radius of an MSA surface is 55 kilometres and none of these concern the current project area, see Figure 18.

In addition to the major shipping lanes that are of national interest for shipping, other shipping routes are also used in the area. Data for a large number of vessels such as container and tankers show the traffic in relation to the planned wind farm Erik Segersäll, see Figure 30 and Figure 31. The northwestern part of Erik Segersäll overlaps slightly with an area that today to some extent is used by freighters.

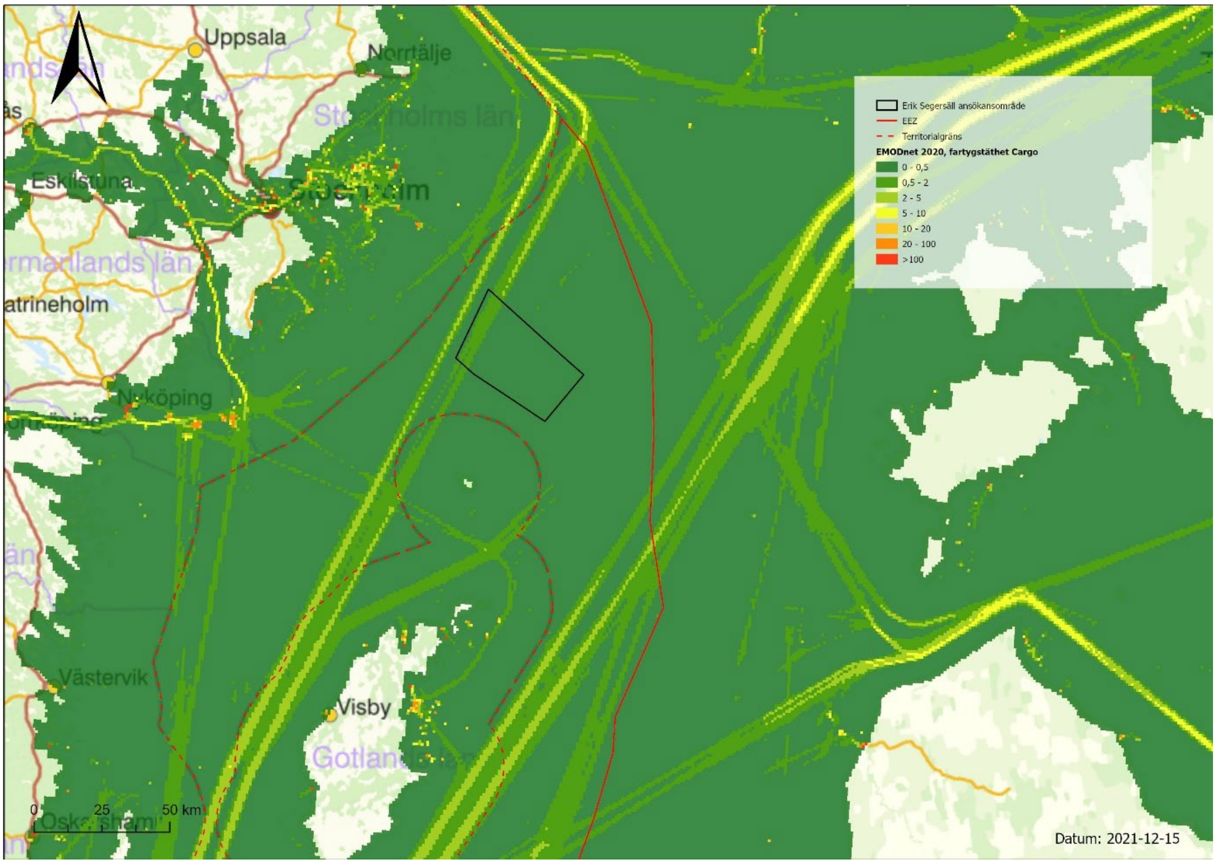

Figure 30. Map of the annual traffic in 2020 for freighters in the current area of the planned wind farm.

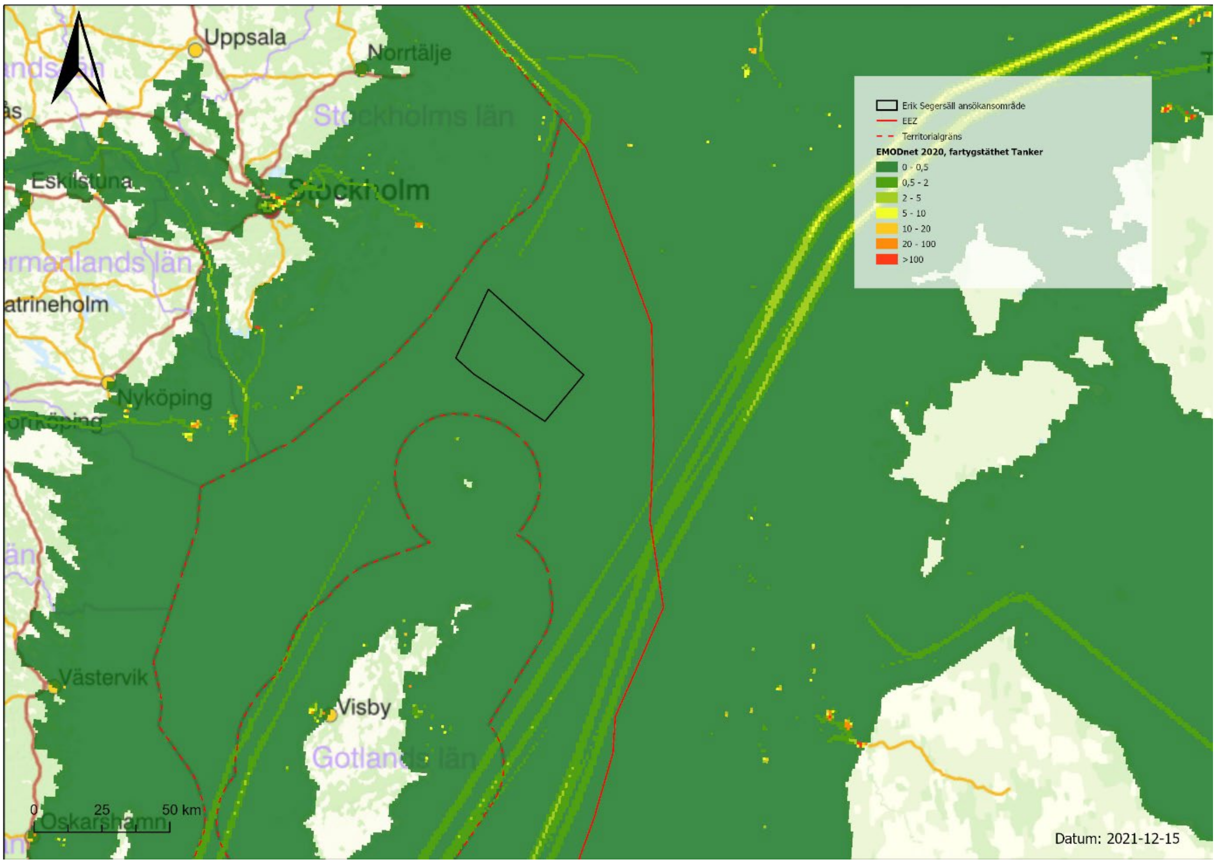

Figure 31. Map of the annual traffic in 2020 for tankers in the current area of the planned wind farm.

5.15 Fishing

Commercial fishing is a maritime industry with importance for food supply and production, which also gives rise to land-based jobs (Swedish Board of Agriculture, 2021). Historically, commercial fishing in the Baltic Sea has focused on the species sprat, herring and cod. As the stock situation for several stocks has been decreasing in recent years, there are now decisions aimed at commercial fishing for certain species. For 2022, the decision means that targeted commercial fishing for cod throughout the Baltic Sea is prohibited. It is also prohibited to fish for herring in the western Baltic Sea and to fish salmon in the south of Åland on a professional basis. All in all, this means a reduction in Sweden's total fishing opportunities. However, there are limited exceptions regarding small-scale coastal fishing which will still to be possible (Government, 2021).

Planned wind farm Erik Segersäll is located in an area where, according to international geodata , fishing is conducted to a relatively small extent, Figure 32.

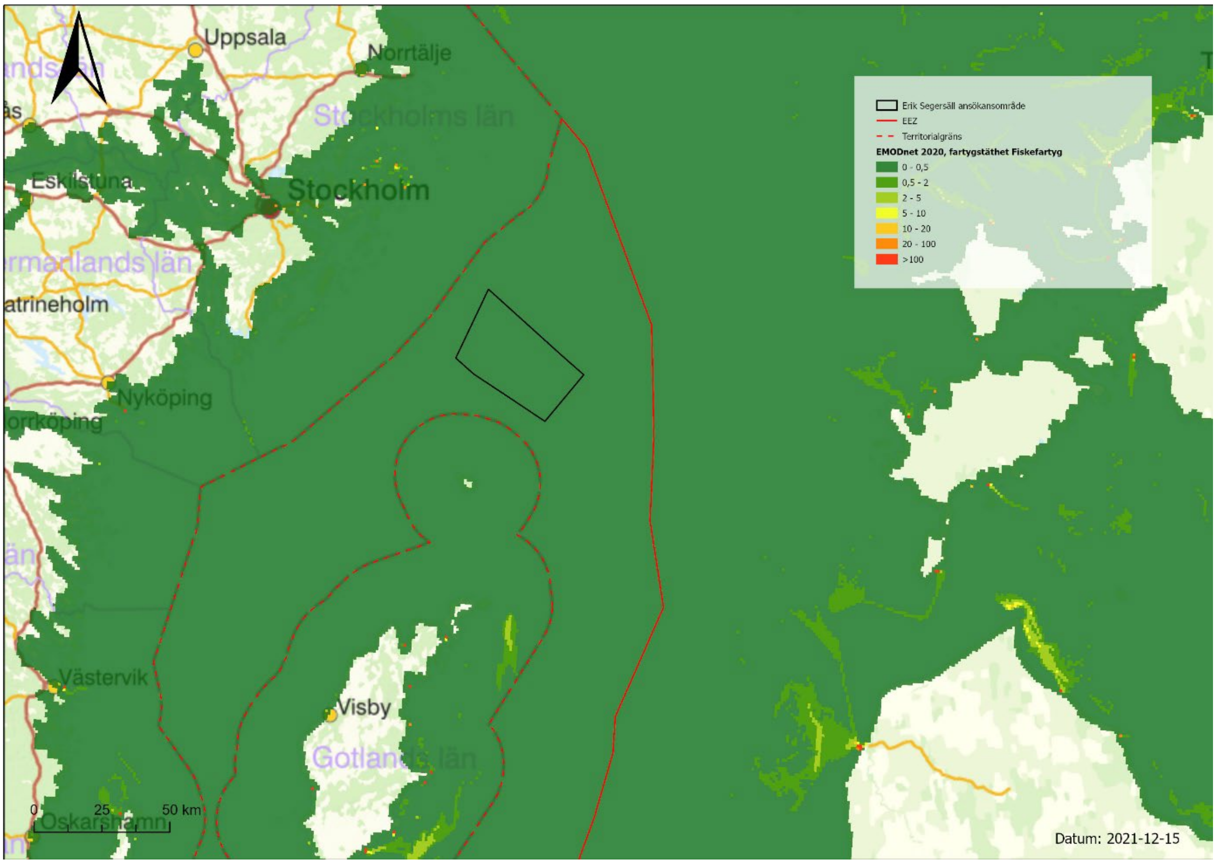

Figure 32. Commercial fishing in the area in question in 2020, vessel density per h/1x1 km/month (EMODnet, 2020).

Charts over trawling conducted in and around Erik Segersäll shows that fishing with trawls has occurred in several places in the area in recent years, see Figure 33. As the fish is a moving resource, the place where fishing is conducted varies.

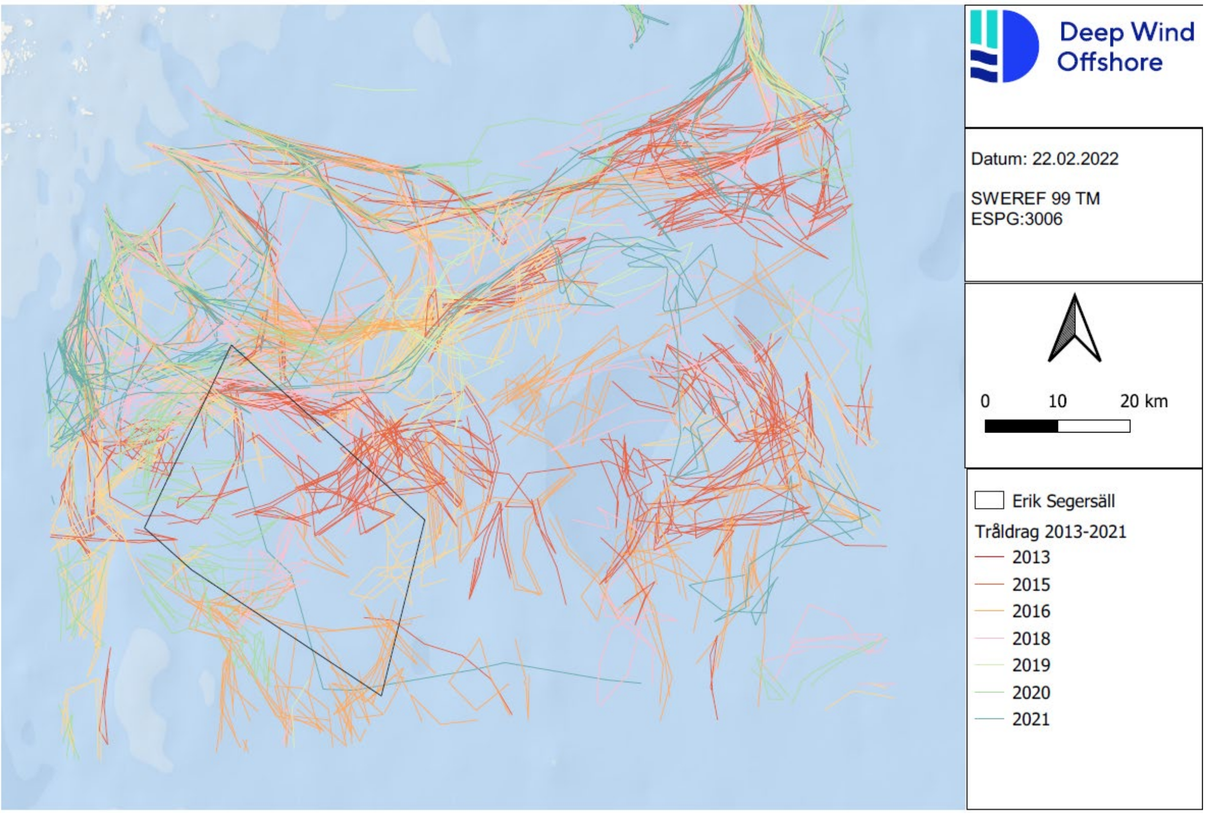

Figure 33. Trawling in/around the area for Erik Segersäll during the years 2013-2021 (Swedish Agency for Marine and Water Management, 2021)

5.16 Plan conditions

5.16.1 Maritime spatial plans

The Swedish Agency for Marine and Water Management (HaV) is responsible for producing marine plans for Sweden that show the state's overall view of how the sea should be used. For the Baltic Sea, the maritime spatial plan was adopted by the government at the beginning of 2022. The Baltic Sea is divided into five sea areas and the planned site is located within the area called the Northern Baltic Sea, Lake Area East Stockholm (Ö204)," see Figure 34.

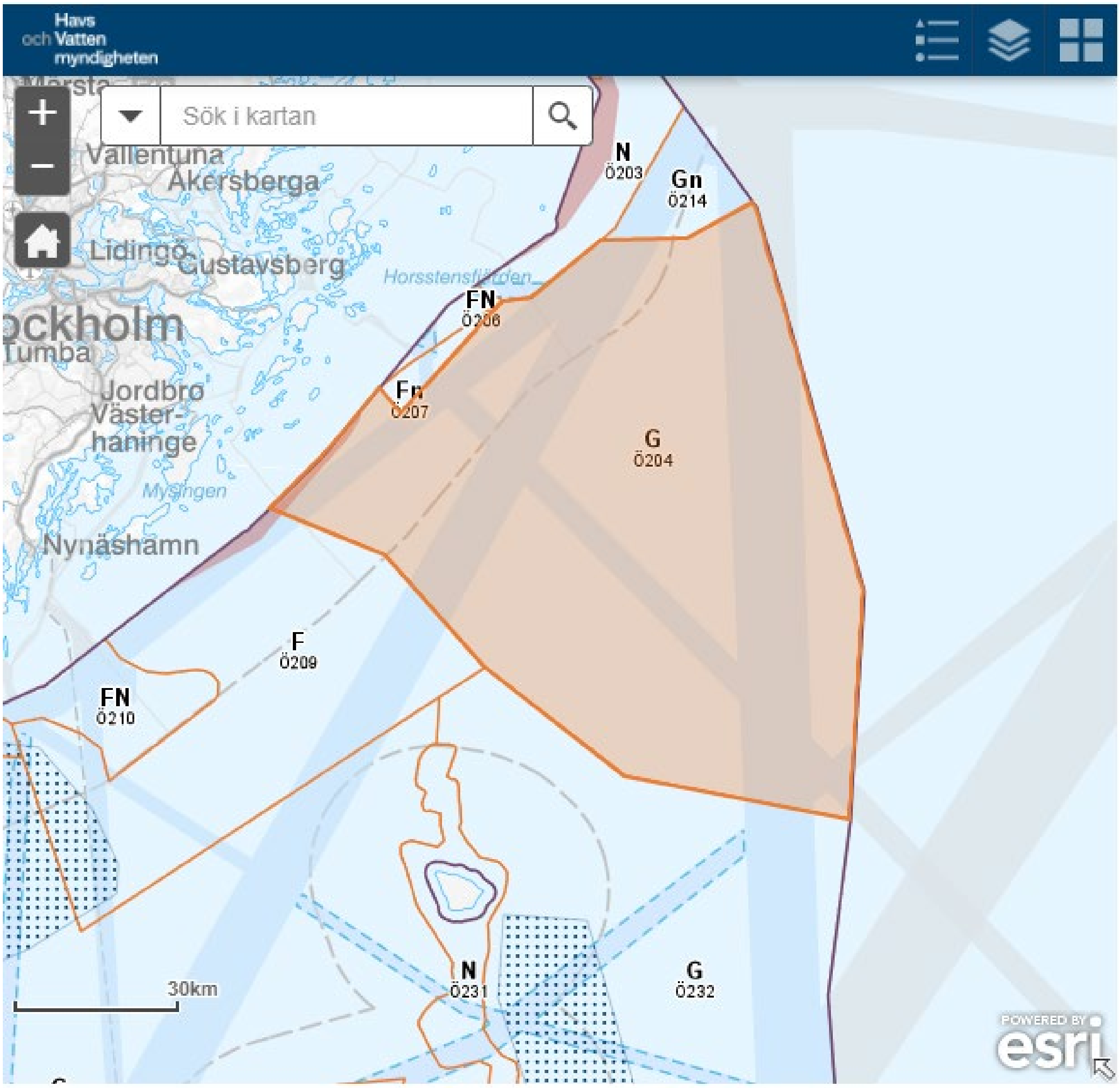

Figure 34. Designated areas in the Northern Baltic Sea Maritime Spatial Plan (Swedish Agency for Marine and Water Management, 2021).

In general, the Baltic Sea plans state that wind power is inappropriate in several areas, mainly because the Armed Forces have extensive interests in the area in the form of, for example, naval exercise areas. Furthermore, there are also a number of places with high natural values that are identified in the maritime plans as unsuitable for wind power. Furthermore, the population of alder birds is mentioned as particularly sensitive to negative impacts from wind power.

The area Ö204, within which the wind farm is planned to be located, is designated in the sea plan as "general use", that is, an area where no particular use takes precedence. In contrast, areas marked by their own geographical markings, such as shipping, take precedence where they are indicated. As there are good wind conditions and suitable depths in the Northern Baltic Sea, the area is suitable for offshore wind power and there are national interest claims for wind farms along the entire coast from Norrtälje to Oxelösund. The current area of the planned wind farm is identified in the maritime spatial plan as *Energy: Other claims for wind power* and has been identified in the marine spatial planning process as a public interest of essential importance for energy extraction, see Figure 35. The area is considered to provide conditions for floating wind turbines.

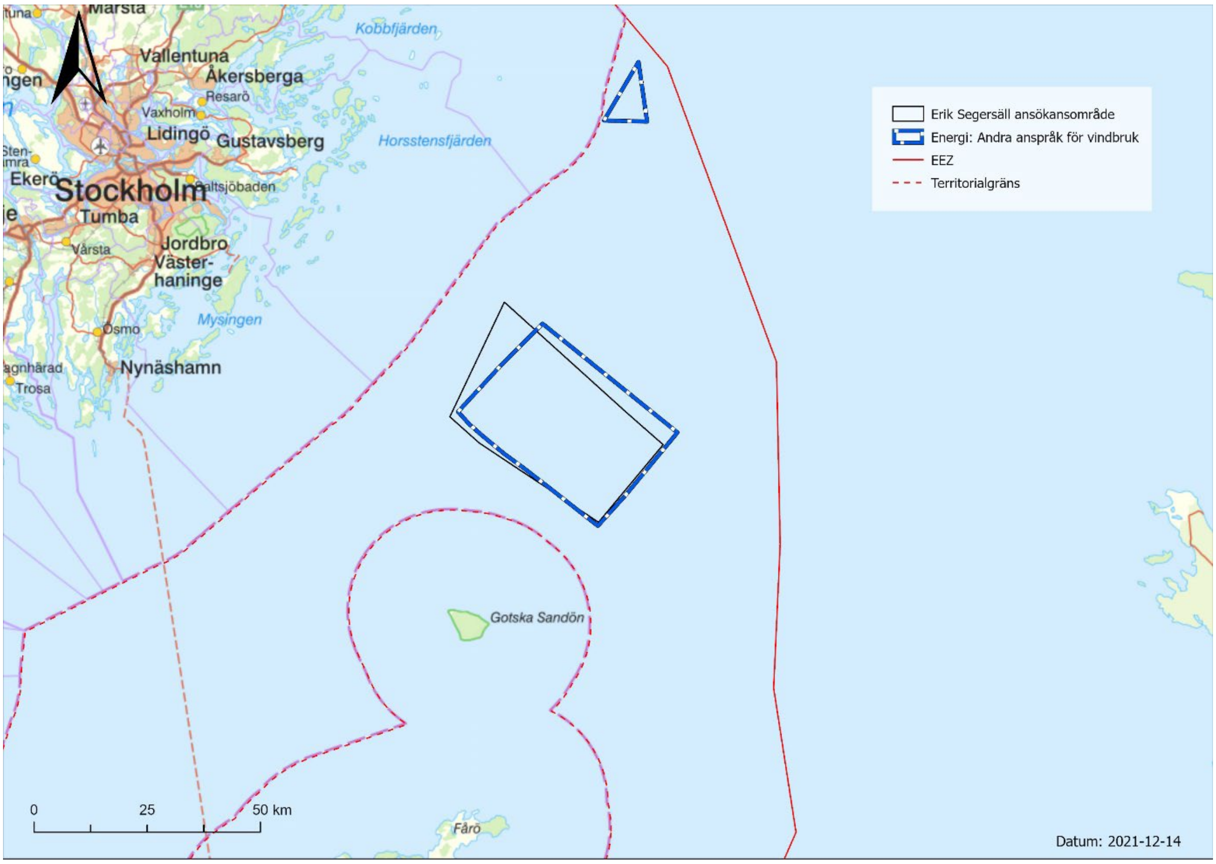

Figure 35. Designated areas for energy production in the maritime spatial plan.

The planned wind farm also borders areas for shipping both to the north, west and east. In these areas, maritime activities shall be maintained and shipping safety with regard to sufficient manoeuvring space shall be taken into account.

5.16.2 Helcom

For the Baltic Sea region, there is a regional environmental convention, the Helsingsfors Convention, which is implemented by a group called HELCOM. The purpose of the Convention is to protect the Marine Environment of the Baltic Sea and the work deals with issues such as eutrophication, protection and conservation of marine biodiversity and the spread of environmentally hazardous substances. Within HELCOM, an action plan has been developed by the ministers around the Baltic

Sea who are part of the group. The aim of the action plan is to restore the Baltic Sea to good ecological status by 2021.

The action plan lists offshore wind power as one of the activities affecting the Baltic Sea. HELCOM's ambition is to work to continuously improve sustainable activities at sea. The plan further states that the expansion of offshore wind power is necessary to achieve the climate goals by 2030 and 2050. Among other things, studies will be carried out regarding underwater noise from the installation, operation and decommissioning of offshore wind farms. After that, HELCOM intends to take further action depending on the outcome of the study, which will be completed by 2026.

5.17 Risk and safety

The construction of an offshore wind farm places high demands on safety, and safety will be a high priority throughout all phases of the project. The risks of large-scale offshore wind projects can be categorized according to the following categories:

- Risks to human health
- Risks to the environment
- Risks to private or public domain

Risks to human health may arise, for example, when work has to be carried out at high altitude or above water, work involving heavy lifting or involving the handling of electrical equipment (high voltage). Risks to the environment may consist of emissions of various kinds, disturbing sounds or of bottom sediments that are stirred up and spread during civil engineering works. Risks of damage to public or private property may arise, for example, during vessel movements in the project area or when handling heavy components. A particular risk is posed by munitions or ammunition that may remain on the site. This will therefore be carefully mapped out in the investigation phase.

The general management of risks can be described in different action steps. In the first instance, the risk shall be eliminated by completely avoiding the hazardous operation or, if possible, be replaced by a less hazardous operation. The next step is to reduce the probability and consequence of a risk event and to be prepared for action should the risk fall out. Personal protective equipment is the last protective barrier for workplace accidents, which, however, can in no way replace other measures.

There are various structured methods for working with risk and security. Deep Wind Offshore and its owners have extensive experience from security arrangements, routines and tools from large projects and operations within

- Shipping
- electricity generation and networks
- offshore oil & gas

There are also effective analytical tools available, such as HAZID and HAZOP and others.

In this type of project, a so-called HSSE Plan (Health, Safety, Security and Environment Plan) is normally drawn up, which describes how the project will plan, manage, monitor and coordinate issues related to health, safety and the environment during the different phases of the project. This is continuously evaluated during the project while continuously conducting risk analyses of future work. As soon as a risk is identified, it shall be followed by an action.

When procuring subcontractors, it is ensured that the project's safety procedures are followed. Risks will be described in more detail in the EIA.

6 POTENTIAL ENVIRONMENTAL IMPACT

The impact that the planned Erik Segersäll wind farm may cause arises in the different phases presented in the description of the operations in section 3.2. Impacts may occur during the preparatory investigations, in the construction phase, in the operational phase or in the decommissioning phase. The greatest impact on the environment is estimated to be the work that takes place during the construction phase.

Below is an account of the potential environmental effects that the Wind Farm Erik Segersäll can implicate and which must therefore also be taken into account in the upcoming process. In the forthcoming environmental impact assessment, the environmental effects will be described in more depth and the consequences will be assessed. The assessments will be based on a worst-case scenario.

6.1 Geology and bottom conditions

The main impact on geology and bottom conditions that arise from the establishment of the Erik Segersäll wind farm consists of the loss of substrates and the supply of hard structures in the form of anchoring of the floating foundations and internal cable networks. However, the bottom area occupied is estimated to be very small in comparison if the foundations had been bottom-fixed.

6.2 Hydrography

The Erik Segersäll wind farm is located far from the coast, which means that the impact on hydrography is expected to be very limited. Marginal impact can occur in terms of wave height and current directions in the vicinity of the wind turbines' foundations.

6.3 Protected areas

The planned wind farm is not expected to affect any protected areas. Based on the current knowledge base, no impact is expected to occur on the Natura 2000 areas located at Gotska Sandön and the Stockholm archipelago. This will be further highlighted in the EIA.

6.4 Natural environment

6.4.1 Bottom-dwelling animals and plants

The impact on the bottom will be limited as Erik Segersäll will be built with floating foundations that are anchored to the bottom with wires/chains and thus have less bottom contact than bottom-fixed foundations. Although the impact is smaller, it can cause some elevated noise levels and the spread of sediment at the anchorage. Negative impact in the form of dispersion of sediment during the laydown of the internal cable network may also occur. Sediment particles that swirl up can primarily affect the oxygen uptake capacity of fish fry (Swedish Environmental Protection Agency, 2013). Although the physical impact on the bottom is small, the wires can involve swirling and dispersion of sediment at the bottom anchorage even during the operational phase. This can also cause some elevated noise levels.

During the construction phase, the bottom fauna in the immediate vicinity of the bottom anchorages may also be temporarily affected, but generally recolonization occurs relatively quickly.

Positive impacts in the form of fouling and reef effects will also occur in cases where bottom-fixed foundations are used, and in these cases are expected to constitute new habitats for hard-bottomed algae and animals. The new habitats increase food availability and create protection against strong currents and predators, which also increases the concentration of mobile fauna, such as fish, in the vicinity of the reefs (Swedish Environmental Protection Agency, 2008). With a floating plant, the reef effect may be less. As the final technical solution for the wind farm has not yet been decided, the estimated extent of the reef effect cannot be stated at present.

6.4.2 Marine mammals

Marine mammals are mainly affected by various underwater sound sources such as ship traffic. Marine mammals are particularly sensitive to elevated noise levels during the time they are mating. It is primarily the porpoise that is sensitive to sound disturbances, but even some seals can be negatively affected by sound (Swedish Environmental Protection Agency, 2012). In the construction of the wind farm, some impact will be made through the sound that is created when anchoring the floating foundations, during transport within the park and when closing the internal cable network. However, the impact during the construction phase is estimated to be small as the foundations will not be grounded in the same way as bottom-fixed foundations by piling, therefore the noise levels are not considered to lead to the same effects (for example. hearing impairment). However, porpoises could be intimidated temporarily and at certain moments during the construction phase.

Air- and waterborne noise can also disturb seals, however, studies have not been able to show any long-term significant effects of this type of impact (Swedish Environmental Protection Agency, 2012). Elevated noise levels at certain stages of work could risk temporarily intimidating the seals or masking their communication.

During the actual operation phase, the mooring lines anchoring the wind turbines could give rise to some swirling and dispersion of sediment at the bottom anchorage as well as elevated noise levels, which could have an impact on marine mammals. This impact will be further analyzed and presented in the upcoming environmental impact assessment.

6.4.3 Fish

Noise from the wind turbines can affect fish during the operating period, but based on the research data that exists today, the impact is considered to be small. Increased noise levels during transport of the wind turbines and mooring to the seabed, for example, can affect the fish's orientation ability and the ability to locate prey. Fishes are especially sensitive to elevated noise levels during the spawning period. The internal cable network can also cause an impact on eels that can temporarily change direction or delay their passage at the cable as a result of the electric and magnetic field that occurs. However, no significant effect of submarine cables on fish has been demonstrated. As mentioned in the section above, the foundations of wind turbines, if they are established with bottom-fixec foundations, can also act as habitats, which could then increase the amount of small fish in the area in question (Swedish Environmental Protection Agency, 2008). The positive effect that floating platforms could have is an overgrowth in the form of seaweed, gastropods and mussels.

During the actual operation phase, the mooring lines positioning the wind turbines could give rise to some swirling and spread of sediment at the bottom anchorage as well as elevated noise levels, which could have an impact on fish. This impact will be further analyzed and presented in the upcoming environmental impact assessment.

6.4.4 Birds

Wind power can generally affect birds in three different ways: by birds being killed as a result of the wind turbines' rotating wings/by birds flying into the towers of the turbines (i.e. fatal accidents), by loss of habitat or by barrier effects that mean that birds avoid flying in the vicinity of wind turbines. The amount of flight mortality recorded at the wind farm depends on the location of the turbines in relation to topography and the surrounding environment. Birds that breed, winter or rest are at greater risk of accident than those that only pass through the area during the migration period (Swedish Environmental Protection Agency, 2017).

Species such as loams and sea soles avoid offshore wind farms extensively, as do bearded grebes and storm petting. Furthermore, there are quite a few species that avoid wind turbines at sea, but to varying extents and not as consistently as the previously mentioned species such as sea sorre, alder bird, lesser lire, razorbill, herring pigsty, dwarf gull and Kentish tern. The avoidance correlates with whether the wind turbine is in operation or not. Furthermore, there are a number of species that are not considered to be affected at all by the offshore wind power such as eider, three-toed gull, fish tern and silver tern. However, gulls and various cormorants are judged to be attracted to the wind turbines, largely because these foundations offer seating (Swedish Environmental Protection Agency, 2017).

The Erik Segersäll wind farm may have a negative impact on migratory birds as the park is located in an area that is used as a migratory route on a broad front across the Baltic Sea. However, the park does not affect any known rest areas or other areas with significance for bird life. Since the park is located far out at sea at great depths, it also does not affect any environments that are particularly good habitats for a number of birds, such as lake banks (Swedish Environmental Protection Agency, 2008).

In the upcoming EIA, the impact on birds will be further described.

6.4.5 Bats

Wind turbines can affect bats by the animals being hit by the turbines' rotating wings, leading to their death instantly or suffering injuries from which they later die. Often, local or non-migratory populations are affected, and not just migratory species. But even the bat's way of chasing and moving is crucial to the species' mortality. However, the mortality rate at offshore wind turbines in Swedish waters is difficult to determine as no such studies have yet been conducted on how offshore wind turbines affect bats (Swedish Environmental Protection Agency, 2017).   The impact on bats from the planned Erik Segersäll wind farm is therefore difficult to assess at present.

6.5 Landscape image

A wind turbine generally changes the prevailing landscape and visual impression of the landscape. Visibility is affected by distance, terrain between the viewer and the object (vegetation and habitation), time of day and weather. The experience of the change is subjective and thus varies with the viewer and their expectations of the landscape image. Humans have difficulty judging the height and size of an object if there is no known object to relate to. Tall objects far away can be interpreted as being small and standing close and vice versa.

Since Erik Segersäll is located far out in the sea area, over 30 kilometres from Gotska Sandön and 55 kilometres from the Stockholm archipelago, the impact on the landscape is considered to be limited. The impact consists of changes in the landscape, mainly in the outer archipelago and for those who are at sea. The wind farm may become visible in open spaces for those moving by boat in the surrounding landscape, especially when there is good visibility, as the turbines are up to 370 metres high. As previously described, shipping lanes are located close by the wind farm.

The visibility of the wind farm is also enhanced by the warning lights, obstacle lighting, which will be lit according to current regulations. Further investigations of the impact on the landscape will be presented in the forthcoming EIA.

Prior to planning photomontages and any other visualizations, a model has been developed based on laser data over the area, where both forest height and ground height have been entered. In Appendix 2, a first visualization is presented in the form of visibility models from some of the visualisation points located along the coast in surrounding municipalities that are interesting from a landscape perspective, presented in Figure 31.

The visualisation is done by placing the wind turbines in the model of the view from the visualisation point or viewpoint. For every view, an image with visible wind turbines and one with red circles describing the position of the rotor blades for both visible and hidden turbines. Red rings below the horizon therefore mean that the wind turbines are at too great a distance to be visible over the horizon, red rings against a forest or island mean that they are behind this "obstacle" and therefore not visible. Even visible wind turbines are provided with rings, but in these cases it is enough to zoom into the image to understand which of the visible wind turbines is marked.

After consultation with the authorities, and any requests from those concerned, additional viewpoints will be visualised with both laser data and photomontage.

From the visualisation points (VP) selected to initially investigate possible visibility, see Figure 31 and Appendix 2, the wind farm is estimated to be only fully visible from Gotska Sandön (VP13) where the distance from viewer to park is approximately 33.5 km (see Figure 36), and from Korsö (VP11, Appendix 2) where the distance is about 43 km. Visibility from several of the visualisation points that are at approximately the same distance is limited by terrain, vegetation and infrastructure, as is the case with Nämndö (VP9) at a distance of about 48 km where from the selected visualisation point you cannot see the wind farm at all (see picture in Appendix 2). At longer distances, the curvature of the earth also comes into play. This means that only the outer blade parts of the nearest wind turbines can be glimpsed from Nåttarö (VP6), which is at a distance of about 63 km, but that no part is visible at all from the visualisation point on Fårö (VP12) where the distance is about 70 km, see Figure 34 . In the event that the viewer is at a lookout point, such as at Vårdkaseberget on Muskö (VP8), there is some visibility even though the distance is about 67 km, see Figure 33.

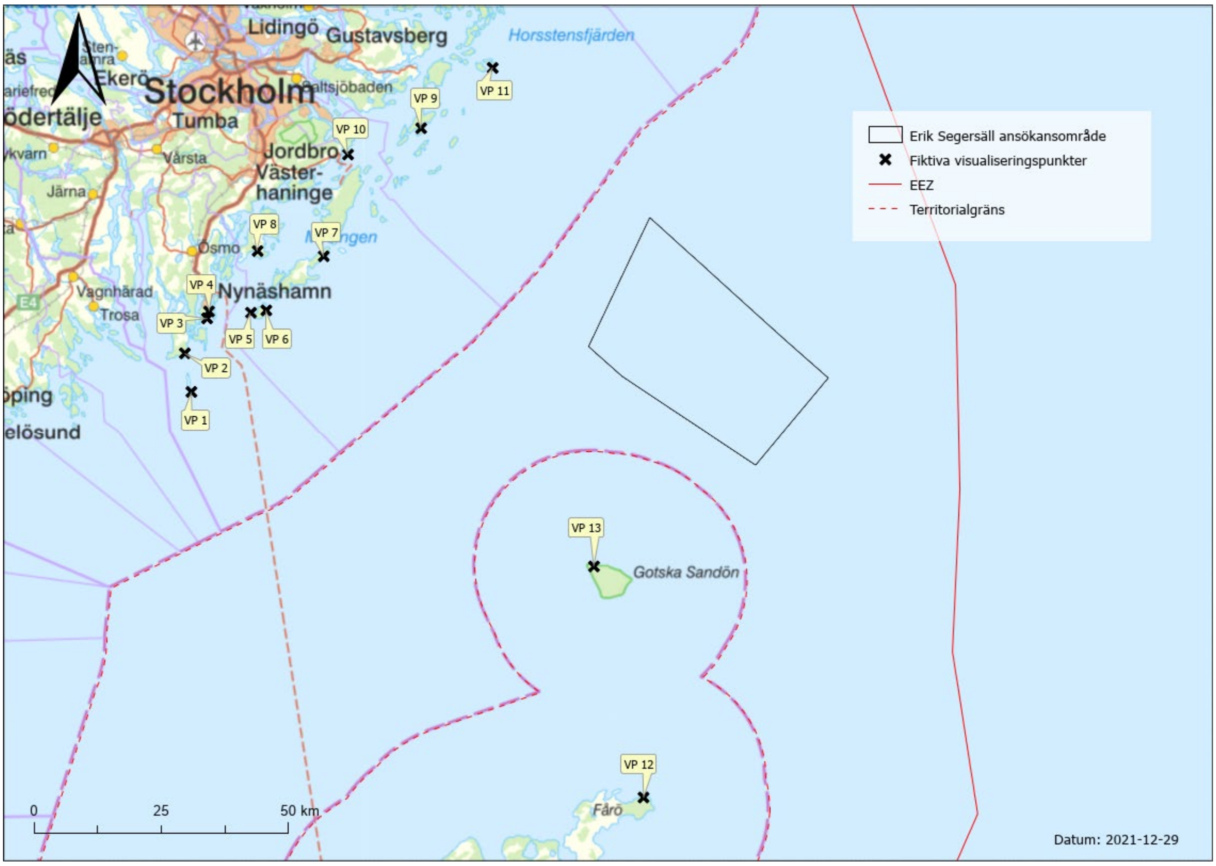

Figure 31. Visualization points that can be used as photo points in further investigation and EIA.

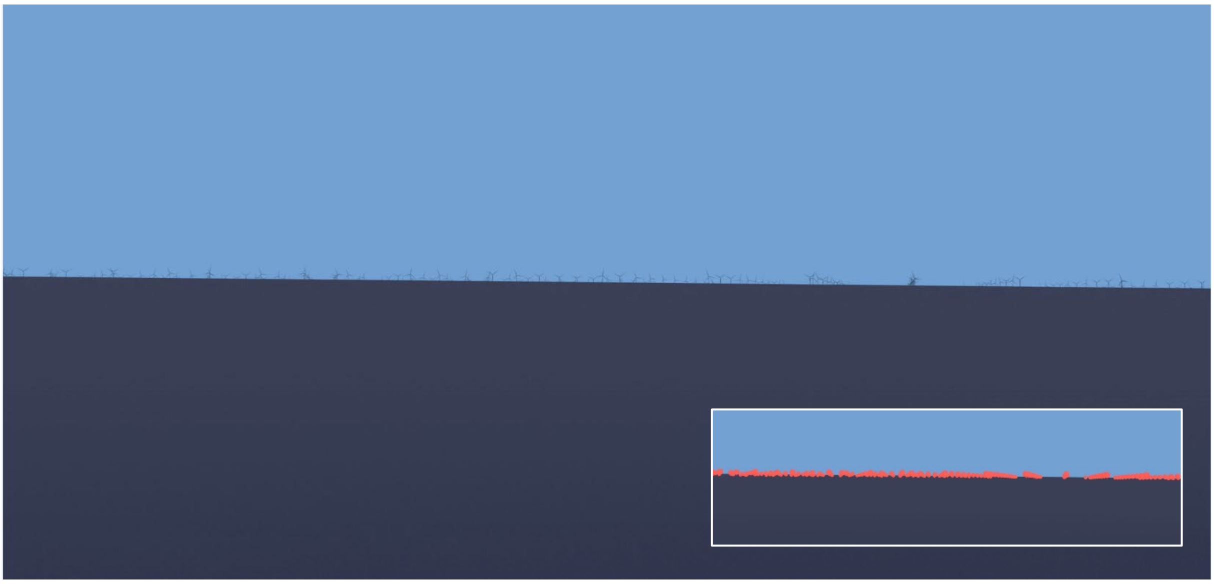

Figure 32. Visibility from Gotska Sandön with distance of about 33.5 km. The front rows of wind turbines depict themselves against the horizon. In the dark, the flashing of the obstacle lights will be visible. The recessed image shows the position of the wind turbines regardless of whether they are visible or not. Each rotor diameter is marked with a red ring.

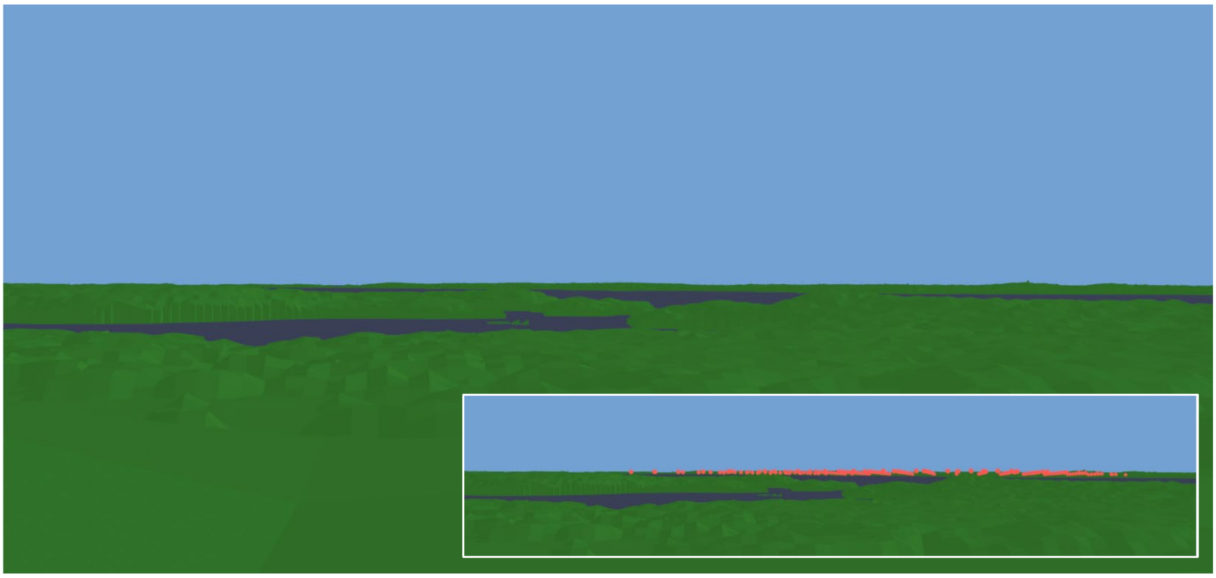

Figure 33. View from Vårdkaseberget on Muskö. Despite the distance of about 67 km, the wind turbines are probably visible over the horizon where they are not obscured by terrain and vegetation. The recessed image shows the position of the wind turbines regardless of whether they are visible or not. Each rotor diameter is marked with a red ring.

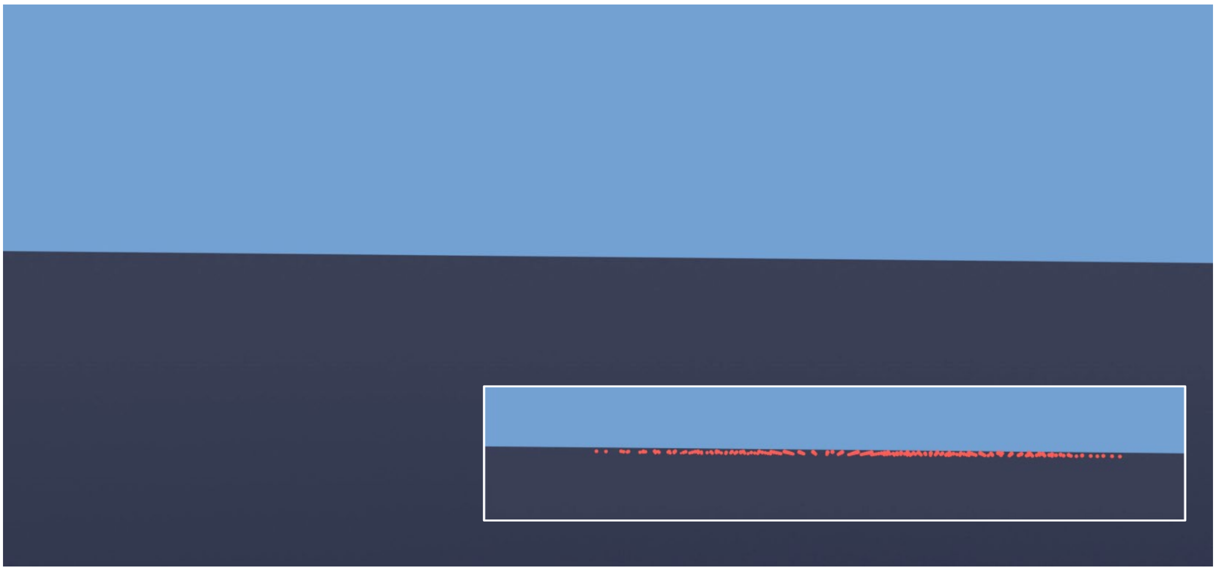

Figure 34. Visibility from Fårö at a distance of about 70 km. All wind turbines will be below the horizon and will not be visible from the shore. The recessed image shows the position of the wind turbines regardless of whether they are visible or not. Each rotor diameter is marked with a red ring.

6.6 Cultural environment

The planned wind farm is not expected to affect any known archaeological remains. Several documented shipwrecks occur in the Baltic Sea, but none of these are within the project area. Erik

Segersäll is therefore not expected to affect the cultural environment in the area during the construction phase nor during the operation phase.

If previously unknown marine archaeological remains or other cultural-historical remains are found in connection with the surveys, the work will be stopped and a notification will be made in accordance with the Cultural Environment Act (1988:950).

6.7 Recreation and outdoor recreation

As the planned Wind Farm Erik Segersäll is located far out at sea, it is considered to have limited impact on recreation and outdoor life on land. The wind farm will be visible from Gotska Sandön and thus be able to change the experience of the horizon, while the visibility from Fårö is extremely small.

For those who are normally used to having open sea while being out at sea, the change in the visual experience will be tangible. During the operation of the wind farm, there are no restrictions on how close to the turbines or wind farm you can pass.

Some impact may occur during the construction phase when transporting wind turbines and plant parts past the designated shipping lanes where recreational boats can potentially occur. The impact consists mainly of increased vessel traffic, noise and possible roadblocks for a limited time.

6.8 Environmental quality standards

The planned wind farm itself is not considered to have any impact on environmental quality standards as the area is outside designated surface water bodies. During the construction phase, however, impact may occur when transporting the wind turbines and platforms out to the current location. Work vessels risk causing an impact in the form of exhaust emissions. However, the impact is considered to be so minor that neither the ecological nor the chemical status of the surface water bodies concerned is considered to be adversely affected. The operations are therefore not considered to impair or complicate the status of these surface water bodies. Any impact on environmental quality standards will be further explained in the forthcoming EIA.

6.9 Climate

The wind farm will have a certain impact on the climate, mainly during the construction phase (production of the wind turbines, transport, installation work, etc.) but also during the decommissioning phase (mainly transports). Overall, offshore wind power has greenhouse gas emissions throughout its life cycle equivalent to an average of 11 grams of $_{CO2}$ eq/kWh, which can be compared to a large-scale photovoltaic system that has emissions of 41 grams of CO2 eq/kWh and carbon powder that emits 820 grams of $_{CO2}$ eq/kWh (Swedish Society for Nature Conservation, 2021). The negative impact on the climate from the planned wind farm will be limited in scope and time.

The wind farm will also have a positive impact on the climate as it contributes to Sweden's climate goals and the transition to fossil-free electricity production. The wind farm, when fully operational, will have a capacity of about 20-26 TWh, which could provide a very large number of households with renewable electricity (20 TWh corresponds to the annual consumption of electricity of the entire Stockholm county in 2020).

In the upcoming environmental impact assessment, the impact on the climate will be further explained.

6.10 Fishing

As fishing activity is relatively low within the planned project area, no significant impact on commercial fishing is expected. The fishing that is currently conducted within the project area may be limited within the actual wind farm area itself. Individual fishermen may also be affected to some extent. The impact on commercial fishing will be investigated during the consultation process and in the upcoming EIA.

6.11 Infrastructure

The wind farm is expected to have a certain negative impact on shipping. The wind farm is located taking into account designated national interest areas for shipping. However, identified data gives an indication that there is traffic also outside designated shipping lanes, within the western part of the area for Erik Segersäll.

In the vicinity of the planned wind farm, Sweden's total defense has extensive interests in the form of, among other things, naval exercise areas. Facilities and activities can affect the national interest areas by constituting physical obstacles over, on or under the water, which limits the Armed Forces' activities for aircraft and ships. Technical disruptions can also affect liaison and radar systems, which may result in limitations in aviation and maritime safety. The wind farm is located with regard to these designated areas and therefore does not directly affect the Armed Forces' national interest area. Erik Segersäll is thus not considered to cause any damage to the designated national interest areas for the military part of the total defense.

Erik Segersäll is also not considered to have any impact on nearby airports as it is not located within any designated MSA areas.

6.12 Plan conditions

The planned wind farm is not considered to conflict with any existing plans for the area. The wind farm largely coincides with the area designated in the maritime spatial plans as particularly suitable for floating wind power and is thus considered to be in line with this.

7 CUMULATIVE EFFECTS

Cumulative effects occur when effects from multiple sources interact with each other. Identification and assessment of cumulative effects is important when assessing the environmental effects of an activity or measure. In order to determine what the cumulative effects will be, it is important to have a clear picture of how parts of the environment are affected by both the measure in question and by other aspects of the impact area.

In the environmental impact statement, an identification and assessment of cumulative effects will be made based on existing and licensed activities in the area, and in the case that it is deemed relevant also for other parks in the permitting process. Cumulative effects may consist of, for example, the impact on marine mammals and birds of the activities located within a relevant geographical area.

Within the current project area, there are currently no plans for other offshore wind farms. To the north of Erik Segersäll, Njordr Offshore Wind AB plans the wind farm Nordic Offshore Delta of about the same size as Erik Segersäll. Between Gotland and the mainland, two more wind farms of slightly different magnitude are planned, see Figure 35.

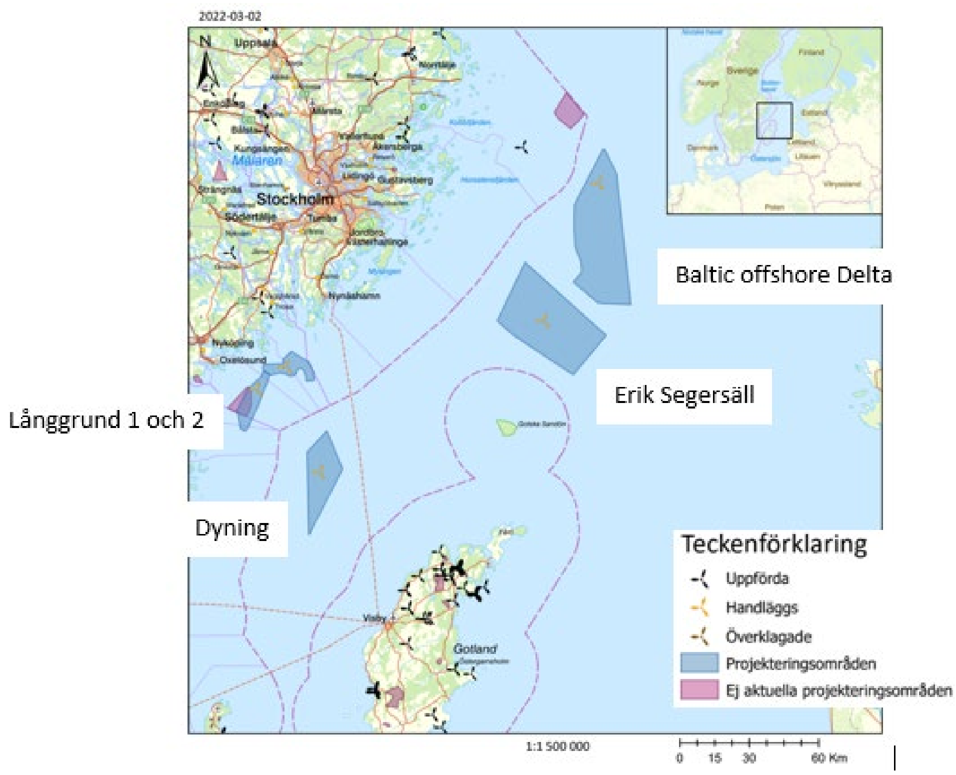

Figure 35. Other planned wind farms in Östersjön between Gotland and the mainland (Vindbrukskollen, 2022-02-03).

Any cumulative effects will be investigated during the consultation and investigation phase and described in the EIA.

8 PLANNED INVESTIGATIONS

Prior to the submission of permit applications, further investigations and inventories will be carried out. The investigations planned are described below.

8.1 Seabed surveys

The purpose of the geophysical and geotechnical surveys of the seabed is to provide the project with information on the seabed conditions for the construction of the wind farm. The results from the surveys will form the basis for the selection of the concept and design of the park, as well as for assessing the topography of the seabed, the possible presence of weapons (mines, etc.) and wrecks or other cultural values on the seabed. Geotechnical surveys may consist of one or more of the following methods: vibrocors, tip pressure procrasoning (CPT) and different types of test drilling. The geophysical surveys may consist of bottom-profiling (seismic) surveys with, for example, sub-bottom profilers (SBP), side scan sonar or airgun.

Sediment surveys are carried out at any accumulation bottoms (where the sediment accumulates and can be expected to have elevated content of impurities).

8.2 Natural environment

A number of inventories and investigations will be carried out regarding the seabed flora and fauna, fish and invertebrates, marine mammals, birds, bats and protected species. For several of these, investigation in the form of initial desk studies will be conducted. Inventories in the field will also be carried out where necessary to assess any impact on the natural environment. The results of completed inventories and surveys will form the basis for the wind farm's design to minimize the impact on identified values.

8.3 Cultural environment

Marine archaeological investigations will be carried out with the aim of mapping any remains that are not currently known.

8.4 Other investigations

The other investigations and analyses that may be relevant include visibility analysis, development of photomontage, animation of obstacle lighting, as well as sound calculation and shipping related risk analysis.

9 DESIGN OF ENVIRONMENTAL IMPACT ASSESSMENT;

An Environmental Impact Assessment (EIA) will be drawn up as part of the environmental assessment process following the consultation process. The purpose of the EIA is to identify, describe and assess the direct and indirect effects and consequences that the activities may entail on people and the environment. The content of the EIA is set out in Chapter 6. 35 § for specific environmental assessments.

Planned EIA will include the following:

- Non-technical summary
- Introduction
- Background and prerequisites
    - Methodology
    - Permit process and completed consultations
    - Schedule
- Planned activities, including consequential activities
- Option accounting
- Area description and location
- Impact and consequences of planned activities
- Protective measures
- Cumulative effects
- Overall assessment
- Attachments
- Reference list

10 PROPOSAL FOR CIRCLE OF CONSULTATION

The circle of consultation includes the authorities, businesses, organisations, associations, and the general public that may be affected by the Erik Segersäll wind farm. Appendix 2 contains proposals for consultation stakeholders that may be relevant. During the consultation period, additional parties may be added to the list.

Written consultations will be held with the parties. In some cases, digital meetings will also be held with presentation of the project, question and answer session and discussions, as well as gathering feedback. Should it be possible with respect to Covid-19 to organise, physical meetings can also be arranged with smaller interest groups and to a limited extent.

The general public will be invited to consultation via advertising in the daily press. Other parties will be contacted via direct invitation from Deep Wind Offshore.

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Helcom

https://helcom.fi/

Lantmäteriet - National Land Survey

https://www.lantmateriet.se/

Provincial government

https://ext-geodatakatalog.lansstyrelsen.se/GeodataKatalogen/

Metria

https://metria.se/

Environmental protection agency

https://www.naturvardsverket.se/

National Heritage Board

https://www.raa.se/

SGU

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Swedish Maritime Administration

https://www.sjofartsverket.se/sv/

Swedish Transport Agency

https://www.trafikverket.se/for-dig-i-branschen/Planera-och-utreda/samhallsplanering/Riksintressen/Kartor-overriksintressen

Water Information Systems Sweden (VISS)

https://viss.lansstyrelsen.se/

Vindbrukskollen - Bachelor of Applied Language

https://vbk.lansstyrelsen.se/

12 ATTACHMENTS

Appendix 1. Proposal for consultation circuit
Appendix 2. Visualisations

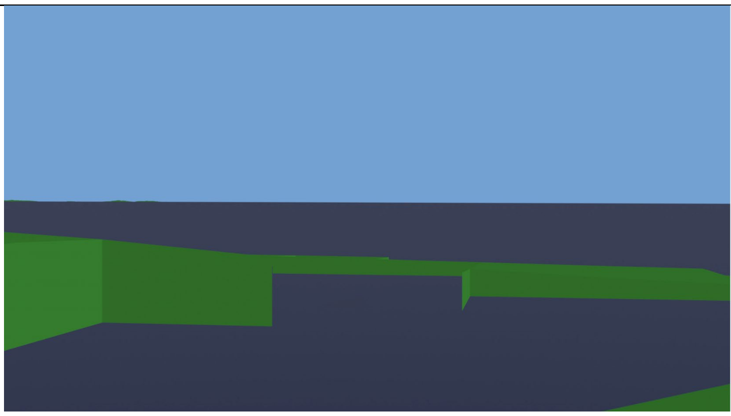
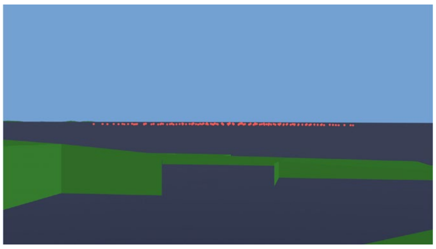
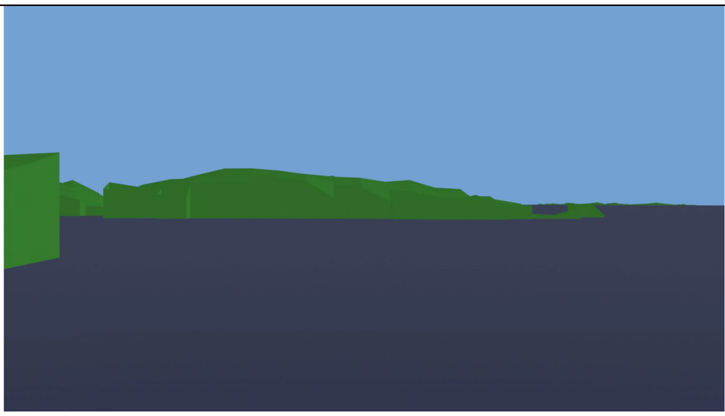
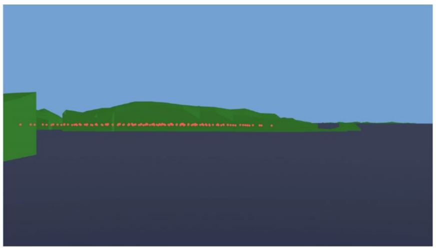
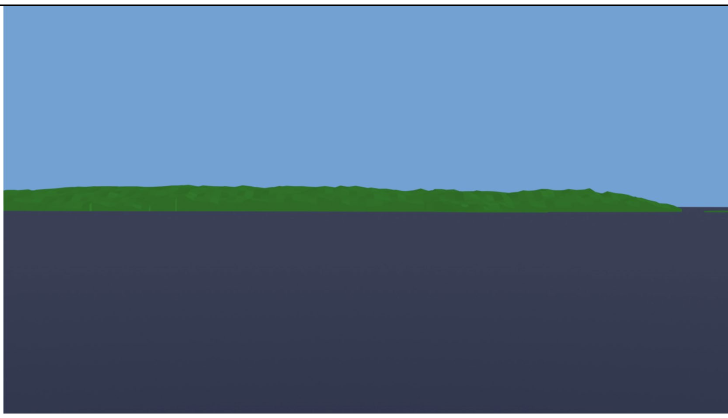
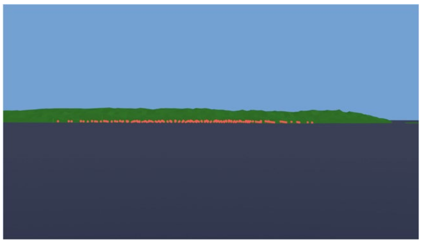
Appendix 1 Proposal for consultation circuit

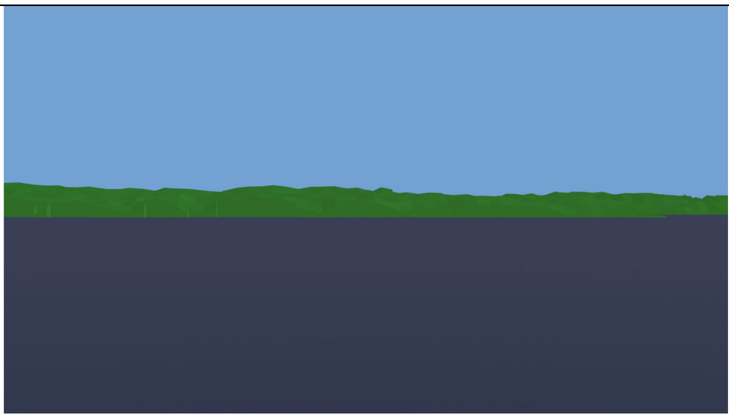
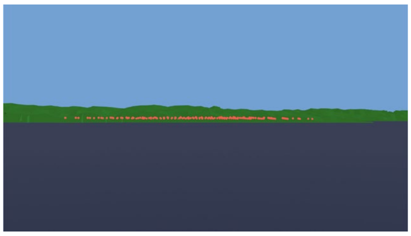
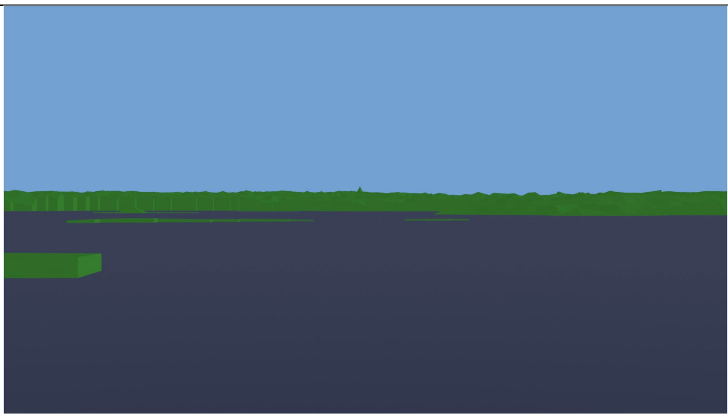
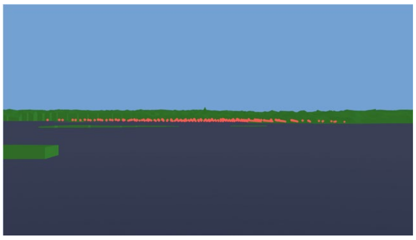
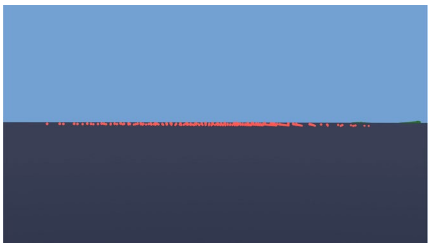
Current County Administrative Board
Gotland County Administrative Board
Other county administrative boards
Stockholm County Administrative Board
County Administrative Board of Södermanland County
Surrounding municipalities
Gotland Municipality
Södertälje Municipality
Nynäshamn Municipality
Haninge Municipality
Tyresö Municipality
Värmdö Municipality
Österåker Municipality
Norrtälje Municipality
Nyköping Municipality
Oxelösund Municipality
Trosa Municipality
Authorities and works
Swedish Agency for Marine and Water Management
Swedish Maritime Administration
Swedish Air Traffic Management (LFV)
Swedish Transport Agency
Swedish Armed forces
Swedish Coast guard
Kammarkollegiet - Wikipedia
Environmental protection agency
Swedish Energy Agency
Swedish Civil Contingencies Agency
Boverket - National Board of
Geological Survey of Sweden
National Geotechnical Institute (SGI)
Swedish power grid (Svenska Kraftnät)
Northern Baltic Water Authority
Water Authority Southern Baltic Sea
Swedish Museum of Natural History, the Swedish National Heritage Board, the Swedish Energy Market Inspectorate

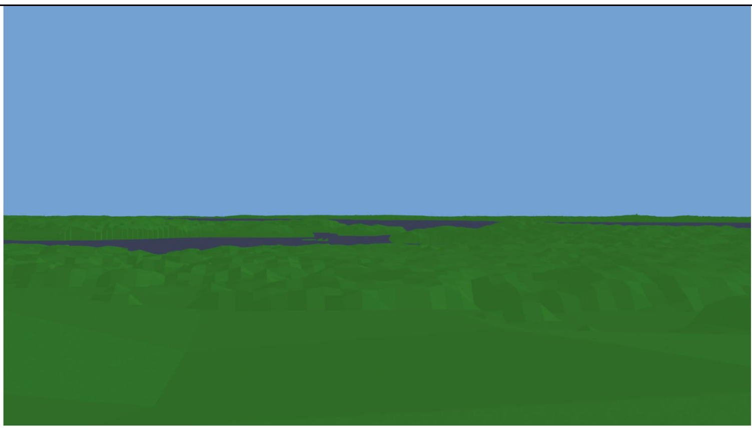
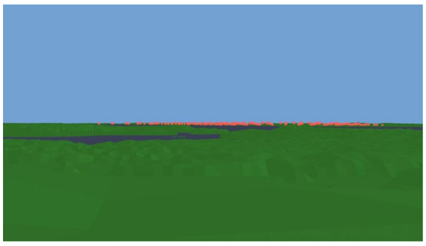
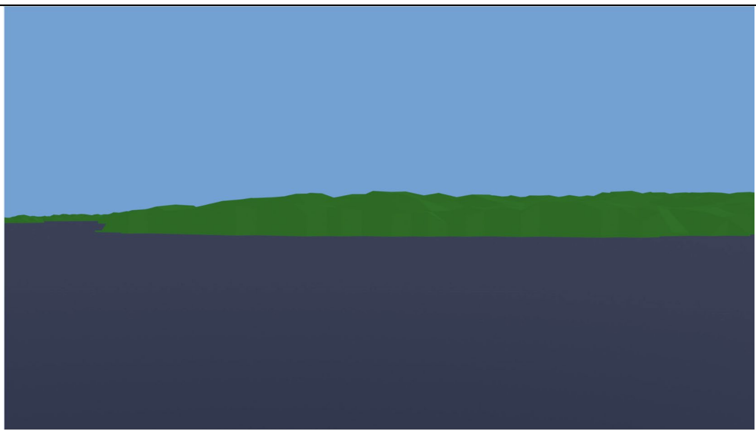
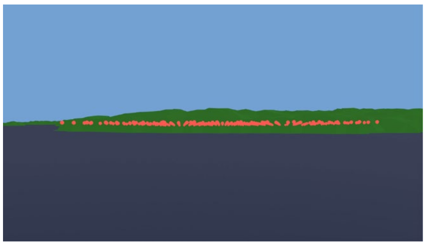
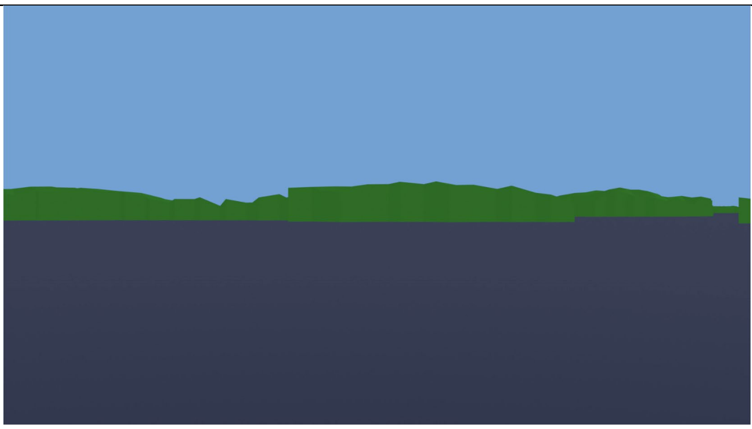
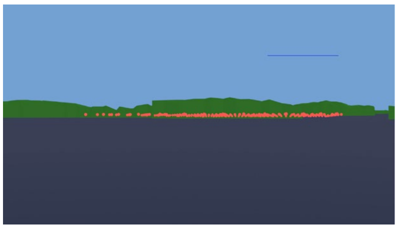
Business activities
Swedish Fishermen's Producer Organisation
Marine and Coastal Fishermen's Producer Organisation
Stena Line
Viking Line
Tallink Silja
Njordr Offshore Wind AB (Baltic Offshore Delta)
Interest groups and experts
Swedish Meteorological and Hydrological Institute (SMHI)
Swedish University of Agricultural Sciences
Swedish Society for Nature Conservation
Birdlife Sweden
WWF
Greenpeace
National Maritime and Transport History Museums
Airports
Visby Airport
Stocholm Arlanda Airport
Stockholm Bromma Airport
Stockholm Skavsta Airport
Norrköping-Kungsängen Airport
Linköping-Saab Airport (Linköping City Airport)
Link operators
Swedish Post and Telecom Authority
Telia
Telenor
Hi3G Access AB (Three)

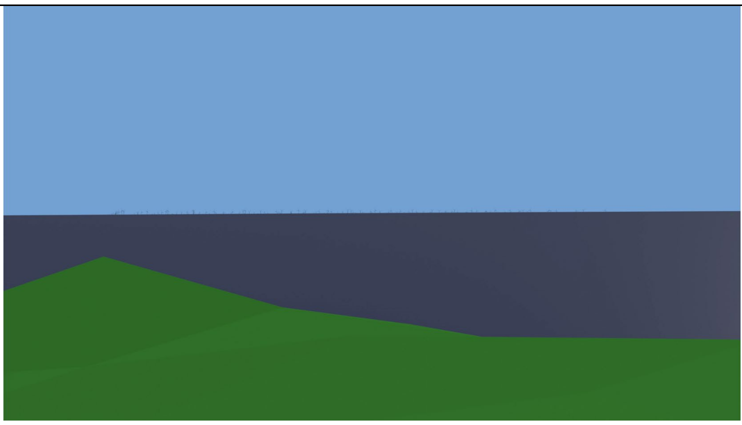
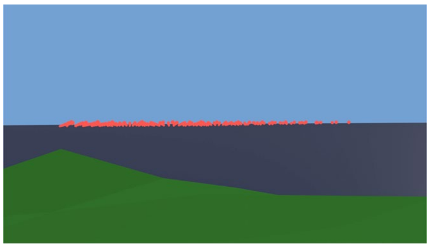
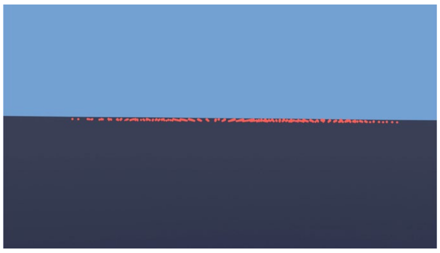
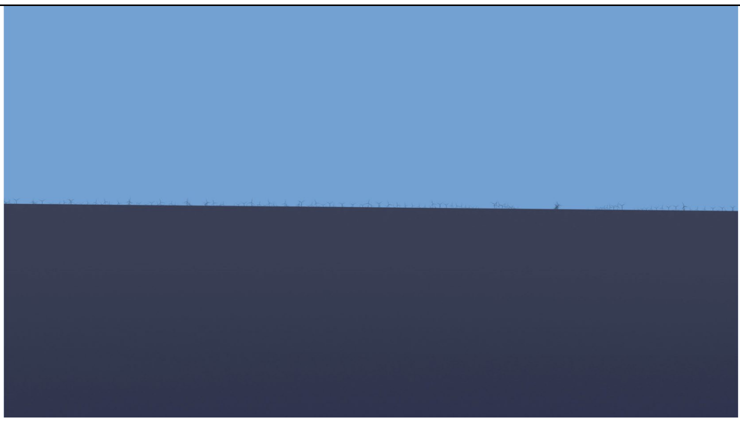
The general public and other particularly affected persons

Appendix 2 Visualisations

VP	Visualisation without symbols	With symbols
1		Landsort, about 78 km No visible turbines are in the field of view. 
2		Torö, about 79 km All turbines are behind the islands between Torö and Erik Segersäll 
3		Knappelskär, about 76 km All turbines are located behind the islands between Knappelskär and Erik Segersäll 

4		Nynäshamn Strandvägen, about 75 km All turbines are located behind islands and land between Knappelskär and Erik Segersäll 
5		Gjusskär about 67 km All turbines are located behind the islands between Gjusskär and Erik Segersäll 
6		Nåttarö, about 63 km The majority of the turbines are behind the horizon between Nåttarö and Erik Segersäll 
7	Not available	Utö

8		Muskö Vårdkaseberget, about 67 km Several of the turbines will be visible over the horizon between Vårdkaseberget and Erik Segersäll 
9		Nämndö, about 48.2 km All turbines are located behind islands and land between Nämndö and Erik Segersäll 
10		Dalarö about 59 km All turbines are located behind islands and land between Knappelskär and Erik Segersäll 

11		Korsö about 43 km Several of the turbines will be visible over the horizon between Korsö and Erik Segersäll 
12		Fårö, about 70 km No visible turbines are in the field of view between Fårö and Erik Segersäll 
13		Gotska Sandön, about 32 km A large part of the wind farm is on the horizon from Gotska Sandön towards Erik Segersäll.