Scoping Consultation Report

prior application for permits for installation and operation of the offshore wind farm Skåne Havsvindpark

Date: April 2021

EXTERNAL

Revision	**5**
Date	**14/04/2021**
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Description	**Basis for extended consultations about the EIA prior application for permits for installation and operation of the windfarm.**

Document ID **07005729_A**

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Abbreviations

Abbreviation	Definition
CPT	Cone Penetration Test
EEZ	Exclusive Economic Zone
EU	European Union
HVAC	High-Voltage Alternating Current
HVDC	High-Voltage Direct Current
ICAO	International Civil Aviation Organization
LVF	The Swedish Civil Aviation Administration
MBES	Multi-Beam Echo Sounder
EIA	Environmental Impact Assessment (EIA report)
NATO	North Atlantic Treaty Organisation
SBP	Sub-Bottom Profiler
SCI	Site of Community Importance Directive
SEAC	Submarine Exercise Area Coordinator
SGU	Geological Survey of Sweden
SPA	The Birds Directive (Special Protection Areas)
SSS	Side Scan Sonar
UHRS	Ultra-High Resolution Seismic

1 Introduction

Skåne Offshore Windfarm AB (referred to as the 'company' below) is in the process of planning permission, in accordance with The Swedish Exclusive Economic Zone Act, to construct and operate the offshore wind farm ''Skåne Havsvindpark'' in Swedish economic zone. The company is also planning to apply for permission to construct and operate the wind farm under Chap. 7 (28 a) of the Swedish Environmental Code (Natura 2000). The same Environmental Impact Assessment (EIA) will be included to each application. Consultations in relation to the Swedish Environmental Code are being conducted before the EIA is produced. As Large-scale wind power development will presumably involve significant environmental impact according to Sweden's Environmental Assessment Regulation. Hence there is a need for an extended consultation, performed under Chap. 6 of the Swedish Environmental Code in relation to the content and format of the EIA.

This report provides the basis for the extended consultations. The report describes the project, the project area, the impact on the surrounding area that the operations may cause, as well as the content and format of the subsequent EIA. The project in question will involve construction and operation of a wind farm, as well as laying and establishment of the internal cable network. At the moment this does not include the laying of export cables to land, in light of the government's commissioning of Svenska Kraftnät who are to investigate offshore grids and at which points export cables could be connected, in order to facilitate the establishment of offshore wind farms.

Relevant authorities, parties most affected, relevant organisations and the general public will all be consulted. Via the Swedish Environmental Protection Agency, the company will also be conducting consultations and sharing information with surrounding countries in accordance with the convention on EIA in a transboundary context – i.e. the Espoo convention. In November 2018, the company also held preparatory initial consultation meetings with the The County Administrative Board of Skåne, the Swedish Environmental Protection Agency and the Swedish Agency for Marine and Water Management to discuss the permission process and scope of environmental studies in the project area. In December 2020, the company conducted further coordination work with the County Administrative Board of Skåne in relation to the studies.

For more information about the consultation process, see: https://orsted.se/havsbaserad-vindkraft/vara-projekt

Comments received during the consultation process will be compiled and included in a consultation report. The consultation report is a basis for the EIA and is to be added as an attachment when the applications are submitted.

1.1 Skåne Offshore Windfarm AB and Ørsted Wind Power A/S

Skåne Offshore Windfarm AB is a subsidiary of Ørsted Wind Power A/S (referred to as 'Ørsted' below). Ørsted is a Danish company and world-leading when it comes to development and operation of offshore windfarms. The company currently has 7.2 gigawatts (GW) of installed power across 21 wind farms. Ørsted has a large amount of experience in the development, design, construction, operation and ownership of wind farms. Ørsted's first-ever wind farm, Vindeby, off Lolland, was one of the first sea-based wind farms in the world. Vindeby, which began operating in 1991, has now been de-commissioned after accruing more than 25 years of operation and experience.

1.2 Administrative information

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2 Background

2.1 General information about offshore wind power

The development of wind power is a crucial aspect of societal development and achieving fossil-free related climate targets. In contrast to electricity production and most other types of energy, the operational phase of wind power does not, in principle, involve any carbon dioxide emissions to the land, air or water; likewise no fuel needs to be extracted, transported or disposed of.

Around half of all electricity production in Sweden comes from renewable sources. Wind power accounted for about 12% of Sweden's total electricity production in 2019 – having increased considerably in recent years (SCB, 2020). Given that Sweden is aiming for a target of 100% renewable electricity production by 2040, there is a significant need to increase renewable energy production in the country. The Energy Authority estimates that 100 to 120 TWh of new renewable electricity production will be needed in the lead-up to 2045, of which 100 TWh will come from wind power (Energimyndigheten, 2021b). To meet EU climate targets, 300 GW of sea-based wind power will be required by 2050, 60 GW of which must be delivered by 2030. With the favourable wind-power conditions of the Baltic Sea (over 90 GW), Sweden (which has the longest coastline of all the Baltic Sea bordering countries), has major potential to exploit and utilise wind energy from wind: 12–25 GW (Baltic Sea Offshore Wind Energy Declaration of Joint Intent, 2020). Taking advantage of the favourable conditions for production of renewable electricity in Sweden will help to speed up the transition process, and thus reduce the risk of negative impact and costly effects resulting from climate change. Limiting the increase in temperatures will be crucial for saving the marine environment in particular. The expectation is that development of sea-based wind power within the EU will take up less than 3% of Europe's maritime area, making the strategy consistent with EU biodiversity targets (European Commission, 2020).

Offshore wind power is a large-scale and efficient energy infrastructure. With a clear ambition and long-term ground rules set out in the North Sea countries, the supply chain has matured, and new technology has evolved rapidly. This has resulted in major cost reductions for offshore wind power. EU predictions indicate that offshore wind will be the largest energy source in the 2040s. This is also the expressed in Skåne, where conditions are favourable and the need for electricity is great (Energimyndigheten, 2021b; Länsstyrelsen Skåne, 2020). The moist air found offshore holds more energy, while the wind is generally more consistent and stronger than over land. This results in a high capacity factor, meaning considerable and consistent electricity production. Swedish seawaters are also large in area and provide relatively favourable conditions in terms of wind speed, seabed, water depth, distance to land and grid connection, as well as access to ports. The wind conditions in the Baltic Sea are predictable over the course of the year, with higher speeds during the winter months (Energimyndigheten, 2021b; Länsstyrelsen Skåne, 2020).

Large-scale land-based wind farms are currently being expanded in the north of Sweden, mainly in electricity price areas SE2 and SE1. In southern Sweden, fewer land-based areas are available for large-scale wind farms. There is, however, a large and growing need for electricity production capacity in central and southern Sweden and around the largest cities, partly due to old electricity plants being phased out and partly due to electrification being imminent. This increased demand in central and southern Sweden means that a capacity increase is now required in the Swedish electricity system for renewable electricity production (Skåne county administrative board, 2020). The Swedish Defence Committee (Försvarsberedningen) and government also take the view that the transition to renewable electricity should be able to deliver benefits from a total defence perspective, emphasising the importance for new plant development and new infrastructure being factored into future planning proposals (Regeringskansliet, 2020).

Although the expansion of land-based wind farms has contributed to a reduction in electricity prices, prices in Southern Sweden have been higher and fluctuated to a larger extent than in other electricity pricing areas. Taking advantage of the favourable conditions for offshore wind power in southern Sweden will also reduce the need for investment in transmission lines from north to south and has the potential to even out the electricity prices between the opposite ends of the country.

2.2 Permission processes

The company is in the process of planning for applications for permission, in accordance with the the Swedish Exclusive Economic Zone Act, to construct and operate the Skåne Havsvindpark wind farm (hereafter Skåne Havsvindpark) in Sweden's economic zone. The company is also planning to apply for permission to construct and operate the wind farm under Chap. 7 (28 a) of the Swedish Environmental Code, as the project will border on the *Sydvästskånes utsjövatten* Natura 2000 area, an area of water protected under the Habitat directive (SCI SE0430187).

The EIA that is going to be enclosed with the applications will include an assessment of the potential consequences of the operations within the operational framework specified in the application. Technological advancements for offshore wind farms are evolving fast, whilst permit processing takes time. As such, it is very important for the company to be able to specify the technical prerequisites for the construction and operation within the given framework, although perhaps without any one technology being finalised in detail. The ability to use the best available technology at the time that the permission is granted is very important if an efficient and sustainable construction, with the greatest possible positive effect on the climate, economy and environment, is to be achieved. Evaluation of the environmental consequences in the EIA will, however, always be based on the technology and design specified in the application which may have the greatest potential impact on the environment.

3 Planned operation

3.1 Location

The planned Skåne Havsvindpark is to be located in the Swedish Exclusive Economic Zone (EEZ) approx. 22 km south of the Skåne coast; see Figure 3-1. The project area is delimited by corner points, the coordinates of which are given in Table 3-1; the coordinate system used in ETRS89 UTM33N.

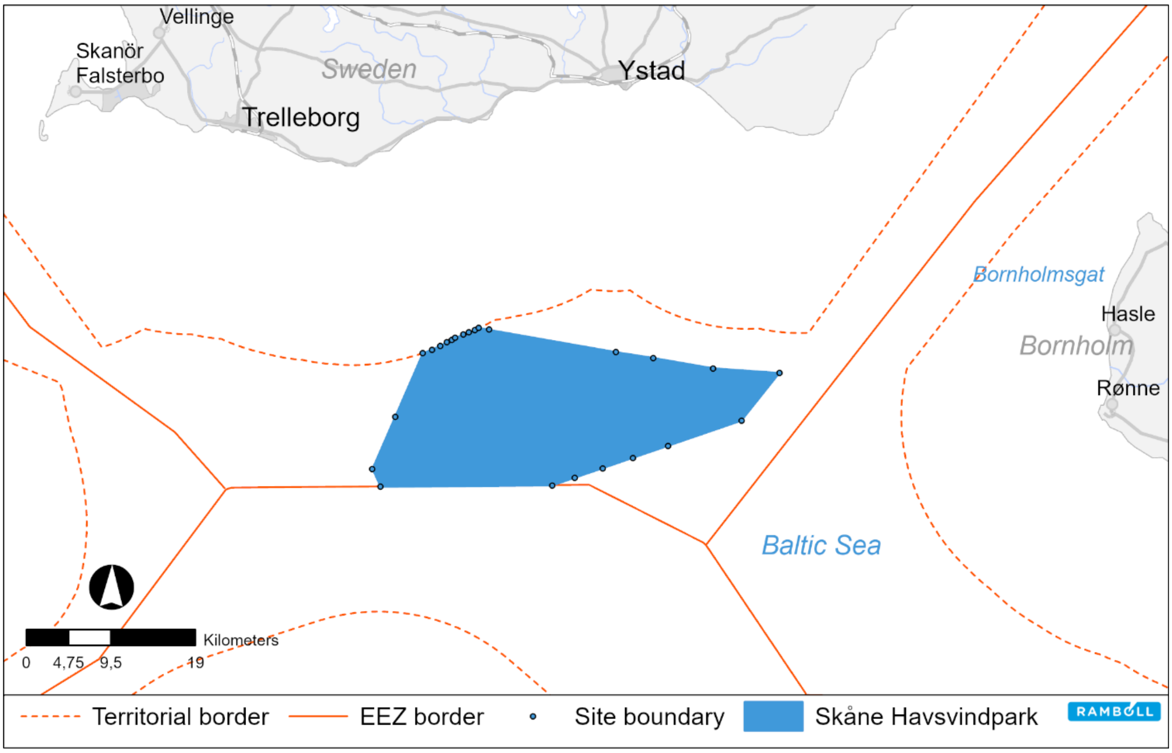

Figure 3-1 Location of Skåne Havsvindpark.

Table 3-1 Coordinates for Skåne Havsvindpark, corner points (coordinate system ETRS89 UTM 33N).

Wind farm area					
Point	**East**	**North**	**Point**	**East**	**North**
A	403698	6112598	P	436340	6110914
B	404707	6113002	Q	443784	6110395
C	405663	6113440	R	439492	6105019
D	406423	6113829	S	431235	6102192
E	406937	6114112	T	427287	6100842
F	407307	6114325	U	423906	6099685
G	408264	6114679	V	420768	6098612
H	408861	6114926	W	418256	6097752
J	409525	6115224	X	398960	6097595
K	409974	6115441	Y	398954	6097610
L	411136	6115238	Z	398038	6099620
M	425369	6112742	AA	400571	6105426
N	429582	6112085			

3.2 Overall system description

The wind farm area is set to contain wind turbines, as well as and potentially a number of platforms for accommodation, logistics and/or an offshore transformer station, which will be used to change the electrical voltage levels. The various parts of the construction will be connected by cables. Export cables will be installed on the seabed, running from the wind farm area to a grid connection point. The export cables will be permitted as part of a separate permitting process and are not covered by this consultation process; this is partly because Svenska Kraftnät (the Swedish Transmission System Operator) has not yet assigned a connection point, and partly because they may instead be commissioned directly by Svenska Kraftnät to expand the transmission network to areas within Sweden's maritime territory.

3.3 Size and layout of the windfarm

The area of the wind farm is shown in
Figure **3-2** and has a total area of approx. 451 km^2. Between 55 and 125 wind turbines are planned to be installed, for a total installed power production of approx. 1'500 MW.

The seabed conditions, among other things, will determine the positioning of the wind turbines. To prevent one wind turbine from sheltering the next in line, the turbines are to be spaced out with a distance of four to five times the diameter of the rotor blades between the different units.

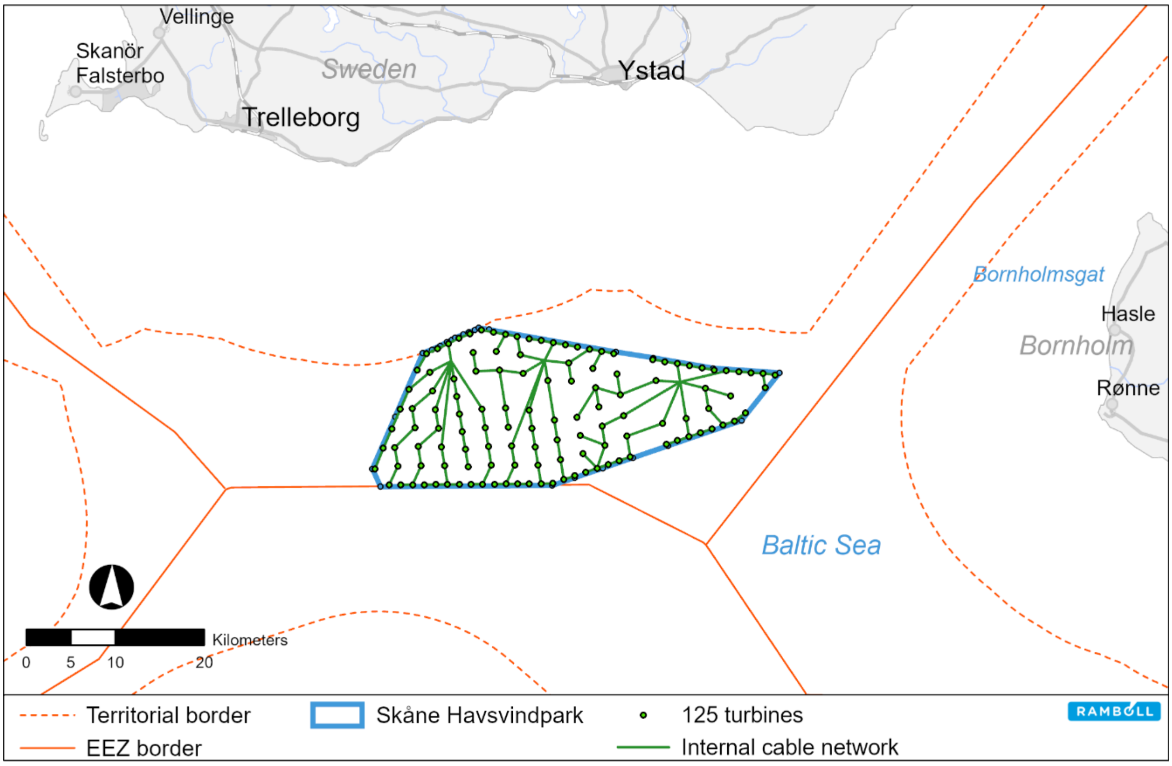

Figure 3-2 Example layout for Skåne Havsvindpark with smallest size of turbine and 125 wind turbines.

Figure 3-2 shows an example layout for Skåne Havsvindpark with the smallest size of turbine and 125 wind turbines. Another example of a layout with a larger size of turbine and 75 wind turbines is shown in Figure 3-3.

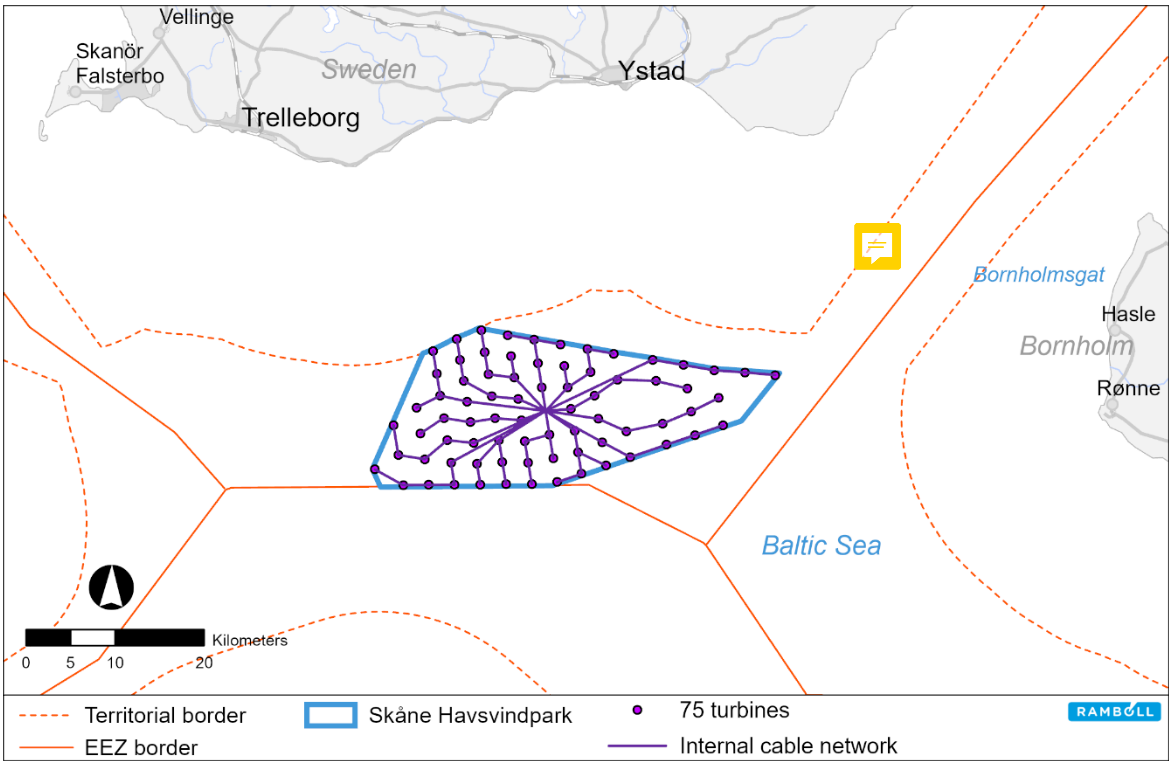

Figure 3-3 Example of layout for Skåne Havsvindpark with 75 wind turbines.

3.4 Wind turbines

A schematic drawing of a wind turbine is shown in Figure 3-4. The exact model of turbine is yet to be decided but is likely to be a traditional model for offshore wind, with three rotor blades on a horizontal axle. The choice of turbine model will be adjusted to reflect technological developments taking place in the wind power sector. In terms of an order of magnitude estimate for a possible model, the turbine rotors could measure between 220 and 320 m in diameter, with the rotor blades tips up to 385 m above the sea surface at their highest point; see Table 3-2.

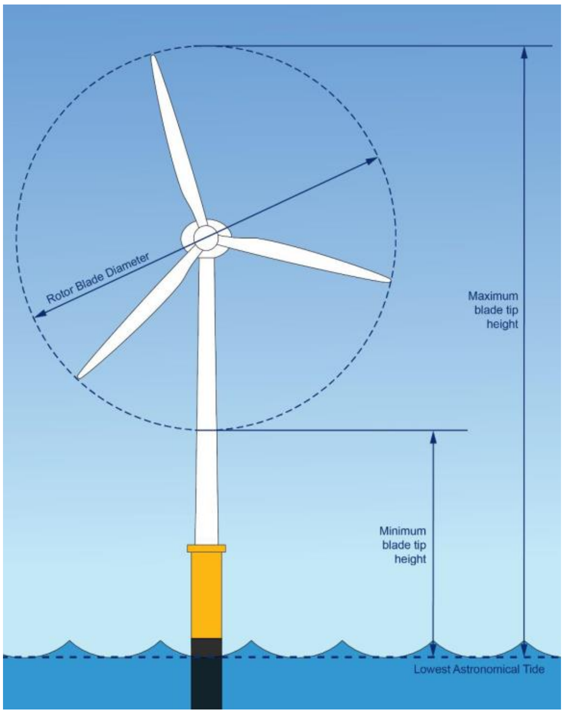

Figure 3-4 Schematic drawing of wind turbine (Illustration: Ørsted).

Table 3-2 Maximum spans and technical parameters of turbines.

Parameter	Maximum number of turbines (with 12 MW turbines)	Largest turbines (with 27 MW turbines)
Number of turbines (units)	125	55
Minimum blade tip height (m)	~30	~30
Rotor blade diameter (m)	240	320
Maximum blade tip height (m)	295	385

The turbines generate power when wind speed is between 3–5 m/s and 25–30 m/s at hub height. More power is generated in the turbine as wind speed increases. The wind speed at which a wind turbine generates its maximum power is known as the rated wind speed and is usually between 11 and 14 m/s at hub height. Above a certain wind speed, the rotor blades will be adjusted so that the wind turbines stop. When the wind decreases to the required level, the wind turbines will re-start automatically. The wind turbines will be able to rotate on their vertical axles so that they can accommodate the prevailing wind direction.

The wind turbines will also be marked up as an obstacle for aviation navigation purposes. The Swedish Transport Agency has a prescript regarding mark-up lighting, see TSFS 2020:88.

3.5 Foundations

The foundations for the wind turbines and platforms are likely to consist of either *monopile foundations*, *jacket foundations, suction bucket foundations* or *gravity-base foundations.*

3.5.1 Monopile foundations

With this foundation type, a hollow steel pipe is driven into the sediment using piling or vibration. A transition piece may then be fixed to the top of the foundation with a cement-based grout. The top of the monopile foundation will have the same diameter as the wind turbine tower, i.e. approx. 8 to 12 m, while the bottom may be up to 18 m in diameter.

The depth to which the foundation is driven into the sediment will depend on the conditions at the site. If the sediment is loose, the foundation may need to be driven up to 50 m into the seabed to achieve the correct stability.

Scour protection is usually placed around the foundation; see section 3.6. Protection against ice may also need to be provided.

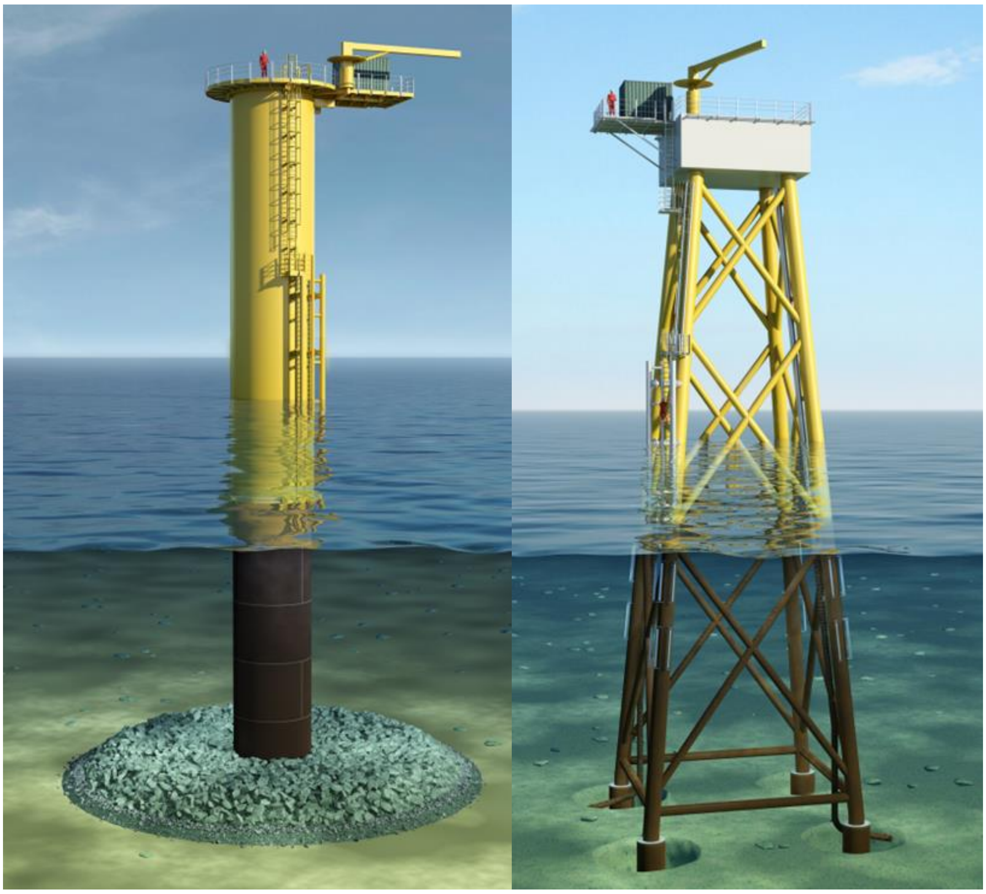

Figure 3-5 Example of possible foundations for the wind power plant: Monopile foundation with erosion protection on left, jacket foundation on right (Illustration: Ramboll).

3.5.2 Jacket foundations

The jacket foundation consists of a lattice of steel pipes/beams, with either three or four legs. A transition piece is placed on top of the legs, where the turbine tower is fixed in place; see Figure 3-5. The jacket foundation is anchored to the seabed with piles. In certain cases, mud-mats are laid in place before the piling to increase stability. The jacket foundation is well suited for deeper waters and can be used in most seabed conditions.

Larger jacket foundations may be required for transformer substations or other platforms; see Figure 3-8 and Figure 3-9. These can have up to six legs and may also require mud-mats at the bottom to support the structure before piles are installed. Converter stations (or large substations) can also be installed with up to four jacket foundations, or with one single larger jacket foundation with up to eight legs.

3.5.3 Suction bucket foundations

A suction bucket consists of an inverted container structure, consisting of hollow steel cylinders with a covered top side. These containers are set in place on the seabed bottom, connected to the base of the foundation. The water in the container is then pumped out, creating a vacuum in the container. The vacuum and the water pressure outside of the container cause the container to be sucked down into the sediment. No piling or drilling is required when installing the suction bucket foundation.

The remainder of the foundation between the containers and the bottom of the wind turbine can use either a lattice construction similar to a jacket foundation or a cylindrical structure similar to a monopile foundation.

Figure 3-6 Example of possible foundations for the wind power plant: the suction bucket foundation (Image: Borkum Riffgund).

3.5.4 Gravitation foundations

Gravity-base foundations are heavy steel and/or concrete constructions, sometimes including additional ballast, which sit on the seabed to support the turbine tower; see Figure 3-7. Although the gravity bases vary in design, they will likely be considerably broader at the bottom (on the seabed) to lend support and stability to the structure.

Gravity-base foundations do not require any drilling; they can either be taken to the site on an installation vessel like other foundation types or towed on a barge. The foundation is lowered into the seabed either by pumping in water or by adding ballast (or both).

For substations, alternative gravity-base foundations known as 'box type' or 'pontoon type' may be used. 'Box type' gravity-base foundations have a square base supporting a steel or concrete construction, on which the substation is installed. Instead of having one single base, a pontoon type has several pontoons or an open rectangular pontoon supporting the substation.

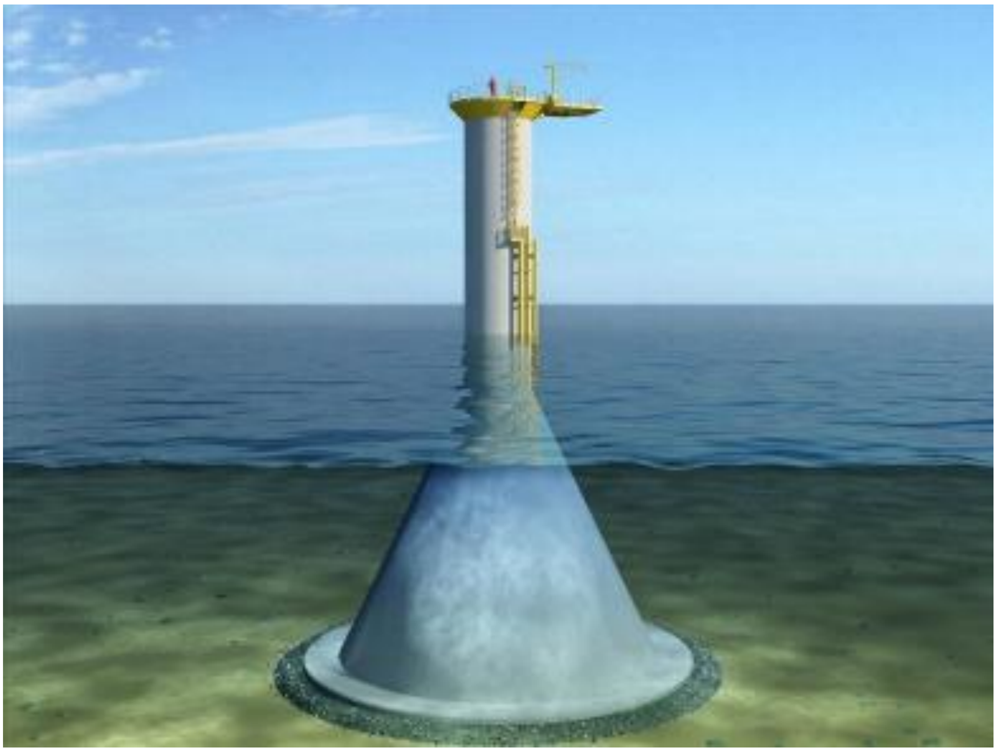

Figure 3-7 Example of gravitation foundation (Illustration: Ramboll).

3.6 Scour protection

To prevent ocean currents from causing erosion around the foundations, scour protection may be necessary. The amount of scour protection needed is adjusted according to the conditions on-site. Erosion protection usually consists of one layer of smaller stones plus a layer of larger stones on top. Other types of erosion protection, such as geomats with clay/sand, may also be put in place.

3.7 Electricity cables

3.7.1 Electricity cables between wind power plants

Within the wind farm, groups of 5–10 wind turbines will be linked with cables, which will then be connected to a substation or a converter station for HVDC (high-voltage direct current). The cables will consist of a copper or aluminium core surrounded by insulating material, as well as material to protect the cable from external damage. There will be a maximum voltage of up to 170 kV in the cables. A maximum of around 400 km of cabling will be laid in the wind farm zone.

The cables in the wind farm will be buried under the seabed where possible. In sites where cables pass other lines or cables, and in areas with little sediment or sediment that is too hard, the cables will be protected with stones, concrete support mattresses or similar.

3.7.2 Interconnecting cables offshore

It is possible that further cables, in addition to the cables between the wind turbines, will be required in the wind farm zone. Cables may be needed to create redundancy in the electrical system and ensure reliable transmission, as well as to supply power to the accommodation/logistics platform(s). These cables will have a similar design and installation process as the cables between the wind turbines and substations.

3.8 Platforms and other facilities offshore

Platforms and other facilities offshore that are an obstacle for aviation and/or shipping will have markings for navigation purposes similar to the markings described above for wind turbines. The positioning of the platforms and facilities within the wind farm zone will be finalised later. This positioning will be adjusted according to the seabed conditions and the need for cabling etc.

3.8.1 Accommodation or logistics platform

An accommodation or logistics platform may be constructed so that staff who work in the wind farm development zone are able to stay at the site for a number of weeks at a time, and to ensure that spare parts and tools can be stored in the wind farm development zone. The purpose of this platform is to reduce the number of trips made and increase the efficiency of repairs. Transport back and forth to the platform will be possible by sea vessel and/or helicopter. Support vessels will also be used for transportation to turbines and substations. The platform will consist of one or more decks, plus a helicopter pad.

The accommodation or logistics platform may be installed in the same place as the substation. Alternatively, a bridge may be constructed between the two platforms. The platform may be installed on the same type of foundation as for the turbines. An example of an accommodation platform is shown in Figure 3-8.

Figure 3-8 Example of an accommodation platform (right) at Horns Rev 2 sea-based wind farm, with a substation located adjacent (left). The accommodation platform is placed on a monopile foundation while the substation has a jacket foundation.

Table 3-3 Maximum technical parameters for the accommodation/logistics platform.

Parameter	Maximum number/length/dimension
Number	1
Length and width	80 m
Main construction height above sea surface	70 m
Maximum height of plant above sea surface (m)	90 m

3.8.2 Substations

Offshore substations are required for a HVAC (high-voltage alternating current) transmission system and, possibly, also for HVDC (high-voltage direct current) transmission (in combination with a converter station). The electricity generated by the wind turbines is converted to a higher voltage in the substation. It is anticipated that the high-voltage equipment in the substation will be between 220 kV and 420 kV.

Up to four separate substations may be needed in the wind farm zone. In certain cases, it may be advantageous to have the substation in the same location as a wind turbine, meaning that the same foundation can be shared. Alternatively, there may be one single large substation instead of several substations across the wind farm. It can also be advantageous to place several different substations or accommodation platforms alongside each other so that one can be accessed from the other.

The substation is prefabricated by the manufacturer and mounted on the foundation in modules; see Figure 3-9 and Table 3-4. The substations consist of one platform with one or more decks and possibly a helicopter pad, fixed to the seabed via a foundation. The substation includes the equipment required to switch and convert electricity that is generated in the wind turbines. The substations will not be staffed 24 hours a day but will be visited regularly for maintenance and repairs.

3.8.3 Converter station

Converter stations, which are similar to a large substation, are needed during HVDC transmission to convert the three-phase alternating current generated in the turbines to direct current for export to shore. No more than one converter station will be required in the wind farm zone; it can be used on its own or in combination with HVAC substations.

The converter station will not be staffed 24 hours a day but will be visited regularly for maintenance and repairs.

Table 3-4 Technical parameters for offshore substations.

Parameter	Maximum number/length/dimension
Number of substations	4
Top-side main-structure length and width	90 m
Complementary-structure length and width	100 m
Top-side maximum-height above water surface	70 m
Maximum height of obstacle light or similar above water surface	90 m
HVDC transmission or large HVAC station length and width	180 x 90 m
HVDC transmission or large HVAC station height	100 m

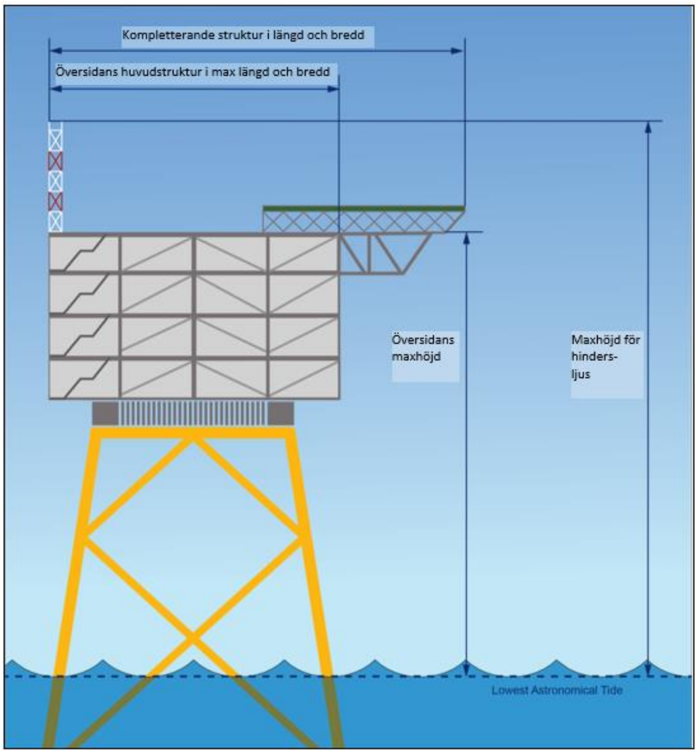

Figure 3-9 Schematic drawing of offshore substation (Illustration: Ørsted).

4 Scheduled works

4.1 The survey stage

See chapter 8 for information about ongoing and scheduled investigations.

4.2 The construction stage

During the construction stage, construction work will take place 24 hours a day, seven days a week, until the wind farm is completed, subject to any restrictions.

It is proposed that temporary 500 m safety zones should be established around the active working area in order to protect the construction and any staff onsite, as well as for the safety of third parties and vessels passing by. The design of these safety zones will be coordinated and finalised with the Swedish authorities. There will be a clear demarcation of the safety zones. The construction stage will also see temporary markings/obstacle lighting put in place if necessary.

Although multiple vessels will be used during the construction stage, the area covered will be vast, with work taking place in different parts of the wind farm zone. It is likely that approx. 10–15 vessels (and up to 24 smaller service vessels) will be present at the site during the construction stage, although not necessarily all at the same time. A port will be needed during the construction stage, but a decision on which port will be used is yet to be made. Helicopters may also be used to a certain degree during the construction stage.

The seabed will be surveyed to investigate whether there is any unexploded ordnance (UXO) remaining there from World War One or Two. If UXO is found, mitigation measures will be put in place to deal with these, in consultation with relevant parties.

4.2.1 Installation of foundations

Foundations will be installed with either a jack-up vessel or a floating crane vessel, along with the required handling equipment etc. Support vessels, barges, tugboats, safety vessels and crew transfer vessels may also be used during the installation process.

Preparatory seabed intervention works may be required before the installation of foundations. These preparations may, for example, involve levelling of the seabed, moving rocks or removing lost fishing nets, anchors or other marine waste.

4.2.2 Installation of scour protection

If scour protection is required, the stone material will be loaded on to vessels and transported to the site. The stone can be deposited directly on to the bottom from the vessel or through a grip transporter.

4.2.3 Installation of turbines

Several different technologies can be used to install the turbines. Typically, one or more jack-up vessels will be used, the legs of which are lowered down from the vessel to the seabed. The vessel’s hull is then lifted up from the water to create a stable work platform. Another alternative is a semi-jack-up vessel, whereby the hull continues floating while support legs are lowered 2 to 15 m down into the seabed to ensure stability.

Figure 4-1 Turbine installation with semi-jack-up vessel at Anholt (Photo: Ramboll).

It is possible that the major components for the wind turbine will be transported from a temporary port, in which case transportation can be done with the installation vessel or a separate transportation vessel. Transportation may also take place directly from a port in close proximity to the wind turbine manufacturer..

The most complicated lifting operations are the tower, hub and the three rotor blades, which are lifted into place by the installation vessel. A number of smaller support vessels for equipment and staff may also be required, in addition to the installation vessel. Installation is weather-sensitive and requires great precision, which poses a challenge given the wind-sensitive components and high working heights. The turbines' main components are typically installed in about a day, excluding the transportation time and any stoppages caused by the weather (approx. 30 % of the time).

Following installation and grid connection, the wind turbines will be tested, after which point they will be available to generate electricity.

4.2.4 Laying of cables

The cables will be transported to the wind farm zone on a cable-laying vessel. The cables are fed down to the seabed from a cable turntable on the vessel; see example in Figure 4-2.

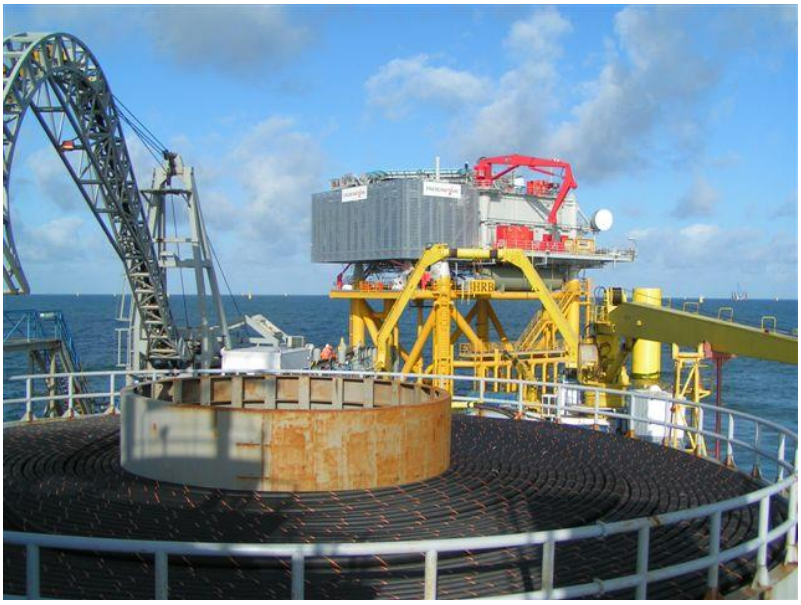

Figure 4-2 Installation of cables from cable-laying vessel at Anholt (Photo: Ramboll).

The cables in the wind farm area will be laid under the seabed, wherever possible, to protect the cable. The depth will be finalised at a later stage, but this is typically is 1–2 m below the seabed. Wherever cables pass pipelines or other cables, and in areas with little sediment or sediment that is too hard, it is possible that the cables will be protected with stones, concrete support mattresses or similar.

A number of different methods will be used to lay the cabling e.g. 'jetting', ploughing, trenching or vertical injection.

'Jetting' involves flushing the cable down into the sediment. This method is also used when repairing cables. In the case of 'ploughing', the cabling is guided down into a furrow below a plough. This method requires the sediments to be homogeneous and softer. When ‘trenching’ is used, the cabling is installed in three stages. The first stage involves digging a trench in the seabed, into which the cable will be installed. The last stage sees the trench filled with sediment to cover and protect the cable. Rock placement may also take place. With ‘vertical injection’, ploughing takes place as a jet sprays water forwards. The cable is pulled through the plough to ensure that the cabling and the protection for the cabling are laid at the same time. This method is suitable for use close to shipping lanes etc. because the technology makes it possible for cables to be laid deep below the seabed but is also time-consuming and more weather-sensitive than other methods.

A vessel will survey the area where the cabling will be installed, supplementing the investigations of the seabed conducted prior at an earlier stage of the project; see chapter 8. If there are large quantities of rock on the seabed, making it difficult to install cabling through these areas, some of the rock will be removed in order for the cables to be laid.

Rocks measuring 10 to 40 cm in diameter tend to be used when laying stone protection for the cable. The design of the protective layer will depend on the depth, waves, ocean currents, sloping etc. The material may be deposited directly from the vessel to the seabed; if the water is deeper, however, more often than not a pipe will be used to lay the rocks in place.

4.2.5 Overview of construction stage scheduling

An overview of the schedule, outlining the sequence and preliminary timing of the construction works for the wind farm, is shown in Figure 4-3. To provide an overview and ensure an overall understanding, the onshore construction sections are also described in the schedule. The schedule shows an order of magnitude estimate for the duration of the construction works and when the various construction activities are scheduled in relation to each other. Construction of the wind park is currently scheduled to take place in the period 2026 – 2029. Construction works offshore will be weather-dependent. Although it is often possible to carry out the construction work all year round, the risk of delays is greater during the winter months. As turbine installation is the most weather-sensitive, the construction work will need to be tailored so that this is done in the most favourable weather conditions.

	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Substations onshore		1	1	1	1	1	1	1	1	1	1	1	1	1										
Export cable onshore	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									
Export cable offshore										1	1	1	1	1	1	1	1							
Substations offshore													1	1	1	1	1	1						
Foundations for turbines															1	1	1	1	1	1	1	1		
Internal cables														1	1	1	1	1	1	1	1	1	1	
Turbines																	1	1	1	1	1	1	1	1

Figure 4-3 Overview of Time plan.

4.3 The operation stage

The works carried out during the operation stage will, to a certain extent, depend on which type of turbine is selected, as well as the transmission system and layout chosen. As such, the description provided below is more of a general outline. Vessels for staff and supplies, as well as helicopters, may all be used during operation, in conjunction with a potential offshore accommodation/logistics platform. A port will also be needed during the operations stage, but a decision on which port is yet to be made. Operation and maintenance of the wind farm will be ongoing 24 hours a day, 365 days a year.

4.3.1 Safety zones during operation

The design of the safety zones is to be developed and agreed with the Swedish authorities. A 50 m zone around each turbine's foundations will be considered forbidden territory for unauthorised parties.

4.4 Chemicals and waste

Wind power plants normally use lubricants, hydraulic oils and coolants. No discharge of these is expected during installation, operation, or decommissioning. Collection systems at the turbines will prevent any discharge in the event of spillages or leakage.

During operation, worn-out components as well as lubricants, fluids etc. will be replaced on an ongoing basis. All waste generated during operation will be collected and dealt with by an approved receiving facility.

4.5 The decommissioning stage

The wind turbines are estimated to have a lifespan of approximately 35 years. A decommissioning plan is usually drawn up about two years before estimated end of life. The decommissioning method will reflect current practice and legislation at the time of the decommissioning. The purpose of the decommissioning plan is to minimise the short-term and long-term effects on the environment and to make the area safe for vessels and other use. The decommissioning stage, inclusive of economic provisions for decommissioning, will be described from an overall perspective in the future EIA.

5 Selection of location and alternatives

5.1 Selection of location

A location study was conducted in 2017. The purpose was to evaluate suitable locations for offshore wind farms in the southern and south-eastern part of Sweden, with particular attention paid not only to wind resources, but also environmental and technical aspects.

The basis for the selection process was finding a location where there is a notable need for increased electricity production i.e. in southern and central Sweden, within pricing area SE4 or SE3; in other words, in the Baltic Sea or Öresund/Kattegat sea area. In addition, sufficient grid capacity was needed at the connection points on land, which led to a focus on sites for de-commissioned power plants. Wind speed also had to be sufficient, as did the space and the depth of the sea (maximum depth around 65 m) for wind farms as per the order of magnitude estimate in question; no competing projects could be under development in the area either. The selected locations were subsequently analysed based on important environment factors, industry and military operations Sensitive environments such as shallow sandbanks were deselected, as were areas with fishing restrictions or restrictions on other use by humans, and areas used for extensive shipping.

Potential wind farm areas were mapped based on their sensitivity and prioritised on a four-point scale. Using the supporting documentation from the location study as the basis, the Skåne Havsvindpark was subsequently selected and developed; see Figure 3-1. The selection process for the project site will be described in more detail in the EIA.

5.2 Main alternative

The main alternative for the wind farm area is going to be described and assessed in terms of potential impact in the EIA. The other options investigated will also be outlined. The consequences of the main alternative will be compared with the consequences of alternative locations, and with the zero alternative.

5.3 Zero alternative

The zero alternative describes the environmental conditions at present, as well as the most probable environmental conditions in the future, if no project development were to take place at all. In other words, there will be no impact (positive or negative) from the project. For example, if electricity generation from renewable sources is not developed at the rate required to meet current climate targets.

6 Planning

6.1 Marine planning

The Swedish Agency for Marine and Water Management (HaV) submitted a proposal for marine spatial plan to the government in December 2019 for their consideration (Havs- och vattenmyndigheten, 2019a). Using extensive supporting documentation, HaV conducted impact assessments for various existing and planned activities, making comparisons and weighing up their pros and cons, to draw up the marine spatial plans. Once adopted, the marine plans will provide guidance, without ruling out the co-existence of various interests. In general, offshore wind power has been found to have a net positive effect on the sea.

The planned wind farm is covered in the marine spatial plan for 'Sydvästra Östersjön och Öresund' (south-west Baltic Sea and Öresund), in subarea Ö267, designation G (General use); see Figure 6-1 (Havs- och vattenmyndigheten, 2019d). The proposal states that the conditions are favourable for offshore wind power and that the area is also important for harbor porpoises, seals and birds. The marine spatial plan also states that shipping is important in the south-west Baltic Sea along Sweden's southern coast for transportation onward to ports nationally and internationally. There are also a significant number of incoming flights bound for Copenhagen Airport Kastrup in the project area. Commercial fishing is widespread, and outdoor pursuits and sailing for leisure are also of importance across the project area. A long stretch of valuable coastal landscape can be found along western and southern Skåne. Special consideration is to be given to Swedish Defence interests.

The area chosen for the wind farm has been identified as public interest of significant importance for energy production south of Skåne. The marine spatial plan describes the conditions for wind farms in area Ö267 as 'favourable', with the combined cumulative environmental impact assessed as being low. To accommodate the interests of Sweden's Defence, the area designated for the wind farm has not been pinpointed for energy production in the marine plan. The wind farms operational design will be compatible with natural values and the interests of Swedish Defence.

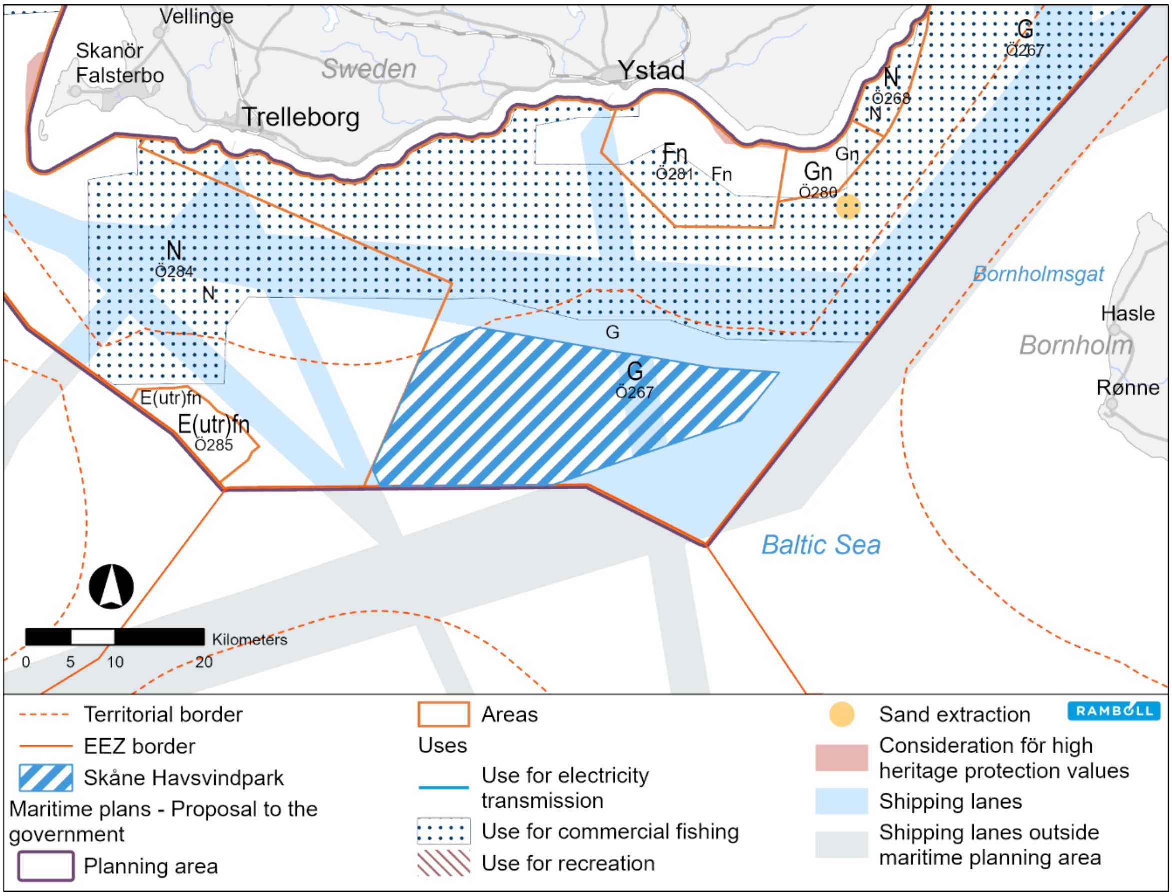

Figure 6-1 Shows sub-areas of the marine plan zone where the planned offshore wind farm is to be located (Ö267) (Havs- och vattenmyndigheten, 2019d).

6.2 Master plans and local development plans

The wind farm is to be located in the Swedish Exclusive Economic Zone (EEZ), where there are no municipal development plans or master plans. Assessing compliance with municipal plans will therefore not be covered in the EIA.

7 Site description and scope

A description of relevant parameters for the planned project is provided below, including scope of the planned EIA process.

The construction phase will have an impact on the surrounding marine environment as it is causing inter alia underwater noise and suspension of sediments in connection with the laying of cables etc. The offshore construction work on the wind farm is expected to last about two years; see Figure 4-3. During the operation phase, there may be a certain impact as a result of the environment-related impact from the wind turbines themselves, in connection with repair and maintenance work, and as a result of utilising the marine area for the wind farm. Suspension of sediments during the de-commissioning phase is also a potential impact.

The company is planning to describe and investigate the impact, the effects, and consequences of the wind farm in more detail in the EIA. The impact assessment in the EIA will be done based on the current situation (baseline), but also contrasted with a zero alternative i.e. the situation if the project applied for do not happen (see section 5.3). The EIA will also describe in more detail the measures being planned to prevent, mitigate, counteract or remedy the negative environmental impacts of the anticipated project.

7.1 National interests and protected areas

This section outlines the initial position, possible effects, and scope in the EIA with regard to national interests and protected areas in accordance with Chapters 3 and 4 of the Swedish Environmental Code within or near to the planned area for Skåne Havsvindpark.

7.1.1 National interest of wind energy

7.1.1.1 Baseline

In Sweden, land and water sites have been designated as sites of national interest for wind energy since 2004. This list of sites was last updated in the period 2010–2013, with a further decision on such made in 2015. There are currently 313 sites of national interest for wind energy, of which 29 are offshore and in inland lakes. In terms of area, these cover just over 1.5% of the total area of Sweden, including Swedish waters (Energimyndigheten, 2021a). When an area is deemed of national interest for wind energy, it means that the area is thought to be highly suitable for production of electricity from wind power on a large scale based on the following offshore conditions: 8 m/s average annual wind speed 100 m above ground, area greater than 15 km^2, maximum water depth of 35 m. It is also an option to build wind farms outside of areas of national interest if the site proves to be suitable in testing. Figure 7-1 shows areas of national interest for wind energy (Energimyndigheten, 2013).

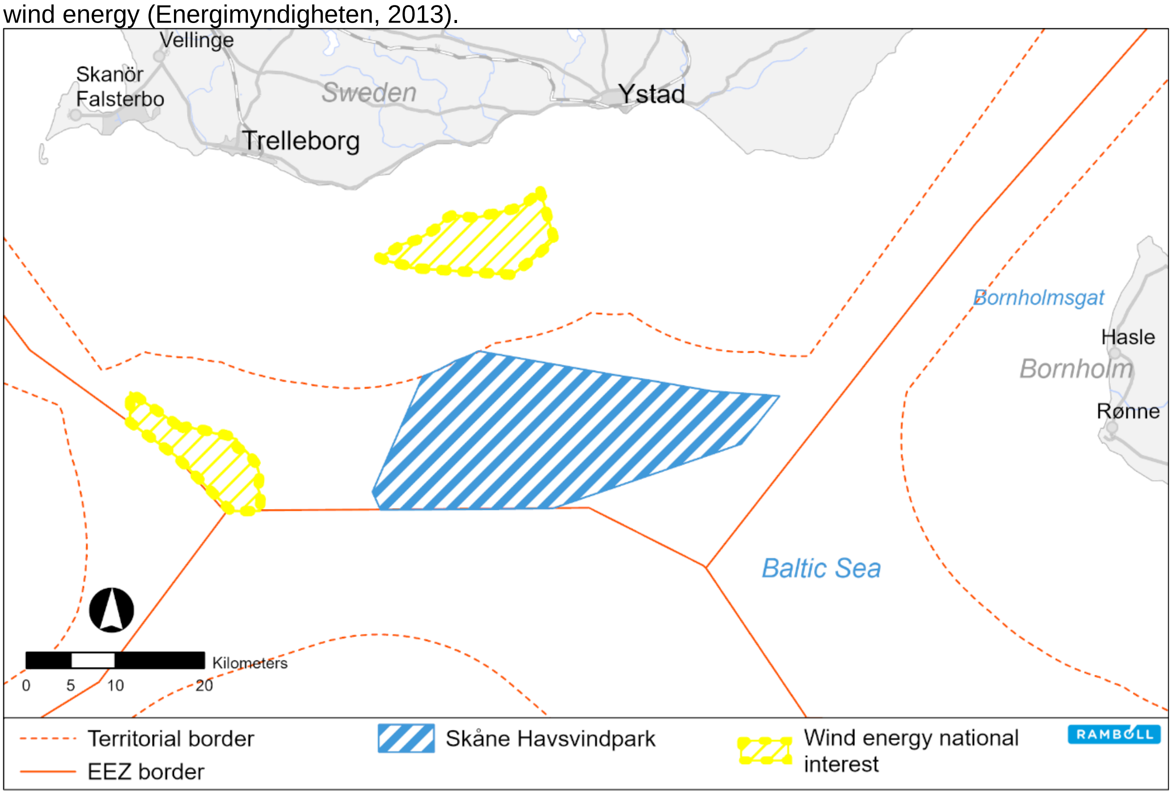

Figure 7-1 The national interest of wind energy (Energimyndigheten, 2021a).

7.1.1.2 Possible effects
Installation of export cables could potentially have a negative impact on an area of national interest of wind energy. The construction phase could create a potential negative impact on other wind farms being developed, or wind farms under operations. However, these kinds of effects are not anticipated.

7.1.1.3 Scope
The areas of national interest for wind energy will be described in the EIA. Potential impact on these sites is not planned to be assessed, because of the large distances to the areas.

7.1.2 Natura 2000 and nature conservation
Natura 2000 is a network within the EU aimed at protecting and preserving biodiversity. Either EU regulations – the Birds Directive or the Habitat Directive provide the basis on which sites become designated Natura 2000 areas. If an area is deemed to meet the requirements of the Birds Directive, it will become a designated Special Protection Area (SPA). Areas can also be protected and become designated Sites of Community Importance (SCI) if they meet the criteria of the Directive of the Habitat Directive.

Areas considered as of national interest for the purposes of nature conservation in accordance with Chap. 3 section 6 of the Swedish Environmental Code are appointed because they have been assessed to be of significant importance because of their natural value and shall be protected from measures that may cause considerable damage to the natural environment. There are no sites of national interest for the purposes of nature conservation close to the wind farm.

7.1.2.1 Baseline
Figure 7-2 shows Natura 2000 areas close to the planned wind farm area, while Table 7-1 shows protected species and habitats for the Natura 2000 areas. The areas of national interest for conservation are the coastal areas in the county of Skåne.

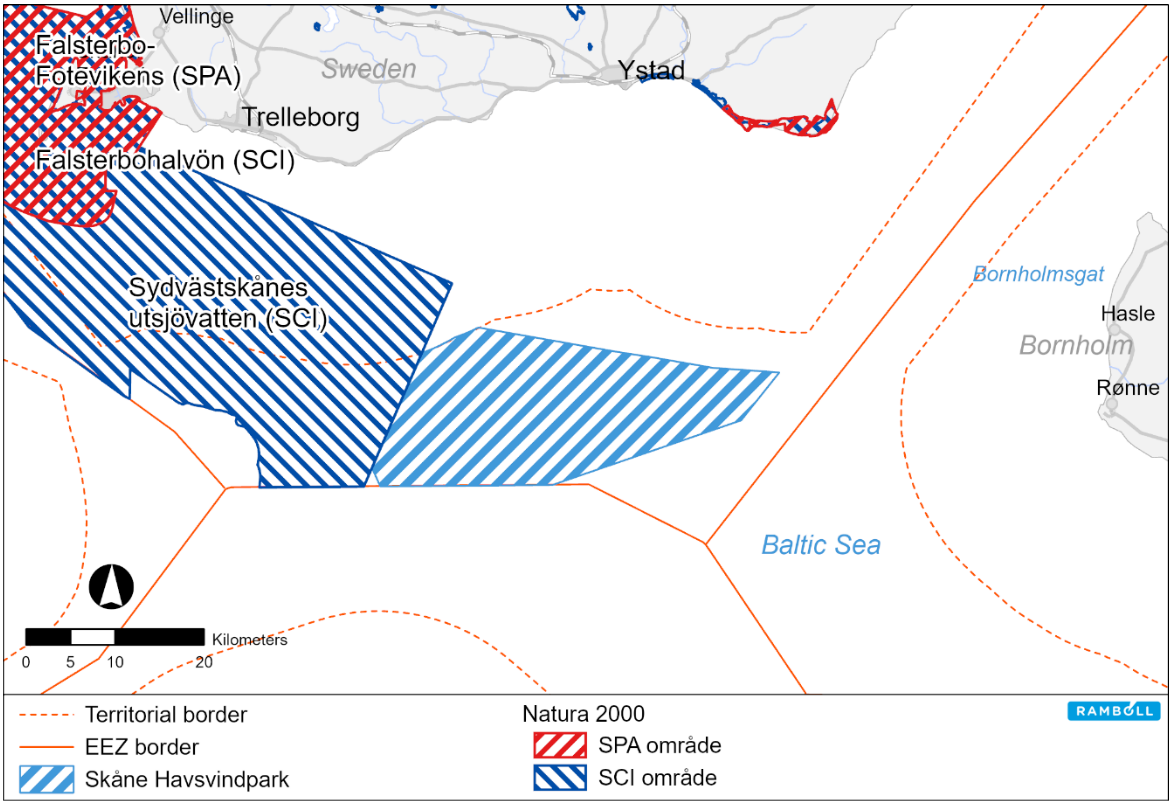

Figure 7-2 Natura 2000 areas (Länsstyrelsen WebbGIS, 2021).

Table 7-1 Natura 2000 area next to the wind farm (Naturvårdsverket, 2021).

Natura 2000 area close to the area of the wind farm	
Sydvästskånes utsjövatten [south-west Skåne's coastal waters] (SE0430187)	Type of area: SCI Species: grey seal, harbour seal, porpoise Habitat: 1110 Sand bank, 1170 Reef

Sydvästskånes utsjövatten (SE0430187) - SCI

The planned Skåne Havsvindpark is next to the Natura 2000 area Sydvästskånes utsjövatten. The north-western part of this Natura 2000 area is of significance as a hibernation/rest area for various seabirds. During the colder months of the year, it is very likely that the area is used by the harbour porpoise populations of both the Baltic Sea and the Belt Sea. In the summer, it is probably only the Belt Sea population that remains, as the Baltic Sea population moves to an area by Hoburgsbank and North/South Midsjöbanken. Harbour seals and grey seals are also found in the area (Naturvårdsverket, 2021).

7.1.2.2 Possible effects

During the construction phase, a certain amount of sediment will be suspended in the water and dispersed, which could temporarily impact the Natura 2000 area and its sand bank and reef habitats. The suspension of sediments could potentially lead to a release of contaminants from the sediment to the water. The underwater noise from the construction works, particularly in the case of piling, could potentially have a temporary impact on the marine mammals

7.1.2.3 Scope

The protected species and habitats in the Natura 2000 area and the areas relevant to conservation described in the chapter below will be outlined in more detail in the EIA. Underwater noise, airborne noise, and sediment dispersion are modelled and incorporated into the EIA. The results of the field studies of marine mammals currently ongoing will provide a basis for the EIA see section 8.1.

Mitigation measures to minimise sediment dispersion and underwater noise will be described in the EIA. The EIA will also assess the potential impact on the Natura 2000 habitat, species, and the areas for national interest of nature conservation.

As there are no sites of national interest for conservation close to the planned wind farm area, these will be covered from an overall perspective in the EIA.

7.1.3 Areas of National Interest for the purposes of cultural environment

Conservation of the cultural environment has been described as a national interest by the Swedish National Heritage Board. An area of national interest is a cultural environment that is unique or special in a region, from a national or international point of view. Areas of national interest in terms of cultural environment conservation have to be protected against measures that could cause considerable damage to the cultural heritage (Chap 3 section 6 Swedish Environmental Code). Within the area of the planned wind farm, there are no areas of national interest in terms of cultural environment conservation in accordance with Chap 3 (6) Swedish Environmental Code.

7.1.3.1 Baseline

Within the area of the planned wind farm, there are no areas of national interest in terms of cultural environment conservation in accordance with Chap 3 section 6 Swedish Environmental Code. There are sites of national interest for the cultural environment along the coast.

7.1.3.2 Possible effects

The area in which the planned wind farm is planned is located about 22 km from land. With this kind of distance, the wind farm will be partially visible from land.

7.1.3.3 Scope

As some parts of the coast are partly located high-up and are valuable from a cultural environment perspective, as well as having major recreational values, the potential impact on the visual landscape is going to be investigated further in the EIA by using photo montages. The locations to be used for photo montages will be selected based on a so-called 'Zone of Theoretical Visibility' analysis (ZTV), as well as on comments received during the consultation process.

7.1.4 National Interest for the purposes of total defence

The national interest for the purposes of total defence and military interests are located on the coast and at sea, and primarily relate to training activity and signals intelligence. Ports and shipping lanes are important resources here too. Secrecy is also an important factor for these interests, and therefore early contact with the relevant authorities may be necessary. The Swedish Armed Forces are responsible for pinpointing areas of national interest for total defence's military facilities (Boverket, 2020a).

7.1.4.1 Baseline

There are no known areas of national interest for the purposes of total defence in the wind farm area; see Figure 7-3.

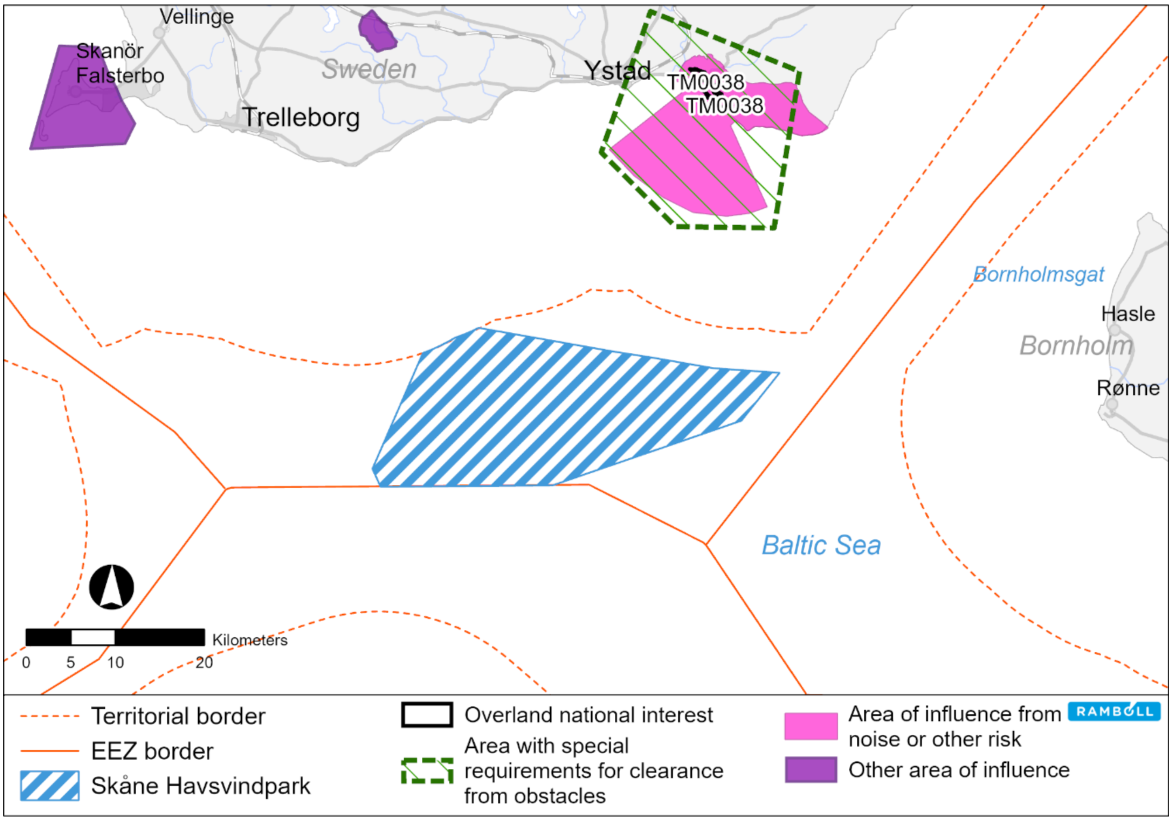

Figure 7-3 National interest for the purposes of total defence (Länsstyrelsen WebbGIS, 2021).

7.1.4.2 Possible effects

The wind farm area could potentially impact on military interests. It will not be possible to investigate potential effects for classified interests, and the dialogue with the Swedish Armed Forces is set to continue.

7.1.4.3 Scope

The planned wind farm area is located far away from any known areas of national interest for Total Defence, and as such no impact on these is expected. Construction and operation of the wind farm may, however, need to be adapted and delimited if consultation with the Swedish Armed Forces deems this necessary. In many cases, military interests and the operations of the Swedish Armed Forces can co-exist with other offshore interests. The EIA is going to elaborate on the adjustment of activities during construction and operation to allow co-existence with the Swedish Armed Forces' operations and interests. These proposed conditions will be documented in the permit applications; see also section 7.13. The proposal for the marine plan states that special consideration is to be given to Swedish Defence (Totalförsvaret) interests; see section 6.1.

7.1.5 National Interest for the purposes of commercial fishing

National Interest for the purposes of commercial fishing is regulated in the Swedish Environmental Code, Chap. 3 section 5 and pinpointed by the Swedish Agency for Marine and Water Management. Land and water sites of significance for commercial fishing or for aquaculture must, as far as possible, be protected from measures that could negatively impact fishing industry operations. For fishing operations to take place within a delimited marine area, it is important that there are ports that can service the fishing vessels, as well as landing possibilities. The most important home and/or landing ports within each marine area are also considered to be of national interest for commercial fishing. (Havs- och vattenmyndigheten, 2019a; Boverket, 2020b)

7.1.5.1 Initial position

Figure 7-4 shows areas of national interest for commercial fishing. There is no area of national interest for commercial fishing directly adjacent to the area in which the wind farm is planned.

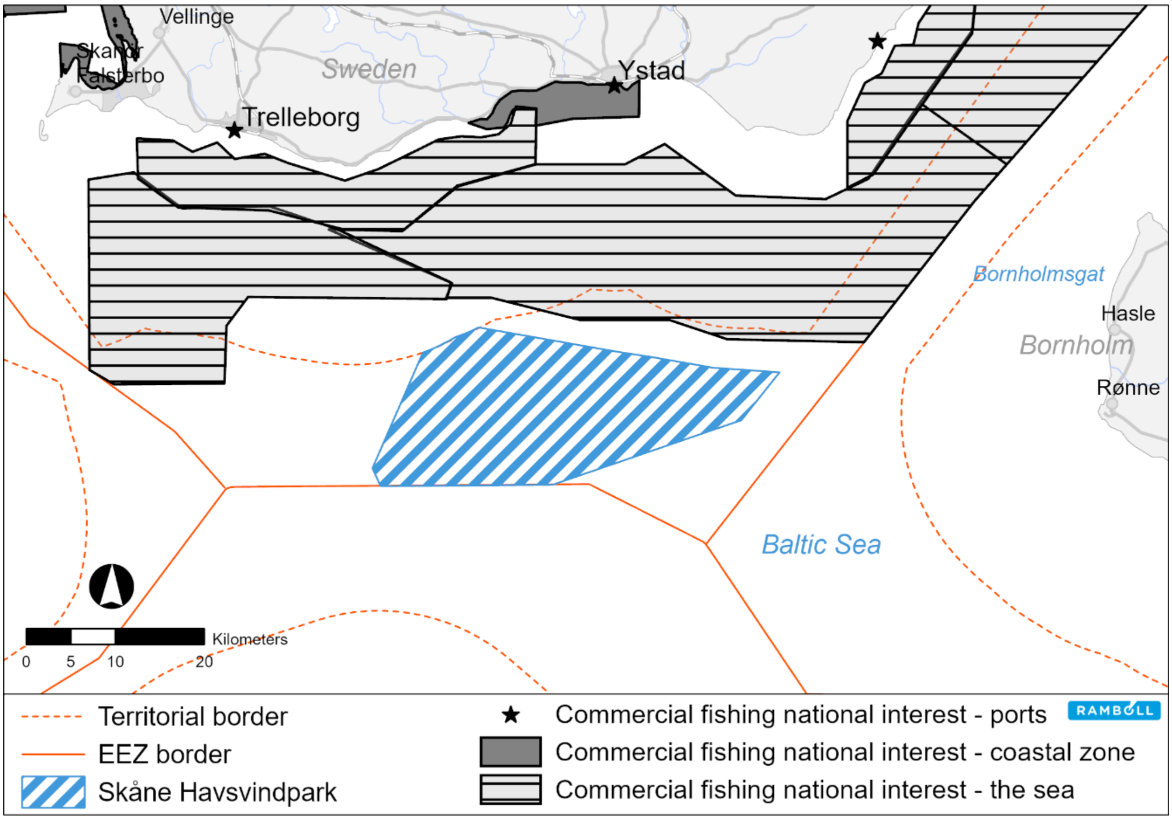

Figure 7-4 Skåne Havsvindpark and national interest for the purposes of commercial fishing (Havs- och vattenmyndigheten, 2021).

7.1.5.2 Possible effects

The sites of national interest for the purposes of commercial fishing are about 5 km away from the proposed wind farm area and therefore no long-term effect on these fishing sites is expected to arise from construction works or operation of the wind farm.

7.1.5.3 Scope

The potential impact on areas of national interest for the purposes of commercial fishing during the construction phase and operation will be covered in the future EIA.

7.1.6 National interest for the purposes of shipping and shipping lanes

The Swedish Maritime Administration pinpoints the ports and shipping lanes, as well as areas in general, that deliver special functions for the sea transport system. These could be designated by the Swedish Maritime Administration as national interest in accordance with Chap. 3 section 8 of the Swedish Environmental Code (Sjöfartsverket, 2001).

7.1.6.1 Baseline

Figure 7-5 shows shipping lanes of national interest which come into close proximity of the planned wind farm development. The shipping lanes involved are in categories class 1 and class 2, where class 1 means the main shipping lanes for merchant vessels and class 2 means shipping lanes for merchant vessels.

The shipping lane known as 'Falsterborev – Bornholmsgattet' passes the planned project area. The traffic separation schemes (TSS) Falsterborev and TSS Bornholmsgattet are shipping lanes with a high traffic density west and south of Skåne respectively.

- The 'Ystad- Sassnitz' fairway, is categorised in class 2.
- The 'Gedser - Svenska Björn' fairway is categorised in class 1.
- 'Falsterborev – Bornholmsgattet' fairway, traffic separation schemes (TSS).

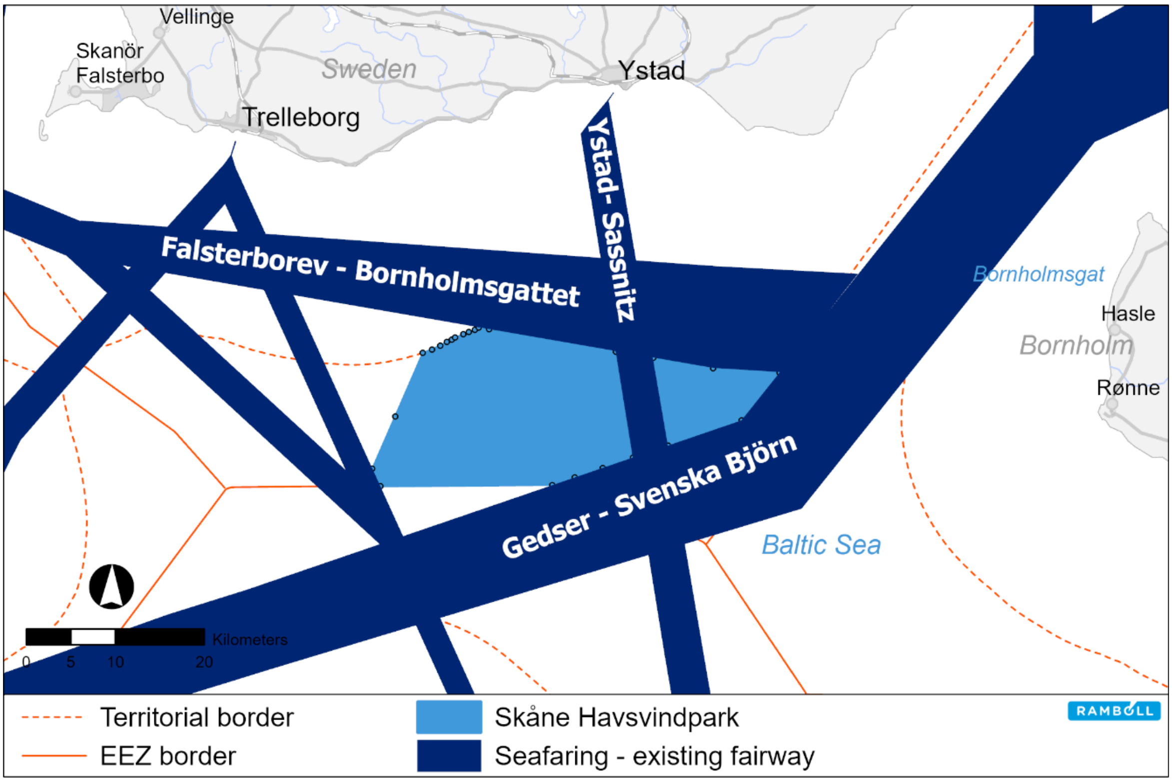

Figure 7-5 National interest for the purposes of shipping and shipping lanes (Länsstyrelsen WebbGIS, 2021).

Port of Ystad and Port of Trelleborg have been pinpointed as being of national interest for communications in accordance with Chap. 3 of the Swedish Environmental Code (Trafikverket, 2018).

7.1.6.2 Possible effects

During the construction phase, the project will take place next to areas where there is high-intensity maritime traffic. Fairway crossings and the establishment of temporary safety zones around project vessels could potentially have an impact on shipping lanes of national interest. Dependent on the safety distance required in the operational phase, the areas of national shipping interest may be impacted to a lesser degree.

7.1.6.3 Scope

The impact on adjacent national interest for the purposes of shipping and shipping lanes will be assessed further in the EIA. Mitigation measures are going to be devised and outlined in the EIA, aimed at minimising any impact on shipping and shipping lanes of national interest, see section 7.1.6.3.

7.2 Bathymetry and hydrology

7.2.1 Baseline

The Baltic Sea is a relatively shallow inland sea characterised by deep basins and shallow, narrow sounds which, together with meteorological conditions, control the exchange of saltwater with the North Sea.

The water in the Baltic Sea is a mixture of Atlantic saltwater that flows in through the Danish sound/Öresund and fresh water from surrounding watercourses. The influx of oxygen-rich saltwater is important for the supply of oxygen to the deep water and marine life of the Baltic Sea; large inflows are relatively rare, however, arriving from the North Sea in storm weather (see Figure 7-6). This lack of major inflows leads to oxygen-free areas becoming more widespread. Relative salinity and hypoxic (oxygen free) areas also impact on the Atlantic cod's ability to reproduce

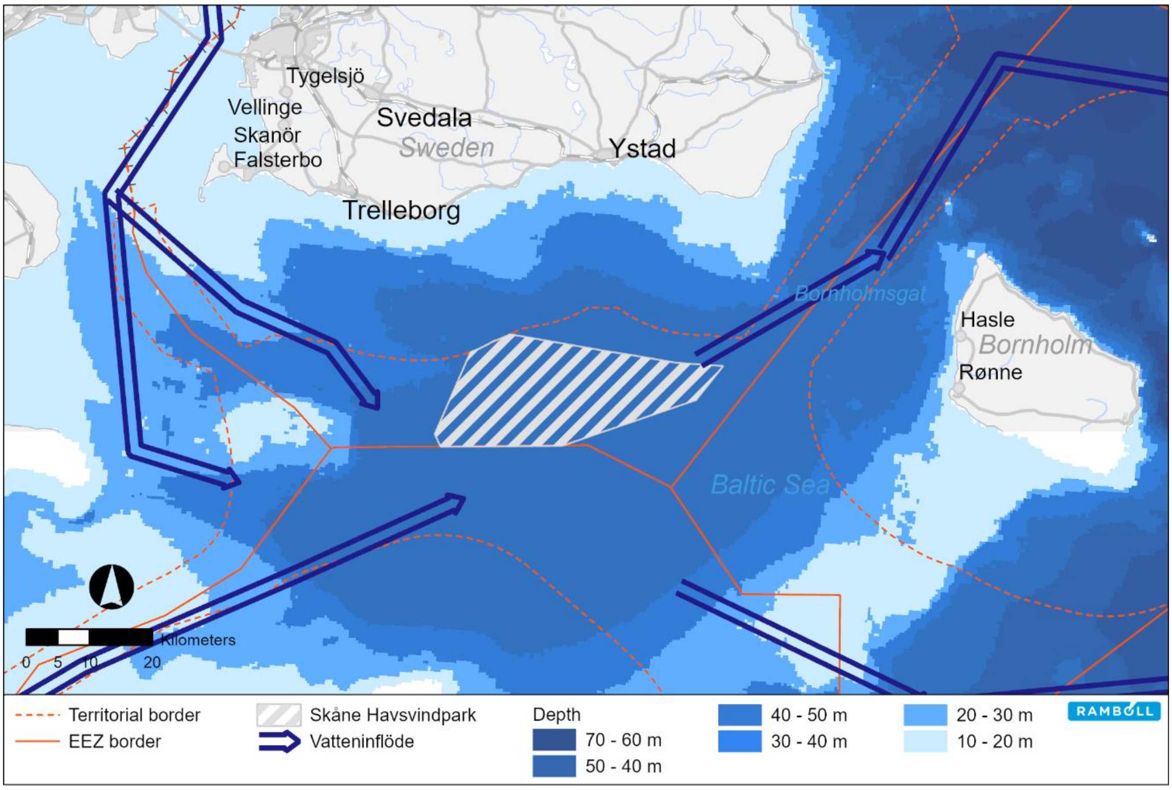

Figure 7-6 Bathymetry (HELCOM, 2021) . The inflow paths for saltwater are indicated with blue arrows (Mohrholz, Naumann, Nausch, Krüger, & Gräwe, 2015).

Water usually flows out from the Baltic Sea due to a surplus of freshwater from rivers and rainfall. Saltwater flows in via the Danish Belt and via Öresund. The inflow of water runs along the bottom of the *Arkona Basin*, the planned location for the wind farm. Once the Basin has filled up, the flow of water continues through the sound between Sweden and Bornholm then into the Bornholm Basin, which subsequently fills up too. The flow of water continues eastwards through *Stolpe ränna* and then onwards into the deeper parts of *the Baltic Proper Sea*, such as the *Eastern and Northern Gotland Basin*. The bottom water found in the deeper basins, further into the Baltic Sea can only be replaced during large and powerful inflows (Naturvårdsverket & Havsmiljöinstitutet, 2010).

The inflows are also important for the water layers. The layer between the shallow water with lower salinity and the deeper water with higher salinity is known as halocline. This is a layer of water that acts as a lid that restricts the vertical mixture of water. During spring, another distinct boundary appears between the warmer and colder water – the thermocline. The most distinct thermocline appears during the summer months. During the autumn, the water closest to the surface cools down again and the thermocline disappears (Bernes, 2005). Thermocline and halocline both occur in the project area, at depths of about 30–40 metres (SMHI, 2020; Ramboll Sverige AB , 2019).

7.2.2 Possible effects

Construction of the wind farm could potentially cause a local temporary mixing of water layers. The different layers and their various levels of salinity and temperatures are important for the marine environment.

7.2.3 Scope

The impact on the bathymetry and hydrology will be assessed further in the EIA.

7.3 Sediment and contaminants

7.3.1 Baseline

The sediment in the wind farm area is thought to consist primarily of glacial clay and postglacial clay; see Figure 7-7.

Historical conditions, but also the current conditions, have led to contamination of sediments in the Baltic Sea. Over-fertilisation as a result of discharge or leaking of nutrients into water has increased the number of organic particles being deposited on the seabed. The accumulation seabed typically has higher levels of contamination and are primarily found in the deeper parts of the Baltic Sea, whereas shallower water is typically characterised by non-accumulating seabed with lower levels of contamination.

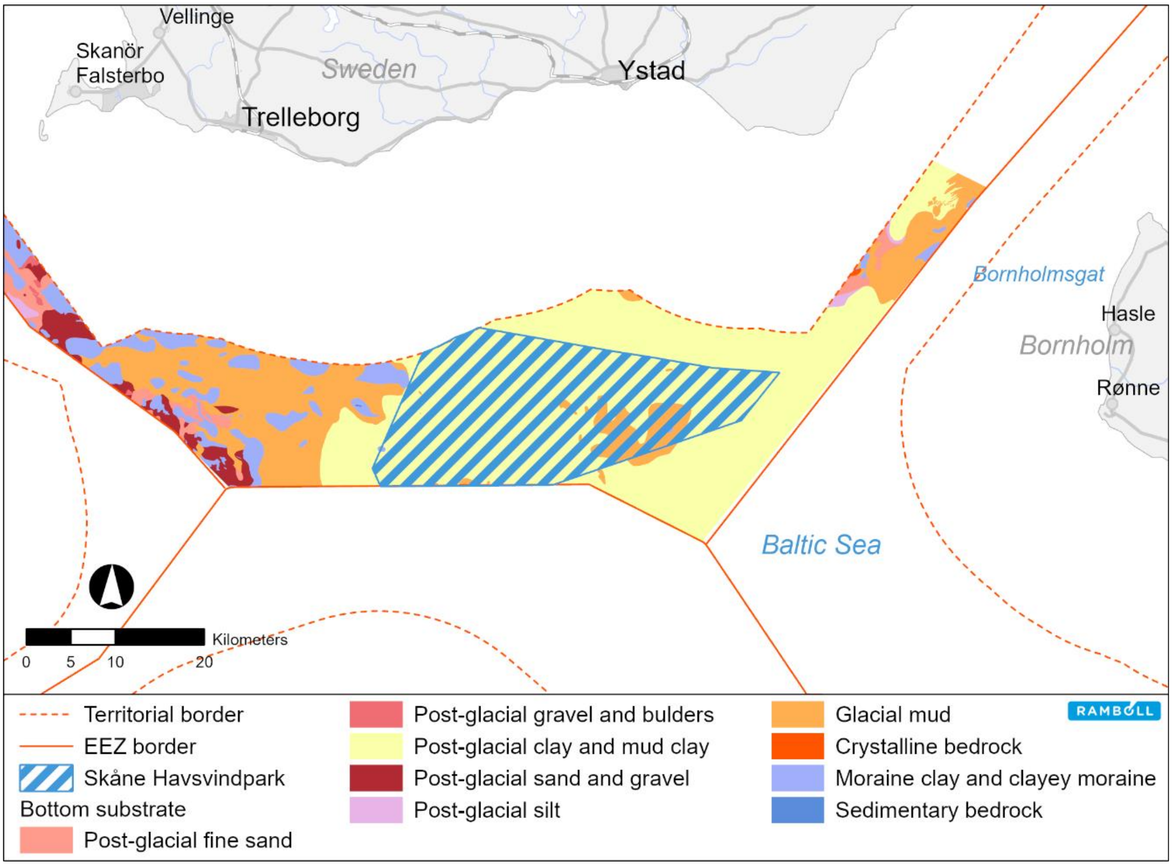

Figure 7-7 Sediment conditions (SGU, 2021a).

7.3.2 Possible effects

Laying cables and the turbine foundations for the turbines within the wind farm area could potentially lead to sediment suspension in the water mass. Contaminants, oceanic plankton and organic material could potentially appear in connection with dispersion of sediment and impact marine life when temporarily mobilised in the water column and sinking to the seabed.

7.3.3 Scope

Temporary turbidity in connection with construction works could potentially have an impact and will therefore be covered in more detail in the EIA. Modelling of potential sediment dispersion is going to be carried out. The spread of contaminants from the construction of the foundations and cable-laying will also be assessed and described in more detail.

7.4 Benthic flora and fauna

7.4.1 Baseline

Benthic fauna

The benthic fauna consists of invertebrate species that are found on (epifauna) and in (infauna) the seabed. The composition of species is related to factors such as salinity, oxygen levels, organic material and sediment type. Polychaetes, bivalves, molluscs and smaller crustaceans are examples of some of the organisms that could be found on and in the seabed in the area. With lower salt levels, the Baltic Sea is a special environment and is less biodiverse than Sweden’s west coast, where oceanic conditions prevail. Whether benthic fauna can be expected within the wind farm area depends on the sediment and seabed substrata, as well as oxygen levels being sufficiently high (> 2 mg O_2/l). Benthic fauna in the area designated for Skåne Havsvindpark is shown in Figure 7-8, with Latin names provided for clarification purposes in Table 7-2.

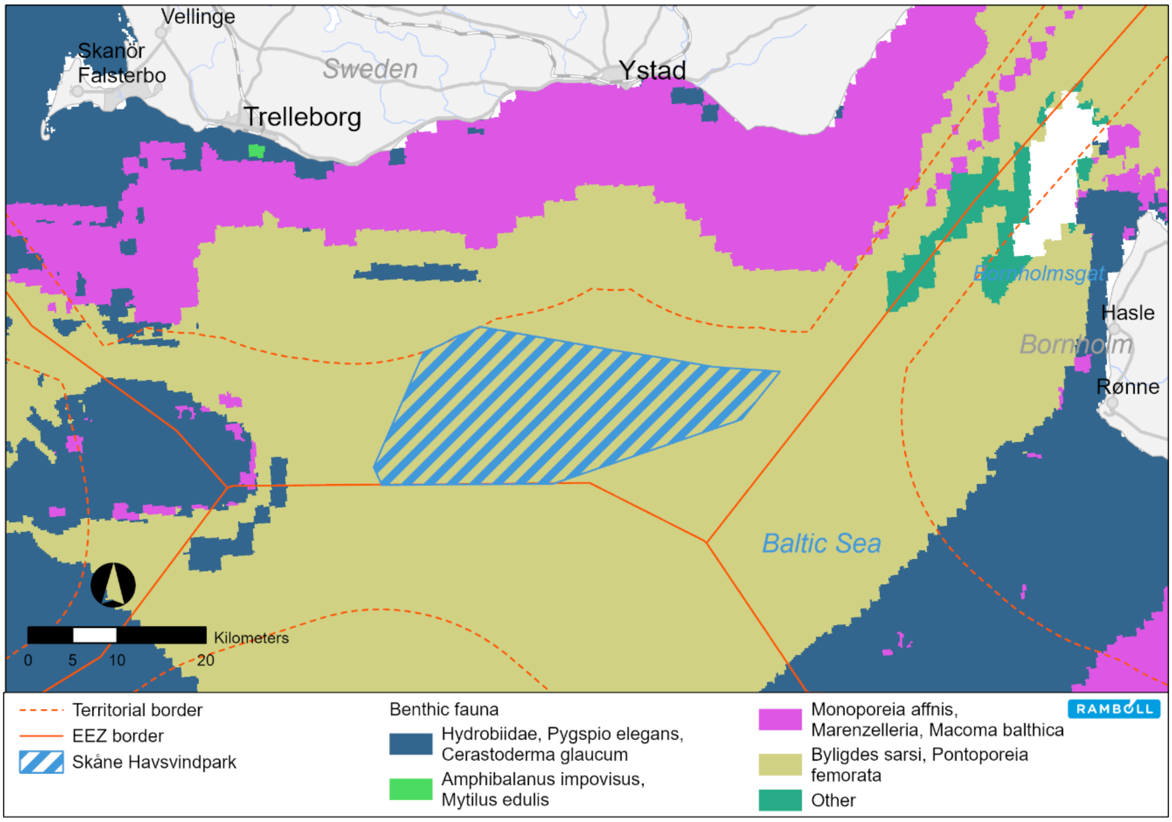

Figure 7-8 Benthic fauna (Gogina et al., 2016).

Table 7-2 Species from Figure 7-8. Name/description of species in English/Latin.

Name of species	
Mud snail (Hydrobiidae)	*Monoporeia affinis*, a small, yellowish benthic amphipod
Pygospio elegans, an annelid species	North American polychaetes (*Marenzellaria* sp.)
Lagoon cockle (*Cerastoderma glaucum*)	Baltic clam (*Macoma balthica*)
Bay barnacle (*Amphibalanus improvisus*)	*Bylgides sarsi*, a scale-worm bilobed
Blue mussel (*Mytilus edulis*)	*Pontoporeia femorata*, a species of amphipod

Benthic flora

Benthic flora in the Baltic Sea consists primarily of macroalgae and a few varieties of marine seaweed. Macroalgae is predominantly found in shallow coastal areas in the Baltic Sea, in the photic zone, which is the sunlit upper part of the water column where photosynthesis can take place. In the non-photic zone, which includes the area for the planned wind farm, there is no photosynthesis, meaning no macroalgae can grow there.

7.4.2 Possible effects

Benthic flora and fauna could potentially be impacted during the construction works for the wind farm and cable-laying. This due to changes in habitat related to increased concentrations of turbid sediment in the water mass, sedimentation and the release of contaminants.

Benthic habitats will be impacted locally wherever the wind farm and cables are placed on the seabed and cover the seabed. It is thought that there will be a lesser impact on areas located outside of the photic zone, and where oxygen levels are low. The foundations and erosion protection will result in introduction of new hard bottom substrate, which may favour certain species such as bivalves and macroalgae.

7.4.3 Scope

As the planned wind farm is going to be located outside of the photic zone on the seabed, it is unlikely that any bottom flora will be found. As such, it is thought that the construction works will not impact on the bottom flora, so this will not be covered in the EIA. Since the benthic fauna may be impacted during the construction and operation phase, this is going to be mapped through field studies and discussed in the EIA. The impact on the benthic flora during the operation phase will also be covered in the EIA.

7.5 Fish

7.5.1 Baseline

There are nearly 100 species of fish in the south-western part of the Baltic Sea. In the Arkona Basin, where the wind farm is located, the most predominant species are herring (*Clupea harengus*), sprat (*Sprattus sprattus*), cod (*Gadus morhua*), flounder (*Platichthus flesus*) and plaice (*Pleuronectes platessa*). The latter four of these species do spawn to a certain extent in the Arkona Basin, where as herring tend to spawn close to shallow coastal bottoms along the German coast.

There are two populations of cod in the Baltic Sea: the smaller western population found west of Bornholm and the larger eastern population mainly found east of Bornholm. The spawning and nursery areas for the western population can be found in the Bay of Kiel, Bay of Mecklenburg, Great Belt, Öresund and the Arkona Basin. In the Arkona Basin, cod spawn where water depths exceed 40 m.

Nowadays, the eastern population of cod mainly reproduces in areas of the Bornholm Basin where the water depth is more than 60 m. Reproduction also occurs in the Arkona Basin, however with annual variations (Hüssy, o.a., 2016). In recent years, the cod from the eastern population has accounted for about 70% of all cod found in the Arkona Basin (Havs- och vattenmyndigheten, 2020). The eastern population of cod in the Baltic Sea is distributing less widely according to ICES (ICES, 2019) This poor state of affairs is mainly due to changes in the ecosystem and, in particular, an increased distribution of low-oxygen bottoms as a result of eutrophication , poor access to prey fish in the form of herring and sprat, and widespread parasitic worm infection. Over-fishing and selective fishing for large individual fish has also added to the problem (Bergenius, o.a., 2019).

Herring is a pelagic fish species which is widely distributed across the Baltic Sea. There are several different populations, which spawn in spring and in autumn. The herring that is found in the south-western part of the Baltic Sea consists predominantly of the spring-spawning population. Although the spring-spawning herring also spawn around the Danish islands and along the German coast, their main spawning area is the coastal region around Rügen (ICES, 2007). Spawning takes place from March to May at depths of 1 to 6 metres. The larvae live pelagically. The spring-spawning herring migrates from the age of two years through Öresund and the Belt Sea to the feeding grounds in Skagerrak and the North Sea and returns to the spawning areas in the south-western Baltic Sea during the winter and spring.

Sprat is a pelagic species that is found in fish shoals. It spawns at depths of between 10 and 40 metres, with spawning in the Baltic Sea taking place from March to August (Havs- och vattenmyndigheten, 2020). The eggs and larvae are planktonic (floating freely in the waters). Sprat is an important food source for cod, marine mammals and seabirds in the Baltic Sea.

Flounder are generally found in an area covering the Baltic Sea up to the Åland Sea. There are two species of flounder in the Baltic Sea: the European flounder, *Platichthus flesus*, and the Baltic flounder, *Platichthus solemdali*. It is mainly the European flounder that is found in the Arkona Basin. Spawning takes place in deep waters during the spring, whereby the eggs remain floating in the water at a salinity of 14–26 PSU (ICES, 2016).

Plaice is found in the southern part of the Baltic Sea, typically on sand and clay bottoms down to a depth of 50 metres. Young individuals normally inhabit shallow coastal waters, while older individuals prefer deeper waters. Plaice spawn in the Arkona Basin and Bornholm Basin during the periods February–March and May–June (ICES, 2014). The eggs and larvae are planktonic.

The European Eel (*Anguilla anguilla*) is found in the Baltic Sea and in freshwater systems within the drainage area. Spawning migration from the Baltic Sea to the North Sea takes place along the coast in the autumn.

7.5.2 Possible effects

During the construction phase, fish could potentially be impacted temporarily by turbidity and underwater noise. High levels of suspended sediments in the water could impact the survival of the fish eggs and fish larvae. Underwater noise may cause temporary changes in behaviour or harm.

During the operational phase, the most significant potential impact on fish could result from the inclusion of hard bottom substrate, such as the foundations with erosion protection, and changes to the acoustic environment in the area designated for the wind farm. It is anticipated that an additional hard bottom could increase access to food for fish and attract bottom-dwelling fish.

7.5.3 Scope

The consequences for cod will be a focus area in the EIA. The spawning migration of European eel and Rügen herring will also be discussed in more detail. The effects and consequences for other species of fish will be summarised rather than discussed extensively. Mitigation measures to limit underwater noise and sediment dispersion are going to be developed and described in the EIA. The EIA will also investigate the potential impact from electromagnetic fields.

7.6 Marine mammals

7.6.1 Baseline

Harbour porpoise and seals are marine mammals which inhabit the Baltic Sea. The project area for the wind farm is adjacent to the Natura 2000 area ''Sydvästskånes utsjövatten'', where harbour porpoise and seals are protected species.

Harbour porpoise

The harbour porpoise is listed in Appendix II and IV of the Site of Community Importance Directive. The inclusion of the species in Appendix II of the Directive requires EU members to pinpoint specific protected areas for harbour porpoises, i.e. so-called 'Natura 2000 areas'. Several Natura 2000 areas have been designated for harbour porpoise conservation, one of which is Sydvästskånes utsjövatten. The harbour porpoise is listed as 'Least Concern' (LC) in the 'Red List', which represents an improvement in status compared to the 2015 'Red List', when it was 'Vulnerable' (VU). The Baltic Sea population is new on the list and red-listed as 'Critically Endangered' (CR) since there are few individuals left, the population is decreasing, and since there is only one sub-population (SLU Artdatabanken, 2020).

The harbour porpoise is the only permanent whale species inhabiting the Baltic Sea. The information about the harbour porpoise in the Baltic Sea, Skagerrak and Kattegat are better known from the SAMBAH (Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise) science project (SAMBAH, 2016). A total of eight areas in Swedish waters have been identified as important for harbour porpoises, including the south-western part of the Baltic Sea.

For an overview based on the SAMBAH project showing the location of harbour porpoises in the summer, see Figure 7-9; and for the winter, see Figure 7-10. There are two different populations of Harbour porpoise in this part of the Baltic Sea; the endangered Baltic population of around 500 individuals and the more stable Belt Sea population, estimated as 42,000 individuals in 2016. As established in Figure 7-9 and Figure 7-10, there is a porpoise presence in the project area all year round. There is, however, a clear boundary zone between the Belt Sea population and the Baltic Sea population during the summer months. The area off south-west Skåne is used by both the Belt Sea population and the Baltic Sea population during the winter season, but the Baltic Sea population moves to the area around Hoburgs bank and North and South Midsjöbanken during the summer for breeding purposes.

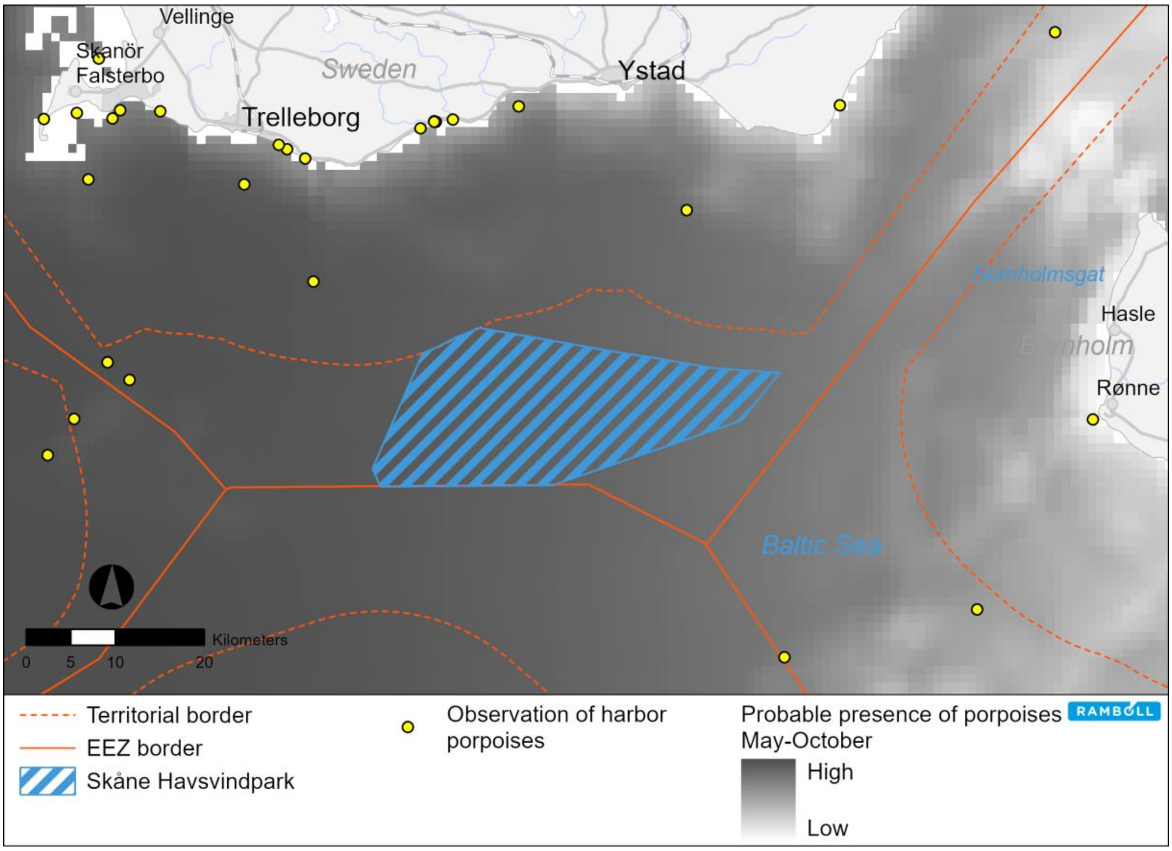

Figure 7-9 Harbour porpoise study – summer, based on (SAMBAH, 2016).

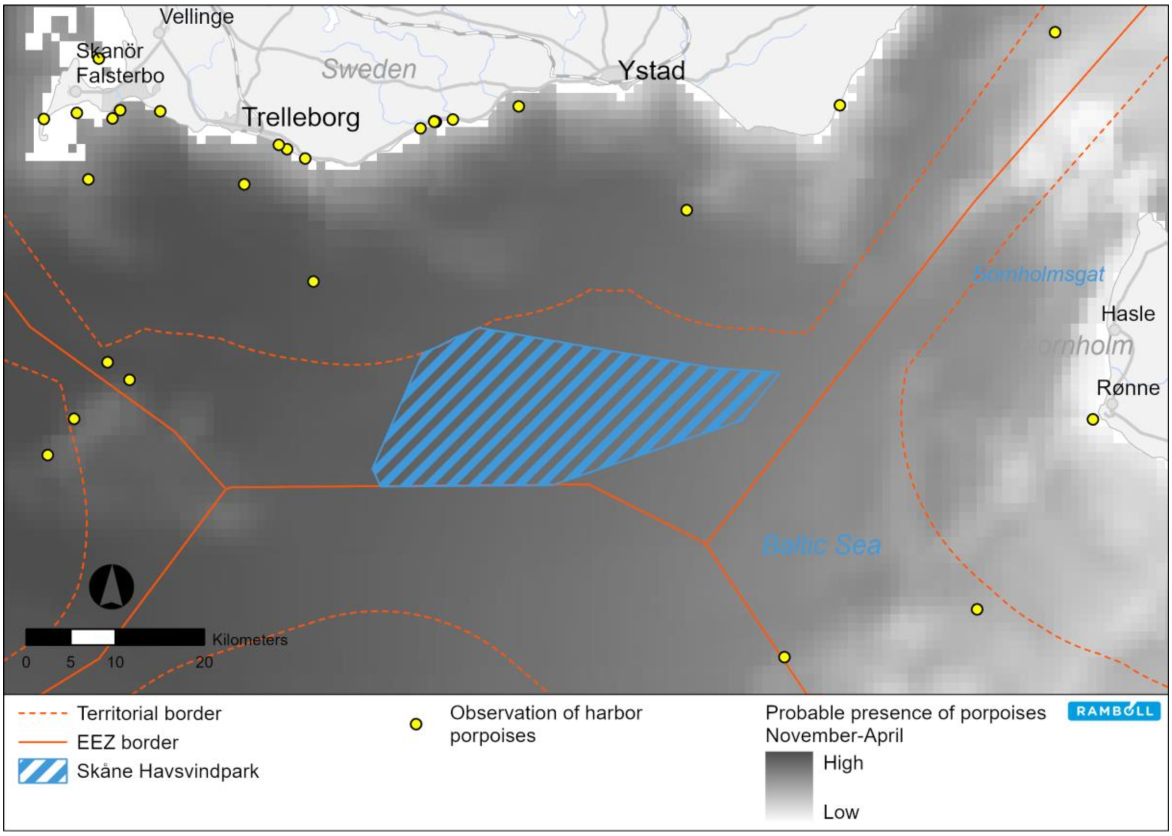

Figure 7-10 Harbour porpoise study – winter, based on (SAMBAH, 2016).

Seals

Seals are listed in Appendix II of the habitat Directive. Both the harbour seal (*Phoca vitulina*) and the grey seal (*Halichoerus grypus*) can be found in the Baltic Sea.

Seals tend to live near shallow coastal areas. The likelihood of extensive seal presence within the planned wind power area is therefore minimal.

7.6.2 Possible effects

The main potential impact on marine mammals is linked primarily to underwater noise during the construction phase, e.g. during foundation piling. Sensitive reproduction periods for marine species should be avoided when constructing and de-commissioning sea-based wind power plants, especially for the Baltic Sea population of porpoise. Mitigation measures should also be implemented to reduce the spread of noise and the number of porpoises and seals in the area by the piling work, e.g. bubble curtains, marine mammal observation, temporary acoustic scaring methods etc. During the operation phase, noise from maritime traffic is expected to exceed the noise levels generated from the wind power plants. Vessels related to the wind farm can be expected to have the same impact as the existing maritime traffic in the area.

7.6.3 Scope

As the marine mammals could potentially be impacted during the construction phase, marine mammals will be described further in the EIA. The patterns of the underwater noise and how this spread through water will also be modelled. Field studies using aeroplanes and so-called *C-pods* began a year ago within the project area, aimed at detecting harbour porpoises. The results of these studies will provide supporting documentation and be factored into the EIA.

Mitigation measures to minimise the spread of underwater noise and to temporarily discourage marine mammals from visiting the area during the construction stage. This will partly be performed using light-emitting activities that will be discussed further in the EIA.

7.7 Birds

7.7.1 Baseline

The Baltic Sea has many important locations for birds, with sites used for resting, gathering food, nesting and overwintering. Certain species live in the Baltic Sea all year round, while others migrate to or from the Baltic Sea during the winter. The distribution of the various species of birds in the Baltic Sea does, therefore, vary greatly from season to season. Migratory birds, that account for a large proportion of the Swedish bird fauna, make their journeys as quickly, safely and efficiently as possible. For this reason, many species follow land or coastlines as far as possible, with many also leaving and arriving in Sweden via the Skåne coastline.

Overwintering birds, including diving ducks (e.g. long-tailed ducks, eider, velvet scoter and common scoter), are found in shallower marine areas (<30 m depth), where they can find mussel banks. Their distribution is determined to a large degree by seabed substrata and the topography of the seabed. Some of the most important overwintering areas for seabirds in the Baltic Sea are Hoburgs bank, North and South Midsjöbanken, the coastal areas east of Gotland and the south-western corner of Skåne. Since the area surrounding the wind farm is around 40 meters in depth, significant numbers of overwintering birds are not to be expected.

7.7.2 Possible effects

The temporary increase in the number of construction vessels causing airborne noise and disruption through their presence alone, could temporarily have an impact on birds.

During the operation phase, birds may also collide with wind turbines or avoid the area all together whilst migrating or passing through.

7.7.3 Scope

As birds could potentially be impacted temporarily during the construction phase and during the operation phase, relevant migratory birds and seabirds will be covered in greater detail in the EIA. Field surveys involving aeroplanes and radar began a year ago within the project area. The results of these surveys will provide supporting documentation and be factored into the EIA. Potential barrier effects of birds avoiding food searches in areas with wind turbines are expected to be limited given that the water is too deep for food searches. Hence, this will only be covered briefly in the EIA.

7.8 Bats

7.8.1 Baseline

The 19 species of bats found in Sweden vary greatly in terms of their geographical distribution and behaviour across the country. Although many species are active and move around during the autumn and spring, only a few are thought to leave the country and migrate to the continent during the autumn. The species that do leave Sweden often do so in the same manner as birds, i.e. following the land and coast as far as possible. Since the wind farm is far from land (about 22 km), it is not thought that there will be any major bat presence within the project development area.

All species of bat are protected in accordance with Section 4 of 'Artskyddsförordningen', the Swedish protection of species regulation, which places a general ban on deliberately catching, killing, harming or disturbing the animals. The same regulation also prohibits damage to bat habitats.

7.8.2 Possible effects

Potential impacts for offshore bats include collision with the rotor blades of the wind turbines, or if they are sucked in behind them, inflicting harm as a result of changes in pressure. The risk posed to bats by wind turbines varies tremendously from species to species i.e. many species rarely get killed whilst others are high-risk. Of the high-risk species, those who hunt insects are often found high above open spaces, and with regard to offshore wind, it is those species who potentially have their flight paths through the area.

7.8.3 Scope

The potential impact on bats during the operation phase is going to be described and evaluated in more detail in the EIA. Radar surveys are ongoing within the project area to detect bats. The results of these studies will provide supporting documentation and be included into the EIA.

7.9 Marine archaeology

7.9.1 Baseline

In terms of shipwrecks, the southern Skåne coastline is one of the 'richest' areas in the Baltic Sea. Historically, its large number of sand dunes and rapid water currents have led to thousands of vessels ending up as wreckage on the sand bottom. A large number of these shipwrecks are found in the narrow passage between Bornholm and Sandhammaren (municipality of Ystad, the south-eastern tip of Skåne) (Jakobsen, m.fl., 1996; Riksantikvarieämbetet, 2020).

Remnants of marine archaeological interest are known to be present within the wind farm area in Skåne; see Figure 7-11.

The water in the wind farm area is 43–46 m in depth. A project-specific analysis shows, there are no remnants of settlements from the Stone Age or other periods of history at such great depths. This was confirmed through discussions with the county administrative board.

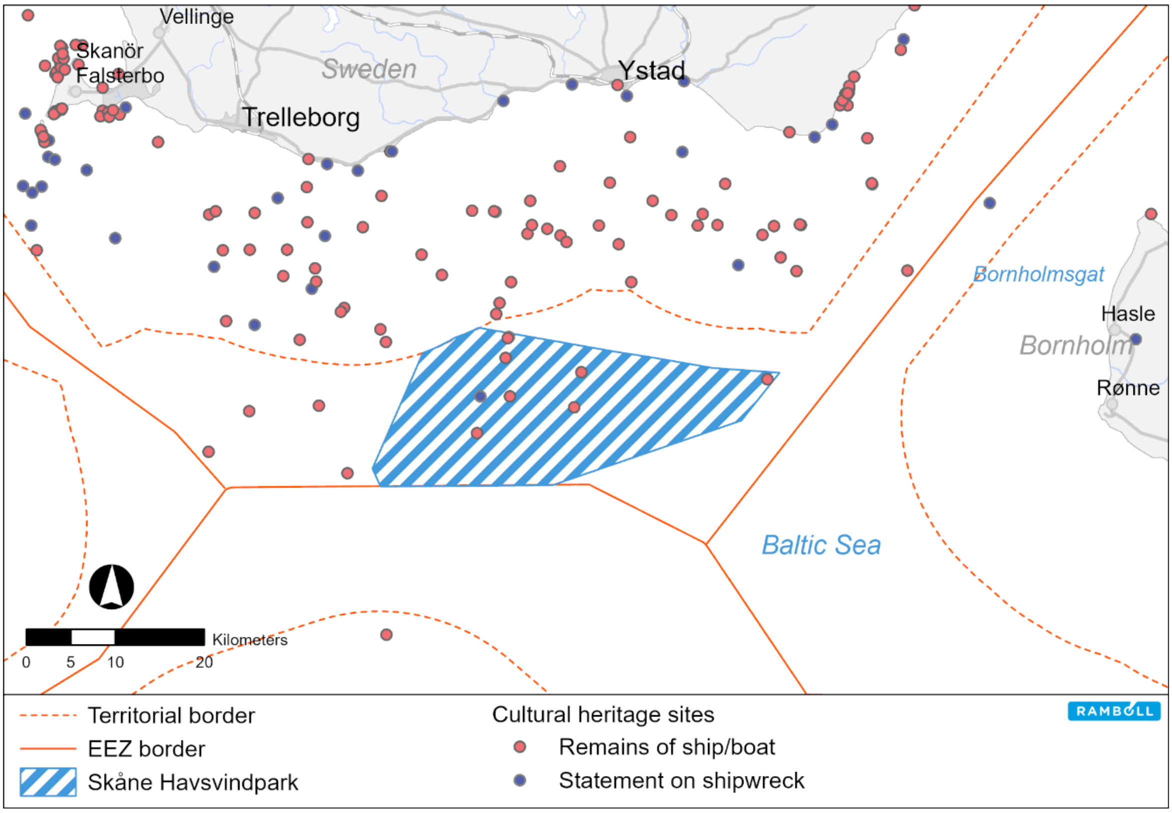

Figure 7-11 Known cultural/historical remains within the wind farm area (Riksantikvarieämbetet, 2019).

7.9.2 Possible effects

Prior to the construction works, the seabed is going to be investigated to detect any marine archaeological objects so that these can be avoided during the work and so that any potential impact can be minimised. The findings of the investigations are going to be analysed by marine archaeologists.

Mitigation measures are going to be devised and implemented via, among other things, the establishment of safety zones, through maintaining distance from any cultural artefacts and by taking special precautions during construction works.

7.9.3 Scope

Analysis of the current situation, any impact on cultural objects on the seabed during the construction phase, and any precautions and mitigation measures are going to be developed further in the EIA.

As the waters within the wind farm area are deep, and project-specific analysis indicate that there are no remnants of settlements from the Stone Age or other periods of history in the area, remains of settlements will not be described any further in the EIA.

7.10 Shipping and shipping lanes

7.10.1 Baseline

Skåne's proximity to important trading partners in Germany, Poland and Denmark have led to the creation of important shipping hubs in the region. In total there are six commercial ports active in Skåne at present.

The ports of Ystad andTrelleborg are designated as being of national interest for communications in accordance with Chap. 3 of the Swedish Environmental Code (Trafikverket, 2018).

The port of Ystad is one of Sweden's largest ports for ferry traffic and transportation of goods to Poland and Bornholm. There are also ferry routes from Malmö to Copenhagen and northern Germany. Nowadays, the port of Trelleborg is a hub for traffic between Scandinavia and Europe, and is Scandinavia's largest ferry port (Trelleborgs hamn AB, u.d.), with ferry connections to and from Swinoujscie (in Poland), Sassnitz (Germany), Rostock (Germany), Travemünde (Germany) and Klaipeda (Lithuania).

The wind farm area is located immediately west of Bornholm; see Figure 7-12. In terms of traffic, the shipping lane past Bornholm is extremely busy, with passenger ferries and transportation vessels sailing between ports between ports in Germany, Denmark and Poland. There is also fishing activity in the area. Traffic separation schemes (TSS), in which vessels congregate to then pass, are in place west of the area for the planned windfarm at Bornholm, north-west of the wind farm area at Falsterbo Reef, and south-west of the wind farm area at Rügen.

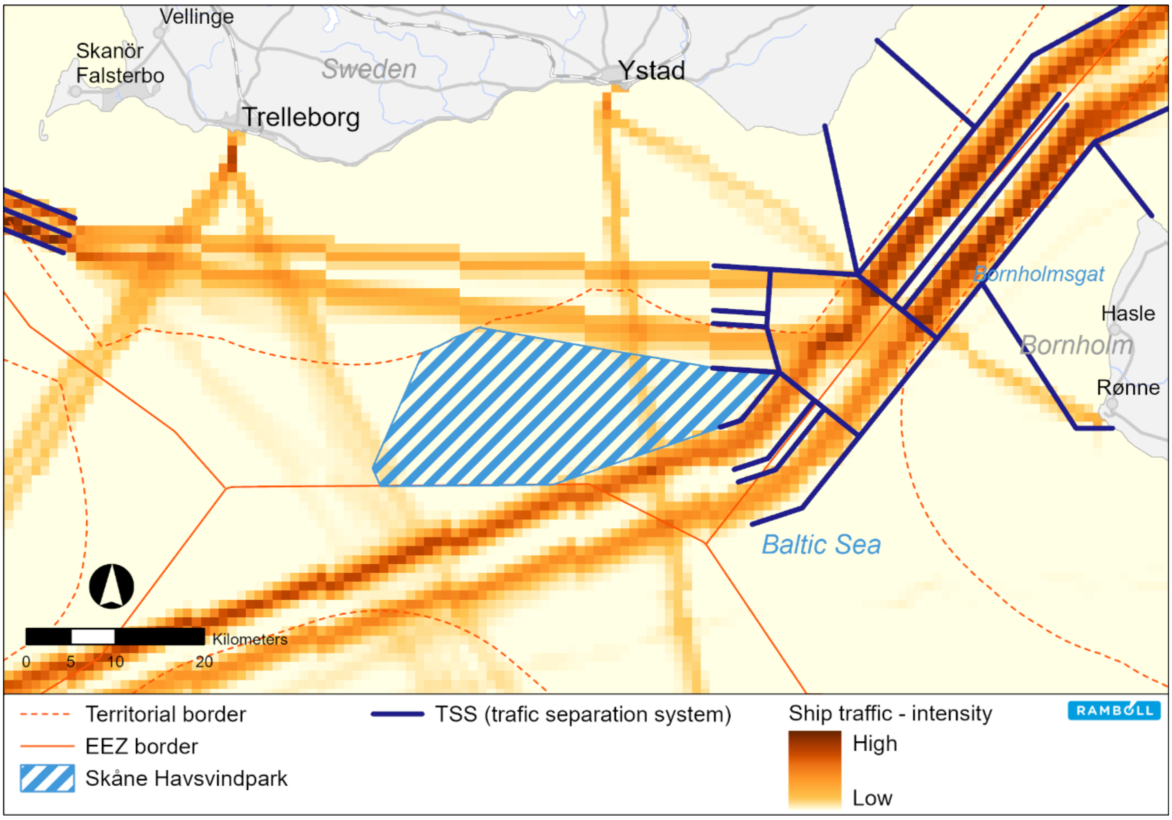

Figure 7-12 Vessel traffic in the south Baltic Sea (HELCOM, 2021) and TSS (Styrelsen for Dataforsyning og Effektivesering , 2021).

7.10.2 Possible effects

Construction of the wind farm could potentially lead to temporary and local disruption for maritime traffic when the construction vessels cross shipping lanes, or when the construction works are carried out next to shipping lanes. Various project vessels involved in the installation of the foundations, delivery transportation, investigations, and cable-laying (within the wind farm area) will also be in the area. There are also plans to put temporary safety zones in place around certain project vessels. This will mean that other vessels will have to temporarily navigate around the safety area.

7.10.3 Scope

The potential impact on shipping and shipping lanes, including risk assessment studies for third parties, is going to be addressed in the EIA. A so-called Hazard Identification Workshop (HAZID), attended by users of the maritime area, has been held as part of the marine risk assessment work. Mitigation measures to minimise any impact on shipping will be devised. The impact on the vessel traffic situation will be evaluated in the EIA. Given the limited presence of leisure boat traffic expected in the project area, no significant impact is expected; as such, it will not be described any further in the EIA.

7.11 Outdoor recreation

7.11.1 Baseline

Marine outdoor recreation refers to use of the local landscape and natural environment for activities such as sailing, birdwatching, and swimming. It also refers to visits to cultural environments, lighthouses, and wreck-diving. Areas for outdoor recreation are often classed as being of national interest for outdoor recreation. Nature areas and protected marine areas may also be important in this regard.

The southern Skåne coast partly consists of sandy beaches, making it important for recreation, jobs and homes. The coast is also home to valuable nature sites and areas used for outdoor pursuits, as well as providing favourable conditions for leisure fishing, which is enjoyed by residents and visitors alike. The municipality of Ystad's coastal stretch is one of the most-visited in Sweden, with its white sandy beaches and opportunities for swimming, walking, sightseeing and exploring nature, e.g. at Nybrostrand and Kabusa, Kåseberga and Ale's Stones, the heathland at Backåkra, Hagestad nature reserve, Sandhammaren, Hammars backar and Smygehuk.

Fishing is a popular leisure activity along the Swedish coast. The scale of fishing as a leisure activity was studied in a survey conductedby the Swedish Agency for Marine and Water Management in 2017, supported by Statistics Sweden (Havs- och vattenmyndigheten, 2019c). It found that more than 500,000 recreational anglers engaged in fishing close to harbours or along the coast, fishing in total for around 3.6 million days.

In 2017, the coast from Trelleborg in Skåne to Karlskrona in Blekinge was frequented by around 50,000 recreational anglers, who between them clocked up 544,000 fishing days and 695,000 gear days (Havs- och vattenmyndigheten, 2019c). This fishing was done from boats on just over half of these fishing days. More than half of the fishing days were in the summer (May to August). Herring, cod, perch, pike, and salmon were the main fish species caught. Trout, flatfish, whitefish and pikeperch were also caught. The main forms of fishing were spin fishing and fly fishing, as well as float fishing and ledgering. Both trolling and feather/jig fishing were performed on about 9% of the gear days, while mass capture tools (nets/yarn, fyke nets, pots) were only used to a limited extent (8%). There was no tour-boat fishing (0%).

The area in which the wind farm is planned is just over 22 km from land, with waters just over 40 m deep. In other words, the likelihood of pleasure fishing taking place in the area is limited. There is a possibility that trolling for salmon or cod from boats may occur, although even here to a limited extent.

7.11.2 Possible effects
The area in which the wind farm is planned is situated just over 22 km from land. At this distance, the farm may be partially visible from land, but only to a limited extent.

7.11.3 Scope
As the wind farm is far from land only a limited amount of outdoor recreational activities will take place close to the wind farm area, and therefore any major impact on outdoor recreation is not expected. The impact from outdoor recreation during operation and construction phase will, however, be covered in the EIA. Visualisations by photo montages of the wind farm from land will be produced. The locations used for photo montages will be selected based on a so-called 'Zone of Theoretical Visibility' analysis (ZTV), as well as comments received during the consultation process.

The impact on leisure fishing during the operation and construction phases are thought to be insignificant, since this kind of fishing occurs infrequently in the proposed wind farm area. This aspect will therefore only be covered from an overall perspective in the EIA.

7.12 Commercial fishing
7.12.1 Baseline
Cod, herring and sprat together account for about 95% of total fish landings in the Baltic Sea (ICES, 2020). Herring and sprat, which tend to be caught with midwater trawlers or purse seine nets, are the most important species economically speaking. Cod is mainly fished using demersal trawls or bottom nets. Other species caught commercially include salmon, plaice, flounder, dab, brill, pikeperch, pike, perch, vendace, whitefish, turbot, eel and trout. Over the past few years, a total of around 700,000 tonnes of fish have been landed and reported in the Baltic Sea, with Swedish commercial fishery landing about 125,000 tonnes.

In the Arkona Basin, cod, herring and sprat are the target species and tend to be caught using different types of trawl net and pelagic fishing gear. The planned wind farm is located within ICES rectangle 39G3 in catch area 24. ICES rectangle 39G3 covers an area of sea measuring roughly 60 x 50 km and stretches from the coastline between Trelleborg and Kåseberga to the Swedish economic zone boundary. Within 39G3, the annual landings were on average 2,600 tonnes per year for the years 2010–2015, with Swedish fishing accounting for 63% of the landings (HELCOM, 2018). The biggest catches by weight were cod (46%), herring (39%), sprat (8%) and flounder (2%). The annual landing of cod was about 1,200 tonnes, which is comparable to the annual landings of around 8,000 tonnes from catch areas 22–24 west of Bornholm in the same period (Havs- och vattenmyndigheten, 2020).

In 2020, targeted fishing of cod, with the exception of net fishing along the coast, was prohibited in Swedish waters in the southern areas of the Baltic Sea. In catch area 24, which includes the Arkona Basin, there was a total ban on fishing from 1 June until 31 July to support cod spawning and reproduction.

7.12.2 Possible effects
To guarantee the safety of maritime traffic in the vicinity during the construction phase. it may be necessary enforce temporary access restrictions in the project area. This may have a temporary impact on commercial fishing in the local area.

7.12.3 Scope

Repercussions during the construction and operation phases will be described in more detail in the EIA. Active trawling areas will also be covered in more detail and outlined in the future EIA.

During operation, the co-existence of commercial fishing and wind farm operation is to strive for and will be developed in more detail.

7.13 Military areas

7.13.1 Baseline

The Baltic Sea is a strategic area for military interests. The Baltic states have different types of military training areas. Countries may, for example, restrict access to areas used for military purposes in their territorial waters on a permanent basis.

The southern Baltic Sea is also used for international military training exercises e.g. NATO activity, in the form of naval training. Military submarine exercise areas can also be found in the southern part of the area for the planned wind farm. These submarine areas, which are coordinated by the Germany Navy (Submarine Exercise Area Coordinator – SEAC), are used for NATO training and exercise patrols. Other practice areas may also be set up temporarily.

Additional information about military areas is expected to be received during the consultation process.

7.13.2 Possible effects

The construction and operation of the wind farm may potentially impact on military training areas in the Swedish economic zone, which could impact upon military exercises.

7.13.3 Scope

The potential impact on Swedish military training activities, as well as NATO training activities, will be analysed further in the EIA. The EIA is going to elaborate on the adjustment of activities during construction and operational phases to allow co-existence with the Swedish Armed Force's operations and interests. These details will be documented in the upcoming planning applications. Experience from other countries' wind energy markets and wind farms, plus the studies of European defence suppliers carried out will be used to develop solutions that allow military operations and wind power operations to co-exist. Solutions and agreements will be developed and adjusted in order to facilitate a functional co-existence in collaboration with the Swedish Armed Forces and other relevant parties.

7.14 Infrastructure

7.14.1 Baseline

Cables, pipelines, and other wind farms are the main types of existing and planned construction that may be found in and near the wind farm area.

There are many telecommunication and transmission cables installed on the seabed of the Baltic Sea. There are also plans to install a pipeline, the 'Baltic Pipe', in the area. The location of existing infrastructure and infrastructure for which plans are approved is shown in Figure 7-13. Besides fixed installations, there will also be radio signals and traffic from aviation in the air space above the area.

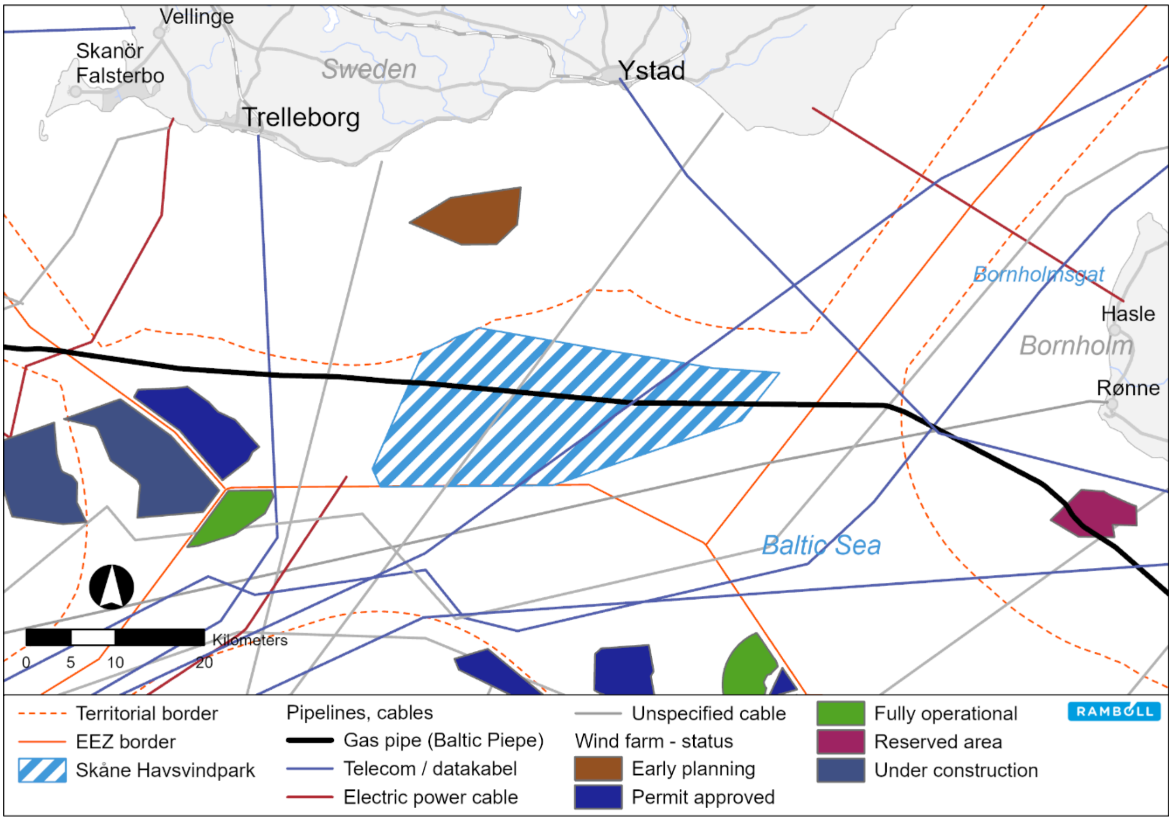

Figure 7-13 Existing, planned and approved infrastructure within the area (HELCOM, 2021; EMODnet, 2021; Ramboll Sverige AB , 2019).

Conditions for wind power in the marine area off the Skåne coast are favourable, thanks to the advantageous wind and water depths for bottom-based wind power plants and close proximity to areas in southern Sweden that consume a large amount of electricity. South of Trelleborg, 'Kriegers Flak' is a site for which Vattenfall has obtained permission to construct a sea-based wind farm consisting of 128 wind power plants. The project has received Natura 2000 permission for an increased height (280 m) and extended time period for building and construction measures. Wind power plants already exist, or are being planned, in the German and Danish sections of Kriegers Flak respectively.

7.14.2 Possible effects

During construction of the wind farm, existing cables or pipeline may be impacted unless mitigation measures are put in place. During construction, temporary restrictions may be placed on maintenance work for existing cables and pipeline.

Wind power plants could potentially impact on radio link connections, which might then have an effect on signal transmission and reception.

7.14.3 Scope

Any impact on existing cables and planned gas pipelines from the construction work, and possible interactions with other projects are going to be assessed in the EIA. The potential impact during the operation phase will also be covered in the EIA. The company is going to coordinate with identified owners of existing cables and planned pipelines regarding the design of crossings.

With regard to aviation and radio link connections, the relevant authorities will be notified of the distribution, position and design of the wind farm following coordination with the Swedish Civil Aviation Administration, the Swedish Armed Forces and the Swedish Post and Telecom Authority. Any impact and potential mitigation measures will be reviewed and coordinated.

7.15 Sites for recovery of raw materials

7.15.1 Baseline

Extraction of material in marine areas refers mainly to sand extraction. There is no interest in, or legal options for, getting permission to extract fossil hydrocarbons from Swedish maritime territories or its economic zone.

There is no geologic carbon dioxide storage on the seabed of Sweden at present. The potential for storage in the future is being investigated, as there is potential for geologic storage of carbon dioxide in the Nordic countries. The areas with potential for carbon dioxide storage according to the Geological Survey of Sweden (SGU) are Faludden, south-east of Gotland, and Arnagergrönsand, south of Skåne (SGU, 2021b). The area for the planned wind farm is located within the area of interest Arnagergrönsand. At present, there are no existing or proposed installations for capturing and/or storing carbon dioxide.

Extraction of sand refers to the process whereby fractions of sand and gravel of economic interest are extracted from the seabed for use, predominantly, in the production of building materials, as filler or as beach nourishment. Working together with the Swedish Agency for Marine and Water Management (HaV), SGU has pinpointed four areas with potential for geologic and environmentally sustainable sand extraction: Sandflyttan, Sandhammar bank and Klippbanken in the south Baltic, and Svalan and Falkens Grund in the Bothnian Bay, which are also pinpointed in the proposals for the Baltic Sea marine plan. Sandhammar bank is located close to the Skåne Havsvindpark and is shown in Figure 7-14.

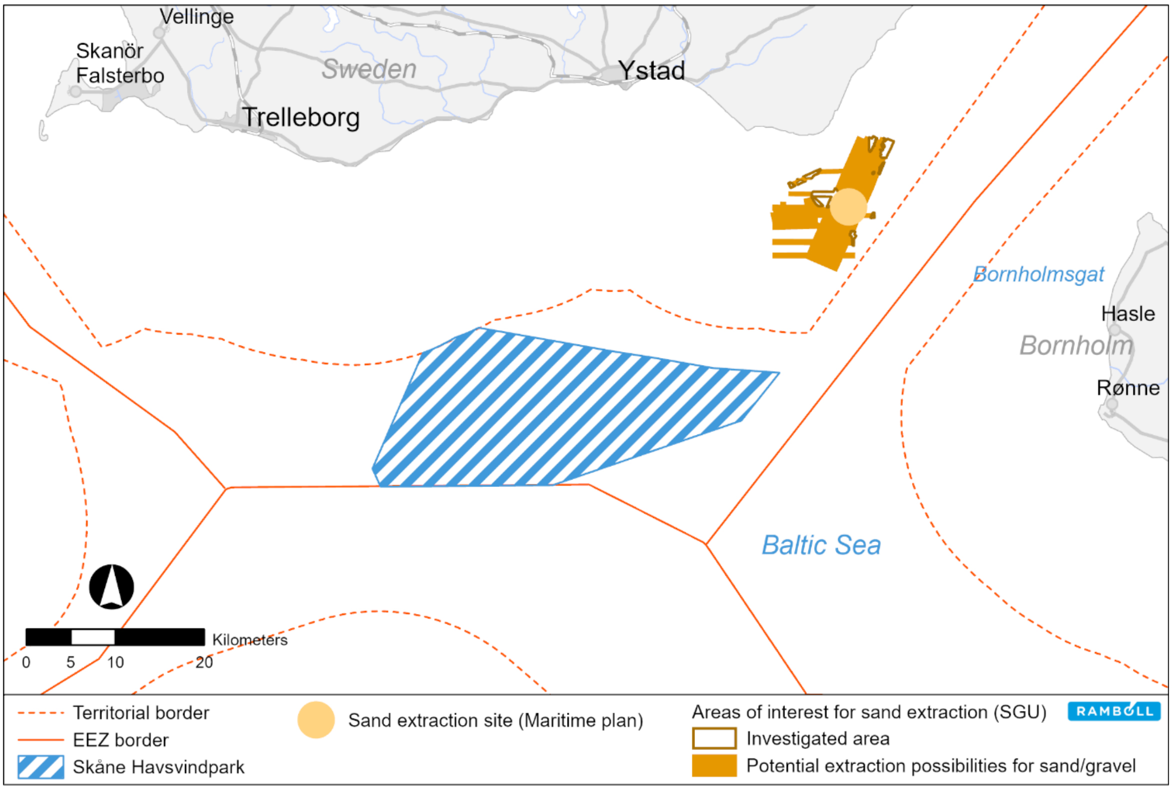

Figure 7-14 Areas designated for sand extraction (Sandhammar bank) in proposals for Baltic Sea marine plan (SGU, 2021a).

At the moment, there is a permission proposal being granted in Sweden for sand, gravel and stone quarrying. This permission, which has been granted to the municipality of Ystad for ten years, from April 2011, allows for a total of 340,000 m³ sand, gravel and stone to be extracted, on four occasions, within a specific area at Sandhammar bank, to counteract ongoing beach erosion. The most recent extraction occurred in 2020 (SGU, 2021a).

7.15.2 Possible effects

With regards to the extraction of raw materials, the wind farm could potentially have an impact on storage of carbon dioxide. This is because the wind farm's planned location falls partly within an extensive area with potential for carbon dioxide storage.

7.15.3 Scope

Sand extraction at Sandhammar bank is not impacted by the wind farm and will not be covered in any great detail in the EIA. The planned wind farm is located within an area of interest for storage of carbon dioxide and will therefore be elaborated further in the EIA.

7.16 Monitoring stations

7.16.1 Baseline

National and international environmental monitoring stations in the Baltic Sea monitor trends over time using various different physical, chemical and biological parameters. There are also environmental monitoring stations measuring contamination levels and ecological parameters within and in close proximity to the planned wind farm; see Figure 7-15.

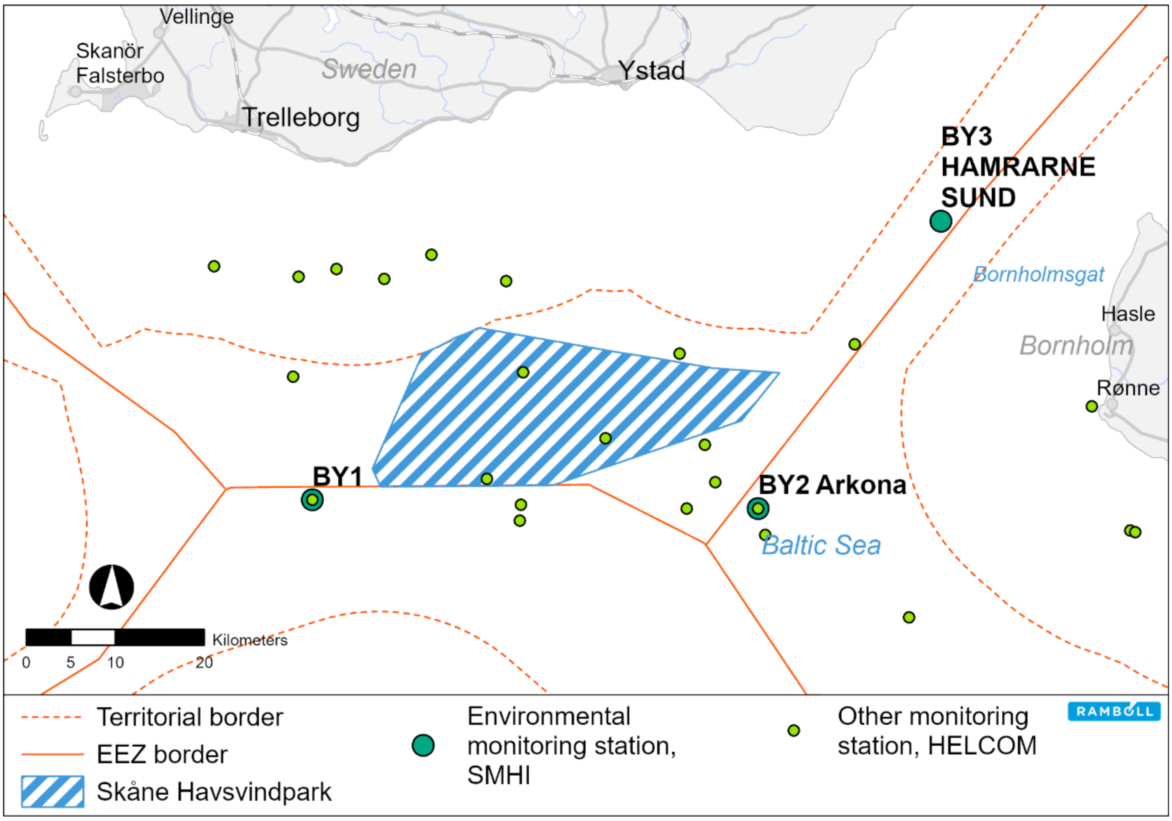

Figure 7-15 Environmental monitoring stations that are part of the national environmental monitoring scheme (Havs- och vattenmyndigheten, 2019b) and the HELCOM monitoring programme (HELCOM, 2021).

7.16.2 Possible effects

Environmental monitoring stations that measure levels of contamination and ecological parameters within and near to the planned wind farm could potentially and temporarily be impacted by the construction works, e.g. due to sediment spreading.

7.16.3 Scope

The impact on environmental monitoring stations will be outlined in more detail in the EIA.

7.17 Climate

7.17.1 Baseline

Global warming caused by increases in greenhouse gas emissions through the combustion of fossil fuels are driving climate change at a national and international level. As mentioned in chapter 2, the EU has set the target of being climate-neutral by 2050; Sweden's parliament, meanwhile, has decided that 100% of electricity produced must be renewable by 2040 (European Commission, 2020; Energimyndigheten, 2021b). As use of electricity is expected to increase nationally by the 2040s, renewable electricity production will need to be increased not only to meet future energy needs, but also to meet climate targets. A strategy has been devised for sustainable expansion of wind power to put the conditions needed for the energy transition in place, i.e. at least 100 TWh of new wind power up to 2040, with the need for renewable electricity production greatest in central and southern parts of Sweden (Energimyndigheten, 2021b; Länsstyrelsen Skåne, 2020).

Expansion of renewable electricity production (wind power) will contribute to a reduction in greenhouse gas emissions, which in turn may make it possible to reach the *Reduced Climate Impact* environmental quality objectives, as well as the 'zero emissions' target set for greenhouse gases by 2045. Seen from a life-cycle perspective, electricity production from burning fossil fuels contributes the most to greenhouse emissions. Renewable sources and nuclear power plants, meanwhile, emit considerably less greenhouse gas – their main contribution to emissions actually being during the production of wind power plants and the construction phase. One important factor here is that the energy sources emit varying amounts of greenhouse gas during the manufacture of parts/components, depending on whether the electricity comes from coal power plants or renewable fuels themselves during production (Energimyndigheten, 2021b).

Currently around half of all electricity production in Sweden comes from renewable sources (primarily hydropower), with roughly 40% coming from nuclear power. Although accounting for a smaller share of electricity production, the amount generated by wind power has increased significantly in recent years (around 12% in 2020). The amount of electricity produced from wind power increased from 457 GWh in 2000 to 19,847 GWh in 2019; see Figure 7-16 (SCB, 2020; Energimyndigheten, 2021b).

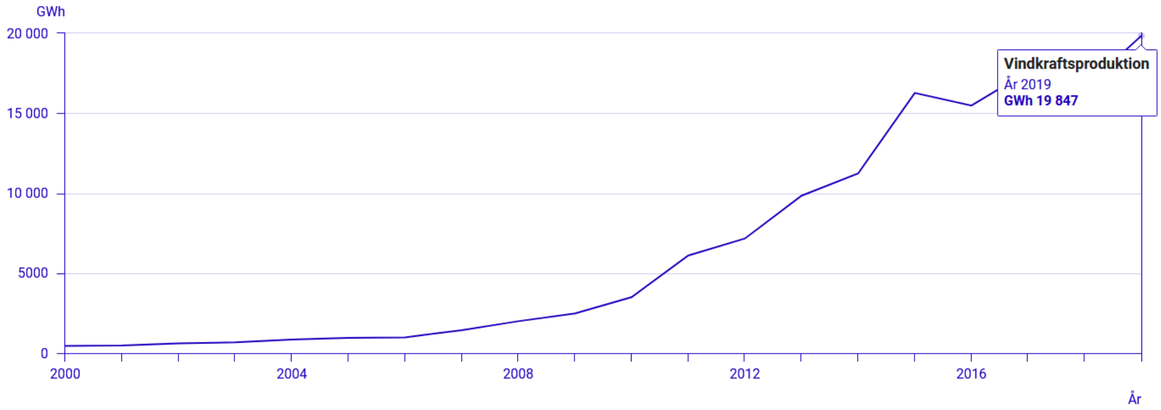

Figure 7-16 Wind power production from 2000 to 2019 (Gross supply of electrical energy, GWh by type of production and year) (SCB, 2020).

Sea-based wind power technology is evolving fast, resulting in cost reductions, which in turn is increasing the potential for expansion in Sweden (Energimyndigheten, 2021b; Länsstyrelsen Skåne, 2020).

7.17.2 Possible effects

Assessing the impact of electricity production on climate should be done based on the entire life-cycle of the electrical system (Energimyndigheten, 2021b). The biggest potential impact on climate may be felt during the early phases of the wind farm project, i.e. during the production of materials for the wind power plants and transportation of materials and during the construction phase. Use of fossil fuels in the production of materials (steel) and transporting materials considerable distances will increase greenhouse gas emissions into the atmosphere and therefore contribute more to climate change. The impact on the climate will be considerably less, however, if materials are produced locally, e.g. in certain parts of Europe where much of the electricity used in production comes from renewable sources. Transport distances would also be reduced, lessening the impact on climate even more. Sea vessels used during the construction phase may also contribute to the impact on climate, depending on the fuel they use; likewise, they may also have an impact on local air quality.

After the wind farm has been installed, there will be a small impact on the climate from vessels used for operation and maintenance.

Nevertheless, wind power provides a good basis for achieving national and international targets for renewable energy, and thereby increasing the likelihood of transition from fossil fuels to renewable sources of electricity production, and in doing so reduce the impact on the climate.

7.17.3 Scope

Any impact on the climate caused predominantly by the construction phase will be outlined in the EIA. The EIA is also going to assess how the project can facilitate national and international targets for greenhouse gas emissions and reduce impact on climate.

8 Planned field studies and surveys

Below you will find a summary of the field studies and surveys that are planned or already ongoing.

8.1 Planned field studies

8.1.1 Geophysical and geotechnical surveys of the seabed

The purpose of geophysical and geotechnical surveys is to provide the project with information about the conditions for construction of a wind farm. The surveys will provide a basis for concept choice and design, as well as providing a basis for investigating the presence of munitions (mines etc.) and assessing topography, sediment conditions on the seabed, and the presence of wrecks and other sites/items of cultural importance. Additionally, this supporting documentation will be used for interpretation of the flora and fauna conditions on the seabed.

The following geophysical investigations are planned:

- ‘Multibeam’ (MBES), a multi beam echosounder providing a 3D image of the seabed;
- ‘Side scan sonar’ (SSS), which is used to find out more about the seabed as a surface and to detect and pinpoint objects on the bottom;
- Magnetometer;
- High-frequency shallow sub-bottom profile (SBP);
- Ultra-high resolution multichannel seismic (UHRS)’.

The following geotechnical investigations are planned:

- Grab sampling;
- Cone Penetration Tests (CPT);
- Drilling and/or Vibrocore.

8.1.2 Metrological surveys
Surveys are going to be conducted using instruments that measure wave height and wind speed.

8.1.3 Sediment surveys
Plans are in place to investigate contaminants in the sediment of any accumulation bottoms in 2021 (‘accumulation bottoms’ referring to when sediment accumulates and can be expected to have an increased contaminant content). The scale of the sediment sampling within the wind power zone will be adjusted according to the type of sediment.

8.1.4 Natura 2000
Surveys on harbour porpoise are currently on-going; see section 8.2.1.

8.1.5 Benthic flora and fauna
The majority of the area for the planned wind farm is located in the non-photic zone, hence surveys of benthic flora is not planned. Surveys of benthic fauna will be made.

8.1.6 Fish
An in-depth desktop study is being made about the project area’s significance as a spawning area, nursery area and residence area for fish.

8.2 Ongoing field studies
The section below describes the field studies currently taking place.

8.2.1 Harbour porpoises
The wind farm area is situated close to the Natura 2000 area ‘Sydvästskånes utsjövatten’ (south-west Skåne coastal waters), an area protected because of its porpoise population, among other things. Field studies researching presence of harbour porpoises in the wind farm area is ongoing for one year ago using C-pods (click detectors) and aeroplanes.

8.2.2 Seabirds and migratory birds
Field studies researching a broad spectrum of different seabirds and migratory bird species have been ongoing for the past year. These are aimed at gaining supporting documentation to be used as a basis for evaluating the ornithological significance for seabirds and migratory birds in the wind farm area and applying this to any potential impacts on birds protected under Natura 2000 within Falsterbo Foteviken.

8.2.3 Bats
Field studies using ultrasound detectors began in 2019 to find out more about the bat population in the area and, where possible, to learn more about which migratory species of bat fly over the wind farm area.

8.3 Planned studies
The section below outlines plans for future studies.

8.3.1 Sediment spread
Modelling of sediment spreading is going to take place for works causing turbidity.

8.3.2 Noise distribution
The patterns of the underwater noise and how this will spread are going to be modelled for the construction phase in connection with installation of the foundations. Modelling of airborne noise may also take place.

8.3.3 Landscape visualisation
As parts of the coast are located high-up and are valuable from a cultural environment perspective, as well as having major recreational values, the impact on the visual landscape is going to be investigated further using (for example) photo montages from the most sensitive locations. The locations used for photo montages will be selected based on a so-called 'Zone of Theoretical Visibility' analysis (ZTV), as well as from comments received during the consultation process. Analysis of the park area's appearance from Ale Stenar and from Smygehuk hamn are two possible areas for photo montage and landscape analysis.

8.3.4 Shipping and shipping lanes
Analysis of ship traffic and risk assessment related to navigation for both the construction and operation phase are planned. A so-called Hazard Identification Workshop (HAZID), attended by users of the maritime area by the project area, has been held, as part of the risk assessment.

8.3.5 Munitions
One heritage of the two World Wars is the presence of munitions in the Baltic Sea, partly as a result of mines being laid during war years and partly due to the munitions (both conventional and chemical) being dumped offshore in the post-war period. Interpretation of geophysical data for the seabed will be the main method used to study any munitions present in the area.

8.3.6 Marine archaeology
Surveys and assessments in relation to presence of marine artefacts of potential cultural/historical value will be conducted. The results of the surveys will be analysed and assessed by marine archaeologists.

9 Provisional content of EIA report

Chap. 6, section 35 of the Swedish Environmental Code establishes what an EIA shall include. The scope and level of detail of the information to be included in an EIA shall be appropriate in terms of current knowledge and assessment methods, and as required to provide an overall assessment of the major environmental effects that the activity or measures will presumably involve (see Chap. 6 (37) of the Swedish Environmental Code).

As a suggestion, the EIA will in summary summarise contain the following:

1. **Non-technical summary**
2. **Introduction**
3. **Background and purpose**
4. **Permitting process, environmental assessment, and method**
5. **Consultations**
6. **Alternatives**
7. **Project description**
8. **Description of area, planning situation and protected areas**
9. **Baseline, environmental impact and mitigation measures**
    - *Bathymetry*

- *Water quality and hydrography*
- *Sediment*
- *Climate and emissions into the air*
- *Noise distribution*
- *Pelagic environment*
- *Benthic environment*
- *Fish*
- *Marine mammals*
- *Birds*
- *Bats*
- *Protected areas*
- *Visual landscape*
- *Cultural heritage*
- *Recreation and outdoor pursuits*
- *Human beings and health*
- *Commercial fishing*
- *Shipping and* shipping lanes
- *Aviation*
- *Environmental monitoring stations*
- *Existing and planned installations*
- *Sites for recovery of raw materials and other natural assets*
- *Munitions and military practice areas*
- Natura 2000

10. **De-commissioning**
11. **Cumulative effects**
12. **Transboundary impact**
13. **Risk assessment**
14. **Environmental objectives**
15. **Overall assessment**
16. **Follow-up and monitoring**
17. **Uncertainties**
18. **EIA authors' credentials**
19. **Bibliography**

9.1 Proposed consultation circle

The following parties will make up the consultation circuit initially:

Skåne county administrative board
The Swedish Agency for Marine and Water Management
The Swedish Environmental Protection Agency
The Swedish Armed Forces
National Defence Radio Establishment
Swedish Defence Research Institute (FOI)
The municipality of Ystad
The municipality of Skurup
The municipality of Trelleborg
The Swedish Transport Agency
The Swedish Transport Administration
The Swedish Maritime Administration
The Swedish Coastguard
The Swedish Civil Aviation Administration
The Swedish Energy Agency
The Swedish Energy Markets Inspectorate
The Swedish Civil Contingencies Agency

The Swedish National Heritage Board
Swedish National Maritime and Transport Museums
National Board of Housing, Building and Planning
The Swedish Board of Agriculture
The Legal, Financial and Administrative Services Agency
Geological Survey of Sweden (SGU)
Swedish Geotechnical Institute (SGI)
SMHI (Swedish Meteorological and Hydrological Institute)
The Swedish Post and Telecom Authority
Svenska Kraftnät
Department of Aquatic Resources (SLU Aqua) at the Swedish University of Agricultural Sciences
SLU Swedish Species Information Centre
The Swedish Institute for the Marine Environment
The Swedish Shipowners' Association
Havs- och kustfiskarnas producentorganisation (Association of sea and coastal fishers' producers', HKPO)
Sveriges fiskares Producentorganisation (Association of producers in Sweden's fishing industry, SFPO)
Swedish Pelagic Federation Producer Organisation (SPFPO)
Torskfiskarnas Producentorganisation (Association of producers in Sweden's cod fishing industry, STPO)
Sveriges hamnar ('Ports of Sweden' organisation)
The Swedish Society for Nature Conservation
The World Wide Fund for Nature (WWF)
Greenpeace Sweden
Skånes Ornitologiska Förening (Skåne Ornithological Society)
BirdLife Sweden
Sportfiskarna (Swedish fishing for sport association)
Sydkustens Vattenvårdsförbund (South-Coast Water Management Association)
Affected companies

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