Notification

Southern North Sea II wind farm

June 2024

VENTYR

Foreword

Ventyr SNII AS ("Ventyr") hereby submits a notification of initiated planning of an offshore wind power plant of up to 1,500 MW within the announced area of the Southern North Sea II area.

The notification covers the wind power plant itself, with wind turbines, foundations, internal submarine cable network and offshore converter stations. A separate report has been prepared for the grid connection to the wind power plant, and it is desirable that these two reports are processed in parallel by the authorities.

The notification is forwarded to the Norwegian Authorities, which processes it in accordance with the Marine Energy Act and makes a final decision in the case.

Questions about the notification and the technical plans can be directed to Ventyr at the following e-mail address: KU.Ventyr@parkwind.eu

Oslo, 18 June 2024

Ventyr

Stefan Clinck

Project Counsel

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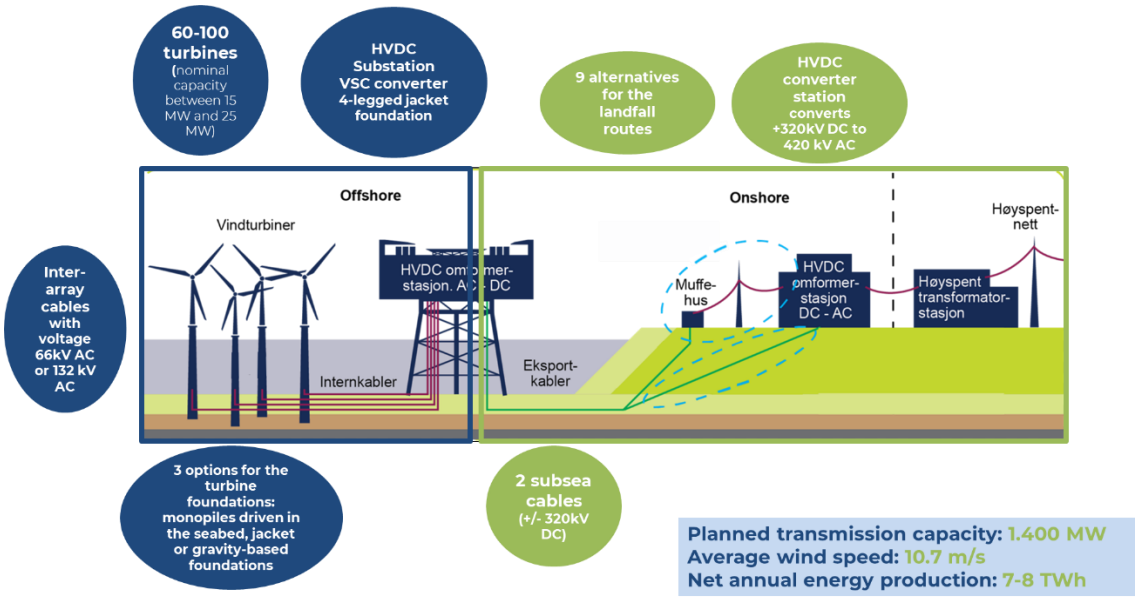
Executive summary

Ventyr is grateful to have been chosen to develop the offshore wind project on the Southern North Sea II and thereby help Norway fulfill its ambitions to produce more renewable energy. The development of offshore wind will contribute to reduced greenhouse gas emissions and to the development of new expertise and technology within the Norwegian supplier industry.[1]

Ventyr is owned by Parkwind and Ingka Group. In addition to the two owners, Ventyr also collaborates with NorSea Group as a strategic supplier. Parkwind is a leading European developer of offshore wind projects. Ingka Investments is the investment arm of Ingka Group, which owns most of IKEA's stores globally. Ingka is a long-term European investor in sustainability.

Southern North Sea II comprises a large offshore wind farm consisting of an estimated 60-100 wind turbines with a total capacity of 1,500 MW, an offshore converter station, internal cables in the wind farm, submarine cable ("export cable"), landfall facility (sleeve station), power line, underground cable and/or micro tunnel on land and a new converter station on land. Connection to the main grid is from Statnett's existing substation in Kvinesdal.

The development plans cover areas at sea within Norway's economic zone and on land in Kvinesdal municipality and either Flekkefjord, Farsund or Lyngdal municipality in Agder (depending on which option is chosen for the grid connection).



This report applies to the offshore wind power plant and includes the wind turbines and turbine foundations as well as the internal submarine cable network up to and including the offshore converter station. A separate notification has been prepared for the grid connection.

The notifications have the following content:

- Description of background and process

[1] https://www.regjeringen.no/en/aktuelt/ventyr-nordsjo-ii-har-vunnet-auksjonen-om-tildeling-av-prosjektomrade-for-havvind-i-sorlige-nordsjo-ii/id3030559/

- Preliminary measure description
- Description of the current situation and knowledge base
- Preliminary assessment of environmental and social impacts and possible mitigation measures
- Proposal for investigation program

The reports will be put out for public consultation under the auspices of NVE and open public meetings will be arranged where everyone can provide input and views on the development plans and the proposed assessment program.

Based on the report and the subsequent consultation round, the energy authority will determine a final study program.

In connection with the license application, Ventyr will prepare a project-specific impact assessment that describes the effects on the environment and society in accordance with the established assessment program.

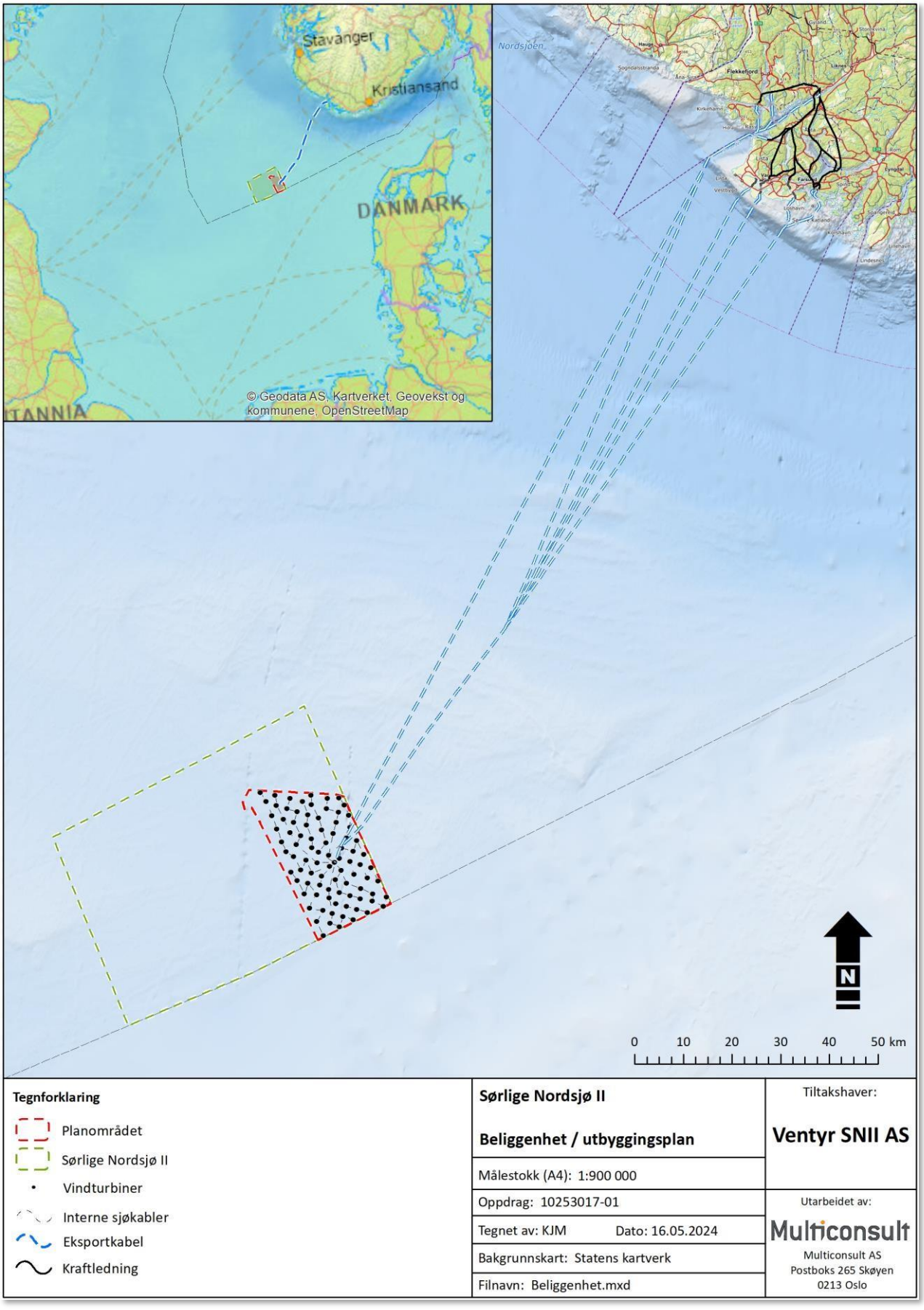


Figure 0-1. Wind power plant location and planned grid connection.

1 Introduction

1.1 Background information

In White Paper No. 13 (Climate Plan for 2021-2030), Norway has decided to cut its greenhouse gas emissions by 50-55% by 2030, a process that will require large amounts of power according to a long-term power market analysis for 2020-2040 conducted by NVE. New business development with large power needs will lead to further increases in power consumption and the European Commission has estimated that a total of 300 GW of offshore wind must be built in Europe by 2050. The Norwegian government's ambition is to allocate offshore wind areas for 30 GW by 2040, and the Southern North Sea II offshore wind power plant is part of this.

Southern North Sea II was identified as a priority area for offshore wind development based on a strategic impact assessment conducted by the Norwegian Water Resources and Energy Directorate (NVE) in 2012. By Royal Decree on June 12, 2020, it was decided to open Southern North Sea II for applications for renewable energy production.

The competition to be awarded an area for the first phase of offshore wind production on the Southern North Sea II was announced by the Ministry of Energy on March 29, 2023. The competition was conducted through an auction in accordance with section 2-3 of the Offshore Energy Act and chapter 2A of the Offshore Energy Act Regulations, where the winner is awarded a project area with a time-limited exclusive right to conduct a project-specific impact assessment and to apply for a license pursuant to section 3-1 of the Offshore Energy Act, cf. section 2-3 (4) of the Offshore Energy Act.

Ventyr was announced as the winner of the auction on April 17, 2024. One of the conditions of the award is that the developer must submit a notification with a proposal for a project-specific impact assessment program, cf. section 2d of the Offshore Energy Act, within six weeks of the award decision. This notification has been prepared in accordance with this requirement and with a view to initiating the impact assessment as soon as possible.

The report covers the wind power plant including the internal submarine cable network up to and including the offshore converter station. A separate report has been prepared for the grid connection with submarine cable ("export cable"), landfall, power line and other installations on land.

The proposed assessment program is included in chapter 3 of this report and in the appendices. The assessment program must satisfy the requirements in Chapter 5 of the Regulations on impact assessments and the requirements for applications under the Offshore Energy Act. It is based on relevant legislation, including Section 6 of the Offshore Energy Act Regulations, as well as established assessment programs for other wind power plants. Account has also been taken of the guidance for planning and assessment programs in the Norwegian Environment Agency's "Handbook on impact assessment of climate and the environment (M-1941)".

1.2 Presentation of the developer

1.2.1 Ventyr

Ventyr (organization number 932 214 202) is a joint venture between Parkwind and Ingka Investments:

- Parkwind is a leading European developer of offshore wind projects.
- Ingka Investments is the investment arm of Ingka Group, which owns most of IKEA's stores globally. Ingka is a long-term European investor in sustainability.

The corporate cultures and values of Parkwind and Ingka are closely linked. The companies share a common ambition to contribute to a more sustainable world while facilitating positive collaboration with the local communities where we work.

In addition to the two owners, Ventyr also collaborates with NorSea Group as a strategic supplier. Parkwind, Ingka and NorSea share a common vision to leverage offshore wind experience, investment experience and experience in port services, base and logistics solutions, respectively, to provide an integrated solution for Norway's long-term offshore wind ambitions. Ventyr will:

- Develop, finance, build and operate the Southern North Sea II offshore wind farm within agreed deadlines and budget.
- Contribute to reducing Norway's greenhouse gas emissions.
- Create employment and local ripple effects, and contribute to a positive transformation of the energy system and the economy as a whole.
- Continue to share knowledge and experience with other players, suppliers and partners to create innovation.

1.2.2 Parkwind

Parkwind works according to the highest operational standards with a documented track record and good systems for HSE, operations/maintenance, quality and resource management. This results in excellent HSE statistics.

Parkwind has been active as a company since 2010 and has been run with a long-term and sustainable approach. Parkwind is Belgium's leading offshore wind developer with ownership of a net capacity of 535 MW and operation of a gross capacity of 1,028 MW. This corresponds to approximately 34% of all installed offshore wind capacity in Belgium. Over the past decade, Parkwind has grown from a "family business" to a global player in the offshore wind and renewables sector.

This ambition was strengthened when Jera Nex (https://www.jeranex.com/), part of Jera Inc (https://www.jera.co.jp/en/), acquired Parkwind in July 2023. The partnership between Parkwind and Jera represents a strong and ambitious combination of technical expertise and experience, financial strength and long-term strategy**.** This partnership plays a central role in the Jera Group's Smart Transition strategy. By combining renewable energy and zero CO2 emissions for power generation, it facilitates the production of sustainable electricity independent of natural conditions and thus a more sustainable future.

Figure 1-1. Overview of Parkwind's documented history and future ambitions.

Parkwind has helped to reduce production costs over the lifetime of all its projects. Parkwind and Jera Next are not only committed to developing and delivering offshore wind projects - the company is also responsible for operations and will, when the time comes, take care of replacements or decommissioning. The company's development and construction planning, as well as its financial

planning, is based on in-depth analysis of various factors, including technology, laws and regulations, financial markets and specific market conditions in the supply chain. Parkwind's expertise allows them to make the right choices to ensure a successful project outcome and they are proud of their track record of completing our offshore wind projects within predefined budgets and deadlines.

Through this development, Parkwind has contributed and continues to contribute to the industry as a whole and to support further expansion. Parkwind has embraced new designs, methods and technologies in all its projects. Parkwind has approved and brought new players into the supply chain and helped Belgian offshore suppliers to become world leaders in offshore wind construction.

1.2.3 Ingka Investments

Ingka Group is the largest retailer of IKEA globally. The first IKEA company was founded in 1943 in Sweden. As an IKEA franchise, the Group's core business is IKEA retail consisting of 379 IKEA stores, including stores in 31 different markets. Every year, 657 million customers visit IKEA stores and shops.

Ingka Group is also involved in two other business areas:

- Ingka Centres create meeting places where shopping centers are anchored in an IKEA store. So far there are 44 centers across Europe and China.
- Ingka Investments is the Group's investment arm, responsible for investments within the company's core business and in other areas that can create value for customers. Ingka Investments grows the IKEA retail business by partnering with companies that share the Group's values.

IKEA's vision is to create a better everyday life for most people. The vision is not just about furniture and interiors, but also about having a positive impact on people and the environment. The key values are simplicity, cost efficiency, entrepreneurship and unity. These values form the basis for all activities in the Group and are deeply rooted in the way the company works in all three business areas.

Ingka Investments was established in 2018 with an ambition to invest in socially beneficial projects that provide lasting financial returns for investors and create positive impact for customers and the environment. Ingka Investments is rooted in the IKEA brand, which is one of the largest brands in the world looking to make meaningful investments.

Ingka Group shares IKEA's goal of becoming a circular and climate positive business by 2030 without compromising further growth. Ingka Group's business grew by 17.6% from fiscal year 2016 to 2021. In the same period, Ingka Group reduced its climate footprint by 6.5% by reducing emissions from IKEA's retail operations and the wider value chain, and by switching to renewable energy. The Group is also committed to meeting the requirements of the Paris Agreement and limiting warming to 1.5°C.

Although Ingka Investments was established just five years ago to ensure alignment with IKEA's retail and sustainability strategy, it's been more than a decade since the group identified the strategic potential of renewable energy. The Group acquired its first wind farm in 2009 with the aim of "macro hedge" electricity costs across the Group. In 2012, the Group drew up a strategy for 2020 in which the goal was to produce more renewable energy than the Group uses in its entire operations. The Group has invested EUR 2.5 billion in onshore and offshore renewable energy and solar power, which together enable the Group to produce more renewable energy globally than it consumes. Ingka Investments is committed to increasing its renewable energy investments by 2030 by a further EUR 4 billion to support the transition to a renewable energy future.

The Group aims to facilitate the production of 15 TWh of renewable energy each year. This is a major step towards 100% renewable energy throughout the value chain and an estimated 50% reduction in the Group's overall footprint.

Ingka Investments aims to invest in geographies where Ingka Group has business operations (North America, Europe and the Asia-Pacific region), thereby linking the production of the assets it invests in to the company's value chain.

1.3 Legal provisions

1.3.1 Port Energy Act

While the Energy Act applies to energy production, conversion and transmission of electrical energy within the baseline, the Marine Energy Act regulates this outside the baseline.

In accordance with the requirements of the Offshore Energy Act and associated regulations, Ventyr will prepare a license application and impact assessment for the planned development. The application will be submitted to the energy authority.

If a license is granted for a development, a detailed plan for the development and operation of the wind power plant will be prepared. This plan will account for technical, safety and environmental conditions. The plan must be approved by the energy authority before development can begin.

1.3.2 The Law of the Sea Treaty

The Law of the Sea Treaty divides geographical sea areas into different zones. Outside the land territory of the individual states, the internal waters extend to the baseline. From the baseline, the territorial sea extends 12 nautical miles to the economic zone. The economic zone extends 200 nautical miles from the baseline. The continental shelf also extends 200 nautical miles from the baseline. Outside the continental shelf, there is free sea according to international law.

The Ocean Energy Act is based on the above-mentioned zoning in its provisions on the geographical scope.

The Law of the Sea Treaty regulates the rights and obligations of states in the various zones. This regulation applies to the various areas of the sea, in the airspace above the territorial sea, on the seabed and its subsoil.

The coastal state can also establish an economic zone. In this economic zone, the coastal state does not have sovereignty, but has exclusive rights to explore and exploit natural resources in the waters above the seabed, on the seabed and in the subsoil. In addition, the coastal state has exclusive rights with regard to other economic activities aimed at economic exploitation and exploration of the zone. This also includes, among other things, electricity production based on wind. Under the Law of the Sea Treaty, the coastal state also has the exclusive right to permit and regulate the construction, operation and use of facilities and installations for, among other things, electricity production purposes. The coastal state shall pay due regard to the rights and duties of other states. Among other things, due notification shall be given of the construction of facilities. A coastal state has the right under the Law of the Sea Treaty to establish reasonable safety zones around the facilities of up to 500 meters. The coastal state must notify other states of the location of the zones. Such safety zones cannot be established if they may interfere with the use of recognized shipping lanes of significant importance to international shipping. Other states have the right to, among other things, free shipping and overflight within this zone, as well as the right to lay submarine cables and pipelines.

1.3.3 The Espoo Convention

The Espoo Convention, or the Convention on Environmental Impact Assessment, was signed in 1991 and entered into force in September 1997. The general purpose of the Convention is to prevent or reduce adverse transboundary environmental effects of planned activities. The Convention stipulates that states planning measures that may cause significant adverse transboundary environmental effects in other countries must notify the affected countries at an early stage, assess the consequences and discuss what can be done to limit the harmful effects. In Norway, the Norwegian Environment Agency is responsible for following up the Espoo Convention, and will then forward notifications, applications and impact assessments for projects within Southern North Sea II to the authorities in the other North Sea countries.

1.3.4 Other legislation

The establishment of offshore wind power plants with associated infrastructure will also have to be clarified in accordance with other relevant legislation. This will be done in connection with the preparation of the license application. Among these other laws that may apply are:

- Energy Act - application for a license to establish a submarine cable, underground cable, overhead line, converter station on land and other necessary infrastructure within the baseline (see separate notification for grid connection).
- The Cultural Heritage Act - the entire wind power plant is outside the scope of the Cultural Heritage Act, but the developer intends to maintain a close dialogue with the Norwegian Maritime Museum in connection with mapping the seabed and assessing the need for plan adjustments in the event of any discoveries of maritime cultural heritage such as shipwrecks or the like.
- Nature Diversity Act - it is assumed that the Norwegian Energy Agency will assess the project against the Act's application in Norway's economic zone, but that there is no need for further clarifications/applications under the Nature Diversity Act.
- Port and Fairway Act - measures in Norway's economic zone can be established without requiring a permit under the Port and Fairway Act, but rules on marking and establishing safety zones associated with facilities for renewable energy production are given in a separate regulation pursuant to the Port and Fairway Act and the Ocean Energy Act.
- Petroleum Act - the wind power plant is outside existing production licenses under the Petroleum Act, and it is therefore assumed that no further clarifications/applications are required under this Act.
- Pollution Control Act - a separate application under the Pollution Control Act is not normally required for the establishment of wind power plants. The exception is if the measure affects areas (seabed) with contaminated sediments. In such cases, the Norwegian Environment Agency, as the responsible authority, will assess whether it is relevant to process the case under the Pollution Control Act.

1.3.5 Other necessary measures and permits

Connection to the central grid

A development requires that a license is also granted for the establishment of a submarine cable, underground cable, overhead line and converter station on land for connection to Kvinesdal substation, cf. separate notification for the grid connection.

Crossing agreements

If the internal cable network or export cable requires crossing of existing submarine cables, it will be necessary to enter into crossing agreements with the owners of these cables.

Marking of aviation obstacles

In accordance with the regulations on reporting, registration and marking of aviation obstacles, the wind turbines will trigger requirements for reporting to the Norwegian Mapping Authority, and a proposed marking plan must be submitted to the Norwegian Civil Aviation Authority for approval. This will be done in connection with the preparation of the detailed plan.

Approval of detailed plan

A detailed plan for the wind power plant and associated infrastructure must be drawn up and approved by the energy authority before development can begin.

1.3.6 National plans

The planning area is part of the Southern North Sea II area, where the Ministry of Energy has opened up for offshore wind development through a decision dated June 12, 2020.

The planning area is not covered by national protection plans or similar.

1.4 Further proceedings and progress plan

1.4.1 Procedure

The notification (this document) with a proposal for a study programme is sent to NVE, which then submits it for consultation to relevant authorities and interest groups. After the consultation period of at least six weeks, the energy authority determines the study program based on the statements received and the proposal presented in the notification.

The proponent then prepares the license application and impact assessment in line with the established assessment program. This is sent to the energy authority for processing and a new round of public consultation, and meetings are arranged with local authorities and public meetings on the application. The standard consultation period is eight weeks. The energy authorities may request additional studies from the proponent. The energy authorities will make a decision when the measure has been sufficiently clarified. This decision will also undergo a consultation process.

1.4.2 Progress plan for the measure

The report was submitted to NVE in May 2024. At the same time as the report is out for consultation, work on the license application and impact assessment will continue so that these can be submitted to the energy authority in March 2026. This is necessary to ensure commissioning of the wind power plant by the end of 2031.

Some of the environmental studies will continue after the license application has been submitted to ensure sufficient data collection. In these cases, the impact assessment will be based on available knowledge at the time of submission.

Work on the detailed plan will be carried out in parallel with the impact assessment and the licensing process. Approval of both the license application and the detailed plan is required before a final

investment decision is made.

The construction phase is planned to take 3.5 years. The wind power plant can thus be commissioned by December 31, 2031.

Table 1-1. Preliminary progress plan.

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	....	2060
Notification, incl. consultation												
License application and impact assessment												
Licensing process, including consultation												
Detailed plan												
Approval of detailed plan												
Development												
Operation												

1.5 Plan for participation

As discussed in section 1.4 above, three public hearings will be held in the process: of the notification, of the license application and impact assessment, and of the proposed decision. In this connection, meetings will be arranged with the authorities concerned, dialog meetings with those particularly affected and an open public meeting. These will be advertised in the local press and on the websites of the project owner and the energy authority.

Ventyr has initiated a dialog with key authorities in connection with the planning of Southern North Sea II. Meetings have been held with the Ministry of Energy, NVE, the Norwegian Environment Agency, the Norwegian Petroleum Directorate, the Norwegian Maritime Museum and Statnett. Following the award, Ventyr has also held meetings with local authorities in Kvinesdal Municipality, Stavanger Municipality and Rogaland County Municipality. Further meetings are planned with Agder County Council and the State Administrator of Agder.

In connection with the preparation of the report, contact has also been established and information exchanged with relevant research environments, including the MAREANO program and the Institute of Marine Research in connection with planned and already completed mapping and monitoring programs in the Southern North Sea II. The Norwegian Institute for Nature Research (NINA) has been involved in the preparation of the report and the proposed assessment program.

If various players, organizations or other stakeholders want further information about the development plans, or want a meeting with the developer beyond the established meeting schedule, they are encouraged to contact Ventyr (see contact information in the preface to this message).

2 Description of the measure

2.1 Plan area

The project area is located in the eastern part of Southern North Sea II and covers an area of approximately 520 km^2 . This area was delineated by coordinates in the call for tenders for the first phase of Southern North Sea II, which was announced on March 29, 2023. The announced area constitutes approximately 20% of the entire Southern North Sea II area, which covers a total area of 2,591 km^2 .

The Ministry of Energy has determined the project area with the requirement that the installed capacity shall be a minimum of 1,400 MW and a maximum of 1,500 MW. The Ministry has the right to adjust the project area within the area that has been opened if it is necessary to develop the project or for the sake of other affected interests.

The development plans consist of 60 to 100 wind turbines within a planning area that encompasses the entire announced project area of 520 km^2 . Each turbine will have a nominal capacity of 15 MW to 25 MW, bringing the total capacity to between 1,400 MW and 1,500 MW. Of this, 1,400 MW will be delivered to the grid, while the rest will be used to cover grid connection losses or for electrification of the Ekofisk field.[2]

In addition to the area for the wind power plant, there will be a need for ports and base facilities for both installation and operation/maintenance. Ventyr plans to use existing ports already operated by its strategic partner NorSea Group. The ports of Espevik in Tysvær municipality or Jelsa in Suldal municipality can be converted to meet the needs of an installation port, while Risavika port in Tananger, Sola municipality, can be used for operations and maintenance. Any expansions and measures in these ports will be handled separately and are not part of this report.

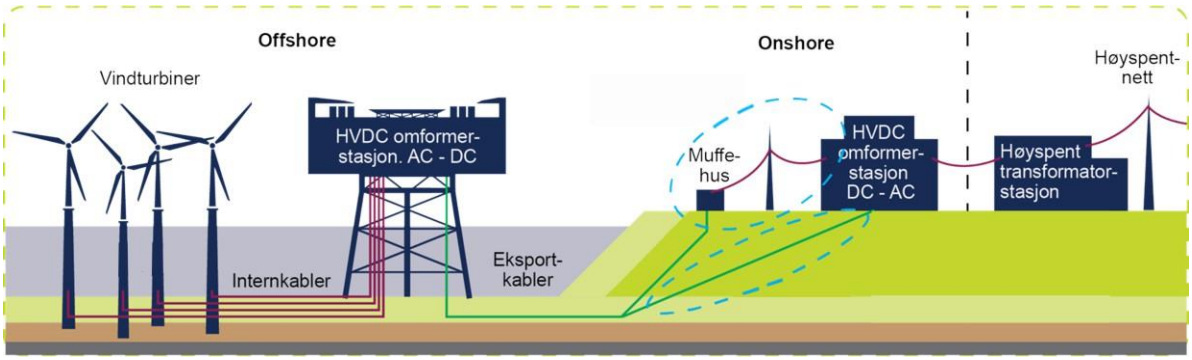


Figure 2-1. Sketch of project concept with offshore wind power plant and power transmission to the existing high-voltage grid from Kvinesdal substation. This notification applies to the left part of the figure up to and including the offshore converter station.

[2] A possible connection to Ekofisk to electrify the petroleum installations is not part of the notified measure, but may be considered as a separate measure at a later date if further investigations show that it is relevant.

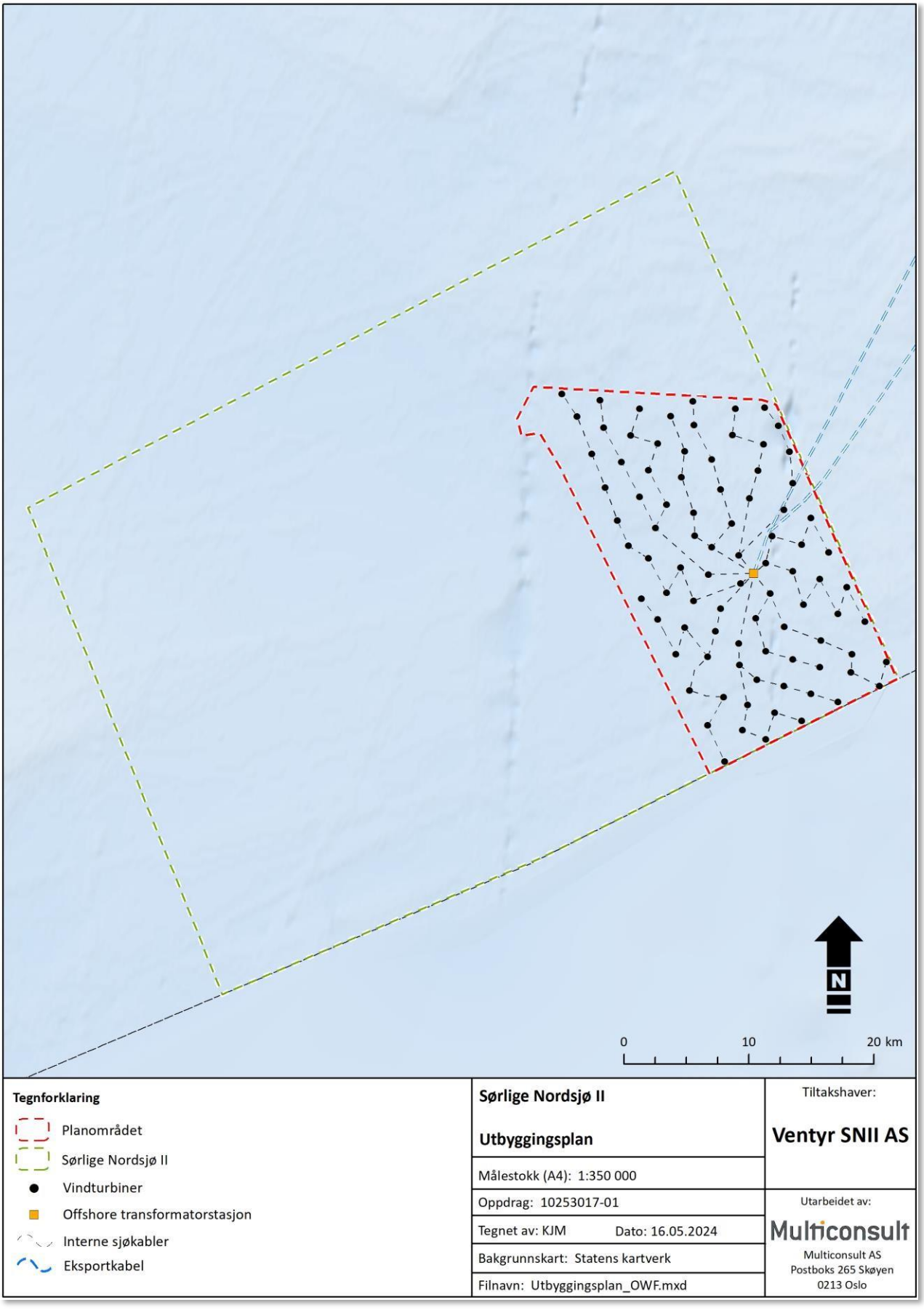


Figure 2-2. The planning area with possible layout for the main alternative with 88 wind turbines of 17 MW each.

2.2 Wind turbines

Wind turbines produce electrical energy by harnessing the kinetic energy of the wind. The main components of a wind turbine are the tower, rotor, main shaft, generator, transformer and necessary auxiliary equipment and control system. Most of these components are built into the machine housing on top of a steel tower.

The rotor, which consists of three blades mounted on a hub, converts wind energy into rotational energy that is fed into a generator. This converts the rotational energy into electrical energy.

The machine housing rotates with the direction of the wind, so the rotor plane is always at right angles to the wind direction. As the wind speed, and thus the energy content of the wind, increases with the height above sea level (wind shear), it is important that the height of the tower is optimized in relation to the wind shear.

Wind turbines normally operate within the range of 3 - 30 m/s depending on the turbine model. Electricity production normally reaches its maximum level at a wind speed of around 12 m/s. At wind speeds between 12 and 30 m/s, production is constant, i.e. equivalent to the rated power or nominal power. At wind speeds above 30 m/s, the wind turbines are usually stopped. This is to avoid excessive mechanical stresses on the turbines.

When the wind passes the rotor, it will be drained of energy and the wind speed will be reduced behind the wind turbine. Other wind turbines installed in this wind shadow will then be affected by the turbines in the previous row. The impact leads to both a reduction in energy content and increased turbulence, and it is therefore important to maintain a good distance between the turbines.

The proposed main alternative for the development of Southern North Sea II is 88 wind turbines with an installed capacity of 17 MW each. This implies an improvement on the 14-15 MW turbines that are planned to be used in many developments in the coming years. Wind turbines with an output of up to 25 MW can also be expected to be developed over the next few years, but the choice of larger turbines will entail a significant technical and commercial risk that may prevent the project from being completed by 2031.

The proposed 17 MW wind turbines will have a rotor diameter of 250 meters and a hub height of 150 meters. This means that the top of the rotor blades will rise a full 275 meters above sea level. The rotor blades' sweep zone will cover an area of approximately 49 acres, which corresponds to about seven football fields. The distance between the turbines will vary between approximately 1.5 km and 3 km.

The preferred turbine size will be further investigated in connection with the license application and will depend on what is available in the market, installation method, suppliers, etc.

Installation

The various turbine components will be manufactured and delivered to a port for pre-assembly. Ventyr's strategic partner NorSea Group plans to upgrade an existing port in Espevik or Jelsa for this purpose.

The wind turbines will likely be installed using a jack-up vessel. Different methods will be considered, including the use of one vessel capable of handling multiple wind turbines in each voyage or two vessels to be able to complete the wind turbine installation during a summer season. Another option is to retain the jack-up vessel in the project area and utilize heavy lift vessels to deliver wind turbine components to the jack-up vessel. Ventyr will assess these options with a view to finding an optimized solution in connection with the license application and detailed plan.

Table 2-1. Preliminary specifications for the wind turbines.

Parameter	Minimum	maximum
Rated power	15 MW	25 MW
Number of	100	60
Hub height	146 m	171 m
Rotor diameter	236 m	300 m
Total height	265 m	325 m
Output voltage	66 kV/132 kV	66 kV/132 kV
Frequency	50 Hz/60 Hz	50 Hz/60 Hz

2.3 Turbine foundations

The foundations for the wind turbines can either consist of monopiles driven into the seabed, jacket structures or gravity-based concrete foundations. The choice of the best solution for Southern North Sea II will be based on price, production time and risk associated with the ocean climatic constraints for transportation and installation.

Installation

The installation of the bottom foundations will take place within the period of assumed good weather conditions from early April to the end of September. This is necessary in order for the installation of the wind turbines to start the following spring.

The fabrication of the turbine foundations will start well in advance of the installation to avoid delays.

Prior to the installation of the turbine foundations, erosion protection will be installed to prevent leaching around the foundations. After the erosion protection is in place, the foundations will be installed by separate installation vessels.

If the turbine foundations are monopiles, these will be driven into the seabed using a hydraulic hammer or vibro-hammer. Based on the outcome of the impact assessment, necessary measures regarding noise will be assessed.

A transition piece (TP) is then mounted on top of the monopile so that the wind turbine can be connected.

The same applies to bottom-fixed truss structures. Piles will be driven into the seabed before the jackets are driven into the piles and the connection grouted with mortar.

The choice of gravity-based foundations in concrete will involve towing by tugboat out to the field and lowering using ballast.

2.4 Internal cable network

The internal cables connect the wind turbines electrically via strings, before they are connected to an offshore converter station. The cables between the wind turbines will be dry insulated XLPE cables with three cores and a voltage of either 66 kV AC or 132 kV AC (high-voltage AC cables). Today, turbine manufacturers use turbines with a rated voltage of 66 kV, but turbines with a rated voltage of 132 kV are under development. Several cable manufacturers have confirmed that they will be able to deliver 132 kV cables by 2026. The main alternative is 132 kV cables.

The preliminary development solution for the internal cables involves a total cable length of 256 km, divided into eight strings with eleven turbines each. The size of the cable cross-section will be cost-optimized based on power flow calculations. The cross-section is expected to vary from 185 mm² up to 1,200 mm².

Installation

The production of cables will start after the final investment decision. If the turbine foundations will be monopiles, the inner cables can be laid while the installation of the transition pieces (TP) is still ongoing. This first campaign will include the installation of internal cables with the smaller conductor cross-sections.

Installation of the remaining internal cables, including the connection between the offshore substation and the first turbines in each string, will start once the substation has been installed and commissioned.

After completing the installation of the wind turbine, the internal cables will be terminated and tested. When the cables of a complete wind turbine string have been terminated and tested, the string can be put into operation.

The internal cables will be buried and/or covered. Possible solutions can be, but are not limited to:

- Flushing
- Plowing
- Cutting

Covering with stone/gravel/concrete mattresses will be considered in areas with hard bottoms where the cables cannot be buried. The choice of method will be assessed in connection with the impact assessment and will depend on what is technically and economically feasible. However, it is expected that most of the cables can be buried in the sediments.

2.5 Offshore converter station

The offshore converter station will be a high-voltage rectifier facility (HVDC), where the internal cable network is connected before the voltage is transformed up and rectified in the converter station. The primary function of the converter is to feed power from the wind turbine into the HVDC cable that transports it to the connection point in the power grid on land.

The HVDC converter station will be a voltage source converter (VSC) that converts alternating current from the wind farm to 320 kV direct current. The chosen topology is a symmetrical monopole.

The foundation of the converter station will consist of a bottom-fixed truss structure ("jacket") with four legs. The foundation will be fixed to the seabed using micropiles.

Installation

The platform deck is designed for installation with a heavy lift vessel. Both the deck and the foundation will be installed within the same installation campaign, and with the same vessel.

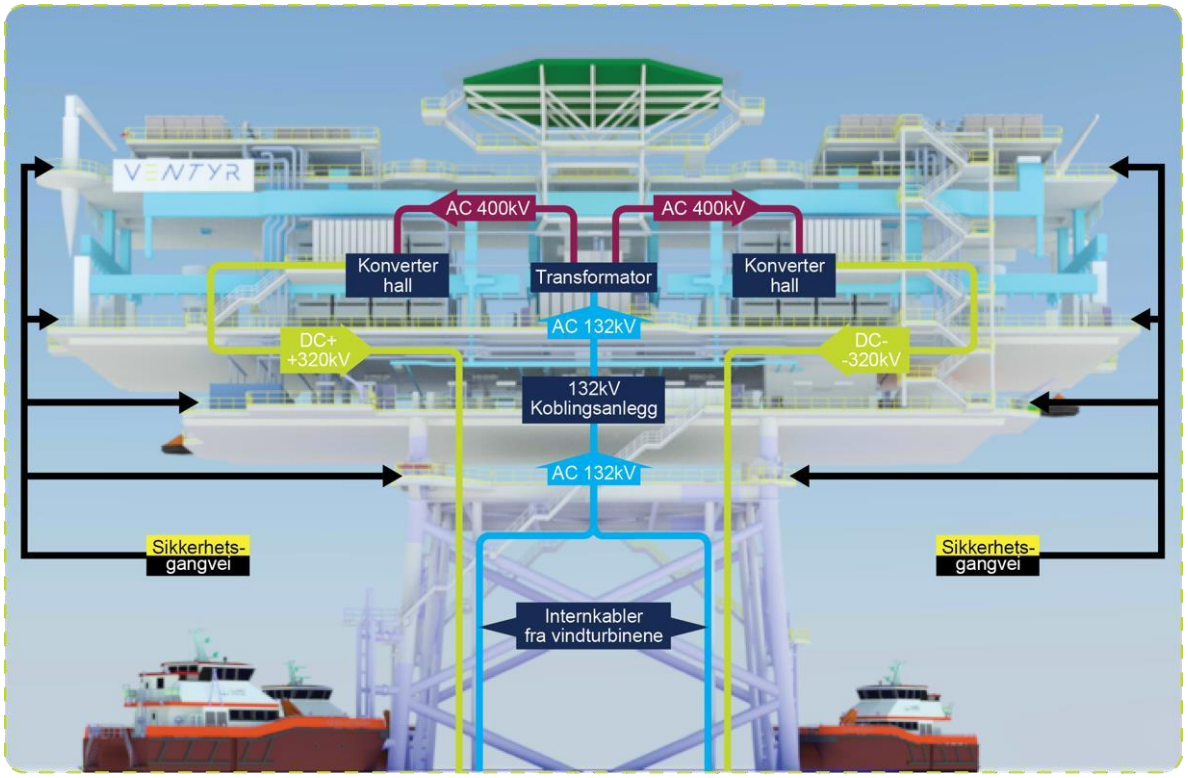


Figure 2-3. Concept design for offshore converter station.

2.6 Wind resources and production

Assessment of available wind data indicates an average wind speed of 10.7 m/s at 150 meters above mean sea level. High mean winds combined with little turbulence over the open sea provide very good conditions for the production of wind power. The wind blows primarily from the northwest and southwest.

Preliminary calculations show that the wind power plant will be able to provide a net annual energy production of approximately 7-8 TWh. Normal annual production in Norway is around 155 TWh, which means that the offshore wind farm on the Southern North Sea II alone could produce around 5% of total power production in Norway.

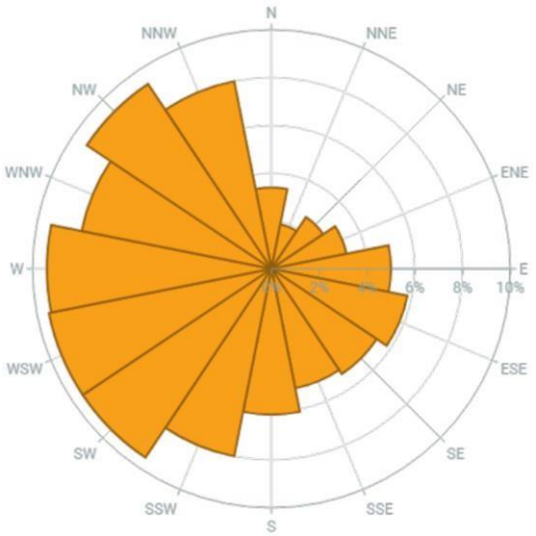


Figure 2-4. Wind rose for the planning area. Source: NEWA (New European Wind Atlas).

2.7 Operation and maintenance

Separate operation and maintenance plans will be drawn up for each component of the wind farm, with specialists managing service contracts and equipment manufacturers. All components will be monitored through supervisory control and data acquisition (SCADA) systems.

Daily offshore operations will be coordinated from a Service Operation Vessel (SOV), equipped with vessels for crew deployment and a motion-compensated walkway for transferring personnel from the SOV to the wind turbine (so-called "walk-to-work" system). If weather conditions prevent the transfer of personnel, helicopter services can be arranged from Sola Heliport.

Preliminary plans for operation and maintenance contracts consist of the following main components:

Wind turbines: A service and availability agreement will be entered into with the supplier of the wind turbine components. This contract will include maintenance, offshore logistics and major component repairs with associated production-based availability guarantees for at least five years after commissioning.

Foundations: Foundation vibrations in the wind farm will be monitored to determine the consumed life of the foundation. Inspections will be carried out to ensure that all components and systems are functioning according to specifications. Minor repair tasks, such as coating and painting jobs, will be given to local service providers.

Submarine cables: The internal cables and HVDC export cables will be continuously monitored. A separate contingency plan will be prepared in cooperation with the cable manufacturer and the owners of the cable laying vessels. Spare drums of submarine cables will be stored at the port for operation and maintenance should they need repair.

Offshore converter station: The unmanned converter station will be managed under a long-term service agreement with the supplier of the HVDC components. In addition, a separate service level agreement will be entered into for the maintenance of all auxiliary systems in the substation.

2.8 Ports for installation, operation and maintenance

The plan is to use the existing port of Espevik in Tysvær municipality or Jelsa in Suldal municipality as an installation port. These ports are already operated by Ventyr's strategic partner NorSea Group, which plans to make strategic investments in one of these ports to adapt the facilities to meet the needs of large-scale offshore wind development.

The port for operations and maintenance is planned for Risavika harbor owned by NorSea Group. This port is located in Tananger, Sola municipality, and meets the requirements to be able to receive service vessels in all weathers and is also suitable for crew changes and loading and unloading of materials. There is also space to set up administration offices and storage space for spare parts. As the port of Risavika has been used by the oil and gas industry for decades, most of the necessary infrastructure and resources are already in place.

2.9 Land use

The planning area covers an area of 520 km^2 . If bottom-fixed monopile foundations are used for all 88 wind turbines, combined with jacket foundations for the converter station, the total area affected will be approximately 11 acres of seabed. This corresponds to 0.002% of the entire planning area.

The establishment of the safety zone and the determination of traffic restrictions will be assessed in connection with the impact assessment and the license application. The outcome of these assessments will determine the total area that will be seized, including the seabed area that will be restricted by the internal cable network.Possible effects and proposed assessment program

3. Possible effects and proposed assessment program

3.1 Introduction

This chapter provides a brief description of the planning area and a preliminary assessment of the wind power plant's expected impact on the environment, natural resources and society. The description and assessment are based on existing knowledge about the development plans and the environmental values in the area of influence, including the conclusions of the strategic impact assessment for offshore wind power [1]. This will be dealt with thoroughly in the next phase of the project (license application and impact assessment).

The topics discussed in sections. 3.2 to 3.12 are taken from section 6 of the regulations to the Offshore Energy Act (the Offshore Energy Act Regulations). The topic "Birds, fish, habitats and other biodiversity" in the Offshore Energy Act Regulations is dealt with here collectively under the study topic "Biodiversity". In addition, we have included two topics that are not listed in the Marine Energy Act Regulations: "Aviation" and "Business and employment". These are topics that we believe are relevant to this type of project and should therefore be investigated. The topic "Sami nature and cultural basis" is not mentioned as this is not relevant to Southern North Sea II.

The proposed assessment program is described for each topic in this chapter. In addition, a comprehensive proposal for a study program has been prepared (see appendix), which also describes general requirements, process and method as well as other study requirements that are not covered by the topics in this chapter.

3.2 Bottom conditions and aquatic environment

3.2.1 Description of the current situation and state of knowledge

Bottom conditions

The announced project area for the wind power plant is located in the eastern part of Southern North Sea II and covers an area of approximately 520 km^2 . The water depth varies from 50 meters to 70 meters. The seabed is mostly flat with a steady downward slope from east to west. The seabed conditions in this part of Southern North Sea II are reported to be muddy sand, possibly mixed with medium and large rocks in the northeast of the area. Below the sediment layer, the seabed consists of stiff clay with pockets and belts of fine sand, heavily influenced by glacial processes The bedrock layer lies more than 100 meters below the seabed.

Geophysical surveys have been carried out to map the seabed in the planning area ahead of the area allocation for Southern North Sea II. In addition, geological, biological and chemical data is being collected from the seabed under the auspices of the national MAREANO program. The next step in the mapping of seabed conditions is geotechnical surveys that will be carried out in connection with the preparation of technical plans and impact assessments.

Bottom conditions are particularly important for the choice of technical solutions for the plant, but are also relevant in terms of pollution and biodiversity. It is proposed that seabed surveys be included in a theme called

"Seabed conditions and pollution" in the impact assessment. Biodiversity related to the seabed environment, including marine habitats and bottom-dwelling species, is dealt with under the topic "Biodiversity".

Water environment

The aquatic environment is defined here as a chemical and physical description of the aquatic environment. Water pollution is already included as a separate topic in this report (see "Pollution to sea, air, ground and noise"). In order to avoid dealing with the same issues under several topics in the impact assessment, we have chosen to merge these into the topic "Seabed conditions and pollution" in the proposed assessment program.

3.2.2 Possible effects

The effects on seabed conditions and the aquatic environment mainly include pollution risk. This corresponds to the topic "Pollution of the sea, air, ground and noise" in section 6 of the Norwegian Marine Energy Act. Below is a preliminary and general description of the relevant teams and impacts.

Noise level

The measure will result in acoustic noise in both the construction phase and the operational phase. During the construction phase, there will be noise from vessels and from installation activities. During the operational phase, there will be noise from the wind turbines and offshore converter station. The measure will be established far out to sea, and acoustic noise is not expected to be a nuisance to people, either in the construction or operational phase. However, it could affect marine species, and calculations and assessments focusing on this will therefore be carried out in connection with the impact assessment.

Emissions to air

Greenhouse gas emissions are a separate topic (see section 3.12). In principle, wind power does not result in other emissions to air, and no further investigations are therefore proposed here.

Discharge to sea

Both wind turbines and substations have oil-filled components. In the event of an accident, this can leak into the sea. However, separate tanks will be installed to collect oil in the event of leaks. There is also a risk of microplastics being released from the wind turbines as a result of wear and tear or accidents.

Sediments and bottom conditions

The installation of the fixed turbine foundations will cause major disturbance to the seabed, including the stirring up of sediments. Submarine cables will probably be laid by flushing them about 1 meter into the seabed, which will also lead to local upwelling of sediments. How far the particles are dispersed depends on, among other things, flow conditions and topography at the site.

Alternatively, if the sediment layer is thin, the cables can be laid on the seabed and covered with rocks. If the topography on the seabed is very uneven, it may be necessary to level the route. This is only relevant if there is little sediment and it is not possible to establish a cable trench. In that case, there will be little sediment that can be stirred up.

In the Southern North Sea, this is considered to have insignificant consequences. There are no contaminated sea sediments that far out to sea, and it is unlikely that mitigation measures will be necessary when laying the cable.

Waste management

The production, installation and operation of the wind power plant all lead to the production of

waste. In the event of irresponsible treatment, accidents, poor routines, etc. this can end up in nature (the sea). However, strict requirements will be imposed on contractors with regard to routines for waste management, so there is nothing to indicate that this will be a significant issue in the development of a wind power plant on the Southern North Sea II. The developer aims to establish a comprehensive reporting system for waste volumes and waste management for both the construction and operational phases.

Electromagnetic fields

Electromagnetic fields (EMF) arise from both natural and man-made sources, including from electrical installations and telecommunication cables. The wind turbines, the converter station and the internal cable network will all contribute to the generation of EMF. It is known that EMF can affect marine organisms, but the extent is currently uncertain [2]. However, it is known that some species such as sharks and skates can be sensitive to EMF, and that the animals' ability to navigate, search for food and possibly communicate can be affected. In connection with the impact assessment, calculations of EMF and assessments in relation to the detection level of sensitive marine species will be made.

3.2.3 Proposal for investigation program

It is proposed that the topics "Bottom conditions and aquatic environment" and "Pollution to sea, air, ground and noise" in Section 6 of the Marine Energy Act Regulations are discussed together under the study topic "Bottom conditions and pollution".

The impact of the wind power plant on the physical seabed conditions and marine processes (flow conditions, erosion and sedimentation) will be investigated, including modeling of sediment dispersion.

Modeling of underwater noise will be carried out with a view to assessing the impact on the general soundscape in the marine area. The effects of underwater noise on marine life will be included under the topic "Biodiversity". Similarly, electromagnetic fields (EMF) will be calculated and used in the studies related to the topic "Biodiversity".

Possible sources of water pollution from the facilities must be described for both the construction and operational phases, and the risk of pollution and the spread of environmentally harmful substances must be assessed. A description must be provided of the expected use of chemicals and other substances that have a particular risk of causing environmental damage in the event of a discharge. For facilities that have oil-filled components, the amount of oil must be specified.

A general description of expected emissions from wear and tear of the wind turbine blades shall be provided, and an assessment made of the possible effects of this.

Procedure:

The assessments must be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below. The geophysical mapping and seabed surveys under the auspices of the national MAREANO program must be included in the assessment basis.

The assessment of underwater noise shall be carried out in accordance with international standards, including ISO 18405:2017 and NOAA Technical Memorandum NMFS-OPR-59 (2018), adapted to Norwegian conditions. Underwater noise in both the construction and operational phases shall be calculated based on validated sound propagation models that allow aggregated source handling of wind turbines and other dominant noise sources.

Sediment dispersion modeling shall be carried out with a high-resolution dispersion model that shall include particles with a variable size distribution and with different physical properties based on assumptions about the amount of waste, residue, discharge and pollution.

3.3 Cultural heritage, cultural environment and landscape

3.3.1 Description of the current situation and state of knowledge

Cultural heritage and cultural environment

The strategic impact assessment of offshore wind power concluded that there is little potential for the discovery of marine cultural heritage sites within the Southern North Sea II planning area, but that the data base is very diverse [1].

This part of the North Sea was originally dry land before it was flooded 10,000 to 14,000 years ago [3]. However, there is a great deal of uncertainty about whether the area was ever settled [4], and artifacts that were previously interpreted as indicative of settlement and activity have subsequently been written off as "proof" of this [3].

Boat and ship traffic across the North Sea has been extensive since prehistoric times, mainly due to trade, fishing and events related to war and piracy. A number of anchors and other objects have been found while fishing in the North Sea, and several shipwrecks, ship parts, anchors and cargo were also reported in connection with clean-up operations under the auspices of the Norwegian Petroleum Directorate (Sokkeldirektoratet) in the 1980s and 1990s [3].

Until recently, no shipwrecks had been found within the Southern North Sea II planning area. However, in connection with the MAREANO surveys in 2024, an unknown vessel was found in the sediments on the seabed. This vessel is possibly the Swedish steamship "Douglas SS", which was torpedoed by a German submarine during World War I [5].

Landscape

Offshore wind turbines can be visible at a distance of up to 30-40 kilometers from land, but from 16-18 kilometers the curvature of the earth will affect visibility [6]. The larger wind turbines planned in this development are likely to be visible at even greater distances under favorable visibility conditions. However, Southern North Sea II is located a full 180 km from the Norwegian coast and 190 km from the Danish coast, and it is therefore not considered necessary to investigate or illustrate the facility's visual impact on land areas. Therefore, no further investigations of the landscape topic are proposed.

3.3.2 Possible effects

Through its impact on the seabed, a bottom-fixed offshore wind turbine may affect marine cultural heritage sites, such as shipwrecks with associated cargo and artifacts. If important marine cultural heritage sites are identified within the planning area, the location of the turbine foundations and submarine cables will be adjusted to avoid possible destruction and disturbance.

3.3.3 Proposal for investigation program

A marine archaeological survey of the seabed must be carried out to assess whether the measure will come into contact with shipwrecks or other marine cultural heritage sites.

It must be explained how any negative effects on cultural heritage can be avoided through planning adjustments and other mitigation measures.

Procedure:

Existing knowledge will be compiled, including information from the geophysical mapping of the seabed. The Norwegian Maritime Museum will be contacted as early as possible so that they can provide input to the investigation.

Acoustic data collected from the seabed survey will be interpreted by a qualified marine archaeologist. If necessary, remotely operated underwater vehicles (ROV) shall be used for further mapping of any shipwrecks or other marine cultural heritage sites that may be affected by the development.

The assessment must be carried out in accordance with the Norwegian Environment Agency's Guide M-1941 for impact assessment of cultural environments.

3.4 Natural diversity

3.4.1 Seabirds and migratory birds

Description of the current situation and state of knowledge

Seabirds are birds that are wholly or partly dependent on the sea for food. The most typical species only come ashore to breed, and are often found in large colonies that house several species of seabirds, while others are only dependent on the sea for shorter periods of their life cycle, such as during molting or during the winter months. Seabirds are currently one of the world's most endangered groups of birds, and the number of seabirds worldwide has decreased by almost 70% between 1950 and 2010 [7] [8].

A quarter of all European seabirds breed on Norwegian land [9] and even more use Norwegian waters both during and outside the breeding season. Norway therefore has a special responsibility for the management of seabirds. At the same time, 63% of Norwegian seabird species are on the Red List [10]. In addition, the Norwegian coast and other Norwegian land areas are an important part of the East Atlantic migratory route that annually connects northern breeding areas and southern wintering areas for millions of migratory birds [11] [12].

Southern North Sea II is located far from the coast and the nearest seabird breeding colonies. According to the strategic impact assessment for offshore wind power, the planning area is outside the action radius for birds breeding in the southern parts of the North Sea and Skagerrak, and large gatherings of seabirds cannot therefore be expected in the area during the breeding season [1]. However, the data base for this part of the North Sea is very inadequate, and there is therefore a need for further research.

Summer

The knowledge presented in the strategic impact assessment showed that there are few pelagic diving seabirds in the planning area during the summer. Species such as razorbills, puffins and razorbills may occur, but these are probably non-breeding birds [13]. In addition, pelagic, surface-feeding seabirds such as gannet, kittiwake and fulmar can be expected to occur in summer, but only in low or medium densities. Of the species included in coastal surface-feeding birds, herring gulls and gulls occur in medium densities in the eastern parts of Southern North Sea II during the breeding season [13]. However, these species are more common outside the breeding season.

Autumn and winter

The density of pelagic diving seabirds is higher outside the breeding season, and the area has the potential for the occurrence of guillemots, which are critically endangered in Norway [13]. Southern North Sea II is close to the easternmost core area for guillemots in winter. Relatively high densities of razorbills have been observed in winter in the areas to the east and south of Southern North Sea

II, while little auks occur in medium densities [13].

The group that occurs in the highest density outside the breeding season is pelagic, surface-feeding seabirds. Fulmar occur at the highest densities, followed by gannets, while kittiwakes are less common in the fall and winter [13]. Among the coastal, surface-feeding seabirds, there are high densities of herring gulls, black-backed gulls and herring gulls, especially in the fall. The largest occurrences of these species are probably found outside the planning area and closer to the Norwegian coast [13].

The data base for seabirds in this part of the North Sea is expected to improve over the next few years through increased funding for the seabird program SEAPOP and Seatrack. Studies will be carried out to map seabirds' use of the area at different times of the year and the breeding populations of birds along the mainland coast of southern Norway will be mapped more closely. This work will be carried out under the auspices of the Norwegian Institute for Nature Research (NINA).

Alke. Source: Charles J. Sharpe / CC-BY-SA-4.0.

Seahorse. Source: Mike Pennington / CC-BY-SA-2.0.

Gannet. Source: Andreas Trepte / CC-BY-SA-2.5.

Lunde. Source: Charles J. Sharpe / CC-BY-SA-4.0.

Figure 3-1. Examples of seabirds that can be encountered within the

planning area. Migratory birds

In addition to seabirds, several species groups of birds migrate across the Skagerrak and North Sea. The majority of bird species that breed in the north migrate south in the fall to warmer areas and back to breed in the spring. The migration includes waterfowl and waders, birds of prey and passerines, but there is little documentation on exactly where the migration takes place and how much variation there is in where they migrate across the oceans. For some species groups, there are studies based on position loggers (GPS, satellite and light loggers). In addition, there are a good number of ringing findings in connection with migration that can indicate possible migration routes. Some species migrate between Fennoscandia and the Continent, and there is also migratory activity between the Continent and the British Isles, as well as between Iceland and Scandinavia. Sparrows and raptors with a western migration route include populations from large areas in Fennoscandia, Russia and the Arctic islands, waders and waterfowl such as geese and ducks come from even larger

areas eastwards in Siberia and westwards to northern Canada. The migratory populations are difficult to get an overview of, but there are many different populations of several species groups from large geographical areas that migrate across the North Sea and Skagerrak during both spring and fall migration. In terms of timing, there is great variation, with the earliest species migrating north in February-March and the last in May-June, but with the largest numbers in April-May. Autumn migration starts as early as June for some wader species, and pink-footed geese migrate south in late October.

Possible effects

Offshore wind development may affect birds in several ways. The most important impacts are (1) collisions between birds and turbines or other structures, (2) disturbances leading to avoidance of areas,
(3) barrier effects that require the birds to fly around or over the wind turbine, and (4) direct loss of habitat (foraging areas).

Few birds survive collisions with wind turbines, whether they are struck by the rotor blades, collide with the towers or other installations adjacent to the turbines. Collisions can significantly increase mortality in a population and thus contribute to population declines [14].

Most of the international knowledge on offshore wind impacts on birds originates from risk modeling of movements and flight heights, as well as data on the presence of birds in offshore areas during surveys. Flight height is particularly important for determining the risk of different species colliding with wind turbines [15] [16].

Radar studies of collision risk for birds at Egmond an Zee in the Netherlands [17] and Thanet in the UK [18], for example, have demonstrated greater avoidance effects, and thus lower collision risk, than previously assumed for seabirds.

However, the most important factor for assessing the impacts of an offshore wind farm is the natural density of birds in the development area. The strategic impact assessment for offshore wind concluded that the Southern North Sea II is one of the least conflictual areas for a large-scale offshore wind development due to relatively low densities of seabirds and presumed low impacts on bird migration [1]. However, the uncertainty about swimming migration, possible variations from year to year, and what the consequences of a possible barrier effect may be, make it difficult to assess this without further investigation [13].

The effects on seabirds and migratory birds of a development of Southern North Sea II will be investigated and described in more detail in the license application and the impact assessment. These investigations will be based on our own surveys and modeling of collision risk and barrier effects, as well as new information from the national seabird programs in the countries around the North Sea.

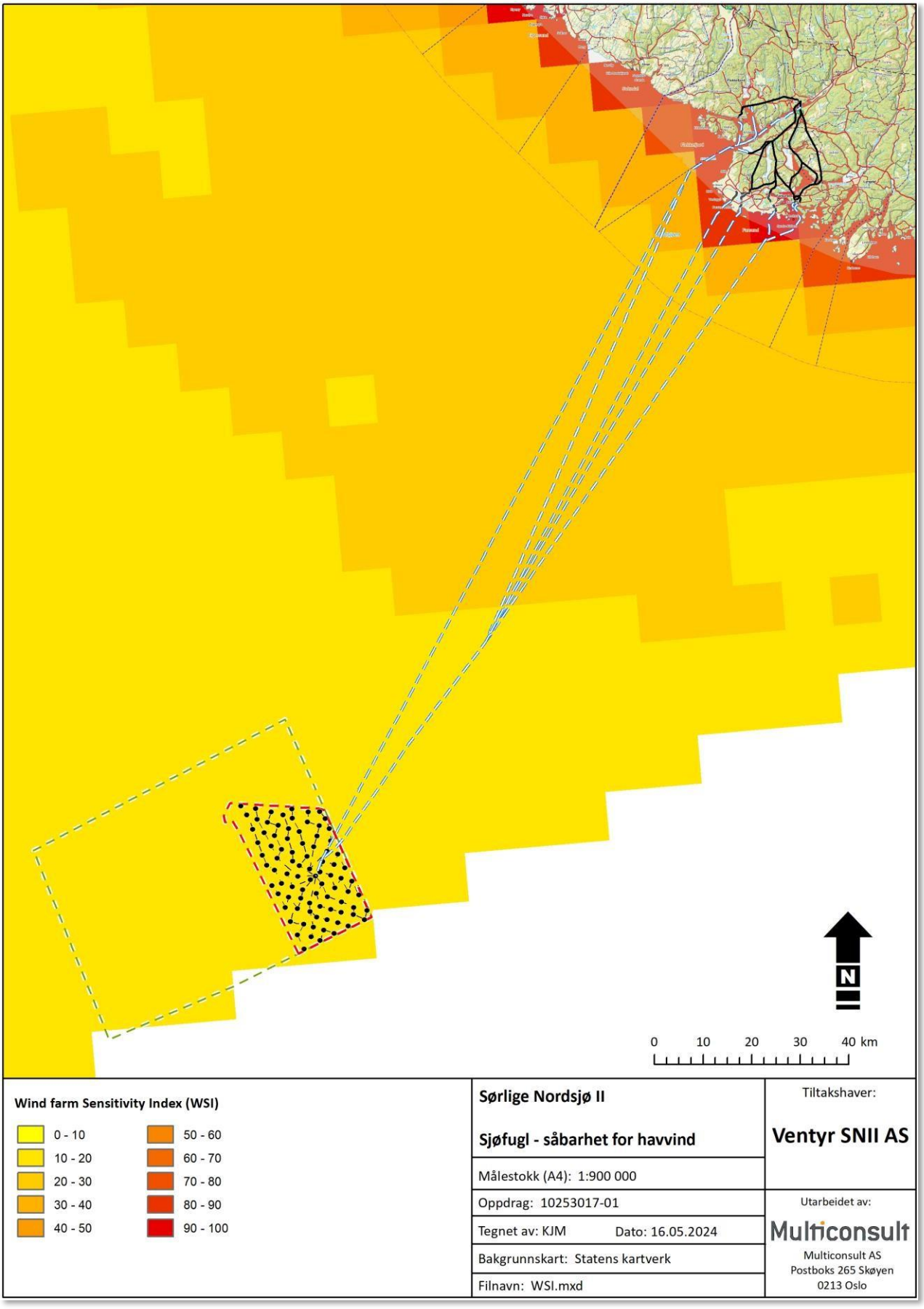


Figure 3-2. Vulnerability of seabirds to offshore wind with the planning area plotted. Source: NINA.

Proposal for investigation program

An overview of seabirds and migratory birds that may be significantly affected by the wind power plant must be prepared, with a particular focus on species of high and particularly high management interest[3] and responsibility species.

An assessment must be made of how the wind power plant may affect seabirds and migratory birds through disturbances, collisions, barrier effects, reduced/degraded ecological functional area, etc.

It must be explained how any negative impacts on seabirds and migratory birds can be avoided through planning adjustments and mitigation measures.

Procedure:

The assessments shall be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below.

Ongoing bird surveys conducted by the Norwegian Institute for Nature Research (NINA), as well as their partners in the other countries around the North Atlantic and the Barents Sea, will be included in the assessment basis. These surveys include GPS and GLS tagging of a number of seabird species in selected colonies. The ongoing surveys will be supplemented with further GPS tagging.
of seabirds from breeding colonies around the southern North Sea, to capture seabirds that can be expected to forage within Southern North Sea II.

Furthermore, registrations of seabirds and migratory birds will be carried out using AI cameras deployed on the planned MetOcean buoy, which will be out for 12 months, or using other similar equipment.

The project's timetable indicates that there is probably not enough time to incorporate more than one year of GPS data from new colonies, in addition to existing data from other colonies, into the impact assessment. However, monitoring will continue beyond one year so that additional data can be incorporated and reported in connection with the approval of the license application and detailed plan.

The need for, and benefit of, supplementary field registrations of birds from ships used for geophysical or geotechnical surveys, bottom surveys or similar will be continuously assessed.

Modeling of collision risk and barrier effects for the species that may be significantly affected by the wind power plant will be carried out.

[3] Includes red-listed species, priority species, protected species, special ecological forms and other species requiring special consideration.

3.4.2 Bat

Description of the current situation and state of knowledge

There are no peer-reviewed scientific publications on bat migration in Norway, but both the long-tailed bat and the common bat are known to be able to fly long distances and have been found well away from the mainland [19]. Trollflag bat is common in Norway in the fall, but it is uncertain where this species reproduces and hibernates. The most likely areas are the UK and continental Europe.

Other species that can occur far beyond their known summer habitats are the northern bat, the hoary bat, the dwarf bat, the brown long-eared bat and, to some extent, the forest bat and other species in the Myotis genus. However, most of these species do not migrate beyond the country's borders or further than the islands along the coast [10].

At least some bats can be expected to migrate across the North Sea. This is particularly the case for the long-tailed bat, which has been recorded quite frequently along the coast in the fall. However, whether this species or other bats use migratory routes in the vicinity of Southern North Sea II is very uncertain.

A Dutch research project aimed at understanding the risks of offshore wind power on migrating bats suggests that an estimated 40,000 wandering bats cross the southern North Sea [20]. However, this estimate is highly uncertain. The Norwegian "source population" that can migrate is estimated at a few thousand individuals.

Possible effects

The European bat agreement EUROBATS recommends that bats are taken into account in the planning of onshore and offshore wind farms. Potential impacts if bat migration is detected at Southern North Sea II will be collisions between bats and turbines and barrier effects that require bats to fly around the facility.

However, it is very uncertain how bat behavior, including flight height, will be affected in the presence of offshore wind turbines. There is also little information on the flight height of most species, but the long-tailed bat has previously been recorded with an average flight height of around 11 meters [21].

The effects on bats of a Southern North Sea II development will be investigated and described

in the license application and the impact assessment.

Proposal for investigation program

An overview of bats that may be significantly affected by the wind power plant will be prepared, with a particular focus on species of high and particularly high management interest.

An assessment will be made of how the wind farm may affect bats through barotrauma, collisions and barrier effects.

It must be explained how any negative effects on bats can be avoided through planning adjustments and mitigation measures.

Procedure:

The assessments shall be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below.

Registrations of bats at sea will be carried out using a bat detector on the MetOcean buoy, which will

be out for 12 months. The registration should primarily cover the fall migration (September and October), but preferably also the spring migration (May).

3.4.3 Marine mammals, fish and benthic animals

Description of the current situation and state of knowledge

Southern North Sea II is part of the distribution area of several species of marine mammals, including sharks, harbor seals, harbor porpoises, porpoises, white-beaked dolphins and minke whales. Sperm whales, killer whales and fin whales may also occur in this part of the North Sea. Most of these species move over large areas of ocean, and it is probably only harbor porpoises, porpoises and white beaked whales that are here all year round. Harbor seals tagged in the nearest colonies on the Danish coast have been shown to migrate far north, but not all the way to Southern North Sea II [22]. The Ekofisk tank, located approximately 50 kilometers west of the Southern North Sea II planning area, has for many years been used by a small colony of sharks.

The relatively shallow areas of the Southern North Sea II are also part of the range of several species of fish, including spawning areas for sandeel and mackerel [23]. Other species that occur in these waters include common and highly mobile fish species such as herring, cod, whiting, sprat and horse mackerel, while the groundfish fauna includes haddock, plaice, sole, gurnard and sculpins. The spawning area for mackerel extends over large areas of the North Sea and Skagerrak, of which Southern North Sea II is only a small part.

The planning area for the wind power plant has been adapted so that it does not affect the known spawning areas for sandeel that are included in the particularly valuable and vulnerable area (SVO) "Tobisfelt sør". However, this living and spawning area for sandeel borders the planning area to the north and east. Sandeel is a key species in the ecosystem of the North Sea and is highly sedentary because the species has strict requirements for the seabed (coarse sand) into which it burrows. The vulnerability is greatest during the spawning period December-January and the larval period February-April.

So far, no mapping of marine habitats has been carried out on Southern North Sea II. However, benthic surveys have recently been carried out under the auspices of the MAREANO program, and it is expected that the results of this cruise will be reported during 2024/2025. The bottom conditions with mainly sand and silt indicate that there may be occurrences of vulnerable habitats such as sea feather communities and bamboo coral forests, while there are probably no vulnerable habitats built of coral and sponges that are common on hard bottoms. The benthic fauna is expected to consist mainly of soft-bottom species that live in and on the sediments.

It should be mentioned that the Institute of Marine Research is planning to deploy three observation platforms on Southwest F, i.e. in and around Southern North Sea II. These will be equipped with hydrophones and echo sounders to map underwater acoustics and marine wildlife. However, it is uncertain whether data from these surveys will be available in time to be used in the impact assessment.

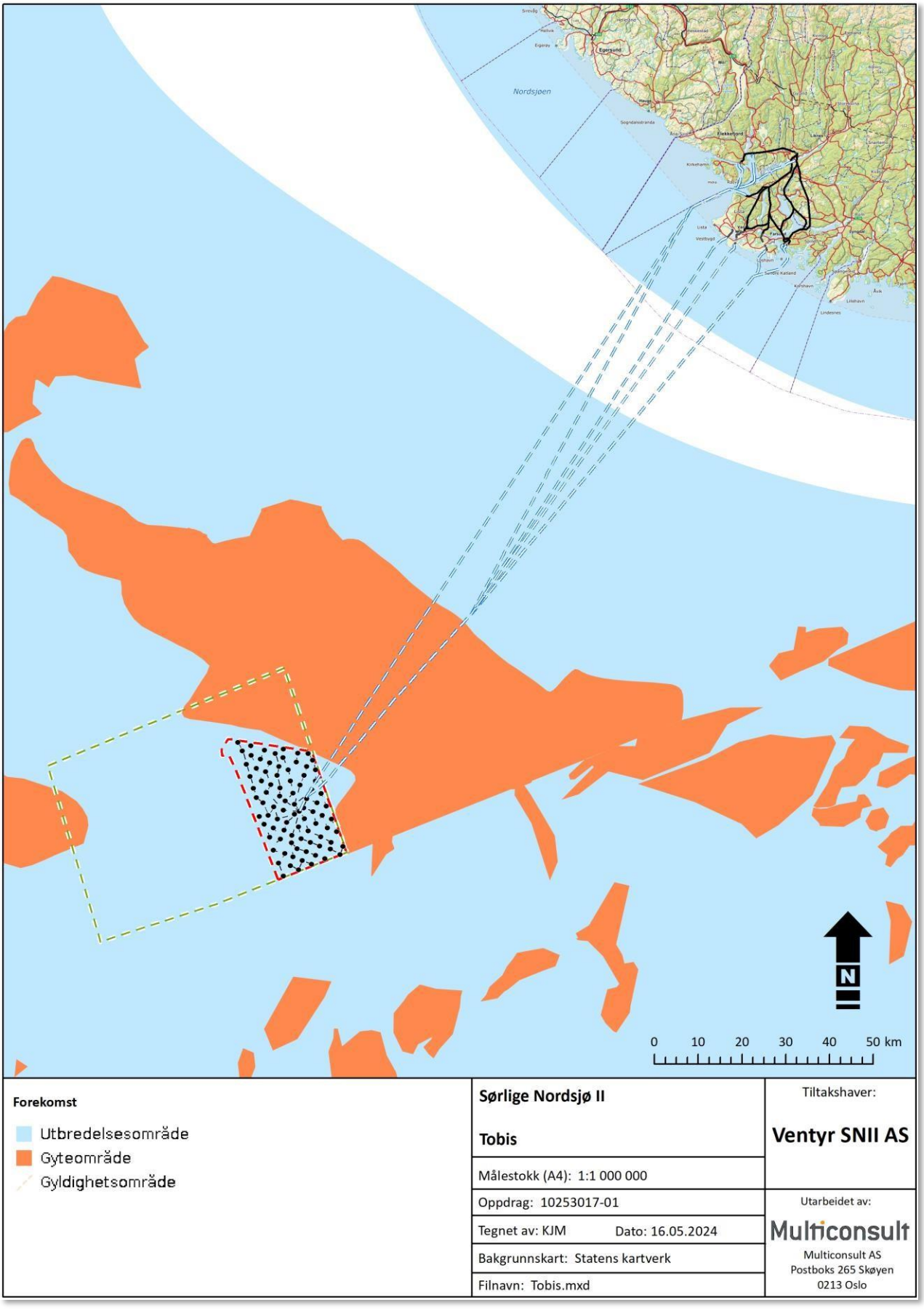


Figure 3-3. Sandeel field south with spawning area for sandeels. Source: Institute of Marine Research.

Possible effects

An offshore wind farm will affect marine biodiversity through both loss of habitat and addition of habitat (the turbine foundations can form artificial reefs that are favorable for several species of fish and benthic animals). In addition, underwater noise, electromagnetic fields around the submarine cables, sediment dispersion and the introduction of environmentally hazardous substances (accidental spills) could affect species' use of the area as a grazing, spawning and/or nursery area. The extent to which large offshore wind farms could affect migration patterns is currently unknown.

Structures placed on the seabed will directly occupy areas, and during the construction phase, the disturbance of the seabed will extend well beyond the physical area occupied by the seabed being stirred up and sediments dispersed in the water masses before settling again on the seabed. Some organisms may be vulnerable to increased sedimentation, and such disturbances may therefore result in a change in species composition on the seabed. During the operational phase, fouling organisms may, for various reasons, detach from the turbine foundations, sediment out of the water column and cover vulnerable habitats. An increased supply of such organic material could affect benthic animals that live in/on the sediments.

Considering that the wind power plant will be located outside "Tobisfelt South", the consequences for sandeel are considered small or insignificant. However, this must be investigated further in connection with the impact assessment. This also applies to marine mammals, which can be negatively affected by noise and disturbance, especially during the construction phase. The effects on marine mammals, fish, shellfish and marine habitats will be investigated and described in more detail in the license application and the impact assessment.

Proposal for investigation program

The effects on marine habitats and benthic species, marine mammals, fish and shellfish must be investigated as described below. In addition, an assessment must be made of the overall impact, cf. Section 10 of the Nature Diversity Act.

Marine habitats and benthic species

An overview of marine habitats and benthic species that may be significantly affected by the measure must be prepared, with particular focus on valuable habitats, OSPAR habitats, species of high and particularly high management interest and responsibility species.

The impact of the measure on marine habitats and benthic species will be assessed, including the effects of direct land take or sediment disturbance and siltation as a result of construction activities. The possible formation of artificial reefs on the wind turbine foundations, and the negative and positive consequences of this for marine biodiversity (including the addition of organic material to the seabed due to the fallout of fouling organisms that detach from the foundations), must also be assessed.

It must be explained how any negative effects on marine habitats and important benthic species can be avoided through planning adjustments and mitigation measures, so that damage to important natural values is avoided as far as possible.

Procedure:

The assessments must be based on existing knowledge and contact with relevant authorities

and organizations/resource persons, as well as own surveys as described below. Bottom surveys under the auspices of the national MAREANO program must be included in the assessment basis.

If there is a lack of knowledge, the assessment of the potential for encountering valuable habitats, OSPAR habitats, benthic species of high and particularly high management interest and responsible species must be investigated through known knowledge of depth, seabed conditions, temperature, salinity and the like.

Based on this assessment, areas will be selected for detailed mapping of marine habitats and benthic species using remotely operated vehicles (ROVs). These surveys are planned to be carried out in Q3 2024 and will be planned with a view to encountering valuable habitats, OSPAR habitats, benthic species of high and particularly high management interest and responsibility species. The survey will be carried out in accordance with updated guidelines from Offshore Norway as well as Guide M-300 from the Norwegian Environment Agency and NS-EN 16260:2012.

Marine mammals

An overview of marine mammals that may be significantly affected by the measure must be prepared, with a particular focus on species of great and particularly great management interest and responsibility species.

An assessment must be made of how the measure may affect different species of marine mammals, including the effects of underwater noise.

It must be explained how any negative effects on marine mammals can be avoided through plan adjustments and mitigation measures, so that damage to important natural values is avoided as far as possible.

Procedure:

The assessments shall be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below.

Marine mammals will be recorded using one or more hydrophones that will be installed on dedicated buoys within the planning area. These will be deployed for at least 12 months. The surveys will be coordinated with the Institute of Marine Research, which is planning to deploy marine observation platforms in and around Southern North Sea II.

The need for, and benefit of, supplementary field registrations of marine mammals from ships used for geophysical or geotechnical surveys, bottom surveys or similar will be continuously assessed.

The effects of underwater noise on the behavior of marine mammals that are recorded shall be based on the results of the noise assessment described under the topic "Bottom conditions and pollution".

Fish and shellfish

An overview of fish and shellfish that may be significantly affected by the measure must be prepared, including important functional areas such as spawning grounds, nursery areas and grazing areas. Particular emphasis must be placed on species of great and particularly great management interest and responsibility species.

An assessment must be made of how the measure may affect various species of fish and shellfish, including the effects of underwater noise, electromagnetic fields, sediment disturbance, altered flow conditions, "artificial reef effect", etc. An assessment must also be made of whether the wind power plant could have a positive effect as a refugium for fish.

The effects on the particularly valuable and vulnerable area (SVO) "Tobisfelt South", which borders

the planning area, will be emphasized in the assessment.

It must be explained how any negative effects on fish and shellfish can be avoided by planning adjustments and mitigation measures, so that damage to important natural values is avoided as far as possible.

Procedure:

The assessments will mainly be based on existing knowledge and contact with relevant authorities and organizations/resource persons. The Institute of Marine Research will be contacted for access to stock estimates for sandeel within "Tobisfelt sør" and adjacent areas.

The video recordings from the ROV mapping will be examined to determine the presence of fish and shellfish. In addition, the physical seabed conditions will be assessed to determine the potential for wintering sandeels in the sediments.

The effects of underwater noise on different species of fish and shellfish shall be based on the results of the noise assessment described under the topic "Bottom conditions and pollution". Similarly, electromagnetic fields (calculated under the topic "Seabed conditions and pollution") shall be assessed in relation to the detection level of any magnetically sensitive species.

Total impact, cf. section 10 of the Nature Diversity Act

An assessment must be made of whether the wind power plant with associated infrastructure and other existing or planned energy measures in the area may collectively affect the management objectives for one or more endangered or prioritized species and/or valuable, threatened or selected habitats.

It must be assessed whether the condition and population development of these species/nature types may be significantly affected.

Procedure:

The assessments must be based on known and available information about other plans and assessed impacts on biodiversity.

In the assessment, emphasis must be placed on the measure's effects on any occurrences of valuable habitats, cf. the Directorate for Nature Management's Handbook 19, selected habitats designated in accordance with Section 52 of the Nature Diversity Act and ecosystems that are important ecological functional areas for endangered species in the Norwegian Red List and priority species designated in accordance with Section 23 of the Nature Diversity Act. Chapter II of the Nature Diversity Act" can be used as a basis for the studies.

3.5 Relevant topics for environmental monitoring

Relevant topics for environmental monitoring are specified as a possible study topic in the Marine Energy Act Regulations
§ A wind power facility can have a number of effects that require environmental monitoring, such as how birds are affected by the facility. However, in our view, this is not a separate impact assessment topic. The need for environmental monitoring will instead be described in connection with each individual topic in the impact assessment. In addition, an overview of relevant topics for environmental monitoring will be provided in the license application. The final monitoring program will be determined as part of the detailed plan for the wind power plant.

3.6 Fishing and other business activities

3.6.1 Description of the current situation and state of knowledge

The fishing industry

Southern North Sea II is located between *Lille* and *Store Fiskebank* in catch field 41 (locations 64 and 65). Almost exclusively large fishing vessels are active in this part of the North Sea and tracking data therefore provides a good picture of fishing activity in the area. According to the strategic impact assessment for offshore wind, fishing is mainly carried out with bottom trawls and autoline, and most sandeel and cod are caught [1]. However, the quotas and thus the number of trawl hours vary greatly from year to year. Recent statistics from the Directorate of Fisheries show that there has been no bottom trawling in the plan area in the years 2018-2021 [24].

The petroleum industry

Southern North Sea II lies within the predefined area in the North Sea with annual licensing rounds and is covered by quadrants 3, 4, 9 and 10 in the petroleum administration's system. This is a mature petroleum province with well-developed infrastructure and good coverage of seismic data.

Large parts of the Southern North Sea area have been covered by production licenses several times, but at present there are no active licenses within the planning area. The nearest license, however, borders the planning area to the east. This is license PL1136, which was awarded in the APA2021 licensing round to Equinor Energy AS and PGNiG Upstream Norway AS. The production license is valid until 2029. There are several producing fields on the Danish side of the border, including the Siri field.

When Southern North Sea II was opened for renewable energy production, one of the conditions was that no license could be granted in areas where a production license for petroleum had been granted, unless this was notified in the production license or there was an agreement with the holder of the production license.

Mineral business

Southern North Sea II is not among the areas identified by the Norwegian Shelf Directorate as having potential for economically interesting deposits of seabed minerals. Therefore, no further investigations of this topic are proposed.

Tourism

Potential impacts on tourism were assessed in the strategic impact assessment for offshore wind [1]. For Southern North Sea II it was concluded as follows:

"There are no tourism activities in the area of influence, and there are no known plans to start such [25]. A development of Southern North Sea II will have insignificant consequences for tourism."

This conclusion remains valid, and no further investigation of this topic is therefore proposed.

3.6.2 Possible effects

The fishing industry

The Directorate of Fisheries considers Southern North Sea II to be one of the least conflict-ridden areas for offshore wind power [26]. Based on consultation responses in connection with the opening of Southern North Sea II for offshore wind power, the planning area for the development has also been adjusted in relation to the original proposal, so that some areas have been excluded for the sake of important fish stocks and fishing interests.

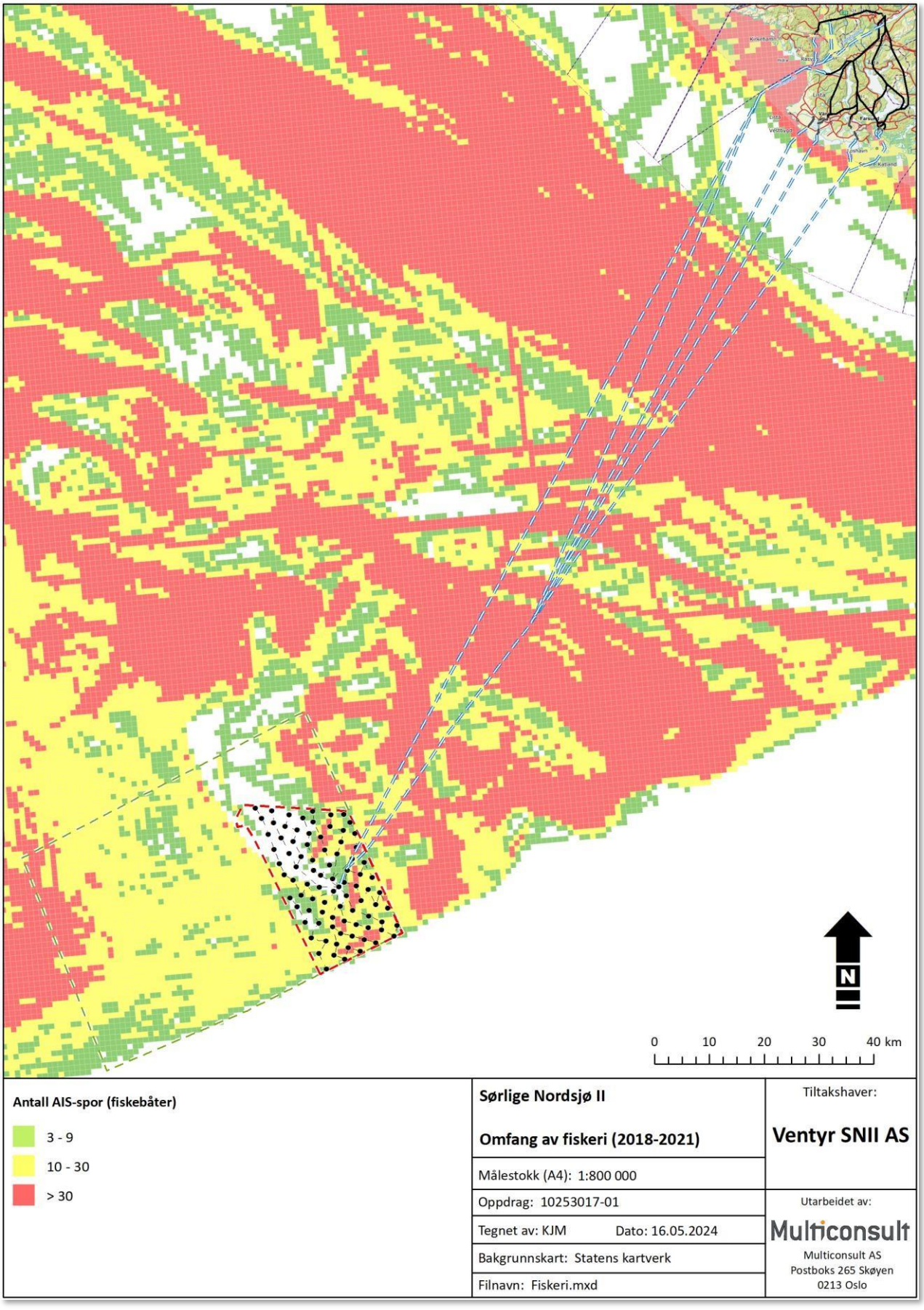


Figure 3-4. Scope of fishing in the period 2018 - 2021. Source: Directorate of Fisheries.

The fact that important spawning and fishing areas have been taken into account in the delimitation of the planning area indicates that there will be limited consequences for fish stocks and the fishing industry. The impact on the fishing industry will depend on whether fishing is permitted within the offshore wind farm and, if so, on the distance between the wind turbines and whether the internal cable network is made trawlable or not. This will be investigated further in connection with the license application and the impact assessment. It is proposed that
"Fisheries" will be a separate study topic.

The petroleum industry

The establishment of offshore wind power will entail a physical land take that affects the possibilities of exploiting any subsea oil and gas resources in the area. At present, however, there are no active licenses within the planning area. However, this topic should be investigated further under the topic "Petroleum interests".

The development of Southern North Sea II could contribute to the electrification of the petroleum installations on the Ekofisk field or other nearby projects and installations.

3.6.3 Proposal for investigation program

Fishing

A description must be provided of the fishing interests within the planning area and the effects the measure may have. The distance that different fishing activities should have to the wind turbines must be specified, including the size of the exclusion zone for fishing and which fishing gear should be permitted.

Any plan adjustments and mitigation measures that can reduce potential conflicts shall be considered.

Procedure:

Existing documentation, including catch data and information from automatic identification systems (AIS data), is compiled and supplemented by contacting the fisheries authorities, fishing clubs and other interest organizations to collect information about current activity and possible future activity.

Petroleum interests

A description must be provided of any petroleum interests within the planning area, including the possibilities for storing CO_2, and what effects the measure may have.

Procedure:

Information must be obtained from relevant authorities, as well as relevant companies and interest organizations. This topic does not require a separate technical report in the impact assessment, but must be discussed in the license application.

3.7 Risk of accidents and emergency preparedness

3.7.1 Description of the state of knowledge and possible effects

The risk of accidents and emergency preparedness is specified as a study topic in section 6 of the Offshore Energy Act Regulations.

The greatest safety risk associated with wind power development in the Southern North Sea II is collisions between ships and wind turbines. However, the turbines will be marked on nautical charts and clearly visible on ships' radar systems. There is also a risk that wind turbines may break down as a result of various parts failing due to manufacturing defects, assembly errors, wear and tear or extreme load cases.

A breakdown can lead to discharge of oils, and turbine parts such as wing material can be dispersed into the sea. Breakdowns of transformer stations can also lead to spills of various oil products and produce waste.

Risk analyses will be carried out continuously during the design and construction phases. An overall assessment of the risk and effects of undesirable incidents and accidents, including extreme weather events and emergency preparedness considerations, will be included in the license application and the impact assessment.

3.7.2 Proposal for investigation program

An overall assessment of the risk and effects of undesirable incidents and accidents, including acute pollution and collisions between ships and wind turbines, must be carried out.

The emergency response situation in the area must be described and emergency response considerations for various incidents must be assessed, including incidents from other industries such as shipping or the petroleum industry.

The dimensioning and location of the facilities with regard to future extreme weather events must be described and assessed.

Procedure:

Information shall be obtained from relevant authorities as well as relevant companies and interest organizations.

Recognized methods for risk assessment must be used in accordance with NS IEC 31010 or equivalent.

3.8 Defense interests and shipping traffic

3.8.1 Defense interests

Description of the current situation and state of knowledge

There are no firing ranges or training areas within or near the plan boundary. However, the Ministry of Defense notes that the Norwegian Air Force has plans to establish a military training airspace, without shooting activity, over the entire sea area Southern North Sea I and II towards the adjacent borders with Denmark and the UK [27]. On the Danish side of the border, the Danish Air Force has an existing training area over parts of the Southern North Sea (TRA North Sea 9).

Possible effects

The development of offshore wind power in the Southern North Sea II may affect the Norwegian Air Force's plans to establish a military training airspace over this sea area. The possible consequences of any restrictions on training activities or special requirements related to the marking of aviation obstacles must be further investigated.

Proposal for investigation program

Effects on the Air Force's plans to establish a military training airspace over the Southern North Sea will be investigated.

Procedure:

The study will be based on existing documentation, including data sets for the Norwegian Armed Forces' shooting and training fields at sea. Forsvarsbygg shall be contacted for any new and updated knowledge.

This topic does not require a separate technical report in the impact assessment, but must be discussed in the license application.

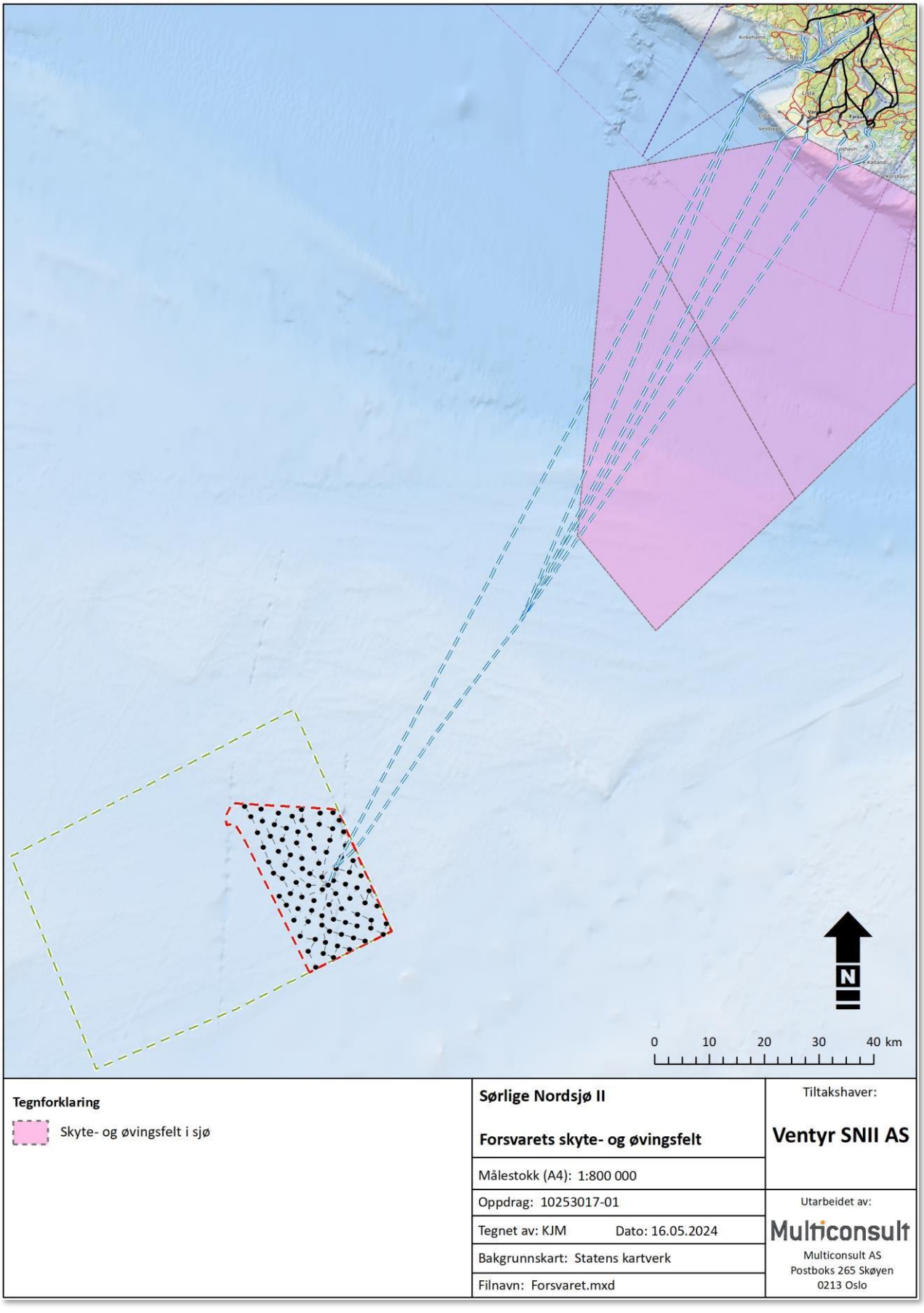


Figure 3-5. The Norwegian Armed Forces' firing and training ranges in the sea.

3.8.2 Ship traffic

Description of the current situation and state of knowledge

The satellite-based Automatic Identification System (AIS) is mandatory for commercial vessels and for fishing vessels up to 15 meters in length. Many vessels under 15 m also use it voluntarily for safety reasons. This provides detailed images of ship traffic in this part of the North Sea (Figure 3-6).

Possible effects

NVE referred to the possible effects on ship traffic as follows in the strategic impact assessment for offshore wind [1]:

"The traffic density at Southern North Sea II is among the highest among the study areas when looking at the number of registrations, distance sailed and operating hours. AIS registrations show that the area has traffic from all ship categories. Over 20% of the registrations are vessels over 5000 gross tons. The Norwegian Coastal Administration nevertheless considers it possible for ship traffic to adapt to a potential wind power plant within the assessment area without incurring excessive time and fuel costs. There is no fairway through Southern North Sea II and the study area is far from the Traffic Separation System (TSS) along the west coast of Norway. Traffic leaving the TSS outside Stavanger will naturally continue on to the continent, or further south, between and tangent to Southern North Sea I and II. The same will apply to traffic from the south that enters the traffic separation zone outside Stavanger. Fishing activity in the area will, as a result of the areas being far out to sea, be characterized by larger fishing vessels.

Southern North Sea II has a general cargo route between the Baltic Sea area and Newcastle that runs across the area. The route is dominated by ships of 1000-5000 gross tons. The choice of route is primarily determined by the shortest/fastest route between the Baltic Sea area and Newcastle and partly by the petroleum industry. An expected transition from oil to gas production in the fields south of the North Sea suggests a slight decline in petroleum-related traffic in the next few years, but this effect will probably be offset by a general increase in other traffic segments.

A development could lead to a significant proportion of the ship traffic in the area having to adapt or change their choice of route. Even if the traffic situation is affected, the Norwegian Coastal Administration nevertheless considers it possible to move the traffic flows. This does not entail greater costs than can be justified based on requirements for efficient maritime transport. However, a development may result in the need for new and/or changed marking in the area."

Proposal for investigation program

Vessel traffic in the area will be described and the effects of the offshore wind installations on shipping and navigation will be assessed, including any consequences of increased sailing distance and maritime safety.

Procedure:

The report will be based on existing documentation, for example from Kystdatahuset and Kystinfo as well as AIS data.

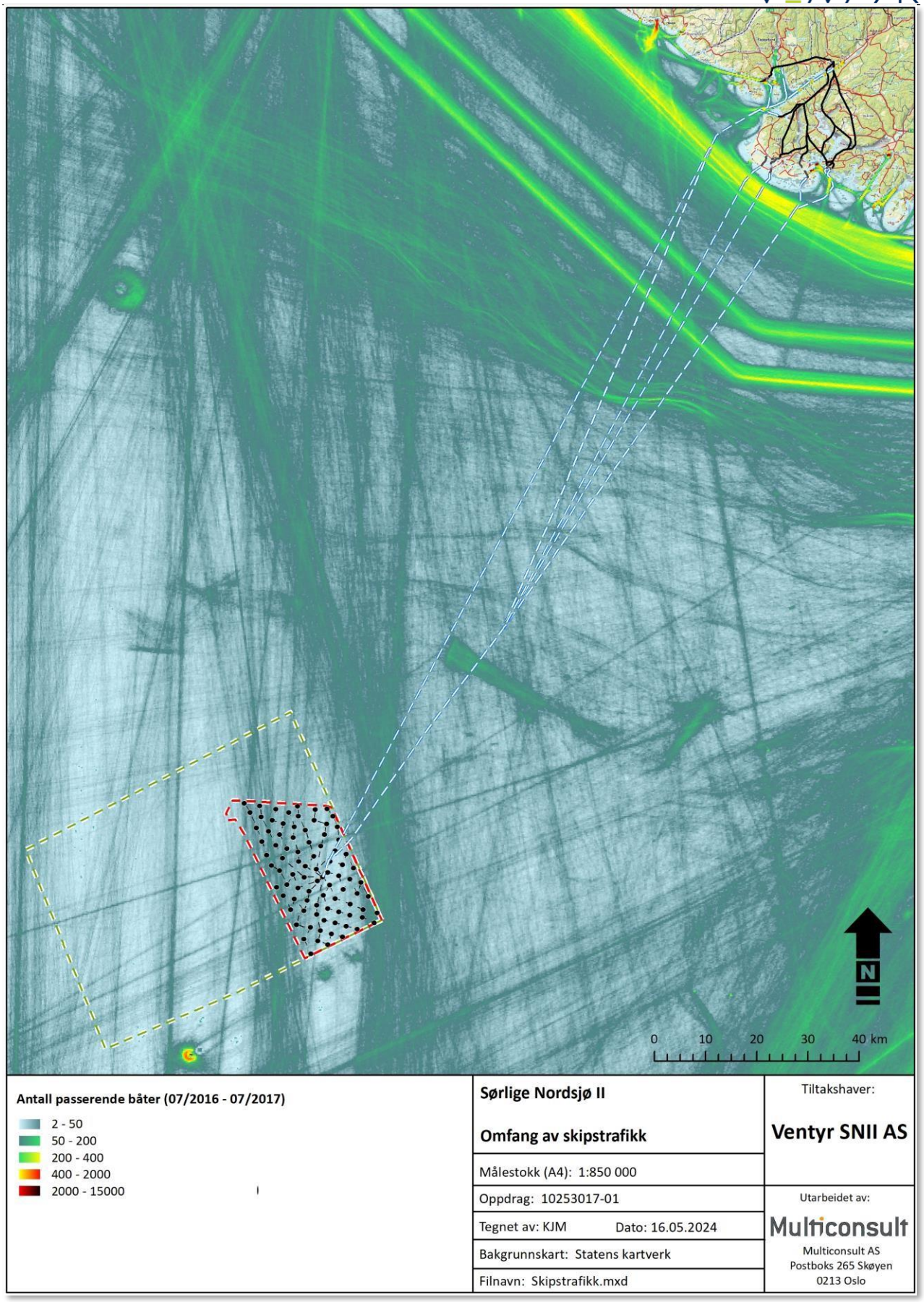


Figure 3-6. Scope of ship traffic. Source: Kystverket.

3.9 Potential impact on ecosystem services

Potential impacts on ecosystem services are specified as a separate topic in section 6 of the Marine Energy Act Regulations. Ecosystem services describe all the goods and services we receive from nature. It is common to divide ecosystem services into four [28]:

1. Basic life processes (supporting services) are the fundamental life processes that must "be in place" for ecosystems to provide other services. In the ocean, primary production, nutrient cycling and sediment formation are examples of processes that form the basis for all the other ecosystem services.
2. Provisioning services (producing services) are the physical products we get from nature, such as food like fish and shellfish or additives like alginate.
3. Regulating services are what nature contributes to a safe and healthy environment. This includes ecosystem services that are not consumed, but which nevertheless affect welfare and the scope for action in society. Examples include climate regulation, waste decomposition and protection against extreme weather.
4. Experience and knowledge services (cultural services) are what nature contributes in other ways and which provide us with well-being and well-being. For example, the sea is an important source of recreation, outdoor life, knowledge and learning.

Fishing and other utilization of marine resources is a significant ecosystem service associated with the Southern North Sea II marine area. However, fisheries are treated as a separate topic, and it is therefore not natural to also investigate this as an ecosystem service.

Of the other ecosystem services, the North Sea, like all other oceans, is also part of the basic life processes and regulatory services. Ecosystem services related to this will be addressed under the biodiversity themes.

We cannot see that there are other ecosystem services that are relevant to investigate, and therefore propose no further investigations of this topic. This is also in line with the Norwegian Environment Agency's handbook on impact assessment (M-1941), which does not describe ecosystem services as a separate topic, but that it is handled under other topics (primarily biodiversity).

3.10 Outdoor life

The strategic impact assessment for offshore wind [1] concluded that the offshore areas of Southern North Sea II are little used and have no significant value for outdoor recreation [25]. NVE's assessment from 2012 is considered adequate for the planning area also in 2024, and no further investigations of the outdoor recreation topic are therefore proposed.

3.11 Pollution to sea, air, ground and noise

Pollution to the sea, air, ground and noise (cf. section 6 of the Marine Energy Act) is discussed in the chapter on "Bottom conditions and aquatic environment" above. It is proposed that these topics be investigated under the theme "Bottom conditions and pollution" (see section 3.2.3).

3.12 Climate

3.12.1Description of the state of knowledge and possible effects

This topic mainly covers greenhouse gas emissions. Weather, wind and other climatic conditions are naturally an important part of this project since it uses wind to produce energy and because knowledge of the external conditions is very important in planning, dimensioning and securing the

plant.

Although offshore wind power provides renewable and climate-friendly energy, there is also a climate impact associated with the construction, operation and eventual decommissioning of a wind farm. A number of activities will contribute to greenhouse gas emissions during the facility's lifecycle, including the production of materials, transportation, installation, maintenance, dismantling and material handling.

The emission of greenhouse gases during the lifetime of a facility is assessed using a life cycle assessment (LCA). A lifecycle assessment of greenhouse gas emissions for a wind farm includes all infrastructure and all phases of the project. The turbine foundations and the wind turbines themselves are usually the main contributors to GHG emissions, but the production of the rotor blades, submarine cables and various operations at sea (installation, maintenance, etc.) also contribute to emissions. The majority of emissions occur during the construction phase, but also in connection with the production of materials and equipment. However, there can be major differences between different projects depending on turbine concepts, location and weather conditions [29] [30] [31].

Steel is the material that contributes the most in terms of emissions from the wind turbines themselves, while the tower is the component that produces the most greenhouse gas emissions from materials, followed by the rotor blades and the nacelle (the turbine housing with generator, gearbox and drive train). Other components in the plant also contribute, such as substations and submarine cables. Greenhouse gas emissions are also associated with the operation and maintenance of the plant, particularly in connection with helicopter transportation, replacement of parts, etc. The use of recycled materials in rotor blades, for example, will help to reduce overall emissions.

Offshore switchgear is normally gas-insulated (GIS) due to requirements for compact installations. The gas in such systems, SF6, is a very potent greenhouse gas, which is why there are strict requirements for quality in the manufacture, installation and maintenance of such equipment. The EU will ban the use of SF6 in switchgear from 2030. Commercially available alternatives to SF6 will be assessed in more detail in later phases of the project, and a greenhouse gas budget will be prepared for the entire development in connection with the license application and impact assessment.

3.12.2Proposal for investigation program

A greenhouse gas budget must be prepared for the wind farm and associated infrastructure. The greenhouse gas budget shall be prepared using life cycle assessment (LCA) and include the entire life cycle as well as both direct and indirect emissions. The greenhouse gas budget will be used to assess the need for mitigation/mitigation measures and to calculate the contribution to the total greenhouse gas emissions.

Procedure

The investigation shall be carried out according to the Norwegian Environment Agency' guide M 1941 for impact assessment of greenhouse gas emissions. The following life cycle phases shall be included:

3.12.2.1 Material production (A1-A3)

3.12.2.2 Material transport (A4)

3.12.2.3 Development (A5)

3.12.2.4 Direct emissions in the operational phase (B1)

3.12.2.5 Maintenance (B2)

3.12.2.6 Replacements (B4)

3.12.2.7 Energy consumption in operation (B6)

3.12.2.8 Transport in operation (B8)

3.12.2.9 Decommissioning and disposal (C1-C4)

The analysis period shall be set equal to the licensing period or assumed lifetime of the facility, and the calculations shall be performed based on the standards for life cycle assessment (ISO 14044 and ISO 14040) and using recognized software and databases such as SimaPro and Ecoinvent, One Click LCA and VegLCA.

3.13 Aviation

3.13.1Description of the state of knowledge and possible effects

Wind turbines can potentially affect radar, navigation and communication facilities for aviation. A wind turbine will also be an aviation obstacle that represents a collision risk for aviation. However, the risk of collision is considerably reduced by marking wind turbines in accordance with the However, the risk of collision is considerably reduced by marking wind turbines in accordance with the *Regulations on the reporting, registration and marking of obstacles to air navigation,* and by reporting them to the Norwegian Mapping Authority and showing them on aeronautical charts.

Based on input from Avinor [32], the strategic impact assessment for offshore wind power concluded that the development of wind power plants in Southern North Sea II will not have consequences for civil aviation [1]. NVE's assessment from 2012 is probably also valid for the planning area in 2024, but it is proposed that the topic nevertheless be investigated and dealt with in the license application and impact assessment.

3.13.2Proposal for investigation program

An assessment will be made of whether the wind farm will constitute an obstacle to aviation, especially for low-flying aircraft and helicopters.

Procedure:

Forsvarsbygg and Avinor AS, at the air traffic control division, should be contacted for assessment of the measure. Relevant operators of low-flying aircraft and helicopters should also be contacted.

This topic does not require a separate technical report in the impact assessment, but must be discussed in the license application.

3.14 Business and employment

3.14.1Description of the state of knowledge and possible effects

Experience from established onshore wind farms shows that the development and operation of wind power has a positive impact on local and regional businesses [33] [34]. Local companies have been involved in the construction phase and local jobs have been established in the

operational phase of the wind farms. Several Norwegian municipalities receive property tax from wind farms in addition to landowners and licensees receiving financial compensation for the use of their property.

Offshore wind farms can be expected to have somewhat less positive effects locally, as many of the components will probably be manufactured abroad and shipped to Norway for assembly before being transported out to sea. However, efforts are being made to use Norwegian suppliers of turbine foundations, and there will be a lot of activity related to pre-assembly of the turbines in Norway.
port facilities and equipment deliveries. In the operational phase, local jobs will be created related to logistics and operation and maintenance. Experiences from abroad show that the offshore wind industry has given new life to older ports such as Oostende (Belgium), Helgoland and Mukran (Germany).

The effects on employment and value creation were discussed in the strategic impact assessment for offshore wind [1]:

"Regional value creation and employment from the development of offshore wind power plants in the Southern North Sea II assessment area is assumed to accrue to the Flekkefjord economic region. The economic regions have been chosen based on proximity to the various study areas, as well as where the grid connection is and where there is access to ports [35]. In Flekkefjord, there are many existing companies in industries that supply the offshore wind industry in the development and planning of wind turbines and foundations, in the construction phase, and in the disposal phase [35].

The total potential national value creation from Southern North Sea II is estimated at around NOK 63 million per MW over the lifetime of the wind power plant [35]. Compared to the other assessment areas, this is high. The potential for regional value creation is estimated at around NOK 21 million per MW over the lifetime of the wind power plant. If a 1,000 MW wind power plant is established in Southern North Sea II, it is estimated that there will be a need for around 85,000 man-years over a 25-year period [35]. Most of the need will be in the construction phase. Furthermore, it is estimated that approximately 11 percent of the employees in Flekkefjord could work in the offshore wind industry if a wind power plant is established."

Ventyr plans to utilize existing ports already operated by its strategic partner NorSea Group. The ports of Espevik in Tysvær municipality or Jelsa in Suldal municipality will be rebuilt to meet the needs of installation ports, while Risavika port in Tananger, Sola municipality, will be used for operation and maintenance. The investments required to handle a development of this size could have major ripple effects for the business community locally, regionally and nationally.

NVE's assessment from 2012 must be updated with new figures based on the specific development plans for Southern North Sea II. It is proposed that the topic "Business and employment" be included in the license application and the impact assessment for both the wind power plant and the power transmission to land.

3.14.2Proposal for investigation program

A description must be provided of how the measure, including associated activities on land, may affect local, regional and national business and industry, including employment and value creation. The effects must be quantified as far as possible.

Procedure:

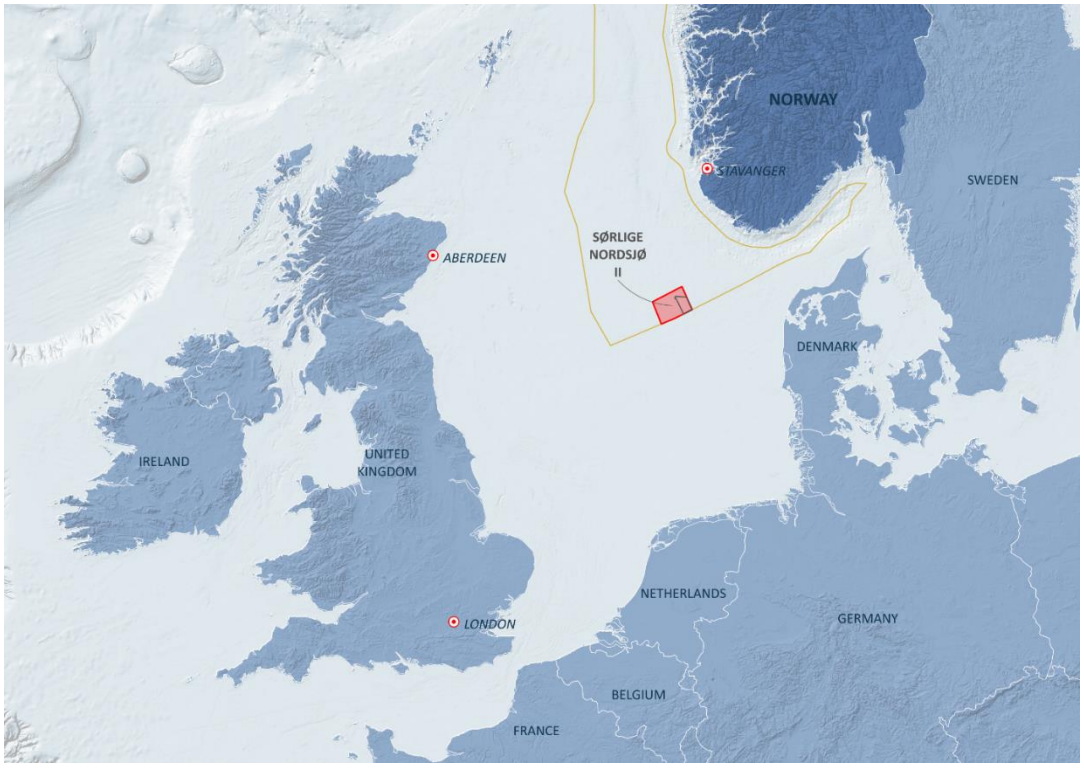
Information shall be obtained from relevant authorities, as well as relevant interest organizations.

4. Potential transboundary impact

The Convention on Environmental Impact Assessment in a Transboundary Context ("the Espoo Convention") is an environmental protection convention for Europe, Canada and the United States focused on cooperation to prevent transboundary environmental impact.

Pursuant to article 3 and the Appendix I of the Espoo Convention, "major installations for the harnessing of wind power for energy production (wind farm)" are listed among the proposed activities that are likely to cause a significant adverse transboundary impact which shall be notified to any other parties likely to be affected by said activity (i.e. other countries). Affected parties are invited to participate in the environmental impact assessment (EIA) procedure.

The concession area, covering approximately 513 square kilometers, is located in the North Sea offshore Norway, near the Danish border. It is situated approximately 175 km from the coast of Denmark, around 280 km from the coast of Germany, approximately 370 km off the coast of the Netherlands, and about 430 km from the coast of the United Kingdom.



The main transboundary impacts that might arise are presented in this chapter. The primary conclusion is that the impact caused by the planned activity within the Norwegian economic zone is expected to be limited, which means that any potential transboundary impact can likewise be expected to be limited.

4.1 Birds

The potential impact concerning birds detailed in section 3.4.1 may extend beyond the boundaries of the Norwegian economic zone, for example taking into account the fact that certain species of birds fly across extremely large areas, thus entering the maritime territories and zones of multiple countries.

The strategic impact assessment for offshore wind concluded that the Southern North Sea II is one of the least conflict-ridden areas for large-scale offshore wind development due to relatively low densities of seabirds and assumed low impact on bird migrations. Therefore, the transboundary impact is expected to be limited too.

The effects on seabirds and migratory birds will be investigated and described in more detail in the license application and the impact assessment.

4.2 Bats

The potential impact on bats as detailed in section 3.4.2 is very uncertain considering the limited state of knowledge. There is little information about bat behavior, including flight height. The effects on bats of Southern North Sea II development will be investigated and described in the license application and the impact assessment.

4.3 Marine Mammals, fish and benthic animals

As detailed in section 3.4.3, Southern North Sea II is part of the distribution area of several species of marine mammals, including sharks, harbour seals, harbour porpoises, white-beaked dolphins and minke whales. Sperm whales, killer whales and fin whales may also occur in this part of the North Sea.

The relatively shallow areas of the Southern North Sea II are also part of the range of several species of fish, including spawning areas for sand eel and mackerel. Other species that occur in these waters include common and highly mobile fish species such as herring, cod, whiting, sprat and horse mackerel, while the groundfish fauna includes haddock, plaice, sole, gurnard and sculpins. The spawning area for mackerel extends over large areas of the North Sea and Skagerrak, of which Southern North Sea II is only a small part.

The benthic fauna is expected to consist mainly of soft-bottom species that live in and on the sediments.

In its planning, the Norwegian government has already taken into account the presence of these species and has e.g. adapted the area so that it does not affect the known spawning areas for sand eel that are included in the particularly valuable and vulnerable area (SVO) "Tobisfelt sør".

The impact on marine mammal, fish and benthic animals will be described in the forthcoming license application and the impact assessment. Reference is made to the above related topics in the notification about the impact assessment investigations that will be performed.

4.4 Fishery

The directorate of fisheries consider Southern North Sea II to be one of the least conflict-ridden areas between fisheries' interests and offshore wind interests. On the basis of consultation responses in connection with the opening of Southern North Sea II for offshore wind power, the planning area for the development has also been adjusted in relation to the original proposal, so that some areas have been excluded for the sake of important fish stocks and fishing interests. Therefore, the transboundary impact on fishing activities is expected to be limited too.

Reference is made to the related chapters on Fisheries in the present Notification document.

4.5 Shipping

The potential impact concerning ship traffic as detailed in section 3.8.2 may extend beyond the boundaries of the Norwegian economic zone. This impact has been highlighted by NVE in its

strategic impact assessment in connection with the opening of Southern North Sea II. In particular, it has been identified as a potential transboundary impact that:

"*Southern North Sea II has a general cargo route between the Baltic Sea area and Newcastle that runs across the area. The route is dominated by ships of 1000-5000 gross tonnes. The choice of route is primarily determined by the shortest/fastest route between the Baltic Sea area and Newcastle and partly by the petroleum industry. An anticipated transition from oil to gas production in the fields south of the North Sea suggests a slight decline in petroleum-related traffic in the next few years, but this effect will probably be offset by a general increase in other traffic segments.*"

Nevertheless, the Norwegian Coastal Administration concluded that it is "*possible for ship traffic to adapt to a potential wind power plant within the assessment area without incurring excessive time and fuel costs*".

Vessel traffic in the area will be described and the effects of the offshore wind installations on shipping and navigation will be assessed, including any consequences of increased distance travelled and maritime safety.

4.6 Air traffic

The strategic impact assessment for offshore wind concluded, based on input from Avinor that the development of wind power plants in the Southern North Sea II will not have consequences for civil aviation and so as the transboundary impact. While Ventyr considers the NVE's assessment from 2012 to be still valid for the planning area in 2024, the impact will be further described and dealt with within the license application and impact assessment.

4.7 Military areas

There are no firing ranges or training areas within or near the plan boundary.

On the Danish side of the border, the Danish Air Force has an existing training area over parts of the Southern North Sea (TRA North Sea 9).

Ventyr will be marking the installations as obstacles according to the international rules and regulations and and impact assessment will be part of the license application.

4.8 The petroleum industry

The project is located in a mature petroleum province with well-developed infrastructure and good coverage of seismic data. Large parts of the area of the Southern North Sea have been covered by production licenses several times and co-existence with these projects is a prime requirement of Ventyr and of the Norwegian government. Moreover, the development of Southern North Sea II could contribute to the electrification of nearby projects and installations.

The effects on the petroleum industry will be investigated further in the license application and the impact assessment.

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Attachment: Proposal for study program

Introduction

This proposal for a study program deals with the Southern North Sea II wind power plant, including the internal submarine cable network up to and including the offshore converter station.

The assessment program must satisfy the requirements of Chapter 5 of the Regulations on Impact Assessments (the Impact Assessment Regulations) and the requirements for applications under the Offshore Energy Act.

The first part of the assessment program deals with general requirements for the impact assessment, including requirements for methodology and procedures used for all subject areas. Furthermore, the assessment program is divided thematically, and describes both the impacts to be described and the specific procedures to be used under each topic.

The impact assessment must cover all parts of the measure, including the wind power plant itself, the internal submarine cable network and the converter station, as described in this report. Impacts will be assessed for both the construction and operational phases. This also includes transportation of the construction components out to the wind power plant as well as transportation related to operation and maintenance.

The proposed assessment program is based on relevant legislation, including Section 6 of the Offshore Energy Act Regulations, as well as established assessment programs for onshore wind power plants and the proposed assessment program for strategic impact assessment of the areas Sørvest F and Vestavind F (allocation 2025). Account has also been taken of the guidance for planning and assessment programs in the Norwegian Environment Agency's "Handbook on impact assessment of climate and the environment (M-1941)".

General requirements, process and method

Investigations and field surveys must follow recognized methodology and be carried out by persons with relevant professional expertise. The methodology in the Norwegian Environment Agency's "Handbook on Impact Assessment of Climate and Environment (M-1941)" shall be used as a basis for the topics where this is specified in the assessment program.

The impact assessment must describe the methodology used for the various topics. The description must include challenges, technical deficiencies, knowledge deficiencies and the most important uncertainty factors in the assessment, including in the data basis.

If the knowledge base is too inadequate to be able to assess the effects of the measure, the necessary field surveys must be carried out.

It must be stated who has prepared the reports and carried out the field surveys, and what relevant expertise they have.

The report must describe the zero alternative. The zero alternative shall be the reference situation for the assessment of the impact that the applied measure will have on the individual subject area. In the assessment of impacts on the environment and society pursuant to the EIA Regulations, the zero alternative is the current state of the environment and how this is expected to develop with the implementation of other approved plans and measures, if the applied measure is not implemented.

When determining the degree of impact, the measure's lasting effects on the individual topic must be taken into account. Where the construction phase may result in permanent impacts, this must be included in the assessment of the degree of impact.

Temporary impacts during the construction and possibly operational phases must be described separately.

Plan adjustments[4] and other mitigation or compensation measures must be described for each individual topic with a view to reducing significant negative impacts. If these are not included in the applied for measure, it must be stated to what extent they can change the determined degree of impact. Relevant environmental monitoring programs before, during and after the construction phase must be proposed.

The overall effects of the measure in light of already implemented, adopted or approved plans or measures in the area of influence must be assessed. Similarly, the overall effects of the Southern North Sea II wind power plant and the power transmission to the main grid shall be assessed for all topics in the study program. With regard to biodiversity, an assessment of the overall impact shall be made as part of this, cf. Section 10 of the Biodiversity Act.

All sources used in the impact assessment must be referenced.

The license applicant shall systematize collected data in accordance with existing standards and make the data available to public authorities or enter it into public databases.

Presentation of alternatives

Where several alternatives are investigated, the consequences must be assessed for comparable alternatives. Sub-areas must therefore be grouped together so that alternative development solutions can be assessed equally against each other.

Summary of thematic reports

The impact assessment/concession application must contain a summary of the thematic reports and a reference to the appropriate thematic report or chapter in the impact assessment for supplementary information.

Summary of impacts and mitigation measures

The impact assessment/concession application must include a table showing the consequences for each subject area of the development of the various alternatives. A summary of mitigation measures must also be provided, stating which measures have been used in the impact assessments and which have not.

Sensitive information

Sensitive information must be shielded, labeled "exempt from disclosure" in accordance with applicable legislation, and included as separate attachments. Those elements that can be described more generally must be included in the public documentation.

Measure description

The impact assessment must contain a detailed description of the measures. This includes the physical characteristics of the facility and planned technical solutions, location and land use in both the construction and operational phases. It must also describe how transportation related to the construction and operation of the wind power plant is intended to be carried out.

The planning area, wind turbines, internal submarine cable network, offshore converter station and all other plant components must be shown on maps.

A brief description shall be provided of plant components covered by other plans and studies, including power transmission, onshore connection points, installation and operation/maintenance base(s), production facilities for onshore wind turbine foundations, port facilities, etc., including area requirements and

[4] The term "plan adjustments" here refers to technical adjustments of the measure within the planning area, e.g. size and location of turbines, distance between the sea surface and the rotor tip ("air gap") and the like.

necessary measures. These should also be shown on maps.

The most important features of the measure in the operational phase, such as energy needs, use, solutions, the need for transportation for the operation of the wind power plant, types and amounts of natural resources that will be used shall be discussed.

Alternatives for design, technology and location that have been assessed must be described. A justification for the choice of solution and the criteria used in the choice must be provided. Assumptions about foundation technology must be stated.

A progress plan for implementation must be provided.

Necessary measures in connection with the decommissioning of the plant at the end of the license period must be described.

Expected annual net electricity production, as well as expected time of use and capacity factor, must be calculated, and the assumptions for the calculation must be stated. Factors that affect production shall be considered, including extreme wind, icing, turbulence and other conditions. Assumptions about losses for calculating net production must also be stated (loss factors such as vacancy losses, maintenance downtime, transmission losses, etc.)

The measure's total investment costs (CAPEX, including and excluding grid connection), annual operating and maintenance costs (OPEX, including and excluding grid connection) and decommissioning costs (DECEX), as well as the expected lifetime of the facility, must be stated. Company-sensitive information must be submitted to the responsible authorities in a separate report marked exempt from public disclosure.

Relationship to legislation, plans and protected areas

The relationship to relevant legislation, including the Marine Energy Act, the Energy Act, the Nature Diversity Act, the Marine Resources Act, the Harbour and Fairway Act, the Petroleum Act and the Cultural Heritage Act must be assessed.

It must be stated whether the measure requires permits or exemptions from other legislation. An

account must be given of the relationship to relevant national plans.

The relationship to any protected areas, proposed protected areas and the marine management plans for Norwegian marine areas must be described.

An account must be given of any effects on international conventions and agreements to which Norway has acceded.

Bottom conditions and pollution

The impact of the wind power plant on the physical seabed conditions and marine processes (flow conditions, erosion and sedimentation) will be investigated, including modeling of sediment dispersion.

Modeling of underwater noise will be carried out with a view to assessing the impact on the general soundscape in the marine area. The effects of underwater noise on marine life will be included under the topic "Biodiversity". Similarly, electromagnetic fields (EMF) will be calculated and used in the studies related to the topic "Biodiversity".

Possible sources of water pollution from the facilities must be described for both the construction and operational phases, and the risk of pollution and the spread of environmentally harmful substances must be assessed. A description must be provided of the expected use of chemicals and other substances that

have a particular risk of causing environmental damage in the event of a discharge. For facilities that have oil-filled components, the amount of oil must be specified.

A general description of expected emissions from wear and tear of the wind turbine blades shall be provided, and an assessment made of the possible effects of this.
Procedure:

The assessments must be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below. The geophysical mapping and seabed surveys under the auspices of the national MAREANO program must be included in the assessment basis.

The assessment of underwater noise shall be carried out in accordance with international standards, including ISO 18405:2017 and NOAA Technical Memorandum NMFS-OPR-59 (2018), adapted to Norwegian conditions. Underwater noise in both the construction and operational phases shall be calculated based on validated sound propagation models that allow aggregated source handling of wind turbines and other dominant noise sources.

Sediment dispersion modeling shall be carried out with a high-resolution dispersion model that shall include particles with a variable size distribution and with different physical properties based on assumptions about the amount of waste, residue, discharge and pollution.

Marine cultural heritage sites

A marine archaeological survey of the seabed must be carried out to assess whether the measure will come into contact with shipwrecks or other marine cultural heritage sites.

It must be explained how any negative effects on cultural heritage can be avoided through planning adjustments and other mitigation measures.

Procedure:

Existing knowledge will be compiled, including information from the geophysical mapping of the seabed. The Norwegian Maritime Museum will be contacted as early as possible so that they can provide input to the investigation.

Acoustic data collected from the seabed survey will be interpreted by a qualified marine archaeologist. If necessary, remotely operated underwater vehicles (ROV) shall be used for further mapping of any shipwrecks or other marine cultural heritage sites that may be affected by the development.

The assessment must be carried out in accordance with the Norwegian Environment Agency's Guide M-1941 for impact assessment of cultural environments.

Natural diversity

Seabirds and migratory birds

An overview of seabirds and migratory birds that may be significantly affected by the wind power plant must be prepared, with a particular focus on species of high and particularly high management interest[5] and responsibility species.

An assessment must be made of how the wind power plant may affect seabirds and migratory birds through disturbances, collisions, barrier effects, reduced/degraded ecological functional area, etc.

It must be explained how any negative impacts on seabirds and migratory birds can be avoided through planning adjustments and mitigation measures.

[5] Includes red-listed species, priority species, protected species, special ecological forms and other species requiring special consideration.

Procedure:

The assessments shall be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below.

Ongoing bird surveys conducted by the Norwegian Institute for Nature Research (NINA), as well as their partners in the other countries around the North Atlantic and the Barents Sea, will be included in the assessment basis. These surveys include GPS and GLS tagging of a number of seabird species in selected colonies. The ongoing surveys will be supplemented with further GPS tagging of seabirds from breeding colonies around the southern part of the North Sea, to capture seabirds that can be expected to forage within Southern North Sea II. Furthermore, registrations of seabirds and migratory birds will be carried out using AI cameras deployed on the planned MetOcean buoy, which will be out for 12 months, or using other similar equipment.

The project's timetable indicates that there is probably not enough time to incorporate more than one year of GPS data from new colonies, in addition to existing data from other colonies, into the impact assessment. However, monitoring will continue beyond one year so that additional data can be incorporated and reported in connection with the approval of the license application and detailed plan.

The need for, and benefit of, supplementary field registrations of birds from ships used for geophysical or geotechnical surveys, bottom surveys or similar will be continuously assessed.

Modeling of collision risk and barrier effects for the species that may be significantly affected by the wind power plant will be carried out.

Bat

An overview of bats that may be significantly affected by the wind power plant will be prepared, with a particular focus on species of high and particularly high management interest.

An assessment will be made of how the wind farm may affect bats through barotrauma, collisions and barrier effects.

It must be explained how any negative effects on bats can be avoided through planning adjustments and mitigation measures.

Procedure:

The assessments shall be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below.

Registrations of bats at sea will be carried out using a bat detector on the MetOcean buoy, which will be out for 12 months. The registration should primarily cover the fall migration (September and October), but preferably also the spring migration (May).

Marine habitats and benthic species

An overview of marine habitats and benthic species that may be significantly affected by the measure must be prepared, with particular focus on valuable habitats, OSPAR habitats, species of high and particularly high management interest and responsibility species.

The impact of the measure on marine habitats and benthic species will be assessed, including the effects of direct land take or sediment disturbance and siltation as a result of construction activities. Possible formation of artificial reefs on the wind turbine foundations, and the negative and positive consequences of this for marine biodiversity (including the addition of organic material to the seabed due to the fallout of fouling organisms that detach from the foundations),

should also be considered.

It must be explained how any negative effects on marine habitats and important benthic species can be avoided through planning adjustments and mitigation measures, so that damage to important natural values is avoided as far as possible.

Procedure:

The assessments must be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below. Seabed surveys under the auspices of the national MAREANO program must be included in the assessment basis.

If there is a lack of knowledge, the assessment of the potential for encountering valuable habitats, OSPAR habitats, benthic species of high and particularly high management interest and responsible species must be investigated through known knowledge of depth, seabed conditions, temperature, salinity and the like.

Based on this assessment, areas will be selected for detailed mapping of marine habitats and benthic species using remotely operated vehicles (ROVs). These surveys are planned to be carried out in Q3 2024 and will be planned with a view to encountering valuable habitats, OSPAR habitats, benthic species of high and particularly high management interest and responsibility species. The survey will be carried out in accordance with updated guidelines from Offshore Norway as well as Guide M-300 from the Norwegian Environment Agency and NS-EN 16260:2012.

Marine mammals

An overview of marine mammals that may be significantly affected by the measure must be prepared, with a particular focus on species of great and particularly great management interest and responsibility species.

An assessment shall be made of how the measure may affect various species of marine mammals, including the effects of underwater noise.

It must be explained how any negative effects on marine mammals can be avoided through plan adjustments and mitigation measures, so that damage to important natural values is avoided as far as possible.

Procedure:

The assessments shall be based on existing knowledge and contact with relevant authorities and organizations/resource persons, as well as own investigations as described below.

Marine mammals will be recorded using one or more hydrophones that will be installed on dedicated buoys within the planning area. These will be deployed for at least 12 months. The surveys will be coordinated with the Institute of Marine Research, which is planning to deploy marine observation platforms in and around Southern North Sea II.

The need for, and benefit of, supplementary field registrations of marine mammals from ships used for geophysical or geotechnical surveys, bottom surveys or similar will be continuously assessed.

The effects of underwater noise on the behavior of marine mammals that are recorded shall be based on the results of the noise assessment described under the topic "Bottom conditions and pollution".

Fish and shellfish

An overview of fish and shellfish that may be significantly affected by the measure must be prepared, including important functional areas such as spawning grounds, nursery areas and grazing areas. Particular emphasis must be placed on species of great and particularly great management interest

and responsibility species.
An assessment must be made of how the measure may affect various species of fish and shellfish, including the effects of underwater noise, electromagnetic fields, sediment disturbance, altered flow conditions, "artificial reef effect", etc. An assessment must also be made of whether the wind power plant could have a positive effect as a refugium for fish.

The effects on the particularly valuable and vulnerable area (SVO) "Tobisfelt South", which borders the planning area, will be emphasized in the assessment.

It must be explained how any negative effects on fish and shellfish can be avoided through plan adjustments and mitigation measures, so that damage to important natural values is avoided as far as possible.

Procedure:

The assessments will mainly be based on existing knowledge and contact with relevant authorities and organizations/resource persons. The Institute of Marine Research will be contacted for access to stock estimates for sandeel within "Tobisfelt sør" and adjacent areas.

The video recordings from the ROV mapping will be examined to determine the presence of fish and shellfish. In addition, the physical seabed conditions will be assessed to determine the potential for wintering sandeels in the sediments.

The effects of underwater noise on different species of fish and shellfish shall be based on the results of the noise assessment described under the topic "Bottom conditions and pollution". Similarly, electromagnetic fields (calculated under the topic "Seabed conditions and pollution") shall be assessed in relation to the detection level of any magnetically sensitive species.

Total impact, cf. section 10 of the Nature Diversity Act

An assessment must be made of whether the wind power plant with associated infrastructure and other existing or planned energy measures in the area may collectively affect the management objectives for one or more endangered or prioritized species and/or valuable, threatened or selected habitats.

It must be assessed whether the condition and population development of these species/nature types may be significantly affected.

Procedure:

The assessments must be based on known and available information about other plans and assessed impacts on biodiversity.

In the assessment, emphasis must be placed on the measure's effects on any occurrences of valuable habitats, cf. the Directorate for Nature Management's Handbook 19, selected habitats designated in accordance with Section 52 of the Nature Diversity Act and ecosystems that are important ecological functional areas for endangered species in the Norwegian Red List and priority species designated in accordance with Section 23 of the Nature Diversity Act. Chapter II of the Nature Diversity Act" can be used as a basis for the studies.

Fishing

A description must be provided of the fishing interests within the planning area and the effects the measure may have. The distance that different fishing activities should have to the wind turbines, including the size of the exclusion zone for fishing and which fishing gear should be permitted, must be specified.

Any plan adjustments and mitigation measures that can reduce potential conflicts shall be considered.

Procedure:

Existing documentation, including catch data and information from automatic identification systems (AIS data), is compiled and supplemented by contacting the fisheries authorities, fishing clubs and other interest organizations to collect information about current activity and possible future activity.

Petroleum interests

A description must be provided of any petroleum interests within the planning area, including the possibilities for storing CO_2, and what effects the measure may have.

Procedure:

Information must be obtained from relevant authorities, as well as relevant companies and interest organizations.

This topic does not require a separate technical report in the impact assessment, but must be discussed in the license application.

Risk of accidents and emergency preparedness

An overall assessment of the risk and effects of undesirable incidents and accidents, including acute pollution and collisions between ships and wind turbines, must be carried out.

The emergency response situation in the area must be described and emergency response considerations for various incidents must be assessed, including incidents from other industries such as shipping or the petroleum industry.

The dimensioning and location of the facilities with regard to future extreme weather events must be described and assessed.

Procedure:

Information shall be obtained from relevant authorities as well asrelevant companies and interest organizations.

Recognized methods for risk assessment must be used in accordance with NS IEC 31010 or equivalent.

Defense interests and shipping traffic

Defense interests

Effects on the Air Force's plans to establish a military training airspace over the Southern North Sea will be investigated.

Procedure:

The study will be based on existing documentation, including data sets for the Norwegian Armed Forces' shooting and training fields at sea. Forsvarsbygg shall be contacted for any new and updated knowledge.

This topic does not require a separate technical report in the impact assessment, but must be discussed in the license application.

Ship traffic

Vessel traffic in the area will be described and the effects of the offshore wind installations on shipping and navigation will be assessed, including any consequences of increased sailing distance and maritime safety.

Procedure:

The report will be based on existing documentation, for example from Kystdatahuset and Kystinfo as well as AIS data.

Greenhouse gas emissions

A greenhouse gas budget must be prepared for the wind farm and associated infrastructure. The greenhouse gas budget shall be prepared using life cycle assessment (LCA) and include the entire life cycle as well as both direct and indirect emissions. The greenhouse gas budget will be used to assess the need for mitigation/mitigation measures and to calculate the contribution to the total greenhouse gas emissions.

Procedure:

The investigation shall be carried outaccording to the Norwegian Environment Agency's Guide M-1941 for impact assessment of greenhouse gas emissions. The following life cycle phases shall be included:

- Material production (A1-A3)
- Material transport (A4)
- Development (A5)
- Direct emissions in the operational phase (B1)
- Maintenance (B2)
- Replacements (B4)
- Energy consumption in operation (B6)
- Transport in operation (B8)
- Decommissioning and disposal (C1-C4)

The analysis period shall be set equal to the concession period or assumed lifetime of the facility, and the calculations shall be performed based on the standards for life cycle assessment (ISO 14044 and ISO 14040) and using recognized software and databases such as SimaPro and Ecoinvent, One Click LCA and VegLCA.

Aviation

An assessment will be made of whether the wind farm will constitute an obstacle to aviation, especially for low-flying aircraft and helicopters.

Procedure:

Forsvarsbygg and Avinor AS, at the air traffic control division, should be contacted for assessment of the measure. Relevant operators of low-flying aircraft and helicopters should also be contacted.

This topic does not require a separate technical report in the impact assessment, but must be discussed in the license application.

Business and employment

A description must be provided of how the measure, including associated activities on land, may affect local, regional and national business and industry, including employment and value creation. The effects must be quantified as far as possible.

Procedure:

Information shall be obtained from relevant authorities, as well as relevant interest organizations.

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