

# **Transboundary impacts due to Aflandshage Offshore Wind Farm**

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## *1. Introduction*

Copenhagen has ambitions of becoming the world's first CO<sub>2</sub>-neutral capital city in 2025. A very important contribution towards fulfilling this goal is to increase sources of wind energy in HOFOR's total energy supply to the capital.

The Greater Copenhagen Utility Company – HOFOR – on March 6, 2019 received permission to conduct feasibility studies to investigate the possibility of establishing Aflandshage Offshore Wind Farm in an area between Stevns and the southern tip of Amager in the Øresund. One objective of feasibility studies is to conduct field investigations to gather information for future assessments of the potential impact of the wind farm on the environment.

The area planned for the Aflandshage Wind Farm is adjacent the international borders in the middle of the Øresund between Denmark and Sweden.

This document provides a brief description of the overall framework for the Aflandshage Wind Farm, which forms the basis for the feasibility studies focusing on the environmental conditions that will be dealt with in a subsequent environmental impact report, and which may give rise to potential transboundary impacts.

## *2. Project description*

Aflandshage Wind Farm consists of the following elements:

- The Wind Farm area (turbines, foundations, and inter array cables between individual turbines) in the Sound.
- Export cables, that transport electricity from the wind farm area to land at Avedøre Power Station
- Land cables in Hvidovre Municipality, transmitting electricity from the coast to the transformer station.
- Transformer station and cable connections to Avedøre Power Station
- Alternative offshore transmission facilities placed on turbine foundations or on separate foundations.

Aflandshage Wind Farm is planned to be established in the Øresund, south of Amager within an area of 65 km<sup>2</sup> (**Fejl! Henvisningskilde ikke fundet.**). The expected capacity of the wind farm will be up to 250 MW, which corresponds to supplying electricity for up to 250.000 households. The layout design of the wind farm has not yet been determined, but it is expected that the wind farm will eventually occupy an area of approx. 44 km<sup>2</sup>.

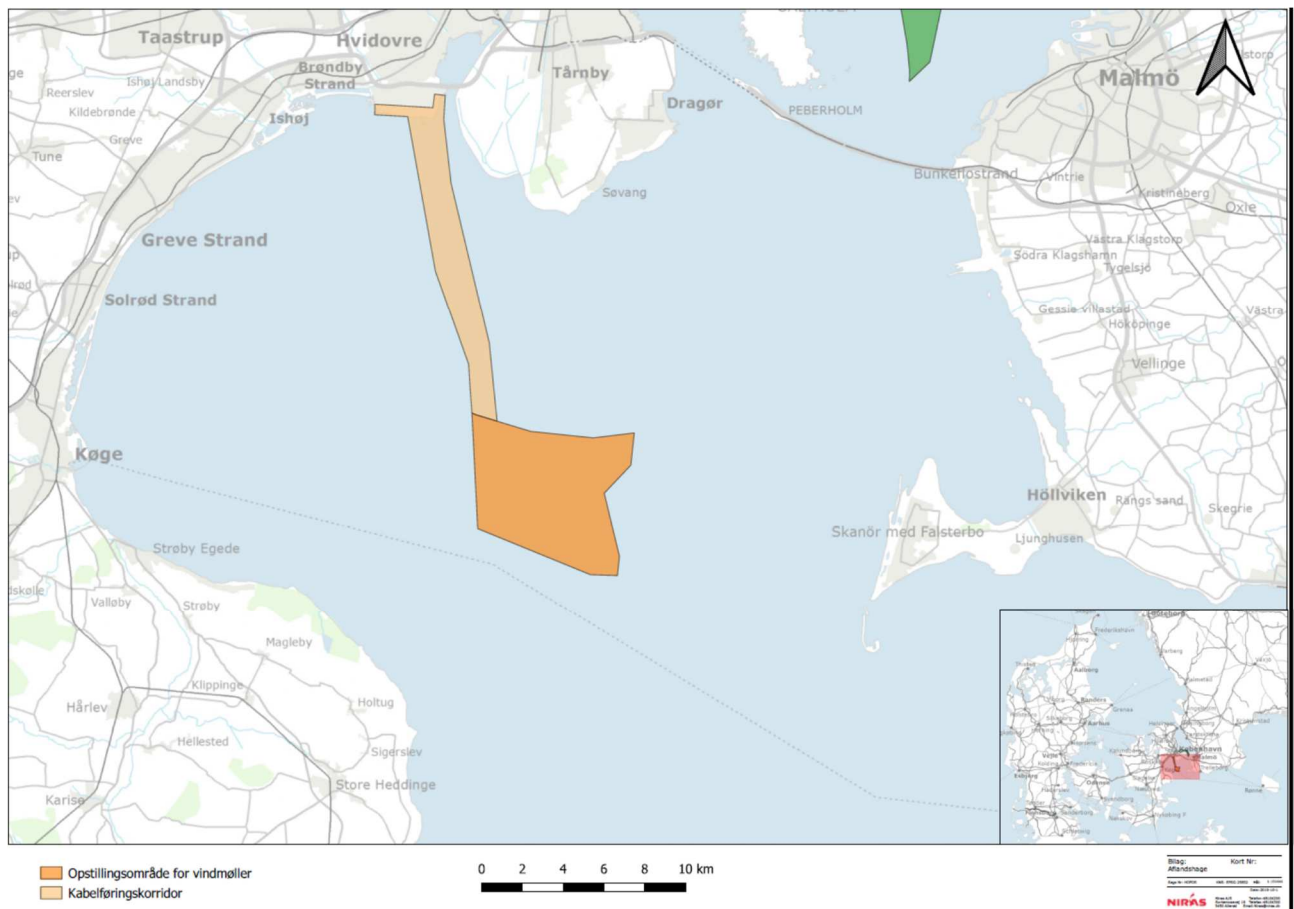


Figure 1: Map of the investigation area for Aflandshage Offshore Wind Farm. The map shows the possible areas for establishing turbines and the corridor for export cables in to land.

At present, the type of turbines haven't been determined, but they are expected to have an output of between 4 and 10 MW. Depending on the size of the wind turbines chosen and the total installed output, the wind farm area will consist of between 25 and 63 wind turbines with a total height of up to 220 m for the largest turbines. If 10 MW wind turbines are installed, a fully developed wind farm area will consist of 25 wind turbines. If the smallest wind turbines of 4 MW are installed, the wind farm will consist of 63 wind turbines.

Turbines will be mounted on foundations installed in the seabed. It is possible to use the following types of foundations:

- Monopiles (a steel casing that is hammered into the seabed)
- Gravity foundation (a foundation of concrete and steel that is placed on the seafloor).
- Jacket foundation (a steel construction with 3 – 4 legs that are fastened to the seafloor by using smaller piles hammered into the seabed at each leg).

At present, the type of foundation hasn't been determined but all the turbines will be mounted on the same type of foundation. The environmental impacts from establishing turbines will depend on which type of foundation will be used. For example, impacts from underwater noise from using monopile foundations is much greater than using other types of foundations. In contrast, the largest amount of sediment spill will come from using gravity foundations.

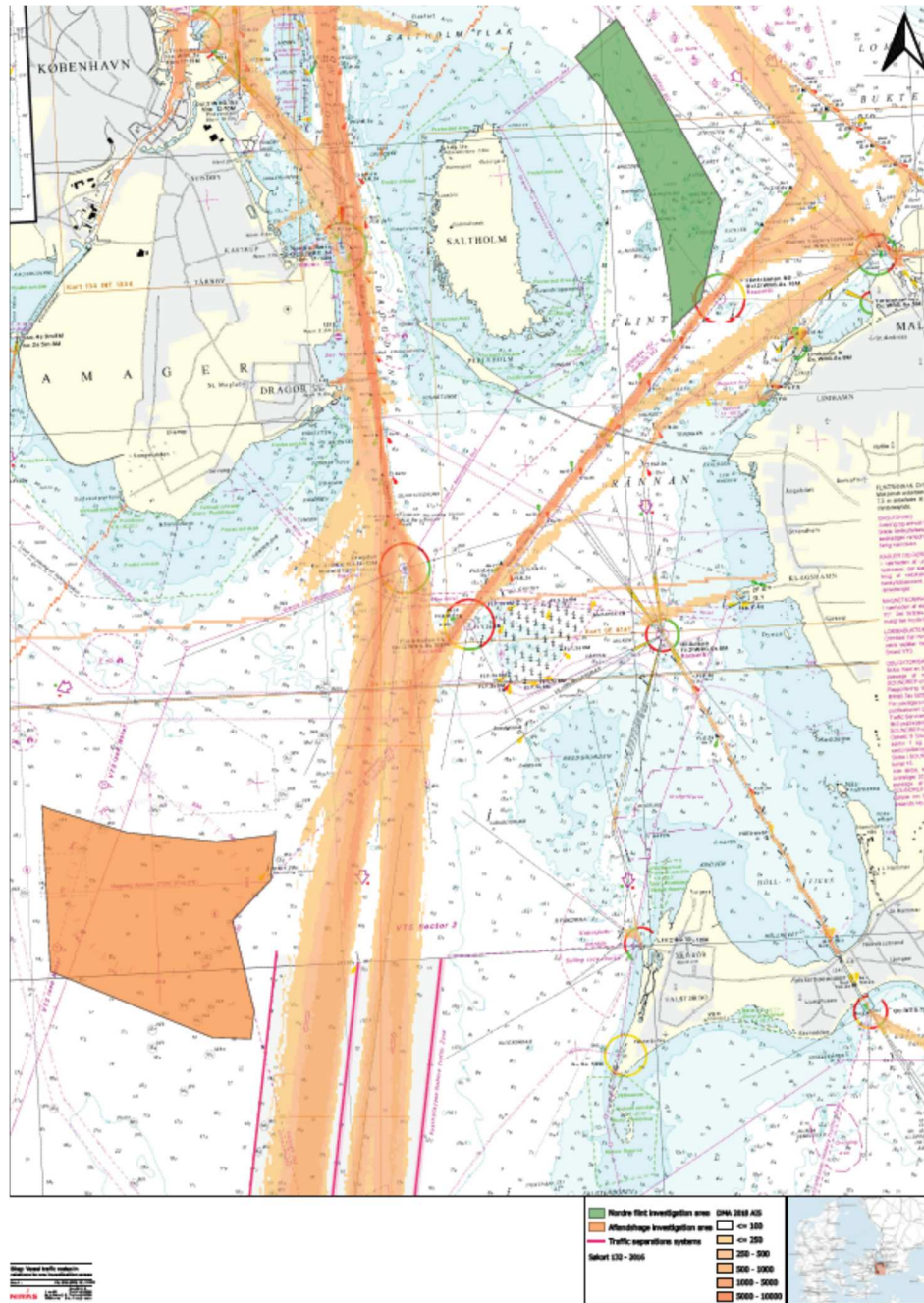
### 3. Transboundary effects

This section describes each of the potential impacts due to the wind farm, which may lead to significant transboundary impacts at regional or global levels. Shipping conditions, seabirds and bats, marine mammals and

visual conditions may have significant transboundary effects. All other transboundary environmental conditions are not considered to be significantly affected.

### 3.1 Shipping conditions

The presence of wind turbines may have an impact on international shipping lanes in the Øresund leading to a transboundary effect. Therefore, in collaboration with the Danish Maritime Authority, an assessment will be made on navigational safety, to help decide the final placement of the wind farm while taking into the greatest possible consideration for shipping traffic. As part of this collaboration, possible risks and necessary mitigation measures or adjustments to the project will be identified.



Figur 3.1: Map of the investigation area for Aflandshage Offshore Wind Farm and international shipping lanes through the Øresund.

### *3.2 Seabirds and bats*

The establishment of wind turbines in the Aflandshage area, might lead to birds losing important resting areas or access to important food sources due to disturbances or by getting frightened away from the wind farm and its surrounding area. This may affect the overall distribution of birds in the area and possibly increase competition for resources, resulting in adverse effects on bird populations. These impacts could potentially extend beyond the Danish border.

A description of effects on birds being displaced will be based on existing knowledge and experience from other wind farms. The effects on species and populations are described from existing knowledge, supplemented with knowledge gathered from field studies of resting birds. These studies are mainly bird counts undertaken in aerial surveys conducted in late summer and during the winter.

The rotating blades and, to a lesser extent, the nonmoving parts of turbines will pose risks of collision for migrating or foraging birds / bats. In extreme cases, this can potentially cause significant impacts to populations that pass turbines or live in the surrounding area. These effects can potentially extend beyond the Danish borders and lead to transboundary impacts.

To expose potential impacts in relation to collision with wind turbines, radar surveys of bird migrations and their concentrations will be conducted in and near the investigation area for Aflandshage Wind Farm in 2019-2020. Radar surveys will be combined with visual observations and measurements of flight altitudes to map flight corridors for individual species and to help assess the significance of collisions in relation to population sizes.

### *3.3 Marine mammals*

The construction activities during the establishment of the Aflandshage Wind Farm will lead to an increase in underwater noise. As noise propagates faster and more efficiently in water than in air, particular construction methods creating large noise emissions, such as hammering monopile foundations for wind turbines, can potentially lead to underwater noise and its effects spreading beyond Denmark's borders in the Sound, and creating transboundary impacts. The spatial extent of underwater noise and possible impacts on marine mammals is modeled according to current guidelines from the Danish Energy Agency. Potential impacts on marine mammals from underwater noise are assessed by comparing threshold distances in which underwater noise will have an effect according to existing literature, with knowledge about the distribution and occurrence of marine mammals in and around the planned wind farm area.

### *3.4 Visual conditions*

The installation of wind turbines leads to a change in how the landscape appears and is experienced. The perception that the landscape is changed depends partly on the person that sees, but also on the contrast between a newly established technical facility in relation to the existing landscape.

The shortest distance from the wind farm investigation area to the Swedish coast at Falsterbo is approx. 12 km. Thus, the establishment of Aflandshage Wind Farm may potentially cause visual impacts along the Swedish coast.

A number of visualizations of the wind farm, including some from Swedish areas, will be prepared and form the basis for the assessment of the visual impact to the landscape.