Hornsea Project Four: Environmental Statement (ES)

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Volume A4, Annex 4.7: Layout Principles

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Revision Summary

Rev	*Date*	*Prepared by*	*Checked by*	*Approved by*
01	20/09/2021	Bjarke Lysgaard, Orsted	GoBe Consultants Ltd.	Julian Carolan, Orsted
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Revision Change Log

Rev	*Page*	*Section*	*Description*
02	6	Footnote	Insert of new footnote describing how bridge linked platforms are dealt with in Principle 2.

Glossary

Term	Definition
Helicopter refuge area	A defined area clear of any surface infrastructure. Note this area is not a defined navigation corridor under the principles of Marine Guidance Note (MGN) 654.
Hornsea Project Four Offshore Wind Farm	The term covers all elements of the project (i.e. both the offshore and onshore). Hornsea Four infrastructure will include offshore generating stations (wind turbines), electrical export cables to landfall and connection to the electricity transmission network. Hereafter referred to as Hornsea Four.
Hornsea Four array area	Consented development area where wind turbine generators (WTGs) and other associated surface infrastructure shall be constructed.
Internal development lane	A defined straight lane within which surface infrastructure shall be constructed.
Line of orientation	Consistent transit lines on the same bearing through the Hornsea Four array area. Lines of orientation form the centre lines of Search and Rescue (SAR) access lanes.
Order limits	The limits within which Hornsea Four (the 'authorised project') may be carried out.
Orsted Hornsea Project Four Ltd	The Applicant for the proposed Hornsea Project Four Offshore Wind Farm Development Consent Order (DCO).
Perimeter development lane	Surface infrastructure within a defined lane around the perimeter of the Hornsea Four array area in which infrastructure shall be constructed.
SAR access lane	A defined lane which allows search and rescue operations to transit safely along a line of orientation through the Hornsea Four array area.
Surface infrastructure	Includes wind turbines, offshore substations and accommodation platforms.
Wind turbine	All of the components of a wind turbine including the tower, nacelle, and rotor.
Wind turbine foundation	The wind turbines are attached to the seabed with a foundation structure typically fabricated from steel or concrete.

Acronyms

Acronym	Definition
AfL	Agreement for Lease
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
MCA	Maritime & Coastguard Agency
MGN	Marine Guidance Note
MMO	Marine Management Organisation
PEIR	Preliminary Environmental Information Report
SAR	Search and Rescue
TH	Trinity House
WTG	Wind Turbine Generator

Units

Unit	Definition
km	kilometres
m	metres
nm	nautical miles

1 Introduction

1.1.1.1 Orsted Hornsea Project Four Limited (hereafter 'the Applicant') is proposing to develop Hornsea Project Four Offshore Wind Farm (hereafter 'Hornsea Four'). Hornsea Four will be located approximately 69 km offshore the East Riding of Yorkshire in the Southern North Sea and will be the fourth project to be developed in the former Hornsea Zone (please see **Volume A1, Chapter 1: Introduction** for further details on the Hornsea Zone). Hornsea Four will include both offshore and onshore infrastructure including an offshore generating station (wind farm), export cables to landfall, and connection to the electricity transmission network (please see **Volume A1, Chapter 4: Project Description** for full details on the Project Design). The Order Limits combine the search areas for the onshore and offshore infrastructure.

1.1.1.2 The Hornsea Four Agreement for Lease (AfL) area was 846 km^2 at the Scoping phase of project development. In the spirit of keeping with Hornsea Four's approach to Proportionate Environmental Impact Assessment (EIA), the project has due consideration to the size and location (within the existing AfL area) of the final project that is being taken forward to Development Consent Order (DCO) application. This consideration is captured internally as the "Developable Area Process", which includes Physical, Biological and Human constraints in refining the developable area, balancing consenting and commercial considerations with technical feasibility for construction.

1.1.1.3 The combination of Hornsea Four's Proportionality in EIA and Developable Area process has resulted in a marked reduction in the array area taken forward at the point of DCO application. Hornsea Four adopted a major site reduction from the array area presented at Scoping (846 km^2) to the Preliminary Environmental Information Report (PEIR) boundary (600 km^2), with a further reduction adopted for the Environmental Statement (ES) and DCO application (468 km^2) due to the results of the PEIR, technical considerations and stakeholder feedback. The evolution of the Hornsea Four Order Limits is detailed in **Volume A1, Chapter 3: Site Selection and Consideration of Alternatives** and **Volume A4, Annex 3.2: Selection and Refinement of the Offshore Infrastructure**.

1.1.1.4 This Annex to the Hornsea Four Project Description (see **Volume A1, Chapter 4: Project Description**) presents the layout principles for Hornsea Four.

1.1.1.5 The Applicant has committed through Co96 (see **Volume A4, Annex 5.2: Commitment Register**) to reaching agreement with the Marine Management Organisation (MMO), in consultation with the Maritime & Coastguard Agency (MCA) and Trinity House (TH) on these layout principles.

1.1.1.6 The final layout of wind turbine generators (WTGs), platforms and array cables will not be determined until after consent has been awarded for Hornsea Four. The intention of these layout principles is to ensure the MMO can more easily sign-off the final layout by confirming the proposed layout complies with the agreed principles. Additionally, these principles demonstrate how the Hornsea Four DCO Application is compliant with Marine Guidance Note (MGN) 654 (MCA 2021) and its annexes.

1.1.1.7 It should be noted that the establishment of these layout principles does not preclude additional principles from discussion noting the MMO, in consultation with the MCA and TH, must sign-off of any layout compliant with these principles.

2 Layout Principles

Table 1: Hornsea Four Layout Principles.

Principle No.	Principle Description
Principle 1	All surface infrastructure shall be located within the Hornsea Four array area. No blade overfly or structural overhang is permitted outside of the Hornsea Four array area. The minimum distance from the centre of the WTGs to the Hornsea Four Order Limits is 150 m.
Principle 2	A minimum spacing of 810 m shall be maintained between the centre points of all surface infrastructure[1].
Principle 3	The layout shall include Search and Rescue (SAR) access lanes to facilitate SAR asset access. These lanes shall be parallel to turbine rows on a minimum one line of orientation subject to a safety justification (for surface navigation and SAR) within the Hornsea Four array area and shall satisfy the minimum width of 500 m required by MGN 654 (MCA 2021).
Principle 4	As per MGN 654, SAR access lanes shall allow a SAR asset to enter and exit the Hornsea Four array area on a consistent heading and without coming within a 250 m radius of any Hornsea Four surface infrastructure.
Principle 5	Dense boundaries are permitted around the Hornsea Four array area and shall comply with **Principles 1, 2, 3 and 4**.
Principle 6	If micro-siting WTGs, surface infrastructure may be positioned up to 50 m from the centre defining a turbine row. This is a maximum distance and any micro-siting required shall be included within this parameter and comply with **Principles 1, 2, 3 and 4**. Should geological constraints prevent a structure from being positioned within 50 m of the line defining a turbine row then the distance may be increased up to 150 m subject to agreement with the MMO, in consultation with TH and the MCA. WTG positioning will comply with **Principles 1, 2, 3 and 4**.
Principle 7	Perimeter type boundaries around the Hornsea Four array area may be arranged in a curved line where required to manage the interrelationship with existing or proposed offshore infrastructure from third parties. This is subject to the degree of curvature being agreed with the MMO in consultation with TH and the MCA. WTG positioning will comply with **Principles 1, 2, 3 and 4**.
Principle 8	As per MGN 654, a Helicopter Refuge Area shall be included within the Hornsea Four array area where SAR access lanes exceed circa 10 nm length and shall be perpendicular to the SAR access lanes. The width of the Helicopter Refuge Area shall be a minimum 1 nm measured from the centre point of surrounding infrastructure to centre point of surrounding infrastructure and with the length covering the extent of the Hornsea Four array area.
Principle 9	The minimum separation distance between the Hornsea Four array area and Hornsea Project Two Offshore Wind Farm array area will be no less than 2.2 nm as measured from the centre-point of WTGs.

[1] Two bridge linked platforms are not included in this principle and considered a single structure for this purpose.

3 References

MCA (2021). Marine Guidance Note 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response. Southampton: MCA.