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| Project Title | Dogger Bank Offshore Wind Farm |
| Date: | 26th May 2020 |

# Dogger Bank Offshore Wind Farm

# **Decommissioning Programme**



| Rev | Prepared By | Sign Off | Checked By | Sign Off | Approved By | Sign Off | Date of Issue |
|---|---|---|---|---|---|---|---|
| 1 | Melisa Vural | | David Scott | | Alan Borland | | 26/05/20 |

Alan Borland (May 26, 2020 16:27 GMT+1)

## Table of Contents

## Executive Summary

Dogger Bank Offshore Wind Farm Project 1 Projco Limited and Dogger Bank Offshore Wind Farm Project 2 Projco Limited are a Joint Venture between SSE and Equinor, known as Dogger Bank Wind Farm, which have been set up to take forward the development of the Dogger Bank A & B Offshore Wind Farms. Consent was granted for the Projects in February 2015 under The Dogger Bank Creyke Beck Offshore Wind Farm Order 2015 (as amended) (the DCO).

The DCO grants development consent for construction, operation and maintenance of two offshore wind farms of up to 200 wind turbine generators per project, each fixed to the seabed by monopile, multi leg or gravity base foundations. The DCO additionally grants four deemed Marine Licences for the marine licensable activities, including the deposit of substances and articles and the carrying out of works involved in the construction and operation of the wind farm and associated development. Through the detailed design process, it has been determined that each wind farm will comprise of 95 wind turbines and one offshore substation.

Construction works commenced in January 2020, with offshore works at the landfall due to commence in late 2020 and the main offshore works commencing in 2022. The operational lifetime of Dogger Bank A & B is expected to be at least 25 years, with the possibility for further extension at the end of this period. At the time of decommissioning, the Projects will be decommissioned in accordance with the legislation and guidance that are available at that time.

In conjunction with complying with relevant legislation on decommissioning, Dogger Bank Wind Farm is committed to decommissioning the wind farms with minimal environmental impact. This will be achieved by restoring the site to as close to the original state as far as is reasonably possible. Data collected from pre-decommissioning surveys, alongside the results of relevant monitoring that has been undertaken to assess the effects of the construction and operation of the wind farms will be presented to the relevant authorities to inform the decommissioning requirements and methodologies.

Towards the end of the Projects' operation, a decision will be made as to whether the operational lifetime of the project can be extended e.g. by repowering. This option could postpone the decommissioning phase. When it is determined that the Projects have reached the end of their operational lifetime, this Decommissioning Programme and the Environmental Statement issued in 2013 will be reviewed and updated as necessary to enable the appropriate licences to be obtained.

This Decommissioning Programme provides preliminary information on the proposed methods and approaches to decommissioning the offshore installations (as required by the Energy Act 2004, as amended). As changing circumstances and technological advancements are expected over the Projects' lifetime, these proposals are subject to continuous updates during the development and operational phases.

# 1 Introduction

Dogger Bank Offshore Wind Farm Project 1 Projco Limited and Dogger Bank Offshore Wind Farm Project 2 Projco Limited are a Joint Venture between SSE and Equinor, which have been set up to take forward the development of the Dogger Bank A and B Offshore Wind Farms (herein referred to as the Project(s)). Consent was granted for the two Projects in February 2015 under The Dogger Bank Creyke Beck Offshore Wind Farm Order 2015 (as amended) (the DCO).

The Decommissioning Programme is being submitted to the Department of Business, Energy and Industrial Strategy (BEIS) for approval in accordance with Section 105 of the Energy Act 2004 and in line with Requirement 10 of the DCO. This document provides preliminary information on methods and approaches to decommissioning the Dogger Bank A and B offshore installations (as required by the Energy Act 2004).

In considering the Decommissioning Programme, the Projects have sought to adhere to the following key principles:

- Safety for all at all times;
- Consideration of the rights and needs of legitimate users of the sea;
- Minimise environmental impact by having regard to the best practicable environmental option;
- Promote sustainable development;
- Adhere to the Polluter Pays Principle;
- Maximise the reuse of materials;
- Commercial viability; and
- Practical integrity.

This Decommissioning Programme is informed and supported by the existing environmental assessment for the consented Projects, namely the Environmental Statement (ES) (Forewind, 2013) and Habitats Regulations Assessment (DECC, 2015). The programme will be subject to regular reviews and updated, as appropriate, throughout the lifecycle of the Projects to reflect changes to regulatory requirements, changing circumstances and to incorporate any improvements in knowledge and understanding of the decommissioning process and impacts on the marine environment. Prior to decommissioning is it expected that a detailed environmental assessment will be undertaken to support the marine licence application for the activities.

## 1.1 Purpose of this Document

The expected operational lifetime of the Projects is at least 25 years, depending on conditions during the Projects' lifecycle. Towards the end of the expected operational lifetime a decision will be undertaken as to whether ongoing operation is feasible. This decision could extend the Projects' lifecycle and subsequently postpone the decommissioning phase. At the end of its lifetime, the wind farms will be decommissioned to restore the site to its original condition as far as possible.

This Decommissioning Programme is being submitted to BEIS to discharge DCO, Schedule 1, Part 3, Requirement 10 which states:

*'No offshore works may commence until a decommissioning programme in compliance with any notice served on the undertaker by the Secretary of State under section 105(2) of the 2004 Act(b) has been submitted to the Secretary of State for approval'.*

Dogger Bank A and B received notice under section (105) (2) of the Energy Act 2004 requiring a decommissioning Programme to be prepared and approved before offshore construction commences.

# 2 Background Information

## 2.1 Location

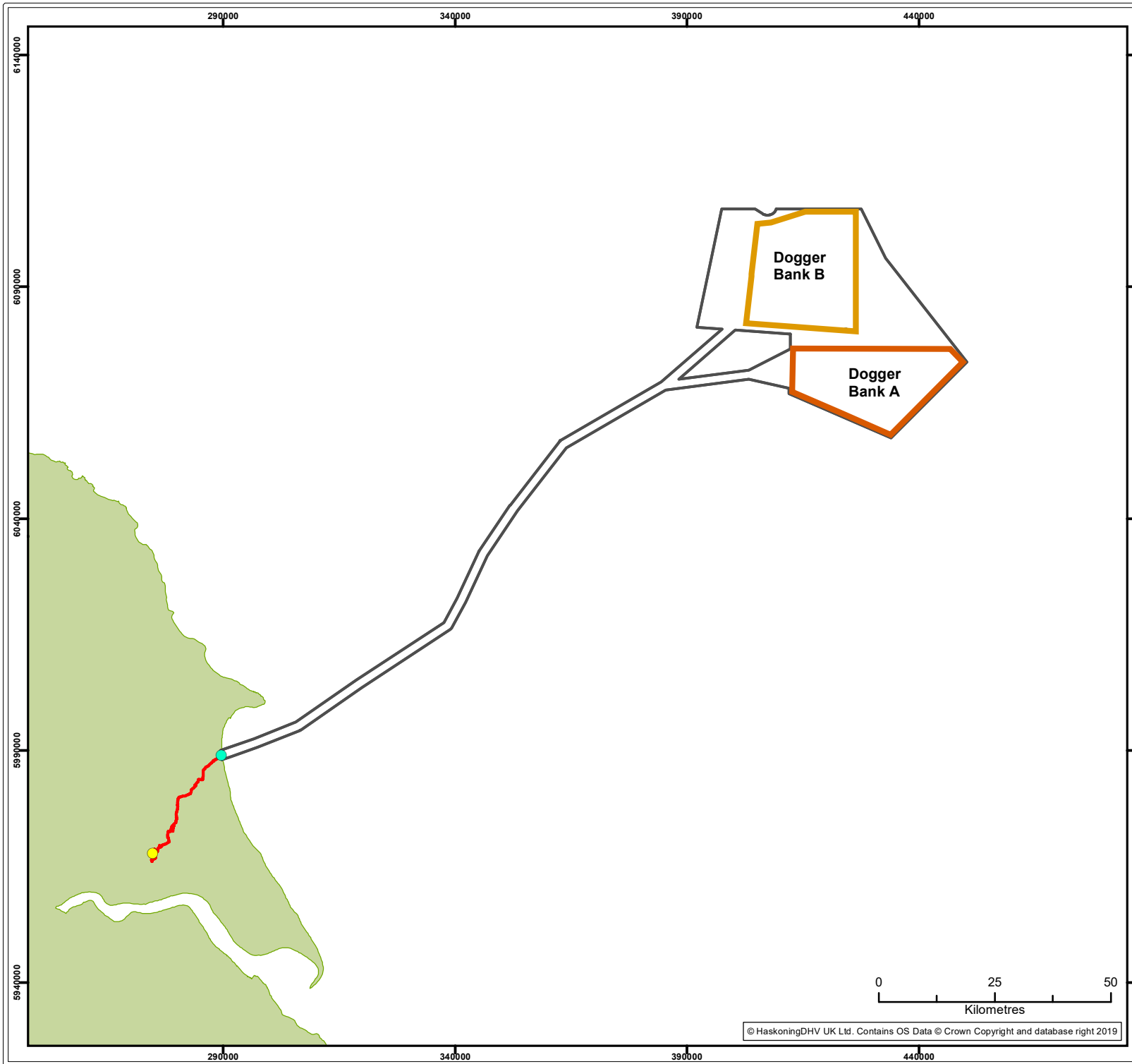
Dogger Bank A and B are located in the Southern North Sea and are approximately 131 kilometres (km) from shore at their closest point. Dogger Bank A covers an area of 515 square kilometres ($km^2$) and Dogger Bank B covers 599 $km^2$. The offshore export cables, which run from the offshore substation platforms to the landfall, are 191 km in length for Dogger Bank A and 172 km for Dogger Bank B. These cables come ashore to the north of Ulrome on the Holderness Coast and run approximately 30 km inland to two new converter stations, situated north of the A1079 between Beverley and Cottingham in East Yorkshire. The location is shown in **Figure 2.1**.

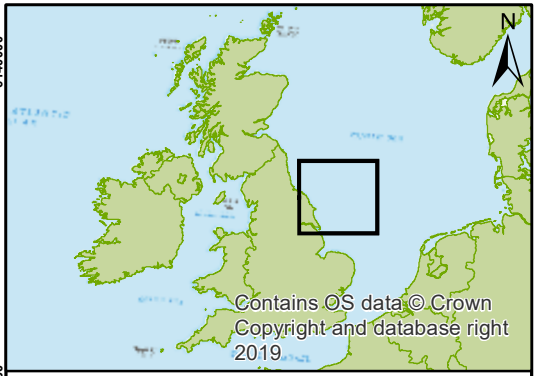
## 2.2 Project Design and Background

Based on the detailed design the offshore infrastructure (i.e. below MHWS) for Dogger Bank Dogger Bank A and B will each comprise the following:

- 95 offshore wind turbines with a rotor diameter of 220 m, a tip height of 260 m above LAT on a monopile foundation with a diameter of up to 10 m;
- One offshore substation on a jacket foundation installed with pin piles;
- ~325km Inter-array cables connecting turbines with the offshore substation; and
- Two HVDC export cables.

The proposed turbine layouts for the Projects are shown in **Figure 2.2** for Dogger Bank A and in **Figure 2.3**.




Legend:

- DCO Order limits - offshore
- DCO Order limits - onshore
- Dogger Bank A
- Dogger Bank B
- Converter station location
- Landfall location

| Client: | Project: |
|---|---|
| Doggerbank Offshore Wind Farm Project 1 Projco Ltd. and Doggerbank Offshore Wind Farm Project 2 Projco Ltd. | Dogger Bank Creyke Beck |

Title: Location Plan

Figure: 2.1 Drawing No:

| Revision: | Date: | Drawn: | Checked: | Size: | Scale: |
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| 01 | 28/02/2020 | JT | GC | A4 | 1:1,150,000 |
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Co-ordinate system: WGS84 UTM31N

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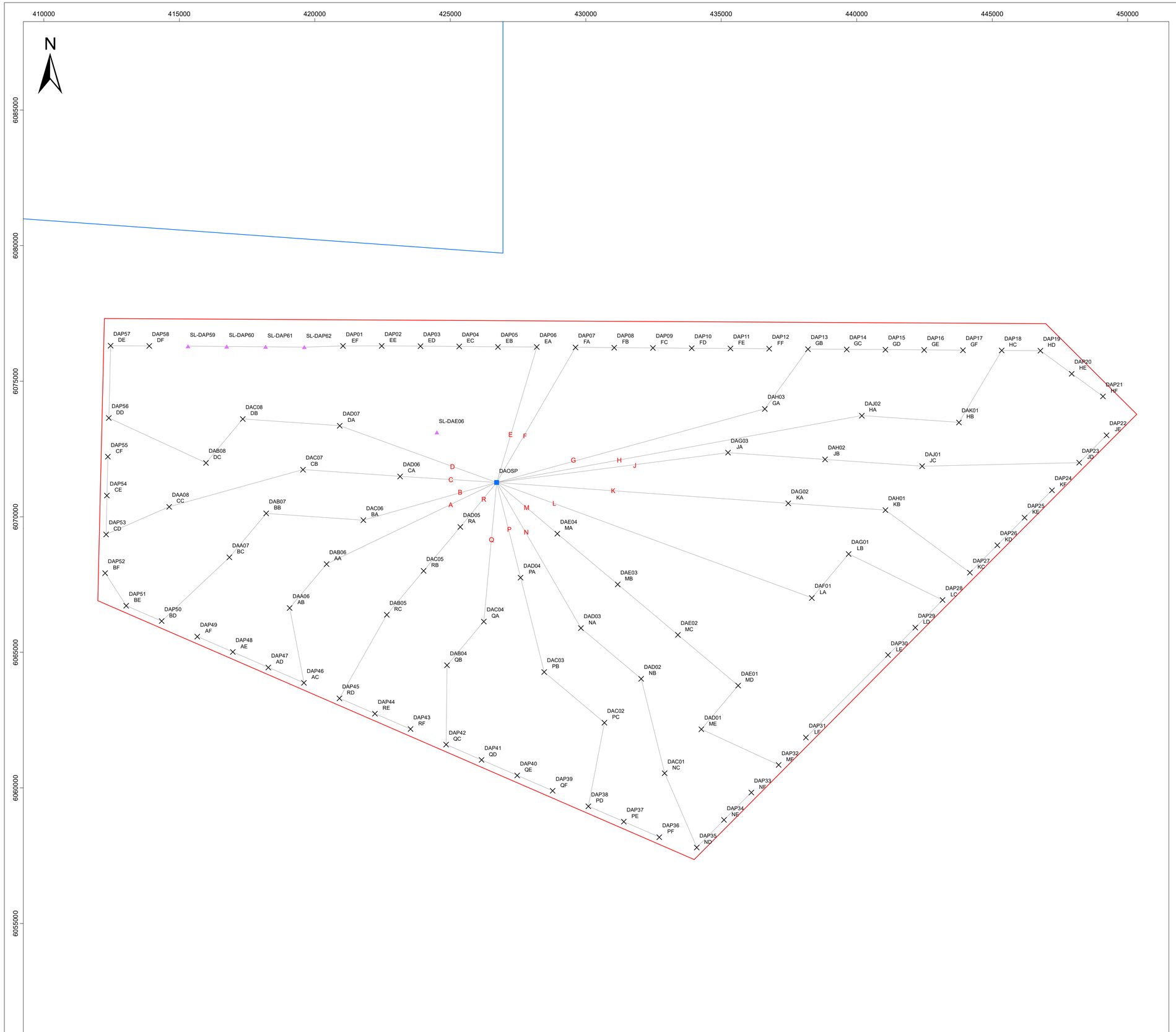


## Legend

- Dogger Bank A
- Dogger Bank B
- Turbine
- OSP
- Spare
- Proposed Inter Array Cable Routes

0 1 2 4 nm

0 2 4 8 km

Data Source:

Drawing Title

# DOGGER BANK A WTG LAYOUT

| Rev | Date | Remarks | Drwn | Chkd |
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| 00 | 04/03/2020 | First issue | MM | LR |
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Drawing Number

Figure 2.2
DB-M-DES-0039-01

| Scale | Plot Size | Datum | Projection |
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DOGGER BANK WIND FARM BY sse Renewables equinor

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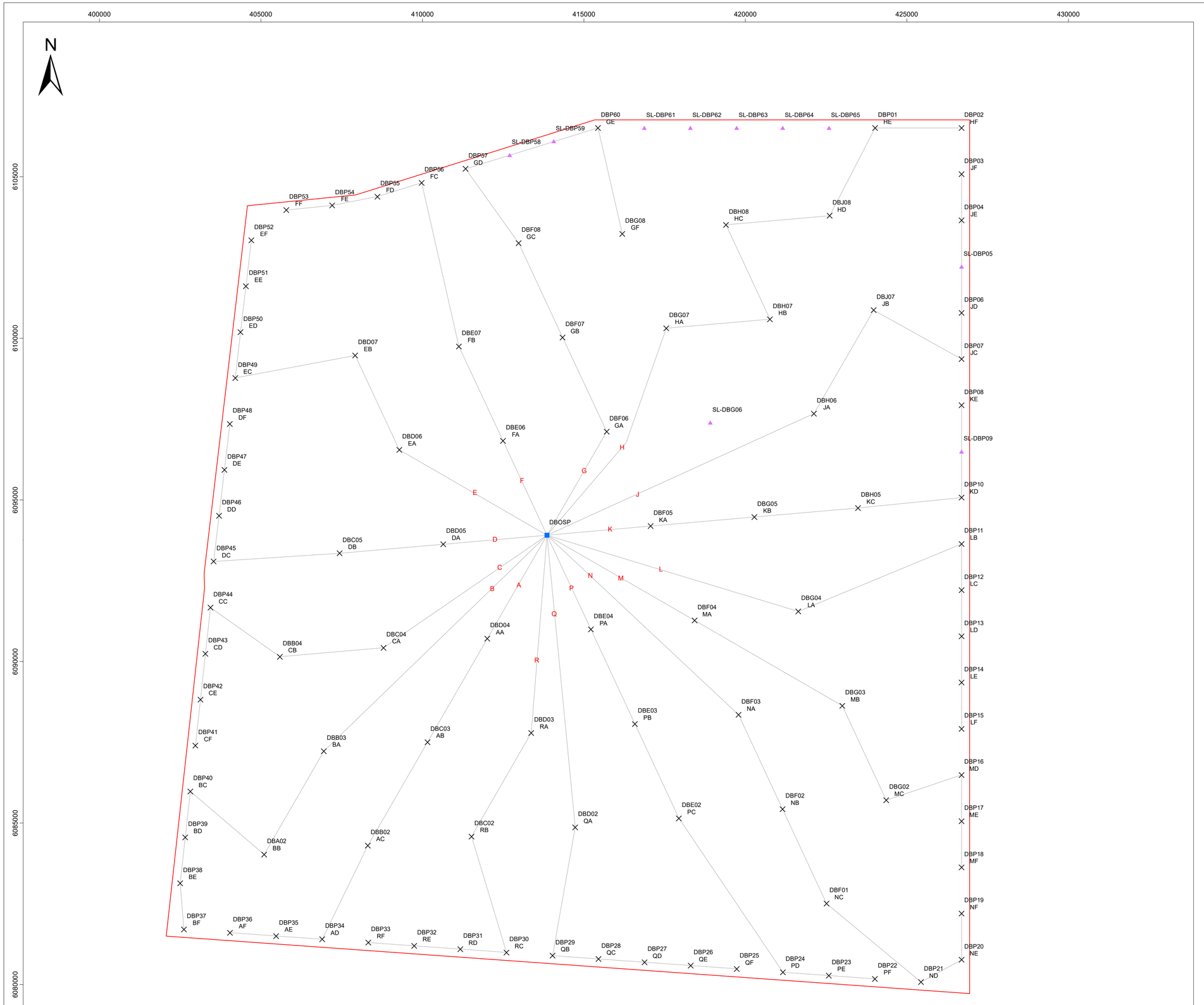


## Legend

- Dogger Bank B
- Turbine
- OSP
- Spare
- Proposed Inter Array Cable Routes

0 1 2 4 nm

0 2 4 8 km

Data Source:

Drawing Title

# DOGGER BANK B WTG LAYOUT

| Rev | Date | Remarks | Drwn | Chkd |
|---|---|---|---|---|
| 00 | 04/03/2020 | First issue | MM | LR |
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Drawing Number

Figure 2.3
DB-M-DES-0039-02

| Scale | Plot Size | Datum | Projection |
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## 2.3 Site characteristics

This section provides a brief summary of some of the key characteristics of the offshore site, including the wind farm array and export cable route and is structured around the environmental attributes identified in the BEIS 2019 guidance on what should be included.

The information is included in **Table 2.1** and is summarised from the ES (Forewind, 2013) and HRA (DECC, 2015) but has been updated where appropriate, for example to include details of nature conversation sites designated since consent was granted. As outlined in **Section 6**, the information in this section will be reviewed and updated based on any surveys undertaken prior to decommissioning activities taking place.

**Table 2.1: Summary of the Dogger Bank site characteristics.**

| **Offshore Physical Environment** | |
|---|---|
| Metocean Conditions | Tidal currents flowing across Dogger Bank A and B are mainly directed north to south and south to north with current velocities usually less than 0.4 meters per second (m/s). Tidal currents flowing across the export cable corridor vary from 0.4 m/s close to the array site to over 1.2 m/s near to shore off Flamborough Head. Measured waves in Dogger Bank A and B have a mean significant wave height of 1.7 m with a maximum value of 6 m. Waves at the array end of the corridor have a mean significant wave height of 1.7 m, decreasing to 1.0 m towards the landfall site. |
| Bathymetry | Water depths across the array sites range from approximately 20 metres (m) to 40 m below Lowest Astronomical Tide (LAT), with the shallowest depths occurring to the southwest of Dogger Bank A at the summit of ridge forms or the crests of sand waves. The deepest areas occur to the north of Dogger Bank B and in the centre of the Dogger Bank A site.<br><br>Along the export cable corridor water depths vary from a maximum of 66 m below LAT along the central part of the corridor, shallowing to 2.5 m below LAT close to shore. |
| Seabed Conditions | Surveys undertaken for the ES showed that the majority of the Dogger Bank A and B seabed consists of sand, with small proportions of gravel and mud (less than 5%) and therefore were categorised as slightly gravelly sand. Smaller patches of gravel were seen across the array sites with areas where the underlying geology, the Dogger Bank Formation, is exposed at the seabed. The majority of the offshore export cable corridor comprises relatively uniform sandy sediments, with some mixing with gravels and muds where the export cable corridor joins the wind farm site.<br><br>Sand waves (wavelengths greater than 25 m) and megaripples (wavelengths between 0.5 and 25 m) sculpted into both gravel and sand substrates are present in patches across the sites. Surveys indicate that the sand waves are symmetrical with wavelengths of 50 - 150 m (average approximately 100 m) and amplitudes up to 2 m (average approximately 0.5 m). Their crests are aligned in east-northeast to west- |

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| | southwest directions, but their symmetrical nature suggests that they are not actively migrating in any one direction. |
| **Human Environment** | |
| Infrastructure and Other Users | On Dogger Bank, there are two other consented wind farm projects, Dogger Bank C (formerly Teesside A), also owned by Dogger Bank Wind Farm and Sofia Offshore Wind Farm (formerly Teesside B) owned by Innogy. Part of the wider export cable corridor for these projects overlaps the southern boundary of the Dogger Bank B array site and crosses the Dogger Bank B export cable corridor.<br><br>The Cygnus gas field is situated to the south east of Dogger Bank A (licence blocks 44/11 and 44/12). Within this field, the planned Cygnus Alpha and Cygnus Bravo developments are approximately 23 km and 16 km respectively from the boundary of Dogger Bank A.<br><br>One active telecommunications cable, TATA North Europe (Operator TATA Communications), and two out of service/disused telecommunications cables, UK-Germany 6 (Cable and Wireless/BT Subsea) and UK-Denmark 4 (BT Subsea) cross or are in close proximity to the Dogger Bank boundary. The TATA North Europe cable passes along the northern boundary of Dogger Bank A and crosses the northern branch of the export cable corridor entering the Dogger Bank Zone. The UK-Germany 6 cable crosses the southern area of Dogger Bank A and the export cable corridor. The UK-Denmark 4 cable runs close to the Projects but does not cross the boundary of Dogger Bank B, passing just to the north.<br><br>The SEAL pipeline (operator – Shell UK) passes along the western boundary of Dogger Bank B and crosses the export cable corridor 12.5 km from the boundary of Dogger Bank A. The Langeled gas pipeline (operator – Gassco) crosses the export cable corridor at a distance of 51.5 km from the export cable landfall. |
| Commercial Fisheries | Fishing activity within the array site and export cable route consists of vessels from numerous countries including the UK and Denmark, targeting several commercial species of fish (e.g. sandeel, plaice and sole) and shellfish (lobsters and edible crab) in the inshore area.<br><br>Predominant fishing methods utilised at the Dogger Bank A and B arrays sites are trawlers including beam, demersal and pelagic. Potting is the predominant activity in the inshore area, along with scallop dredging which was recorded primarily to the immediate north of the export cable corridor.<br><br>Areas to the west of the Dogger Bank Zone are particularly important for sandeel fishing, whilst potting for lobster and crab dominates in the nearshore parts of the export cable corridor. |
| Shipping and Navigation | The 2011 marine traffic survey identified seven commercial routes which transit within the 10 nm buffer of the Dogger Bank A and B array sites, with four of these routes crossing through the array sites. The |

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| | majority of vessels using these routes are cargo, with the most frequent route being used once every three days.<br><br>During the spring/summer surveys, almost half of the vessels recorded were fishing vessels, with cargo vessels being the next most frequently recorded. In autumn and winter the most frequent vessel type recorded was cargo making up almost half of the vessels recorded, with a quarter of vessels in this period being fishing vessels. The level of recreational vessel activity was noted as being low based on the survey data at the array site.<br><br>Along the export cable the majority of vessels recorded passing over the export cable corridor were cargo vessels, tankers and fishing vessels. |
| Military Activities and Civil Aviation | Airspace above and adjacent to Dogger Bank A and B is utilised by both military and civil aircraft, however these will be flying at an altitude at which the presence of a wind farm will not pose any issues. The Ministry of Defence has a number of military Practice and Exercise Areas (PEXAs) located within the vicinity of the Projects, one which overlaps the export cable corridor and one overlapping the whole export cable corridor and array site. |
| **Nature Conservation Designations** (based on those considered in the Appropriate Assessment during consenting of the Project, or any newly consented sites that may need consideration) | |
| Special Protection Areas (SPAs) | A likely significant effect (LSE) could not be ruled out for the following sites and features, and therefore they were considered in the appropriate assessment for the Projects:<br><br>• Farne Islands for Common Guillemot, Atlantic Puffin and Black-Legged Kittiwake.<br><br>• Flamborough and Filey Coast SPA (of which Flamborough Head and Bempton Cliffs SPA is now a part of) for Common Guillemot, Atlantic Puffin, Black-Legged Kittiwake, Razorbill, Northern Fulmar and Northern Gannet.<br><br>• Forth Islands for Atlantic Puffin, Lesser Black-Backed Gull, Northern Gannet, Black-Legged Kittiwake, Common Guillemot, Razorbill and Northern Fulmar.<br><br>The Greater Wash SPA has now been designated which overlaps in the nearshore with the export cable route. |
| Special Areas of Conservation (SACs) | An LSE could not be ruled out for the following site and feature:<br><br>• Dogger Bank SAC for sandbanks which are slightly covered by sea water at all times.<br><br>The Southern North Sea SAC has now been designated for harbour porpoise. The Dogger Bank array sites overlap fully with the summer area of this SAC. |

# 3 Items to be Decommissioned

This section of the Decommissioning Programme contains details of the items which will require decommissioning, in particular the wind turbine generators (WTGs), foundations, offshore substation platform (OSP), export cables, inter-array cables and scour protection. At the time of writing, some design details such as exact locations of infrastructure (e.g. due to micro-siting to avoid environmental and engineering constraints) are not finalised. These details will be updated in future revisions of this Decommissioning Programme.

## 3.1 Generation Assets (non-OFTO)

### 3.1.1 *Wind Turbines*

Ninety five WTGs, each with a capacity of 12 MW, will be installed in each of Dogger Bank A and B. The towers will be assembled from three sections bolted together, with internal service platforms and ladders. The rotor diameter will be 220 m with a nacelle positioned on top of the tower section, containing the generator, transformers and other equipment. To enable maintenance and emergency access, there will be a heli-hoist platform on top of the nacelle. Each turbine consists of the following components:

- A tubular steel tower;
- A nacelle on top of the tower; and
- A three-blade rotor, with each blade 107 m in length.

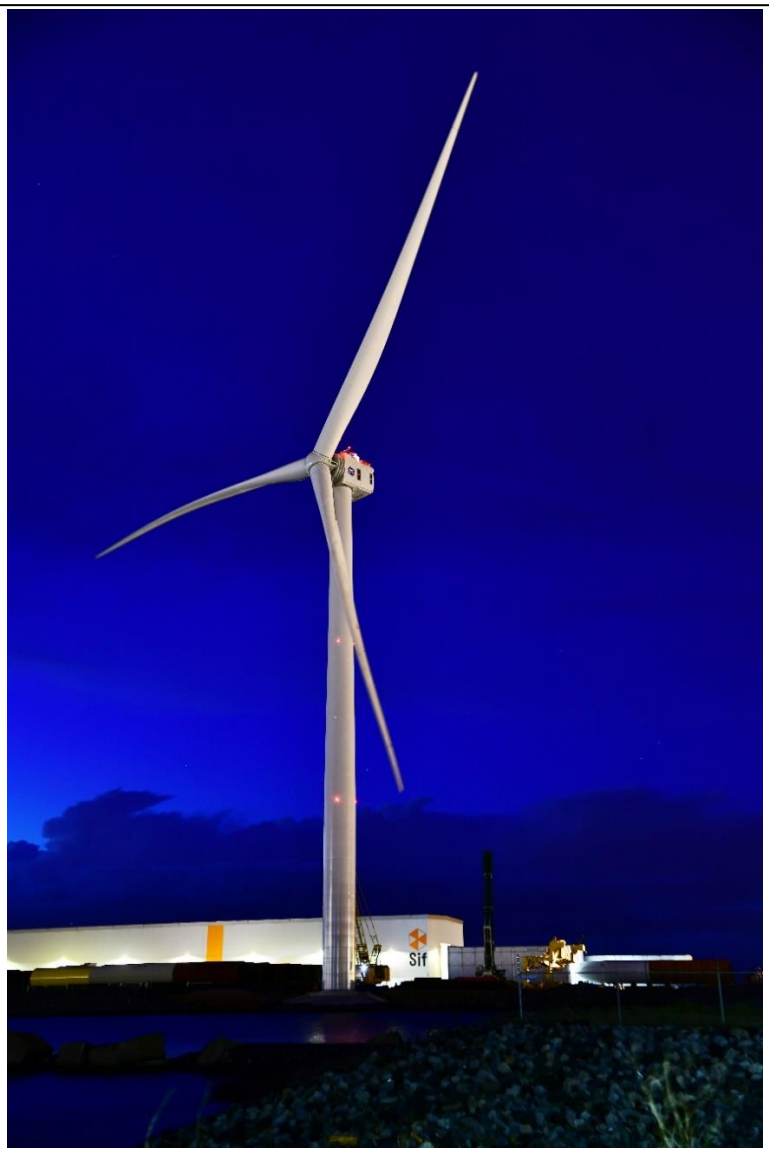
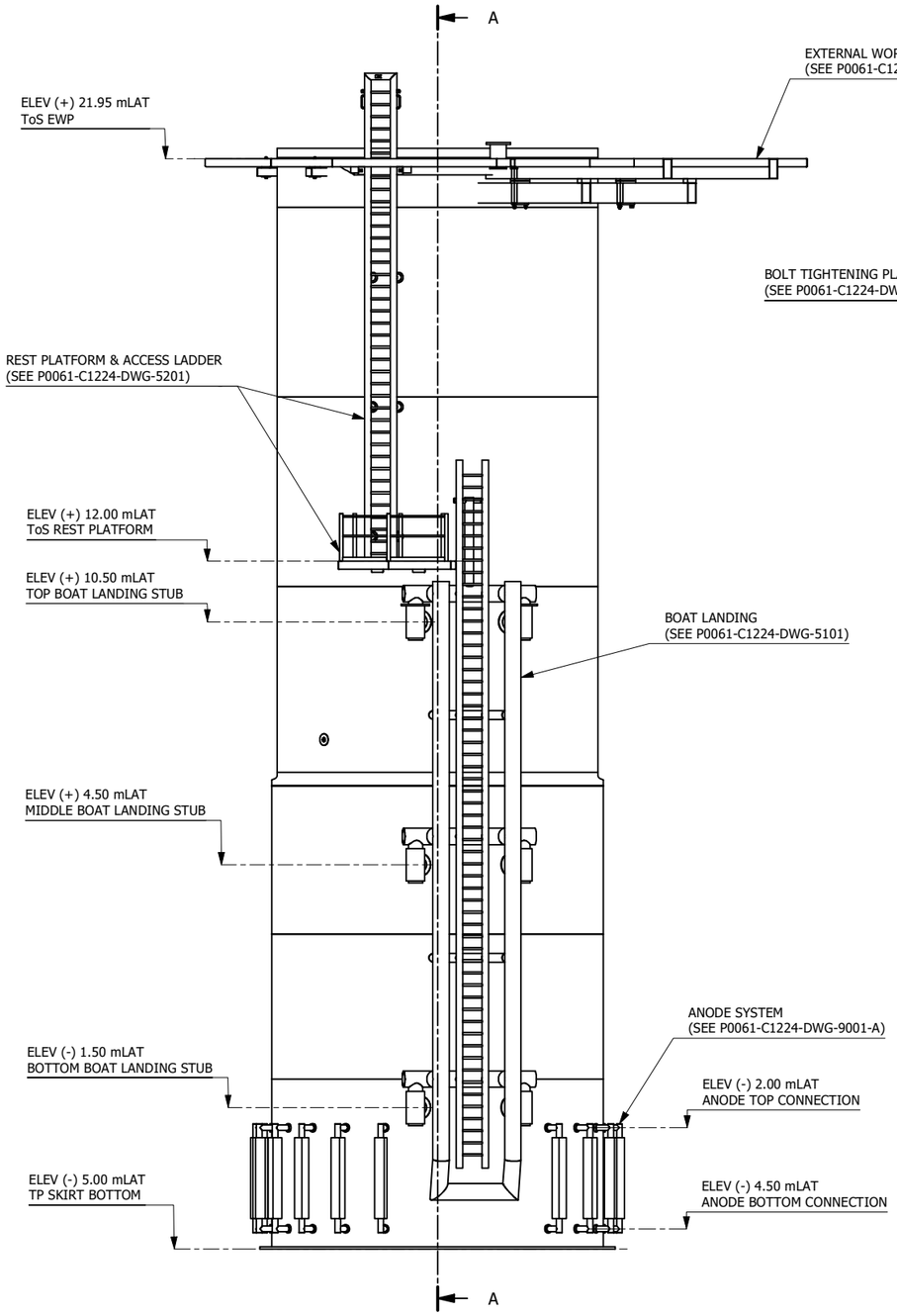



**Figure 3.1: Image of GE Haliade-X 12MW PrototypeTurbine**

### 3.1.2 *Wind turbine foundations*

Each turbine will be installed on top of a monopile foundation which will be up to 10 m in diameter. A transition piece (TP) connected to the top of the monopile will allow personnel to access the turbine tower for maintenance. The Monopiles range in mass from 840 Tonne (T) – 1200 T, with a length varying from 55 m – 70 m (indicative MP drawing is provided in **Figure 3.2** below). The Transition pieces will be approximately 375 T and 27 m tall.




EXTERNAL VIEW OF TP
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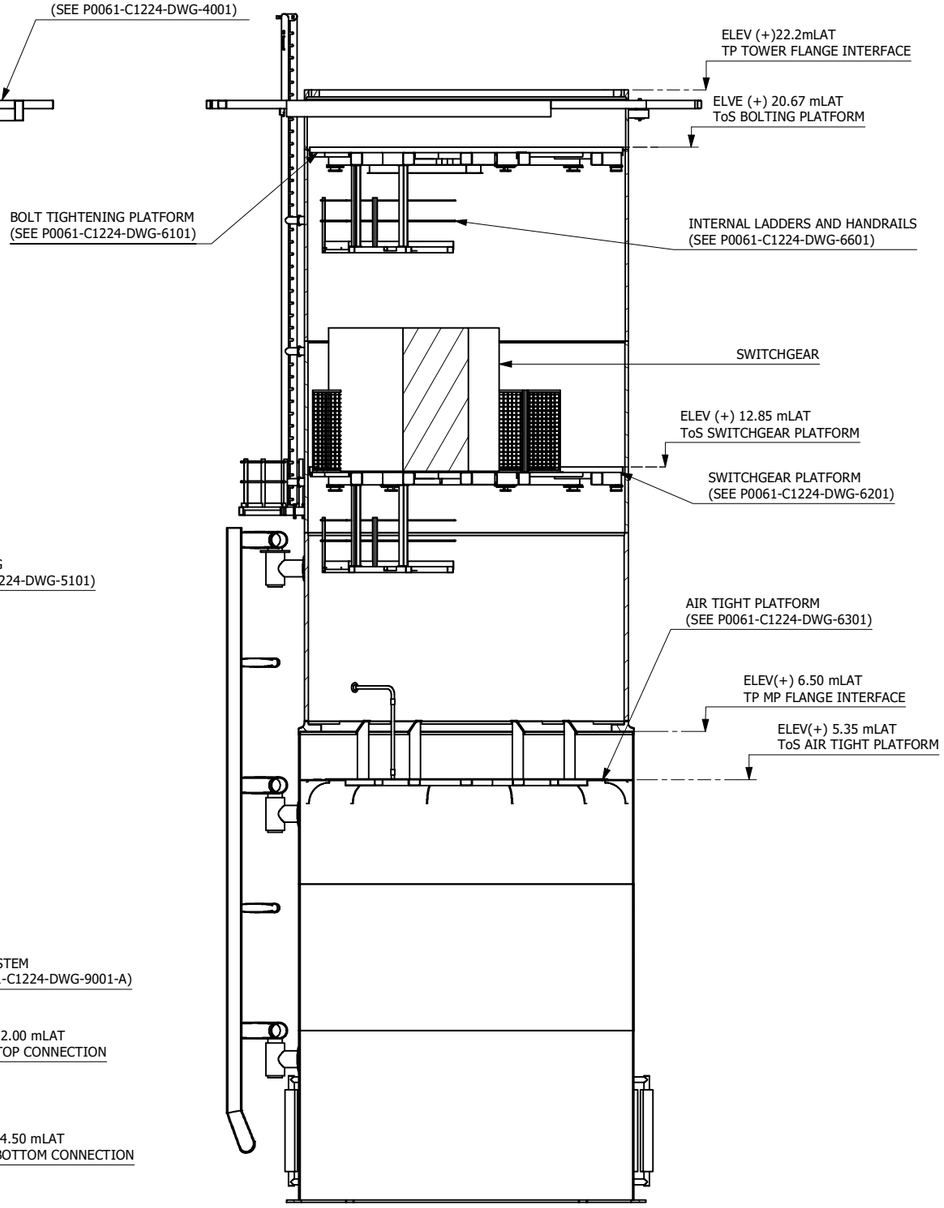
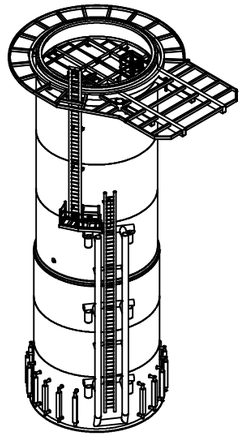



SECTION A-A
INTERNAL VIEW OF TP
( 1 : 150 )



ISO VIEW OF TP

## NOTES

1. ALL ELEVATIONS TO LAT
2. FOR GENERAL NOTES AND FABRICATION DETAILS REFER TO SECONDARY STRUCTURES SPECIFICATION (P0061-C1224-WP04-SPC-001)

DISCLAIMER: THE INFORMATION SHOWN ON THIS DRAWING IS AN EARLY CONCEPT & THEREFORE AT A LOW LEVEL OF MATURITY. THIS DESIGN IS TO BE USED FOR FABRICATION TENDER ONLY. DESIGN MAY BE LIABLE TO CHANGE AS THE PROJECT PROGRESSES.

| Rev | Date | Drawn | Chkd | Appr | Description |
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| A | 28/01/20 | RH | WPH | JMC | PRELIMINARY DESIGN ISSUED FOR ITT. |

Client

DOGGER BANK WIND FARMS BY sse equinor

Client's Drawing Number

Figure 3.2

| WT Project No. | WT Project Title |
|---|---|
| P0061 | CREYKE BECK A OFFSHORE WIND FARM |

WT WOOD THILSTED Web: info@woodthilsted.com

Title

TP1 - General Arrangement

| Scale | Sheet Size | WT Drawing Number | Rev |
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| AS SHOWN | A3 | P0061-C1224-DWG-0101 | A |

### 3.1.3 *Inter-Array Cables*

There will be approximately 325km of 66kV inter-array cables per project to link the WTGs and the OSPs, comprising of 16 inter-array cable strings for each of the windfarms. All the inter-array cables shall be pulled in to the OSP through pre-installed J-tubes and to the WTG foundations through a monopile entry hole. Field layout for DBA and DBB are under development and alternatives regarding two or three different cable dimensions are the subject of ongoing consideration and assessment.

The inter-array cables will be three-core composite cables with aluminium round compacted conductors, XLPE (cross-linked polyethylene) insulation, copper wire screen aluminium polyethylene laminated tape, polyethylene sheath, PPY (poly propylene yarn), galvanised steel wire armour, PPY with one interstitial optical fibre cable. These components as well as a cross-section of the cable is included in **Figure 3.3.**

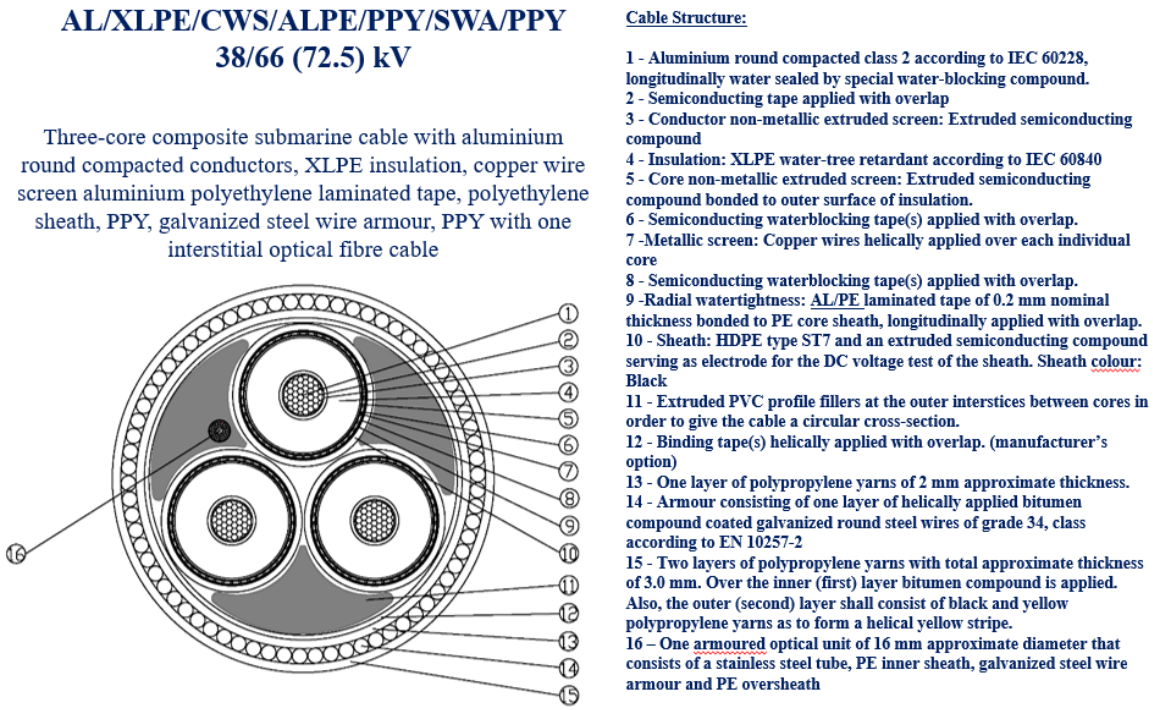



**Figure 3.3: Detailed information on the inter-array cables that will be in place.**

### 3.1.4 *Scour and Cable Protection*

The need and design of any scour and/or cable protection has not yet been determined. Should such protection be required, the design chosen will depend on the ground conditions, as well as the scour and environmental assessments. Once the need and amount of protection has been determined, and the associated decommissioning requirements are understood, this Decommissioning Programme will be updated with this information.

## 3.2 Offshore Transmission Assets

### 3.2.1 *Export Cables*

Four 320 kV offshore HVDC export cables, one circuit (2 cables) for each project, consisting of - single core copper cross linked polyethylene (XLPE) insulated (steel wire armour) SWA cables with a cross sectional area of 1770 $mm^2$ will run approximately 190 km to the landfall north of Ulrome, East Yorkshire where they will connect with the onshore transmission works.

### 3.2.2 *Offshore Substations*

Dogger Bank A and B will each have one OSP which will comprise of a typical topside installed on a jacket foundation secured to the seabed with four pin piles (**Figure 3.4**). The DBA OSP design comprises a combined HVDC and collector substation which houses the HVDC transmission equipment for onward power transmission to the shore, the 66 kV array interface equipment and associated step up transformers. The platform is designed as a Normally Unmanned Installation (also referred to as Normally Unattended Installation, NUI). The generation assets are connected to the HVDC platform through HVAC inter array cables. These cables are routed in dedicated J-tubes and then connected to the transmission system from 66 kV switchgear through HVDC converter to the DC export cable connections (with associated equipment). Two outgoing DC export cables (+/-) are routed from the dedicated 320 kV DC terminations to the hang-off areas and into each of export J-tubes and out into the seabed.

Dogger Bank A platform key figures:

- Mean Sea Level (MSL) is 27 m.
- Key figures Topside (at present):
    - Size: 65 x 39 m
    - Height: 36.26 m (including cast node)
- Key figures jacket (as present):
    - Size: 37.7 x 37.7 m
    - Height: 47.22 m

The OSP's for Dogger Bank A and Dogger Bank B are expected to be similar in design.

**Figure 3.4: A representative image of an offshore platform, similar to the ones that will be used for Dogger Bank A & B.**

## 4 Proposed Decommissioning Measures

This section describes the proposed measures to decommission the component elements of the Projects. As described above, given the construction of Dogger Bank A and B has yet to take place, some detail is subject to final design, for example confirmation of the built locations of cables and where scour protection has been placed. Nevertheless, the following sections present the anticipated decommissioning methods. The decommissioning techniques outlined in this section are based on those which are currently available. It is anticipated that decommissioning methods and the technology available for offshore wind farms will develop during the lifetime of these Projects, and therefore this Decommissioning Programme will be reviewed and updated in light of any new approaches that may be more appropriate than those presented below.

### 4.1 Planned Phasing/Integration

Dogger Bank Wind Farm will liaise with other offshore wind farm developers and / or OFTOs in the vicinity of the Dogger Bank Projects to identify and evaluate any potential opportunities for synergies or economies of scale through decommissioning facilities at the same time. If any opportunities are identified these will be discussed and agreed with the relevant authorities at the time of decommissioning and this document updated accordingly.

### 4.2 Guiding Principles for Decommissioning

The proposed approach to decommissioning has been developed based on the following principles:

- Safety for all at all times;
- Consideration of the rights and needs of legitimate users of the sea;
- Minimise environmental impact by having regard to the best practicable environmental

option, the option which provides the most benefit or least damage to the environment as a whole, in both the long and short term;

- Adhere to the Polluter Pays Principle;
- Maximise the reuse of materials;
- Commercial viability; and
- Practical integrity.

Alongside these, Dogger Bank Wind Farm has considered the UK's commitments under the United Nations Convention for the Law of the Sea (UNCLOS), International Maritime Organisation (IMO) standards and the work of the Convention of the Protection of the Marine Environment of the North-East Atlantic (OSPAR).

Based on these principles and commitments the proposed approach for decommissioning is that:

1. All structures above the seabed are removed i.e. wind turbines, offshore platforms and foundations above the seabed; and
2. Cables and lower sections of foundations which are beneath the seabed are left *in situ*.

This approach has been chosen to minimise the disturbance of the seabed from decommissioning whilst ensuring that there is no risk to the safety of other users or that the materials will become exposed at any future time. This approach will be subject to consultation at the time of decommissioning to determine and agree the best approach and survey information on cable burial. This will be based, at the time of decommissioning, on the 'Comparative Assessment Framework' which is set out in the decommissioning guidance for the Oil and Gas sector which would assess the potential decommissioning options and which is the most appropriate based on a number of criteria.

Components to be left *in situ* following decommissioning will adhere to the standards set out by the IMO which requires consideration of:

- Any potential effect on the safety of surface or subsurface navigation, or of other uses of the sea;
- The rate of deterioration of the material and its present and possible future effect on the marine environment;
- The potential effect on the marine environment, including living resources;
- The risk that the material will shift from its position at some future time;
- The costs, technical feasibility, and risks of injury to personnel associated with removal of the installation or structure; and
- The determination of a new use or other reasonable justification for allowing the installation or structure or parts thereof to remain on the seabed.

Considering these principles, it is anticipated that the complete removal of the cables will require a large number of operations, likely involving divers or other heavy equipment. This process would require significantly more vessel time with the operations potentially resulting in a higher risk of injury, due to increased working days at sea.

Complete removal of the cables would remove all obstructions from within the seabed, and therefore any related potential risks to other users of the sea in the longer-term. However, the

cables are anticipated to be and remain buried at a target depth of 1 m over the lifetime of the Projects; a depth of which the cables are considered to be of low risk to other users of the sea. Therefore, if during the 25-year lifetime of the Projects, the cables do not become exposed, it would be unlikely that they become exposed following decommissioning and the risk to other users from the cables would remain low.

In relation to the environment, it is extremely likely that the benthic habitats covering the cables would have recovered fully during the 25-year period. As such, removing the cables at the end of their lifetime may prove to be more environmentally damaging than leaving them *in situ* during decommissioning.

Based on this review from a technicality, environmental and safety impacts perspective, leaving the cables *in situ* is considered to be the most suitable option for the decommissioning of the inter-array and export cables at this time.

The decommissioning of structures will also be undertaken in accordance with the following legislation and guidance:

- Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004: Guidance notes for Industry, BEIS, March 2019;
- Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, International Maritime Organisation (IMO), 19th October 1989;
- Guidance Notes. Decommissioning of Offshore Oil and Gas Installations and Pipelines. BEIS, 2018;
- OSPAR Guidance on Environmental Consideration for Offshore Wind Farm development, 2008;
- United Nations Convention on the Law of the Sea (UNCLOS), 1982;
- The Conservation of Habitats and Species Regulations (as amended) 2010;
- Hazardous Waste Regulations 2005;
- Marine and Coastal Access Act 2009;
- The Water Resources Act 1991;
- The disposal or recovery of waste on land, principally under Part II of the Environmental Protection Act 1990, other legislation relating to the carriage and transfer of waste and, where appropriate, the Hazardous Waste Regulations 2005; and relevant health and safety legislation;
- London Convention 1972 and the 1996 Protocol, relating to the prevention of marine pollution by dumping of wastes;
- Construction (Design and Management) Regulations (CDM) 2015; and
- Appropriate H&S Regulations.

## 4.3 Pre-Decommissioning

Before decommissioning commences, detailed reviews of the regulations and Environmental Impact Assessment (EIA) requirements will be undertaken to ensure the correct consents and licences are obtained. Further consultation will be carried out with local and statutory bodies to agree the approach. Synergies will be identified and established where possible, such as

sharing of onshore facilities and guard vessels. Disposal facilities will be identified and developed if necessary, in collaboration with specialist industrial recyclers.

## 4.4 Decommissioning Measures

### 4.4.1 *Generation Assets (Non-OFTO)*

Responsibility for the decommissioning of these assets will remain with the generator for the lifetime of the project.

#### *4.4.1.1 Wind Turbines*

Dismantling of the ninety five WTGs will be undertaken as a reverse of the installation process. The WTGs will be shut down, electrically isolated and made ready for dismantling prior to arrival of the crane vessel on site. Blades, nacelles and towers will be disassembled using a jack-up crane vessel.

Cables will be pre-cut at selected positions to allow the WTG components to be separated. Lubricant oil will be left contained in the gearboxes for processing onshore.

### 4.4.2 *Monopiles and Transition Pieces*

It is likely the transition pieces will be uncoupled from the monopiles by removing the bolts. The transition piece will then be lifted off and sea-fastened on a barge. An integrated lifting tool will then be lowered and engaged in the monopile whilst the pile is cut using an automated cutting tool. After cutting, the monopile would then be lifted and placed horizontally on a barge to be transported to an onshore facility for decommissioning. The monopile cut is made at a depth below the seabed surface so that no danger to fishing and shipping vessels will occur. Seabed surveys will dictate the depth below the seabed at which the monopile will be cut, but this is likely to be approximately 1 m below the seabed.

### 4.4.3 *Inter-Array Cables*

It is expected that after the Project's lifetime, the most practical environmental option which will minimise disturbance to the seabed, will be to leave the cables *in situ* where they have remained buried. Any exposed cables will be removed. Following decommissioning there will be exposure of cable ends at the foundation locations and OSP. These cable ends will be weighted and deposited on the seabed to be reburied.

### 4.4.4 *OFTO Assets*

Once operational, these assets will be transferred to the OFTO along with the responsibility for decommissioning.

#### *4.4.4.1 Offshore Substation*

Decommissioning of the OSP will involve a vertical lift strategy from a suitable crane vessel onto a specially designed vessel barge. Dismantling of the substations will take place onshore, as far as practicable, to allow for maximum reuse of materials and minimise the risks to the marine environment.

Following topside removal, the jacket pin piles will be removed in the same way as the WTG foundations, i.e. cut approximately 2 m above the seabed to allow removal of the jacket foundation and then cut below the seabed level for removal of the pin piles with the remaining foundations left in the seabed buried. The jackets will be removed as one piece and taken

back to shore for dismantling.

#### *4.4.4.2 Export Cables*

The export cables will be larger in diameter than the inter-array cables, otherwise their treatment will be the same. Similar to the inter-array cables, if they have remained buried during the operational phase and surveys demonstrate that still to be the case, then they will be left in situ. This will minimise the impact on the marine environment as the seabed will have recovered from installation, and removal of the buried cable will cause unnecessary impacts. Any exposed cable will be removed, with the cut ends being weighted and reburied where it attaches to already buried cables.

### 4.5 Waste Management

Waste management will be carried out in accordance with the relevant legislation at the time of decommissioning. The waste hierarchy will be followed with reuse being considered first, followed by recycling, incineration with energy recovery and lastly disposal.

After offloading from the decommissioning vessels, the materials will be transported by road to a processing area, where they will be broken down into suitable sizes for recycling or disposal. It is assumed that:

- Carbon steel would be reduced to manageable sizes and sold as scrap;
- Copper wire would be removed from the WTGs and transformers, and sold as scrap; and
- Glass reinforced plastic would be recycled. It is anticipated that the current practice of disposing to landfill will not be acceptable at the time that Dogger Bank A and B are decommissioned.

A Waste Management Plan will be produced prior to decommissioning commencing.

## 5 Environmental Impact Assessment

An EIA for the Projects was completed and submitted as part of the DCO application in 2013. This EIA included an assessment of the potential environmental impacts of the project during construction, operation and decommissioning. **Table 5.1** summarises the predicted impacts from the decommissioning phase.

**Table 5.1: Environmental Impact Assessment Results**

| Topic | Magnitude of Impact |
|---|---|
| Designated Sites | No impact to minor adverse |
| Marine and Intertidal Ecology | Negligible to minor adverse |
| Fish and Shellfish Ecology | Negligible to minor adverse |
| Marine Mammals | Negligible to minor adverse |
| Ornithology | Negligible to minor adverse |

| Topic | Magnitude of Impact |
|---|---|
| Commercial Fisheries | Negligible to minor adverse |
| Shipping and Navigation | As low as reasonably practicable |
| Aviation, Military Activities and Communications | None anticipated |
| Marine and Coastal Archaeology | No impact to negligible |
| Seascape and Visual Character | Negligible to minor adverse |
| Other Marine Users | Negligible to minor adverse |

The Projects will commission environmental studies to provide updated data as part of the decommissioning consenting process. The decommissioning ES produced will supersede and replace the assessments presented in the original ES (where relevant) and will incorporate up to date information of both the environment in and around the project site and the decommissioning proposals.

The decommissioning ES will identify potential impacts arising from the programme and, if any are considered significant, will propose appropriate mitigation measures. In addition, pre, during and post decommissioning monitoring programmes may also be considered appropriate and, where these are identified, will be developed in partnership with the appropriate regulatory bodies.

## 6 Consultations with Interested Parties

Throughout the development of Dogger Bank A and B, close and detailed consultation has been undertaken at a national and local level. This consultation will continue throughout the Projects' lifecycle where necessary or required.

This Decommissioning Programme will be consulted on with the following stakeholders:

- Chamber of Shipping;
- Joint Nature Conservation Committee;
- Maritime and Coastguard Agency;
- National British Marine Aggregate Producers Association (BMAPA);
- National Federation of Fishermen's Organisations;
- Natural England;
- Bridlington Harbour Authority;
- North Eastern Inshore Fisheries and Conservation Authority;
- Trinity House;
- Marine Management Organisation;

- The Crown Estate; and
- Royal Yacht Association.

The Decommissioning Programme will be made available to the general public through the Dogger Bank A and B project website. Following consultation, a summary of the comments and actions taken following receipt of any comments will be provided as an appendix to this document. This will be updated as necessary following any reviews and updates to the Decommissioning Programme through the Projects' lifetime.

## 7 Costs and Financial Security

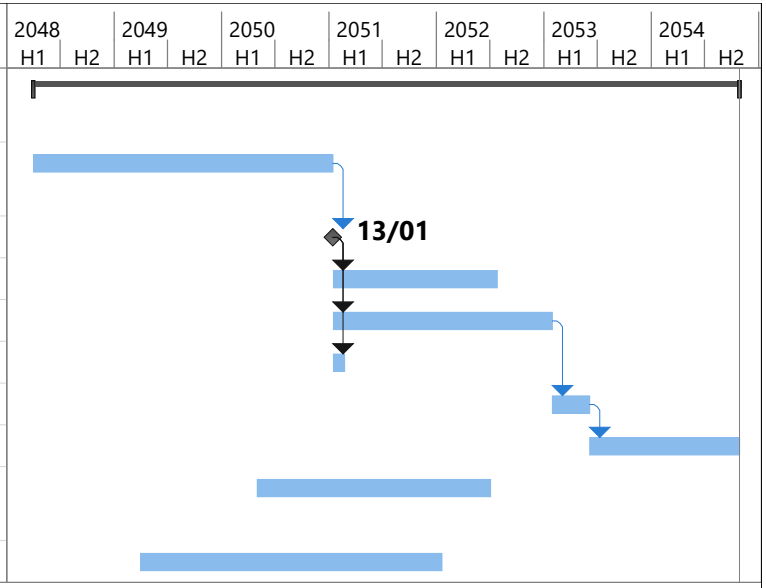
Cost and financial security information is confidential and will be provided to BEIS as a separate document.

## 8 Proposed Decommissioning Schedule

A full decommissioning schedule will be provided prior to decommissioning setting out the detailed programme for consultation with the relevant authorities. It is currently expected that the earliest date that decommissioning would commence would be at year 25 after commissioning of the Project, however this may be postponed subject to any potential extension of the project's operational lifetime. A final review of this Decommissioning Programme would start at least two years prior to the to the start of decommissioning.

It is anticipated that the decommissioning phase could last up to two years, however this duration will not be finalised until closer to the time of decommissioning. As such, the programme provided is only indicative at this stage.

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Dogger Bank A & B Decommissioning Programme** | **1715 days** | **Wed 01/04/48** | **Tue 27/10/54** |
| 2 | Pre-decommissioning surveys & environmental assessments | 728 days | Wed 01/04/48 | Fri 13/01/51 |
| 3 | Vessel mobilisation/ demobilisation | 0 days | Fri 13/01/51 | Fri 13/01/51 |
| 4 | Removal of WTGs at Dogger Bank A & B | 399 days | Mon 16/01/51 | Thu 25/07/52 |
| 5 | Removal of foundations at Dogger Bank A & B | 532 days | Mon 16/01/51 | Tue 28/01/53 |
| 6 | Removal of offshore substation | 28 days | Mon 16/01/51 | Wed 22/02/51 |
| 7 | Seabed clearance and restoration | 91 days | Wed 29/01/53 | Wed 04/06/53 |
| 8 | Post-decommissioning surveys | 364 days | Thu 05/06/53 | Tue 27/10/54 |
| 9 | Onshore decommissioning / disposal / waste management | 567 days | Mon 02/05/50 | Tue 02/07/52 |
| 10 | Decommissioning management | 732 days | Thu 01/04/49 | Fri 19/01/52 |




Project: PB6994-RHD-AW-ZZ-P
Date: Tue 19/05/20

| | | |
|---|---|---|
| Task | Inactive Summary | External Tasks |
| Split | Manual Task | External Milestone |
| Milestone | Duration-only | Deadline |
| Summary | Manual Summary Rollup | Progress |
| Project Summary | Manual Summary | Manual Progress |
| Inactive Task | Start-only | |
| Inactive Milestone | Finish-only | |

## 9 Seabed Clearance

Following the completion of decommissioning activities, a seabed clearance campaign, where necessary, will commence to ensure that the Dogger Bank A and B site has been cleared. The survey will enable identification and recovery of any debris located on the seabed which may have arisen from activities related to either the operation of the wind farms or decommissioning process which may pose a risk to navigation. An independent survey company will complete the surveys and the results of these will be provided to the relevant regulatory body for review.

The required survey area would be determined during the decommissioning phases, taking into account good practice at the time. It is anticipated that the survey extent would focus around the foundation locations, as it is assumed that the inter-array and export cables will be left in-situ.

## 10 Restoration of the Site

Following completion of the decommissioning works, the site will be returned as far as practically possible back to its original pre-construction state. This commitment applies to both the array site and the export cable corridor. The focus of the restoration works will include ensuring that the foundations are cut below the seabed and are adequately covered so as not to pose a risk to safety and that cable ends are adequately buried. The detail and specific decommissioning methods will be agreed in consultation with the necessary regulatory authorities prior to decommissioning.

## 11 Post-Decommissioning Monitoring, Maintenance and Management of the Site

The requirement for post-decommissioning monitoring will be agreed in advance with the relevant authorities at the time of decommissioning based on the latest guidance. A Marine Licence will be applied for from the Marine Management Organisation to undertake decommissioning activities, as these activities are not covered under the Project's current licences. A new DCO is not required for decommissioning activities. It is at this stage that the specific details of the methods and details of any monitoring will be agreed with the relevant authorities and their consultees.

## 12 References

Department of Business, Energy & Industrial Strategy (BEIS) 2019. Decommissioning of Offshore Renewable Energy Installations Under the Energy Act 2004. Guidance notes for industry (England and Wales). March 2019.

Department of Energy and Climate Change (DECC), 2015. Record of the Habitats Regulations Assessment undertaken under Regulation 61 of the Conservation of Habitats and Species Regulations 2010 (as amended) and Regulation 25 of the Offshore Habitats Regulations for an application under the Planning Act 2008 (as amended).

Forewind 2013. Dogger Bank Creyke Beck Environmental Statement. 2013.

Seawatch Foundation. 2008. Cetaceans of eastern and south-east England. Regional fact sheets. Available at http://www.seawatchfoundation.org.uk./fact-sheets.php

# Appendix 1 – Summary of Consultation Responses and Actions Taken

## Table A1 – Consultation Responses

| Consultee | Summary of issues raised | Action taken |
|---|---|---|
| - | To be completed following consultation | - |

## Appendix 2 – Consultation Responses

This section will include copies of the consultation responses once received.