DOGGER BANK D SCOPING REPORT

Document Title: Dogger Bank D Wind Farm EIA Scoping Report

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DOGGER BANK D
WIND FARM

Document Title: **Dogger Bank D Wind Farm EIA Scoping Report**	Document No: **PC3991-RHD-ZZ-ZZ-RP-Z-0006**
Prepared By: **Royal HaskoningDHV**	Prepared For: **Dogger Bank D Wind Farm**

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1.0	24/06/2024	Final	Royal HaskoningDHV	JW / RG	RH
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Glossary

Term	Definition
Areas of Search (AoS)	Broad geographical areas considered during the site selection process for siting infrastructure.
Birkhill Wood Substation	A proposed new substation north of Hull and the onshore grid connection point for DBD identified through the Holistic Network Design process. Birkhill Wood substation will be developed and constructed by NGET and does not form part of DBD.
Construction Compounds	Areas set aside to facilitate the construction works for the onshore infrastructure.
DBD Array Area	The area within which the wind turbines, inter-array cables and Offshore Platform(s) will be located.
Deemed Marine Licence (DML)	A consent required under the Marine and Coastal Access Act 2009 for certain activities undertaken within the UK marine area, which may be granted as part of the Development Consent Order.
Development Consent Order (DCO)	A consent required under the Planning Act 2008 to authorise the development of a Nationally Significant Infrastructure Project, which is granted by the relevant Secretary of State following an application to the Planning Inspectorate.
Environmental Impact Assessment (EIA) Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, which sets out the EIA process for assessing the likely significant effects of a project on the environment.
Effect	An effect is the consequence of an impact when considered in combination with the receptor's sensitivity / value / importance, defined in terms of significance.
Energy Storage and Balancing Infrastructure (ESBI)	A range of potential technologies such as battery banks to be co-located with the onshore converter station(s), which provide valuable services to the electrical grid such as storing energy to meet periods of peak demand and improving overall reliability.
Evidence Plan Process (EPP)	A voluntary consultation process with technical stakeholders to encourage upfront agreement on the nature, volume and range of supporting evidence required to inform the EIA and Habitats Regulation Assessment (HRA) process.
Greenhouse Gases	Gases such as carbon dioxide and methane that absorb infrared radiation and trap heat in the atmosphere, an increase of which due to human activity has led to climate change. Carbon is commonly used as a shorthand for referring to greenhouse gases.
Grid Connection	Electricity transmission network connection at Birkhill Wood Substation.

Term	Definition
Habitat Regulations	As set out in the Planning Inspectorate's Advice Note 10 (Habitats Regulations Assessment relevant to nationally significant infrastructure projects) the following are covered by the term 'Habitats Regulations': the Conservation of Habitats and Species Regulations 2017 (as amended), and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) (for plans and projects beyond UK territorial waters (12 nautical miles). Such regulations set out the requirement for Competent Authorities to consider whether a development will have a likely significant effect (LSE) on a European site (now known as National Network Sites). Where LSE are likely and a project is not directly connected with or necessary to the management of that site(s), an appropriate assessment (AA) is required of the implications of the plan or project for that site(s) in view of its conservation objectives.
Haul Roads	Temporary tracks set aside to facilitate transport access during onshore construction works.
Holistic Network Design (HND)	A strategic and coordinated approach to planning grid connections and developing offshore-onshore transmission infrastructure for offshore wind farms in the UK led by National Grid Electricity System Operator. The Project falls within the scope of the Holistic Network Design process.
Horizontal Directional Drilling (HDD)	A type of trenchless cable or duct installation method (see Trenchless Techniques).
Impact	An impact is a change resulting from an activity associated with the Project, defined in terms of magnitude.
Inter-Array Cables	Cables which link the wind turbines to the Offshore Platform(s).
Jointing Bays	Underground structures constructed at regular intervals along the onshore export cable corridor to join sections of cable and facilitate the installation of cables into the buried ducts.
Landfall Area	The point on the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bays above Mean High Water Springs.
Link Boxes	Underground structures housing electrical equipment located along the onshore export cable corridor, alongside each jointing bay.
Mean High Water Springs (MHWS)	The average throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	The average throughout the year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest.
Micro-Siting	A mitigation measure that involves siting infrastructure to avoid or minimise impacts to receptors.

Term	Definition
Mitigation	Measures identified to avoid, minimise, offset or compensate impacts to receptors, which can be embedded within the design (primary and tertiary mitigation) or identified as additional measures through the EIA process (secondary process) to reduce and / or eliminate any likely significant effects.
National Site Network	A network of core breeding and resting sites for rare and threatened species and habitats on land and at sea in the UK, adapted from the European Union's Natura 2000 ecological network post-Brexit. National Site Network sites are formerly known as European sites.
Offshore Export Cable Corridor (ECC)	The area within which the offshore export cables will be located, extending from the DBD Array Area to Mean High Water Springs at the landfall.
Offshore Export Cables	Cables which bring electricity from the Offshore Platform(s) to the transition joint bays at landfall.
Offshore Hybrid Asset (OHA)	A network infrastructure that combines transmission assets associated with offshore wind generation with interconnectors to increase coordination and enable the efficient use of renewable energy.
Offshore Platform(s)	Fixed structures located within the DBD Array Area that contain electrical equipment to aggregate and, where required, convert the power from the wind turbines, into a more suitable voltage for transmission through the export cables to the onshore converter station(s). Such structures could include (but are not limited to): Offshore Converter Station(s), Collector Platform(s) and Accommodation Platform(s). This also includes a Switching Station platform to enable coordination as an Offshore Hybrid Asset. This combines infrastructure for offshore electricity generation with an interconnector to facilitate the transfer of electricity generated by the Project between different countries.
Offshore Scoping Area	The boundary in which all potential offshore infrastructure associated with the Project will be located, which extends seaward of Mean High Water Springs.
Onshore Converter Station(s) - OCS(s)	A compound, or compound(s), containing electrical equipment required to stabilise and convert electricity generated by the wind turbines and transmitted by the export cables into a more suitable voltage for grid connection into Birkhill Wood Substation.
Onshore Converter Station (OCS) Zone	The area within which the Onshore Converter Station(s) and Energy Storage and Balancing Infrastructure (ESBI) will be located in the vicinity of Birkhill Wood Substation.
Onshore Export Cable Corridor (ECC)	The area within which the onshore export cables will be located, extending from the landfall to the Onshore Converter Station Zone and Birkhill Wood Substation.
Onshore Export Cables	Cables which bring electricity from the transition joint bays to the Onshore Converter Station(s) and onwards to the grid connection point at Birkhill Wood Substation.

Term	Definition
Project Design Envelope	A range of design parameters defined where appropriate to enable the identification and assessment of likely significant effects arising from a project's worst-case scenario. The project design envelope incorporates flexibility and addresses uncertainty in the DCO application and will be further refined during the EIA process.
Safety Zones	Safety zones as prescribed under the Energy Act 2004 exist as 'no-go' areas around an Offshore Renewable Energy Installation (OREI). Safety Zones are temporary in nature (except in exceptional circumstances) and as a consequence are of short duration and usually cover construction, major maintenance and decommissioning.
Scour Protection	Protective materials used to avoid sediment erosion from the base of the wind turbine foundations and offshore platform foundations due to water flow.
Study Areas	A geographical area and / or temporal limit defined for each topic within the EIA to identify sensitive receptors and assess the relevant likely significant effects.
The Applicant	SSE Renewables and Equinor.
The Project	The Dogger Bank D Offshore Wind Farm (DBD) Project
Transition Joint Bays (TJB)	Underground structures at landfall that house the joints between the offshore and onshore export cables.
Trenching	Open cut method for cable or duct installation.
Trenchless Techniques	Trenchless cable or duct installation methods used to bring offshore export cables ashore at landfall, avoid crossing major onshore obstacles such as roads, railways and watercourses and where trenching may not be suitable.
Wind Turbines	Power generating devices located within the DBD Array Area that convert kinetic energy from wind into electricity.

1 Introduction

1.1 Project Overview

1. This Scoping Report supports a request for a formal Environmental Impact Assessment (EIA) Scoping Opinion from the Planning Inspectorate for the proposed Dogger Bank D Offshore Wind Farm (hereafter 'the Project'). This Scoping Report has been prepared on behalf of SSE Renewables and Equinor (hereafter 'the Applicant') in accordance with Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter 'the EIA Regulations').

2. The Project would include an offshore generating station with an installed capacity exceeding 100MW and is therefore classified as a Nationally Significant Infrastructure Project (NSIP). As such, a Development Consent Order (DCO) is required under the Planning Act 2008, with an application to the Planning Inspectorate which administers the application on behalf of the Secretary of State for the Department for Energy Security and Net Zero (DESNZ).

3. To support the DCO application, an EIA is required to be undertaken, which will involve the production of an Environmental Statement (ES) to set out the findings of the EIA. This Scoping Report represents notification under Regulation 8(1)(b) of the EIA Regulations that the Applicant will undertake an EIA in respect of the Project and produce an ES to report the findings of the EIA.

4. The Applicant submitted a Scoping Report in 2023 (LF000016-CST-DOG-REP-0001) based on infrastructure that included the potential for the offshore generating station to either be connected to a Hydrogen Production Facility (HPF) ("the Hydrogen Option") or the UK electricity network via a shared connection to an Offshore Collector Platform ("the National Grid Option").

5. In 2024, a new grid connection point was identified by National Grid Electricity System Operator (ESO), as described in **Section 1.1.2**, resulting in design and spatial differences from the previous "National Grid Option". In addition, following ongoing project refinement, the Hydrogen Option will no longer be progressed as part of the Project.

6. In order to avoid any doubt in relation to compliance with Regulation 14(3)(a) of the EIA Regulations, the Project is requesting a new 2024 Scoping Opinion. Any differences between the impacts scoped in / out within the 2023 Scoping Report and this Scoping Report are presented in a tabular format on a topic-by-topic basis in **Chapter 12 Summary and Conclusions** to facilitate stakeholder review where appropriate.

1.1.1 The DBD Array Area

7. As part of its third licence round in 2008, The Crown Estate designated the Dogger Bank Zone, located between 125 and 290km off the east coast of Yorkshire, as one of the nine offshore wind farm development zones in the UK. Following the award, four project areas were identified within the zone to take to development consent, namely Creyke Beck A, Creyke Beck B, Teesside A and Teesside B (see **Figure 1-1**). In 2015, development consent was granted for all four project areas.

8. In 2017, the four project areas were restructured under new ownership arrangements. Creyke Beck A, Creyke Beck B and Teesside A were renamed as Dogger Bank A (DBA), Dogger Bank B (DBB) and Dogger Bank C (DBC) respectively and would progress collectively as the Dogger Bank Wind Farm in three build-out phases by SSE Renewables, Equinor and Vårgrønn. Teesside B was renamed as Sofia Offshore Wind Farm and would be progressed separately from the Dogger Bank Wind Farm by RWE (see **Figure 1-1**).

9. In 2021, an opportunity was identified by the Applicant to maximise the capacity of the third phase of the Dogger Bank Wind Farm, namely DBC, such that additional capacity of up to 2GW of renewable energy could potentially be consented and constructed in the eastern part of the original DBC site. This new development phase is known as DBD.

10. The Array Area of DBD (which sits wholly within the area of Teesside A) was subject to a full EIA and was granted development consent in 2015. The Applicant therefore intends to adopt a proportionate approach to EIA (Institute of Environmental Management and Assessment (IEMA), 2017) by building upon the robust understanding and knowledge of the environment that the wind farm sits within, and which is underpinned by a range of site-specific surveys and data already obtained for the site. The Applicant has therefore considered the principles of proportionate EIA and relevant available data in the scoping approach throughout this report.

11. The DBD Array Area covers an area of approximately 262km^2 and is located approximately 210km off the north-east coast of England, with its eastern boundary located approximately 160m west of the Dutch Exclusive Economic Zone (EEZ).

1.1.2 Grid Connection

12. The Project was considered as part of the Office of Gas and Electricity Markets' (OFGEM) Offshore Network Transmission Review (ONTR) for a Holistic Network Design (HND). This review, as outlined in the National Grid ESO's "Pathway to 2030" plan, initially indicated that the National Grid Option landward of an Offshore Collector Platform would be developed by National Grid Electricity Transmission (NGET) as part of a coordinated offshore network. This coordinated design was recommended for the Project and other spatially proximate offshore wind farms off the east coast of England, known collectively as the "South Cluster" (National Grid ESO, 2022).

13. Following publication of the initial HND report, discussions through the South Cluster identified a number of challenges with the delivery of the design as presented in 2022. Design changes were therefore considered and assessed through the National Grid ESO's HND Impact Assessment Process which resulted in a design change to the South Cluster which was confirmed in March 2024 (National Grid ESO, 2024a). As a result, the Project is being developed as a radial connection (shown on **Plate 1-1**) into Birkhill Wood Substation, a proposed new substation north of Hull and the onshore grid connection point for DBD identified through the Holistic Network Design process. Birkhill Wood substation will be developed and constructed by NGET and does not form part of DBD.

14. The Applicant is exploring the future possibility for coordination with an Offshore Hybrid Asset (OHA) which combines the offshore wind farm, via offshore platforms, with an electricity interconnector between the UK and another European country's electricity market to form a multi-purpose interconnector (MPI). The Project's design envelope therefore includes flexibility for potential coordination of the Project as an OHA, which has a separate grid connection into Birkhill Wood Substation in the East Riding of Yorkshire. The development of an OHA would increase energy security for the UK, reduce the need to curtail offshore wind output in times of oversupply on the UK electricity network and provide interconnection with other sources of low carbon electricity generation in neighbouring European countries.

1.1.3 Project Scoping Area

15. Within this Scoping Report, the Offshore Scoping Area refers to the boundary in which all potential offshore infrastructure associated with the Project will be located, which extends seaward of Mean High Water Spring (MHWS). The Onshore Scoping Area refers to the boundary in which all potential onshore infrastructure associated with the Project will be located, which extends landward of MHWS. Both the Onshore and Offshore Scoping Areas are shown separately on **Figure 1-1**, with a detailed view of the landfall and Onshore Scoping Area shown on **Figure 1-2**.

16. The generation element of the Project is independent of coordination with any OHA and will remain the same whether or not an OHA is taken forward.

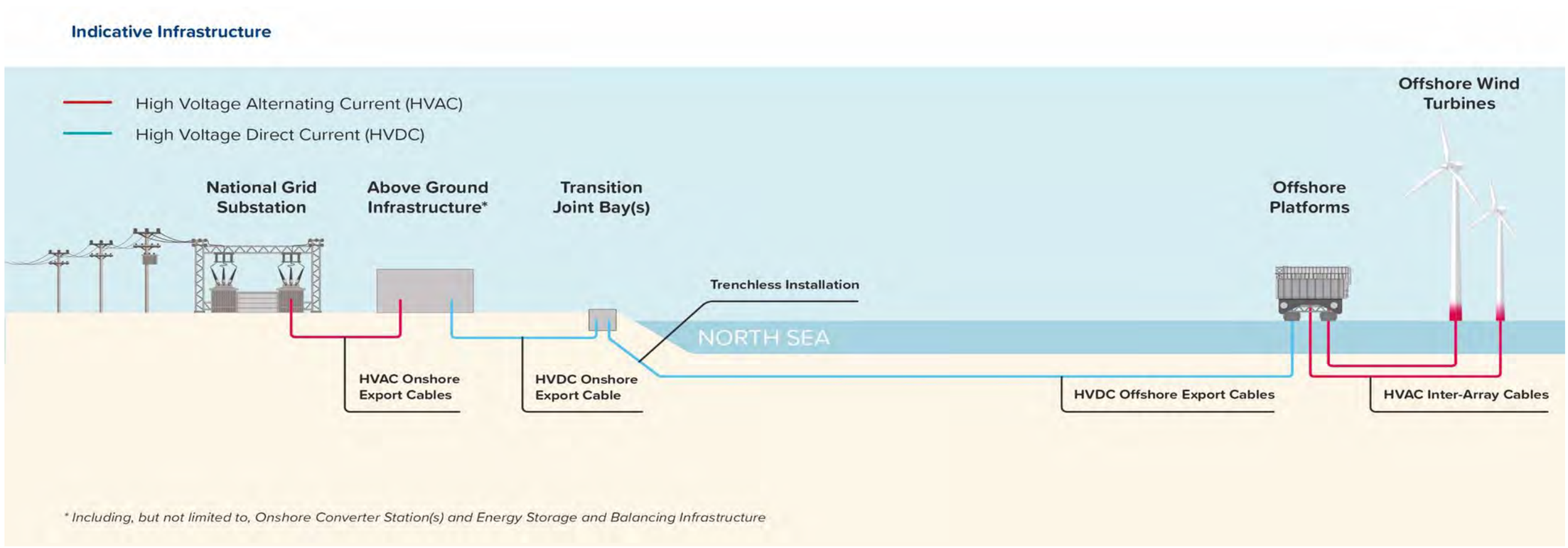
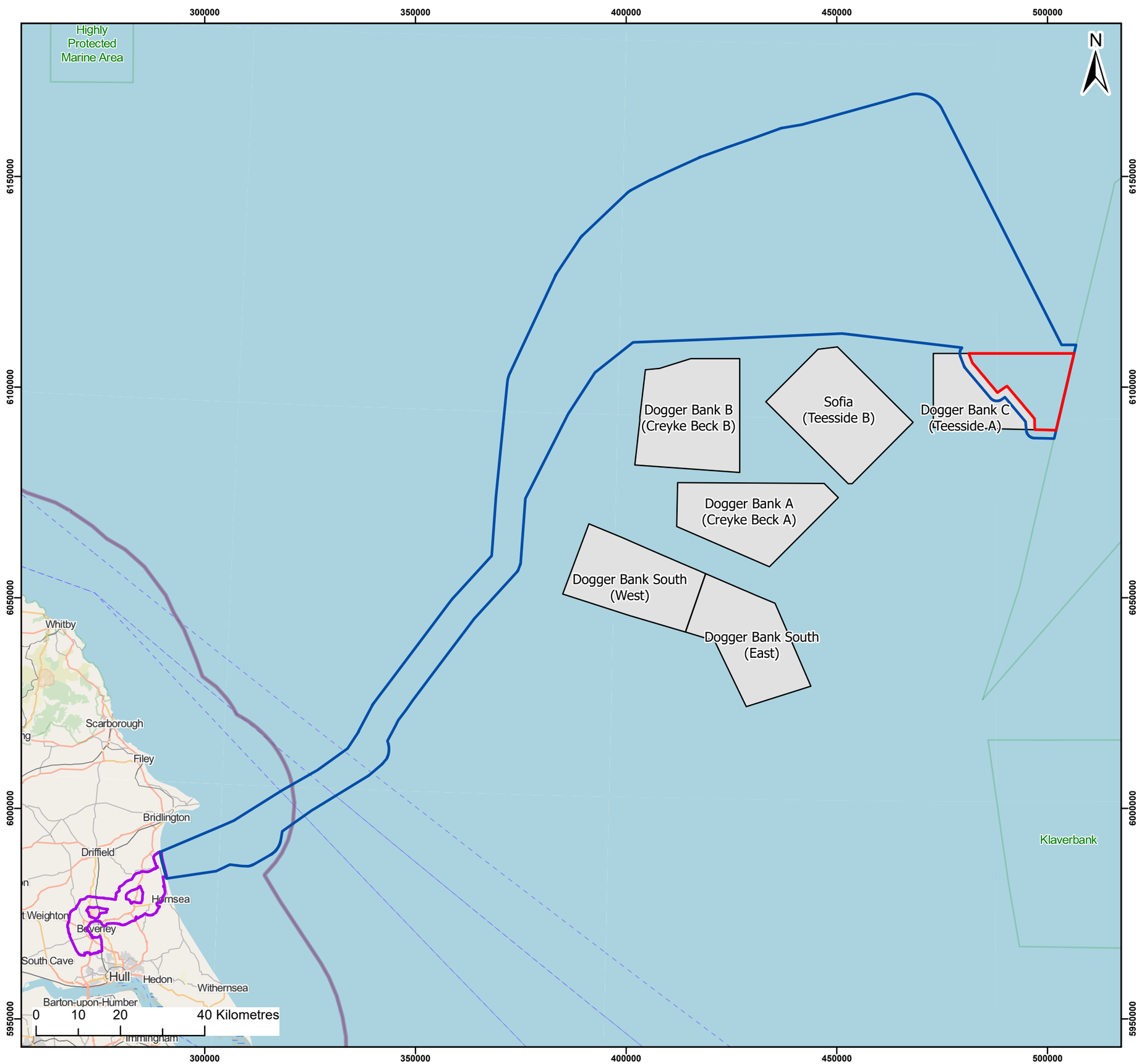


Plate 1-1 Indicative Infrastructure



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Other Dogger Bank Wind Farms

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Project Scoping Area
Within the Context of the Dogger Bank Zone

Figure: 1-1

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0024

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	07/06/2024	JH	AB	A3	1:900,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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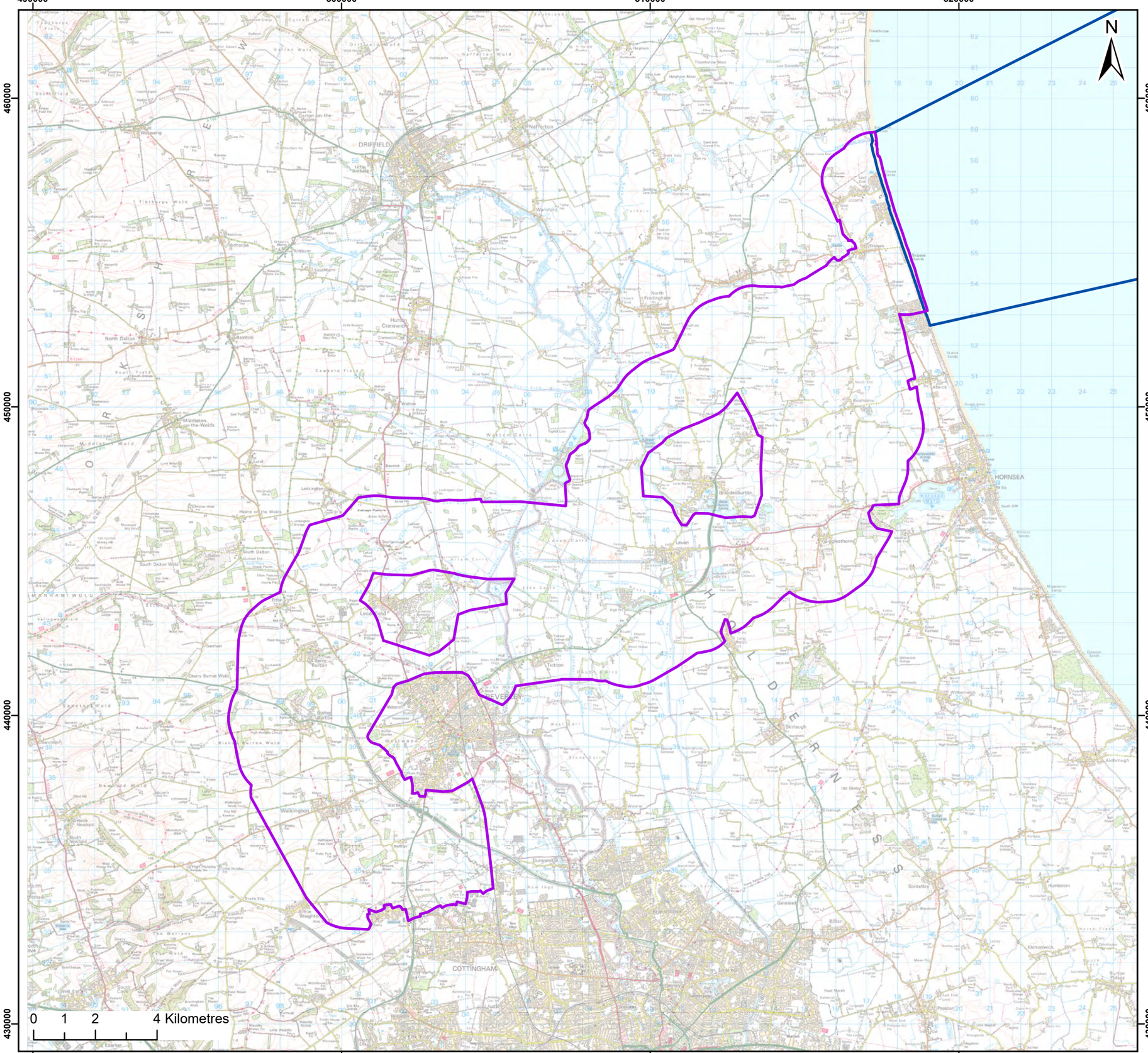
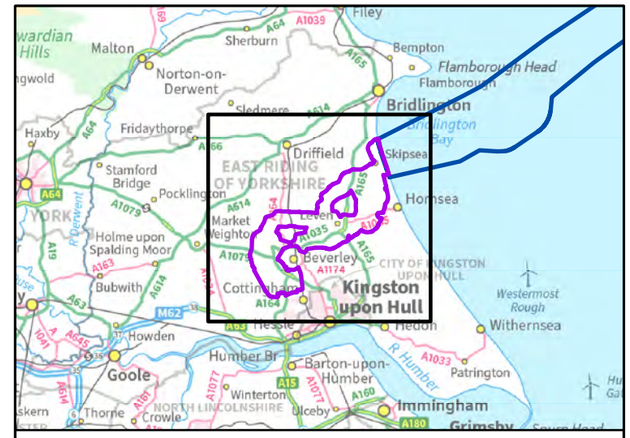
equinor





Legend:

- Onshore Scoping Area
- Offshore Scoping Area

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Onshore Scoping Area

Figure: 1-2

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0025

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/04/2024	AB	SM	A3	1:125,000

Co-ordinate system: British National Grid

sse Renewables

equinor

1.2 The Applicant

17. The Project is being developed by the Applicant as a 50 / 50 joint venture between SSE Renewables and Equinor, two of the world's leading companies in the development and operation of offshore wind energy. Both companies were involved in the design and consenting of the Dogger Bank Wind Farm. Once fully operational, Dogger Bank Wind Farm will be the world's largest offshore wind farm and will provide a total of 3.6GW of energy, which is capable of powering six million UK homes each year and is critical to driving the net zero transition. SSE Renewables is leading on the construction and delivery of all three phases, while Equinor will operate Dogger Bank Wind Farm until the end of its lifetime.

18. Dogger Bank Wind Farm (DBA, DBB and DBC) will employ one of the world's most powerful offshore wind turbines in operation today and is the first wind farm in the UK to utilise a HVDC connection. Moreover, the construction and future operation of Dogger Bank Wind Farm will support over 2,000 new or existing jobs in the UK, increasing the country's supply chain capacity and building capabilities within the national offshore wind sector.

19. SSE Renewables has an operational portfolio of around 4.5GW of installed onshore wind, offshore wind and hydro generation capacity, with a secured future project pipeline of over 16GW in development and a pipeline of over 12GW of additional prospective sites under development. The operational portfolio comprises nearly 2GW of onshore wind capacity, more than 1GW of offshore wind capacity, and almost 1.5GW of flexible hydro power and pumped storage capacity. These generation assets produce around 11TWh of renewable power each year.

20. Equinor has a long track record of developing offshore wind farms in the UK, having already built and commissioned into operation the Sheringham Shoal Offshore Wind Farm, Dudgeon Offshore Wind Farm and Hywind Scotland Pilot Park, the world's first floating offshore wind farm. Equinor has been operating in the UK for nearly 40 years and possesses over 50 years of offshore experience in the North Sea area. Equinor plans to reach an installed net capacity of 12 to 16GW by 2030, two-thirds of this from offshore wind, and is pioneering a set of design principles and solutions for floating wind to enable industrial standardisation and local adaptability.

21. For further information on Dogger Bank Wind Farm, visit: https://doggerbank.com/a-joint-venture/.

1.3 Purpose of this Scoping Report

22. As noted above in **Section 1.1**, the Project meets the criteria for an NSIP, and an EIA is required in support of the DCO application in accordance with the EIA Regulations.

23. This Scoping Report supports a request for a Scoping Opinion from the Planning Inspectorate (on behalf of the Secretary of State) for the Project in accordance with Regulation 10 of the EIA Regulations, which states: 'A person who proposes to make an application for an order granting development consent may ask the Secretary of State to state in writing their opinion as to the scope, and level of detail, of the information to be provided in the environmental statement'.

24. Scoping ensures that resources and timescales for the EIA are effectively managed and that efforts are concentrated on the key environmental issues and their likely significant effects. Moreover, scoping minimises the need for further information requests following the submission of the ES and DCO application, particularly where uncertainty exists in relation to a potential effect, enhancing the proportionality of the EIA process (IEMA, 2004).

25. Additionally, scoping also allows for early-stage engagement with stakeholders, facilitating informed responses, assisting in determining the methodology and approach to identifying, assessing and addressing likely significant environmental effects. This is in addition to ongoing engagement with stakeholders on the Project which is discussed further in **Chapter 6 Consultation**.

26. In accordance with Regulation 10(1) of the EIA Regulations, this Scoping Report includes:

- A plan sufficient to identify the land;
- A description of the Project, including its location and technical capacity;
- An explanation of the likely significant effects of the Project on the environment; and
- Such other information or representations as the person making the request may wish to provide or make.

27. The Scoping Report outlines the receptors that will be considered in the EIA, the proposed data sources and approach to data collection that will be used to characterise the existing environment, the assessment methodology and potential mitigation measures on a topic-by-topic basis. These will be refined following the receipt of the Scoping Opinion, whilst also taking into account the responses from relevant statutory and non-statutory consultees, and during a programme of consultation with technical stakeholders throughout the EIA process (see **Chapter 6 Consultation**).

28. This Scoping Report identifies potential impacts associated with environmental topics to be scoped in or out of the EIA based on the existing evidence base, the previous Scoping Opinion (2023), and expert judgment and lessons learned from past EIA experience, including previous developments within the Dogger Bank Zone.

29. Given the previous development experience within the Dogger Bank Zone, a proportionate approach to both scoping and EIA will be undertaken utilising previous knowledge and data (updated where relevant).

30. The DBD Array Area (which sits wholly within the consented boundary of Teesside A) has previously been subject to a full EIA and associated baseline surveys for the purposes of consent being granted to Teesside A in 2015. Since then, a wide range of additional surveys and data have been collected across this area and the wider Dogger Bank (inclusive of the DBA and DBB projects) through both the pre-construction and construction phases of these projects. Previous data collection has given a greater understanding of the engineering constraints and constructability of offshore wind farms in this area and also the impacts associated with these methods.

31. This Scoping Report refers to these data, embedded mitigation that was successfully implemented, and conclusions of the previous assessment for Teesside A where relevant to underpin proposals to scope impacts in or out of the EIA. This Scoping Report also incorporates existing offshore surveys which have been carried out to date for the Project (e.g. geophysical surveys) where applicable.

32. Ensuring scoping is effective underpins a proportionate approach to the EIA (IEMA, 2014). IEMA guidance suggests that a proportionate approach to EIA is key to adding value to the consenting process by making the process and outputs more efficient and effective (IEMA, 2017).

33. It is recognised that a number of issues cannot be scoped out at an early stage until further information is known about the Project and the existing environment, thus a precautionary approach has been adopted where uncertainty exists at present. Any further refinements of the EIA scope will be justified and agreed with the relevant stakeholders as the EIA progresses beyond scoping, including through the Evidence Plan Process (EPP) which is described in more detail within **Chapter 6 Consultation**.

1.4 Consenting Strategy

34. DBD is a separate project being promoted by a separate commercial entity from any other previous phase of the Dogger Bank Wind Farm, thus a new DCO application will be made for an independent offshore wind farm. This will comprise a single DCO application, with associated Deemed Marine Licences (DML) included as a schedule to the DCO to cover the marine aspects of the Project. These will be developed in consultation with the Marine Management Organisation (MMO).

35. The Applicant is exploring opportunities for coordination as required by NPS-EN5 and this Scoping Report provides a level of flexibility for ongoing coordination discussion with other projects where appropriate. Further information on the requirements for coordination within planning policy are outlined in **Chapter 2 Policy and Legislative Context**.

36. The Applicant will pursue any other permissions required in addition to the DCO with the relevant regulatory bodies or make the required provision within the DCO. Decisions on such matters will be made in consultation with the relevant stakeholders through the EIA process and agreed as far as practicable.

37. The Applicant will continue to refine the Project within the pre-application period, through an iterative process informed by ongoing stakeholder consultation, key environmental considerations (supported by modelling and surveying for specific topics) and technical feasibility and constraints.

38. Alongside Project refinement, the Applicant will explore opportunities for delivering 10% Biodiversity Net Gain (BNG) in the onshore environment, in anticipation of the requirement for all NSIP applications to deliver 10% BNG, which is proposed to be mandated from November 2025 (Department for Environment, Food and Rural Affairs (Defra), 2023).

2 Policy and Legislative Context

2.1 Need for the Project

39. In 2023, the UK Government published the "Powering Up Britain" policy paper (DESNZ, 2023f), which builds on the 2021 Net Zero Strategy and the 2022 British Energy Security Strategy (BESS). The paper outlines a blueprint of the future of the UK energy system and aims to diversify, decarbonise and domesticate energy production. To deliver on these objectives, one of the key areas identified in the paper is to accelerate the deployment of renewables, which include a goal of developing up to 50GW of offshore wind by 2030 and fully decarbonising the power system by 2035.

40. The Project would have the potential to generate and supply a significant amount of secure, renewable energy to the UK electricity network and facilitate the energy transition set out by national climate change and renewable energy policies and legislation. In addition, the Project would contribute to the following national policy aims:

- Reducing greenhouse gas (GHG) emissions;
- Decarbonising the power sector towards net zero;
- Increasing the security of energy supply;
- Lowering the cost and increasing the affordability of generated electricity; and
- Providing economic opportunities.

2.1.1 Reducing Greenhouse Gas Emissions

41. Climate change is a major contributor to global temperature increases and is of direct concern to the UK. The UK Government has considered climate change within the publishing of National Policy Statements (NPS). NPS comprise the UK Government's objectives for the development of NSIPs, ensuring government policy relating to the mitigation of, and adaptation to climate change are implemented.

42. In Overarching Energy NPS (EN-1) (DESNZ, 2023a), predictions are made that at the current rate of climate change, potential impacts associated with such a global temperature rise for the UK include but are not limited to:

- Increasing frequency and intensity of extreme weather events such as floods, drought, heatwaves and intense rainfall periods;
- Increasing unpredictability of weather patterns, including seasonal patterns; and
- Rising sea levels, increased storms and coastal change.

43. In 2019, following the recommendation of the Climate Change Committee (CCC), the UK became the first major economy to legislate a 2050 net zero GHG emissions target through the Climate Change Act 2008 (2050 Target Amendment) Order 2019. This legislation committed the UK to a 100% reduction in greenhouse gas emissions by 2050 from 1990 levels, with an interim target of 78% reduction by 2035 (these legislative targets were not affected by the UK withdrawal from the EU and remain in place). This was followed in 2020 by the UK Nationally Determined Contribution (NDC) submitted under the Paris Agreement to reduce GHG emissions by at least 68% from 1990 levels by 2030.

44. To achieve the net zero target, the UK Government committed to implement a series of legally binding carbon budgets to limit GHG emissions within each five-year period in alignment with the required decarbonisation trajectory. In April 2021, the UK Government announced the Sixth Carbon Budget, and as a result will legislate to reduce GHG emissions by 78% compared to 1990 levels by 2035 (Department for Business, Energy and Industrial Strategy (BEIS), 2021).

45. Renewable and low carbon energy development is a mitigation measure to address climate change. Offshore wind energy generated by the Project would provide a supply of clean energy to the UK electricity network, which has the potential to replace more GHG intensive forms of electricity generation such as fossil fuel-based generation and enable the UK to achieve its international and national climate change commitments.

2.1.2 Decarbonisation of the Power Sector

46. The most recent UK Energy Trends statistics (BEIS, 2023) states that renewables hold a 44.5% share of electricity generation in 2023, with fossil fuels holding a 37% share. Within the CCC's Sixth Carbon Budget, under a 'Balanced Pathway' approach to achieving net zero by 2050, the deployment of low-cost renewables would need to account for 75 to 90% of electricity demand in 2050. The 2023 'Powering up Britian' policy paper (DESNZ, 2023f) states the UK Government's ambition to: 'fully decarbonise the power sector by 2035, subject to security of supply' and 'grow and develop energy sources beyond the power sector'. Moreover, the decarbonisation of the power system would open the path to the decarbonisation of other economic sectors in the UK such as transport and industry, which depends on a reliable, clean and secure energy supply.

47. As described in **Section 1.1.2**, the Project has been considered as part of the HND process led by National Grid ESO, which provided an integrated approach to network planning for connecting 23GW of new offshore wind generation to Great Britain and achieving the UK Government's target of 50GW offshore wind capacity by 2030 (National Grid ESO, 2022). The HND process ensures that the delivery of new infrastructure to bring power to grid and decarbonise the power sector would be undertaken cohesively and create maximum benefit for consumers, local communities and the environment.

48. Alongside development of an increased renewable generation capacity to progress towards the decarbonisation of the UK economy, there is a requirement for the implementation of futureproofing to ensure that the UK electricity network has the infrastructure and transmission capacity to accommodate the increasing supply and changing mix of electricity generation. National Grid ESO published their 'Beyond 2030' blueprint in 2024 (National Grid ESO, 2024b), which builds on top of the HND process to facilitate the connection of an additional 21GW of offshore wind generation, as well as other low carbon energy sources. The blueprint will ultimately ensure a coordinated approach to upgrading the network in support of a decarbonised electricity system, allowing renewable energy to be transported where and when it is needed to meet the demand.

2.1.3 Energy Security

49. The 2022 BESS identifies that: '*the long-term solution to address our underlying vulnerability to international oil and gas prices is by reducing our dependence on imported oil and gas*'. Accelerating the transition away from oil and gas then depends critically on how quickly we can deliver new renewables.

50. The UK Office for National Statistics (ONS) publishes annual UK fuel imports and exports data. The most recent published figures from 2021 (ONS, 2022) identify that the UK imported around 50% of its gas from the international market. Reliance on imported energy from global markets leaves the UK vulnerable to trends in world energy market prices, political pressure, physical supply disruptions and the knock-on effects of supply challenges in other countries. The large increases in fuel prices in 2022 were largely driven by the Russian invasion of Ukraine, which disrupted gas and oil trade. Although gas and oil prices fell in 2023 compared with 2022, the levels remain high (ONS, 2023) and is a demonstration of how external factors can affect the volatility of fuel prices in the UK.

51. The UK Government set out plans to enhance the country's energy security, seize the economic opportunities of the energy transition and deliver net zero commitments in its March 2023 policy paper 'Powering Up Britain' (DESNZ, 2023f). The document sets out the UK Government's view that energy security and net zero are 'two sides of the same coin' and that 'rapid deployment of low carbon electricity [including offshore wind] will enable a systematic transformation across the economy working with technologies across the system to deliver cheaper, more secure energy'.

52. The development of new renewable energy infrastructure such as the Project provides a vital opportunity for the UK to couple its strategic needs to strengthen energy security by increasing the share of electricity generated within the country with clean energy generation to reduce national GHG emissions.

2.1.4 Energy Affordability

53. In order to progress towards a reduction in GHG emissions, decarbonisation targets and energy security, there is a need for renewable energy to be affordable. Innovation within the offshore wind energy sector has resulted in a significant reduction in energy costs over the past decade. This builds on the previous significant reduction of 32% in the cost of energy produced by offshore wind between 2012 and 2016 (ORE Catapult, 2017).

54. The UK Contracts for Difference (CfD) scheme has continued to place downward pressure on prices, with the per unit (MWh) price of offshore wind secured in the 2022 round being almost 70% less than that secured in the first allocation round in 2015. This makes offshore wind one of the most attractive and cost-effective methods of generating large quantities of low-carbon energy.

55. However, due to no new offshore wind projects winning contracts in the fifth CfD round in September 2023, the UK Government has since committed to increasing the maximum strike price by 66% for fixed-foundation offshore wind projects, from £44/MWh to £73/MWh, ahead of Allocation Round 6 (AR6) in 2024 (DESNZ, 2023b). This will help ensure projects are sustainably priced and economically viable to compete in the sixth auction round.

56. This highlights the challenges that the UK Government faces in combatting rising supply chain costs for developers to ensure offshore wind development maintains its current trajectory and allow energy affordability and decarbonisation targets to be achieved. In addition to enhancing energy security, increasing the power supply generated within the UK, as enabled by the Project, would deliver more affordable energy to consumers by reducing the country's reliance on fossil fuel imports, which are subject to high price volatility.

2.1.5 Economic Opportunities

57. The UK Clean Growth Strategy (UK Government, 2017a) states that the UK's low carbon economy could grow by an estimated 11% per year between 2015 and 2030 and could deliver between £60 billion and £170 billion of export sales of goods and services by 2030. In terms of offshore wind, the UK is the second biggest global market behind China, accounting for 24% of global offshore wind operating capacity in 2023 (The Crown Estate, 2023). British companies are increasingly benefitting from exports in areas such as cable installation, repairing equipment, construction work and consulting, helping to drive UK economic growth.

58. The ONS reported in 2021 that the UK turnover from wind energy was around £6 billion, coupled with an increase in employment from offshore wind, with around 10,100 full-time employees in 2020 (ONS, 2021). Continued public support for, and investment in, the UK offshore wind industry will create a virtuous circle of cost reduction and economic growth, increasing UK competitiveness in the global market (ORE Catapult, 2017).

59. According to the Offshore Wind Skills Intelligence Report (OWIC, 2023), the UK existing offshore wind workforce has increased to over 32,000 direct and indirect jobs in 2023. To deliver the 50GW offshore wind target by 2030, the report forecasts that the number of jobs supported by the industry will increase to over 88,000 in 2026 and over 100,000 by 2030.

2.2 Climate Change and Renewable Energy Policy and Legislation

60. Various international and national climate change and renewable energy policies and legislation exist of relevance to the Project, as described in **Table 2-1**.

Table 2-1 Summary of Relevant Climate Change and Renewable Energy Policy and Legislation

Policy / Legislation	Summary
United Nations Framework Convention on Climate Change (UNFCC)	The UNFCC is an international environmental treaty aiming to achieve the 'stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'. This resulted in the 2015 Paris Agreement, whereby member parties committed to a long-term temperature goal to hold temperature increases to below 2°C above preindustrial levels and pursue efforts to limit further to 1.5°C.
The UK Climate Change Act 2008	The Climate Change Act 2008 sets the framework for the UK to transition to a low-carbon economy, placing a duty on the UK Government to ensure their net carbon account and GHG emissions are reduced by 34% relative to 1990 levels by 2020 and 80% relative to 1990 levels by 2050.
Climate Change Act 2008 (2050 Target Amendment) Order 2019	This amendment to the Climate Change Act 2008 introduces a target for at least a 100% reduction of GHG emissions compared to 1990 levels in the UK by 2050, superseding the previous 80% reduction target.
The UK Energy Act 2013	The Energy Act introduced the Electricity Market Reform which was designed to enable the UK to develop a clean, diverse and competitive mix of electricity generation to meet a 2030 decarbonisation target range for electricity. A key output was the Contracts for Difference scheme for financial support in low carbon investment.
The UK Energy Act 2023	The Energy Act 2023 includes policy objectives for areas including Offshore Wind Generation Electricity Generation (Part 13) and supports the ambition for 50GW of offshore wind by 2030. Policy objectives include changes to legal processes which are involved in the governing of offshore wind project development in the UK. The intention of these changes is to enhance the time for project deployment, while maintaining the same level of environmental protection.
Ten Point Plan for a Green Industrial Revolution and Energy White Paper 2020	The Ten Point Plan sets out the approach the UK Government will take to support green jobs and invest in making the UK a global leader in green technologies, including the advancement of the offshore wind sector. The Energy White Paper expands on these ambitions in the context of transforming the energy system to deliver clean, resilient economic growth.
Net Zero Strategy: Build Back Greener 2021	The Net Zero Strategy builds on the approach presented in the Ten Point Plan, setting steps to cut emissions, enhance green economic opportunities, and leverage further private investment into net zero.
British Energy Security Strategy 2022	For renewables, the strategy aims to use smarter planning to maintain high environmental standards whilst increasing the pace of offshore wind deployment by 25%, with an ambition to deliver an increased target of up to 50GW of offshore wind by 2030.
Powering Up Britain 2023	The plan builds on the ambitions set out in the Net Zero Strategy and British Energy Security Strategy to deliver four objectives in the transformation of the UK's energy system: energy, consumer, climate and economic security.

2.3 Planning Policy and Legislation

2.3.1 The Planning Act 2008

61. The Planning Act 2008 established the legal framework for applying for, examining and determining applications for NSIPs. The Act sets thresholds above which certain types of infrastructure development are nationally significant and require a DCO application. The Project is defined as an NSIP under Section 15(3) of the Planning Act 2008 as the Project contains an offshore generating station with an expected capacity greater than 100MW. As required by Section 31 of the Planning Act 2008, a DCO application will be submitted.

62. While Section 37 of the Planning Act 2008 requires that a DCO application is made to the Secretary of State it is the Planning Inspectorate who will carry out the operational aspects of administering the planning process for NSIPs. Planning Inspectors will examine the DCO application and make a recommendation to the relevant Secretary of State. The decision whether to grant the DCO falls ultimately with the Secretary of State.

2.3.2 Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and National Infrastructure Advice Notes

63. The EIA Regulations (2017) require that the potential effects of a project, where these are likely to have a significant effect on the environment, are taken into account in the decision-making for that project. The legislative framework for the EIA was established by the EIA Directive (2011/92/EU) and as amended by Directive 2014/52/EU), which was transposed into UK law for NSIPs by the EIA Regulations.

64. The EIA Regulations set out the statutory process and minimum requirements for an EIA to be acceptable, including the provision of adequate environmental information and the carrying out of consultation, publication and notification. The EIA process provides a systematic tool for assessing the potentially significant impacts of a project on the physical, biological and human environment. It enables the identification of mitigation and management measures, where required, to ensure that development is sustainable and allows for opportunities for beneficial impacts to be identified. As required under the EIA Regulations, the DCO application for the Project will be accompanied by an ES.

65. The EIA process for the Project will also take account of non-statutory National Infrastructure Planning Advice Notes published by the Planning Inspectorate. These notes are published to provide advice and information on a range of process matters in relation to the Planning Act 2008.

2.3.3 National Policy Statements

66. As referenced in **Section 2.1.1**, NPS are produced by the UK Government and set out national policy against which proposals for major infrastructure projects are assessed and decided on. They integrate the UK Government's objectives for infrastructure capacity and development with its wider economic, environmental and social policy objectives, including climate change goals and targets, in order to deliver sustainable development.

67. There are 12 designated NPS, setting out government policy on different types of NSIP development. NPS of relevance to the Project are:

- EN-1 for Overarching Energy (DESNZ, 2023a);
- EN-3 for Renewable Energy Infrastructure (DESNZ, 2023b); and
- EN-5 for Electricity Networks Infrastructure (DESNZ, 2023c).

68. EN-1 states the need to 'increase our supply of clean energy from renewables and low carbon sources', requiring a transformation in the energy system and reducing emissions while ensuring a secure and reliable supply. The statement also highlights that the UK Government legislated for the Sixth Carbon Budget, which requires the UK to reduce GHG emissions by 78% by 2035 compared to 1990 levels. According to the Net Zero Strategy, by 2035 all UK electricity will need to come from low carbon sources, subject to security of supply, whilst meeting a 40 to 60% increase in demand, highlighting a need for additional generating capacity.

69. In addition, EN-1 states the UK Government's ambitions to increase interconnection across national borders to contribute to delivering a secure, low carbon electricity system at low cost, including the potential for delivering multi-purpose projects by combining offshore wind generation with market-to-market interconnection, also known as multi-purpose interconnectors. EN-1 highlights that applicants should consider foreseeable future demand in their project development, which may involve the consenting of additional infrastructure to facilitate future coordination. EN-3 also notes that the '*design of wind farms and offshore transmission projects should seek to be sufficiently flexible such that they are future-proofed as far as possible to enable future connections with different types of offshore transmission or wind farms respectively, where they are proposed to be spatially proximate*.'

70. EN-1 emphasises that different types of electricity infrastructure are needed to deliver the UK's energy objectives, which cannot be delivered in isolation: '*The security and reliability of the UK's current and future energy supply is highly dependent on having an electricity network which will enable new renewable electricity generation, storage and interconnection infrastructure that our country needs to meet the rapid increase in electricity demand required to transition to net zero while maintaining energy security. The delivery of this important infrastructure also needs to balance cost to consumers, accelerated timelines for delivery and the minimisation of community and environment impacts*'.

71. EN-1 notes that storage and interconnection infrastructure complement new generating plants by ensuring that less of the electricity generated domestically is wasted by allowing excess production to be stored or exported, whilst also increasing energy security when domestic demand is greater than the installed generation capacity. Furthermore, EN-1 states that multi-purpose interconnectors have the potential to deliver additional benefits, including enabling reduced curtailment of offshore wind generation, reduced landing points along the coast and capital expenditure. Such benefits can be maximised if the planning of offshore wind farms and interconnectors are aligned.

72. EN-3 states the UK Government's target to deploy up to 50GW of offshore wind capacity by 2030, with an expectation that there will be a need for substantially more installed offshore capacity beyond this to achieve net zero carbon emissions by 2050.

73. EN-1 and EN-3 also introduce a new class of infrastructure being "Critical National Priority (CNP) Infrastructure". This is defined as nationally significant low carbon energy infrastructure, including offshore wind development, supporting onshore and offshore network infrastructure and associated network reinforcements. EN-1 and EN-3 jointly note that there is the urgent need for CNP Infrastructure to achieve the UK's energy objectives, together with the national security, economic, commercial, and net zero benefits. As set out in both EN-1 (paragraph 3.3.59) and EN-3 (Chapter 3) "*subject to any legal requirements, the urgent need for CNP Infrastructure to achieving our energy objectives, together with the national security, economic, commercial, and net zero benefits, will in general outweigh any other residual impacts not capable of being addressed by application of the mitigation hierarchy*."

74. In particular Paragraph 2.8.2 of EN-3 notes that "*to meet its objectives government considers that all offshore wind developments are likely to need to maximise their capacity within the technological, environmental, and other constraints of the development*" which builds on the Secretary of State's previously stated view that all available wind farm projects are required in order to meet UK 2030 targets for renewable energy.

75. Recent updates to the NPS for energy infrastructure, specifically EN-5, have introduced requirements for coordination through both strategic network planning and at a project level. Of particular focus in this latest version of NPS EN-5 (which came in to force 17th January 2024) is the offshore-onshore transmission infrastructure associated with offshore wind farms, whereby a coordinated approach is expected for regions with multiple wind farms or offshore transmission projects, including multi-purpose interconnectors and bootstraps, which are in proximity to one another and whose designs are being concurrently progressed or are expected to come forward in the near future.

76. Applicants are required to align their project development to the recommendations of wider strategic transmission network planning, where relevant, and demonstrate in their assessment of alternatives the steps undertaken to explore coordination with geographically and temporally proximate projects. This includes considerations of opportunities to connect wind farms and multi-purpose interconnectors and/or bootstraps with each other (see Section 2.13 of EN-5).

77. In addition, EN-3 notes in paragraph 2.8.48 "*Applicants are encouraged to work collaboratively with those other developers and sea users on co-existence/co-location opportunities, shared mitigation, compensation and monitoring where appropriate. Where applicable, the creation of statements of common ground between developers is recommended. Work is ongoing between government and industry to support effective collaboration and find solutions to facilitate greater co-existence/co-location*".

78. The Project has been included in the HND process led by National Grid ESO due to its spatial and temporal proximity with other Round 4 projects. The HND process sought to optimise the offshore-onshore transmission infrastructure from offshore wind farms to their grid connection points in order to reduce and minimise impacts on local communities and the environment from multiple projects being constructed at or around the same time in proximate locations. The site selection process undertaken to date (as discussed in **Chapter 4 Site Selection and Consideration of Alternatives**) has been aligned to the most recent HND recommendations to the Project, as stated in the Outcomes of the South Cluster HND Impact Assessment brief (National Grid ESO, 2024a). This revised HND design for the Project concluded a radial connection to Birkhill Wood Substation, as further detailed in **Section 1.1.2**.

79. NPS-EN5 recognises the role of the HND in identifying appropriate co-ordination. Paragraph 2.13.4 states "*It is recognised that proposed projects which have progressed through strategic network design exercises have been considered for strategic co-ordination through those exercises*." By its inclusion in HND, the Project has progressed through a strategic network design exercise.

80. Opportunities for coordination with other planned developments are currently being explored by the Applicant. Engagement with other relevant developers will be sought to share relevant information and collaborate on identifying feasible and practicable solutions.

81. The Preliminary Environmental Information Report (PEIR) and ES will set out the NPS policies of relevance to each environmental topic and supporting information on how each item is addressed.

2.3.4 Marine Policy

82. The UK Marine Policy Statement (MPS) is the framework for preparing Marine Plans and taking decisions affecting the marine environment, which was prepared and adopted for the purposes of section 44 of the Marine and Coastal Access Act 2009. The MPS facilitates and supports the formulation of regional Marine Plans, ensuring that marine resources are used in a sustainable way.

83. The Marine and Coastal Access Act 2009 allows the designation of marine protected areas (MPA) in England, Wales and UK offshore waters, including Marine Conservation Zones (MCZ) and Highly Protected Marine Areas (HPMA). The Act also establishes a streamlined marine planning, licencing, and decision-making system to enable sustainable development in marine environments in accordance with the MPS. The Act also added a new section to the Planning Act 2008, allowing an applicant to apply for DML(s) as part of the DCO application.

84. The Marine Strategy Regulations 2010 provides measures to maintain or achieve 'good environmental status' in the marine environment in order to support healthy, productive and resilient marine ecosystems and the sustainable use of marine resources for the benefit of current and future generations, as transposed from the Marine Strategy Framework Directive (Directive 2008/56/EC).

2.3.5 National Planning Policy Framework

85. The National Planning Policy Framework (NPPF) was originally implemented in 2012 to make the planning system more streamlined and accessible by replacing the suite of Planning Policy Guidance Notes (PPG) and Planning Policy Statements (PPS), which formerly provided national planning guidance to local authorities. The most recent NPPF was published in December 2023 and sets out the UK Government's planning policies for England and how these are expected to be applied (UK Government, 2023).

86. The NPPF does not contain specific policies for NSIP, which are determined in accordance with the Planning Act 2008 and relevant NPS but may still be considered as a relevant matter in decision making. At the heart of the framework is the presumption in favour of sustainable development. The NPPF outlines a series of core principles based on the economic, social and environmental pillars of sustainable development and covers topics such as building a strong and competitive economy, promoting healthy and safe communities and conserving and enhancing the natural environment. The EIA process for the Project will refer to these core principles to ensure that sustainable development is pursued in a positive way.

2.3.6 Regional and Local Planning Policy

87. Local authorities are required to prepare and maintain up to date Local Development Plans (LDP), which set out their objectives for land use and development within their jurisdiction, along with general policies for implementation.

88. Prior to the Planning and Compulsory Purchase Act 2004, local planning policy was set out in a single document, the Local Plan. Local Plans have since been replaced by Local Development Frameworks (LDF), which comprise a suite of Development Plan Documents (DPD) such as a Core Strategy DPD, Site Allocation DPD, Area Action Plans and a Proposals Map.

89. The Onshore Scoping Area falls completely within the administrative area of the East Riding of Yorkshire Council (ERYC). For avoidance of doubt, the EIA process for the Project will consider regional and local planning policies pertaining to this authority and their neighbouring authorities as appropriate. Where such policy documents are still under development or revision, but where draft versions are available, they will be acknowledged and considered within the EIA process.

2.4 Environmental Legislation

90. **Table 2-2** provides a summary of the key environmental legislation of relevance to the Project.

Table 2-2 Summary of Key Environmental Legislation

Level	Policy / Legislation	Summary
International	The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention)	The Ramsar Convention was adopted in 1971 and ratified by the UK in 1976. It provides an international mechanism for protecting sites of global importance and is thus of key conservation significance, covering all aspects of wetland conservation. Sites designated under the Ramsar Convention are known as Ramsar sites.
	The Convention on Biological Diversity (CBD)	The CBD came into force in December 1993. It has three main objectives: • The conservation of biological diversity; • The sustainable use of the components of biological diversity; and • The fair and equitable sharing of the benefits arising from the utilisation of genetic resources.
	The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)	The OSPAR Convention came into force in 1992 and focuses on international cooperation to protect the marine environment of the north-east Atlantic. OSPAR's biodiversity strategy establishes a network of MPAs.
	The Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)	The Espoo Convention came into force in 1997 and sets out the obligations of Parties to notify and consult each other on all major projects under consideration that have the potential for likely significant adverse environmental effects across international boundaries, known as transboundary effects.
National	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017	The Water Framework Directive (WFD) (2000/60/EEC), which was transposed into UK law by the Water Environment Regulations 2017, aims to ensure the quality of inland, estuarine and groundwater bodies including coastal surface waters are protected and improved up to an offshore limit of one nautical mile.
	The Conservation of Habitats and Species Regulations 2017 (as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) and the Conservation of Offshore Marine Habitats and Species Regulations 2017	Under Regulation 61 of the Conservation of Habitats and Species Regulations 2017, appropriate assessment is required for a plan or project which, either alone or in combination with other plans or projects, is likely to have a significant effect on a National Site Network site and is not directly connected with or necessary for the management of the site. The National Site Network includes existing and newly designated Special Areas of Conservation (SAC) and Special Protected Areas (SPA). The overall process is known as Habitat Regulations Assessment (HRA). The Conservation of Offshore Marine Habitats and Species Regulations 2017 consolidate and update the Offshore Marine Conservation Regulations 2007. These regulations apply to the United Kingdom's offshore marine area, affording them the same level of protection as onshore habitats and therefore the HRA process also applies. Any proposals affecting proposed SACs, potential SPAs, Ramsar sites and areas secured as sites compensating for damage to a National Site Network site would also require an HRA, as they are protected by government policy.
	The Environment Act 2021	The Environment Act 2021 sets clear statutory targets for the recovery of the natural world in four priority areas: air quality, biodiversity, water and waste, and sets a new target to reverse the decline in species abundance by the end of 2030. The Act will also deliver annual Environmental Improvement Plans to underpin the targets and a set of environmental principles to be embedded into UK policy making. It is acknowledged that 10% BNG became mandatory as part of the planning system (for Town and Country Planning Act (TCPA) developments) in England from January 2024. For NSIP developments it is anticipated that BNG will be a requirement no later than November 2025 (Defra, 2023).
	Marine Coastal and Access Act 2009	Enables the designation of Marine Protected Areas (MPAs) in England, Wales and UK offshore waters, including MCZs and Highly Protected Marine Areas (HPMAs). Introduces measures including a streamlined marine licensing system and the introduction of a marine planning system and decision-making to enable sustainable development in accordance with the MPS.

Level	Policy / Legislation	Summary
	The Wildlife and Countryside Act 1981	The Wildlife and Countryside Act 1981 enables the designation of Sites of Special Scientific Interests (SSSI) to provide statutory protection of the best examples of flora, fauna, geological and physio-geological features. The Wildlife and Countryside Act 1981 also enables statutory nature conservation bodies to declare sites which are considered to be of national importance as National Nature Reserves (NNRs).
	The Countryside and Rights of Way Act 2000	Under the Countryside and Rights of Way Act 2000, Natural England has the power to designate Areas of Outstanding Natural Beauty (AONBs) in England for areas that are outside national parks and that are considered to have significant landscape value. The Act amends the law relating to Public Rights of Way (PRoW), including making provision for public access on foot to certain types of land.
	The Protection of Badgers Act 1992	The Protection of Badgers Act 1992 makes it an offence to willfully kill, injure or take, or attempt to kill, injure or take a badger; and to cruelly ill-treat a badger. The Act also makes it an offence to intentionally or recklessly damage, destroy or obstruct a badger sett, or to disturb a badger whilst in a set. A licence may be granted for the purpose of development which will interfere with a badger sett within an area specified in the licence.
	The Natural Environment and Rural Communities (NERC) Act 2006	Section 41 of the NERC requires the relevant Secretary of State to compile a list of habitats and species of principal importance for the conservation of biodiversity in England. Decision makers of public bodies must have regard for the conservation of biodiversity in England when enacting their duties, using the list as guidance.
	The Commons Act 2006	The Commons Act 2006 protects areas of common land in a sustainable manner, delivering benefits for farming, public access and biodiversity.
	The Hedgerow Regulations 1997	The Hedgerow Regulations 1997 makes it an offence to remove or destroy certain hedgerows without permission from the local authority and the local authority is the enforcement body for such offences.

2.4.1 Habitats Regulations Assessment

91. In England and Wales, the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and elements of Council Directive 2009/147/EC on the conservation of wild birds (the Birds Directive) are implemented under (i) the Conservation of Habitats and Species Regulations 2017 (as amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) (the 'Habitats Regulations') onshore and up to 12 nautical miles (nm) offshore and (ii) the Conservation of Offshore Marine Habitats and Species Regulations 2017 between 12 and 200nm offshore. The Habitats Regulations (as they are collectively known) require the Secretary of State to consider whether a plan or project has the potential to have an adverse effect on the integrity and features of a National Site Network site (e.g. SPA, Special Area of Conservation (SAC)), known as Habitats Regulation Assessment (HRA).

92. HRA can be described as a three-stage process as outlined in Planning Inspectorate Advice Note Ten (The Planning Inspectorate, 2022):

- **Stage 1. Screening** is the processes which initially identifies whether a proposal is likely to have a significant effect on the National Site Network site(s)'s conservation objectives, both alone or in combination with other plans or projects. If a conclusion of no likely significant effect (LSE) is reached for all National Site Network sites and their qualifying features considered, it is not necessary to proceed to the next stages of HRA. If the conclusion is for LSE to occur or the effect is not known, this would trigger the need for an appropriate assessment.

- **Stage 2. Appropriate assessment** is the detailed assessment of the implications of the proposal for the qualifying features of the National Site Network site(s), in view of the site(s) conservation objectives and identify ways to avoid or minimise any effects. This is to determine whether there is objective evidence that adverse effects on the integrity (AEoI) of the site can be excluded.

- **Stage 3. The derogation stage** considers if proposals that would have an AEoI of a National Site Network site(s) qualify for an exemption. There are three tests to this stage to be followed in order: consider alternative solutions; consider Imperative Reasons of Overriding Public Interest (IROPI); and secure compensatory measures. Each test must be passed in sequence for a derogation to be granted.

93. HRA Screening is being undertaken and will be consulted upon with the relevant stakeholders through the EPP. Further assessment will be undertaken as required and presented with the DCO application in the Report to Inform Appropriate Assessment (RIAA). The RIAA will contain sufficient information to enable the Secretary of State to carry out an appropriate assessment. A draft RIAA will also be provided for consultation.

94. The requirement for Stage 3, namely the derogation case and identification of possible compensation, will be subject to the findings of the RIAA and consultation through the EPP. Outputs from this stage will be reported in the DCO application as required.

2.4.2 Marine Conservation Zone Assessment

95. Noting the presence of the Holderness Offshore and Holderness Inshore MCZ in proximity to the Offshore Scoping Area (see **Figure 7-11** within **Chapter 7.4 Benthic and Intertidal Ecology**), consideration will be made of Section 126 of the Marine and Coastal Access Act 2009 (MCAA) which places specific duties on the MMO relating to MCZ and marine licence decision making.

96. The process has three sequential stages:

- **Stage 1. Screening** is the processes which initially identifies whether s.126 should apply and is determined on the basis of if the licensable activity is taking place within or near an area being put forward or already designated as an MCZ; and if the activity is capable of affecting (other than insignificantly) either (i) the protected features of an MCZ; or (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant. If a conclusion of 'non applicable' is reached, then it is not necessary to proceed to the next stages of assessment. If the conclusion is that s.126 is applicable, then this would trigger the need for further assessment to determine which subsections of s.126 should apply.

- **Stage 2. Stage 1 assessment** will consider whether the conditions in s.126(6) can be met and will determine if there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ; and if the MMO can exercise its functions to further the conservation objectives stated for the MCZ (in accordance with s.125(2)(a)). If the condition in s.126(6) cannot be met the stage 1 assessment will also consider whether the condition in s.127(7)(a) can be met. In doing so the MMO will determine whether there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of the conservation objectives stated for the MCZ. This should include proceeding with it (a) in another manner, or (b) at another location.

- **Stage 3. Stage 2 MCZ assessment** will consider whether the conditions in s.126(7)(b) and (c) can be met and will determine if the benefit to the public of proceeding with the act clearly outweigh the risk of damage to the environment that will be created by proceeding with it; and, if so, then whether the applicant can satisfy the MMO that they will undertake or make arrangements for the undertaking of measures of equivalent environmental benefit to the damage which the act will or is likely to have in or on the MCZ.

97. Screening is being undertaken and will be consulted upon with the relevant stakeholders through the EPP. Further assessment will be undertaken as required and presented with the DCO application. The MCZ Assessment Report will contain sufficient information to enable the Secretary of State or MMO to carry out an appropriate assessment. A draft report will also be provided for consultation.

98. The requirement for Stage 2 and 3, will be subject to the findings of the screening exercise and consultation through the EPP. Outputs from these stages will be reported in the DCO application as required.

3 Project Description

3.1 Introduction

99. This chapter provides an indicative description of the Project for the purpose of informing the Scoping Report and obtaining a Scoping Opinion. The project description will be refined throughout the EIA process and a final description will be provided in the ES, which will form part of the DCO application.

100. As described in **Chapter 1 Introduction**, the Project is being developed to connect into Birkhill Wood Substation in the East Riding of Yorkshire. The Project is also exploring the potential for coordination with an OHA between the UK and another European country's electricity market. This Scoping Report (and project description therein) therefore covers flexibility for potential coordination to connect as an OHA, within a realistic worst-case scenario (as further detailed in **Section 1.1.2**). As noted in **Section 2.3.3**, futureproofing the design envelope to enable potential coordination as an OHA aligns with the Energy NPS (EN-1) and provides potential opportunities for reducing cumulative impacts on the environment and communities by ensuring efficiency in the development of transmission infrastructure. The Applicant is also exploring wider opportunities for coordination as required by NPS-EN5 and this Scoping Report provides a level of flexibility for ongoing coordination discussion with other projects where appropriate. Further information on the requirements for coordination within planning policy are outlined in **Chapter 2 Policy and Legislative Context**.

3.2 Design Envelope Approach

101. The NPS EN-3 (Department of Energy and Climate Change (DECC), 2011) recognises the design envelope approach which states in paragraph 2.6.42:

'Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application to the IPC [the Secretary of State], possibly including:

- *Precise location and configuration of turbines and associated development;*
- *Foundation type;*
- *Exact turbine tip height;*
- *Cable type and cable route; and*
- *Exact locations of offshore and/or onshore substations'*

102. NPS EN-3 (paragraph 2.6.43) continues:

'*Where details are still to be finalised, applicants should explain in the application which elements of the proposal have yet to be finalised, and the reason why this is the case. Where flexibility is sought in the consent as a result, applicants should, to the best of their knowledge, assess the likely worst case environmental, social and economic effects of the proposed development to ensure that the impacts of the project as it may be constructed have been properly assessed*.

103. A design envelope approach will be progressed where maximum and minimum parameters, where appropriate, will be defined to ensure the worst-case scenario can be quantified and assessed allowing likely significant effects to be identified, and mitigated for wherever possible. This approach has been widely used in the consenting of offshore wind farms and is consistent with the Planning Inspectorate Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2018) which states that:

'The Rochdale Envelope assessment approach is an acknowledged way of assessing a Proposed Development comprising EIA development where uncertainty exists, and necessary flexibility is sought'.

104. The project description, including the project design envelope, will be further refined as appropriate during the EIA process with the final design envelope set out in the ES. Such refinement will take into account:

- The Scoping Opinion;
- Consultation with a wide range of stakeholders (including the local community); and
- Further technical and engineering development along with environmental assessments.

3.3 Indicative Project Infrastructure

105. **Figure 1-1** identifies the Offshore Scoping Area and Onshore Scoping Area (with a more detailed view of the Onshore Scoping Area shown on **Figure 1-2**). **Table 3-1** sets out which infrastructure components are located in which area.

106. The Scoping Report has been prepared using a realistic worst-case scenario approach for the Project (which includes an element of flexibility to allow for coordination with an OHA).

107. **Table 3-1** sets out key indicative parameters for the Project infrastructure. The parameters have been identified using the Applicant's knowledge of previous offshore wind developments and future changes in the market to elements such as wind turbine dimensions. These parameters will continue to be refined through the EIA process based on realistic worst-case scenarios, which will be fully justified in the ES.

Table 3-1 Key Indicative Parameters for the Realistic Worst-Case Scenario Assessed in the Scoping Report

Feature	Indicative Parameter
General Parameters	
Distance to shore from the Array Area (at its closest point)	210km
Array Area	262km^2
Array Area water depths	21 to 35m at Lowest Astronomical Tide (LAT)
Offshore Infrastructure Parameters	
Maximum number of wind turbines	122
Maximum wind turbine rotor diameter	337m
Minimum blade clearance	28m above LAT
Wind turbine foundation options under consideration	Potential foundation types include monopiles, piled jackets and suction bucket jackets.
Scour protection options for foundations	Potential options include protective aprons, mattresses or matting (concrete or rock filled bags), flow energy dissipation (frond) devices and rock and gravel placement.
Maximum number of offshore platforms	Maximum of three offshore platform structures
Offshore platform foundation options under consideration	Potential foundation types include monopiles, piled jackets, suction bucket jackets, elevator platform and gravity bases.
Scour protection options for foundations	Potential options include protective aprons, mattresses (concrete or rock filled bags), flow energy dissipation (frond) devices, and rock and gravel placement.
Maximum total inter-array cable length	Up to approximately 400km.
Offshore export cable electrical current	HVDC
Maximum number of offshore export cables	Maximum of four cables.
Maximum number of trenches	Three trenches
Maximum offshore export cable length	Up to approximately 400km
Landfall Infrastructure Parameters	
Proposed landfall installation method	Trenchless methodology or open cut trenching
Maximum number of exit pits	Up to an estimated four exit pits
Maximum number of Transition Joint Bays (TJB)	Estimated three Transition Joint Bays (TJBs)
Approximate transition pit permanent footprint (per pit)	Up to approximately 50m^2 (5m x 10m)
Approximate transition pit construction footprint (per pit)	Up to approximately 250m^2
Landfall trenchless compound (length x width)	Up to approximately 125m x 125m
Onshore Infrastructure Parameters	
Maximum number of onshore export cables	Maximum of four cables
Proposed onshore export cable installation methods	Open trenching methods, with trenchless techniques where required.
Maximum number of trenches	Four trenches
Maximum onshore export cable length	Up to approximately 60km for HVDC cables from the landfall to the Onshore Converter Station(s) (OCS(s)), with up to an additional 7km for HVAC cables from OCS(s) to the Birkhill Wood Substation.
Maximum permanent corridor width	30m
Maximum temporary construction corridor width (including for trenchless techniques)	80m
Estimated maximum OCS(s) area (construction and operation area)	27ha (subject to final design) - any energy storage and balancing equipment will be housed wholly within the footprint of the OCS(s), as detailed in **Section 1.1.1**. Note that estimated maximum OCS(s) area does not consider potential area required for delivery of on-site BNG proposals, which will be in addition to the area stated.

3.4 Infrastructure Description

3.4.1 Dogger Bank D Array Area

108. The wind turbines will be located within the DBD Array Area which is located approximately 210km off the north-east coast of England (at its closest point) in the North Sea, immediately to the east of the DBC Offshore Wind Farm, covering an area of approximately 262km^2 (**Figure 1-1**). Water depths in this area range from approximately 21 to 35m below LAT.

3.4.1.1 Wind Turbines

109. The final selection of wind turbines will be made once further surveys, technical development and engagement with the supply chain have been undertaken with the final decision made post-consent.

110. Based on the likely wind turbines available at the time DBD enters construction (with anticipated rated capacity of 14 to 27+MW per turbine), it has been assumed at this scoping stage that a maximum of 122 wind turbines would be deployed if wind turbines at the lower end of this power per turbine range are selected, with fewer required if the larger turbines are selected. The power rating of the wind turbines is not in itself a consenting parameter but presented indicatively in this Scoping Report to assist the reader with understanding the Applicant's scope for the Project.

111. The final layout of the wind turbines within the Array Area will be confirmed post-consent, informed by site investigation works, impact assessment and wind resource modelling. The final layout will comply with relevant best practice for offshore wind farms in relation to shipping and navigation, fishing interests, offshore health and safety, and any relevant aviation interests. Note that the layout of turbines does not affect the realistic worst-case scenario for scoping purposes – the key consideration is instead the maximum area over which development could occur.

112. Wind turbines typically incorporate tapered tubular towers and three blades attached to a nacelle housing mechanical and electrical generating equipment. The minimum clearance above the HAT of the turbine blades will be 26m, subject to further project design refinement. At present, the expected maximum rotor diameter is 337m. Indicative wind turbine parameters are set out in **Table 3-1** and shown in **Plate 3-1**.

3.4.1.2 Foundations

113. The wind turbines will be secured to the seabed using fixed foundations. Foundation designs will be informed by several factors including environmental characteristics such as ground conditions, water depths, metocean conditions, and techno-economic parameters including the size of wind turbines selected, and supply chain constraints.

114. The final selection of the type(s) of foundations that will be utilised will be made following seabed surveys, engineering and environmental assessments and engagement with the supply chain, with a decision made post-consent on the finally selected foundation type(s). It is possible that more than one type of foundation could be used across the Array Area.

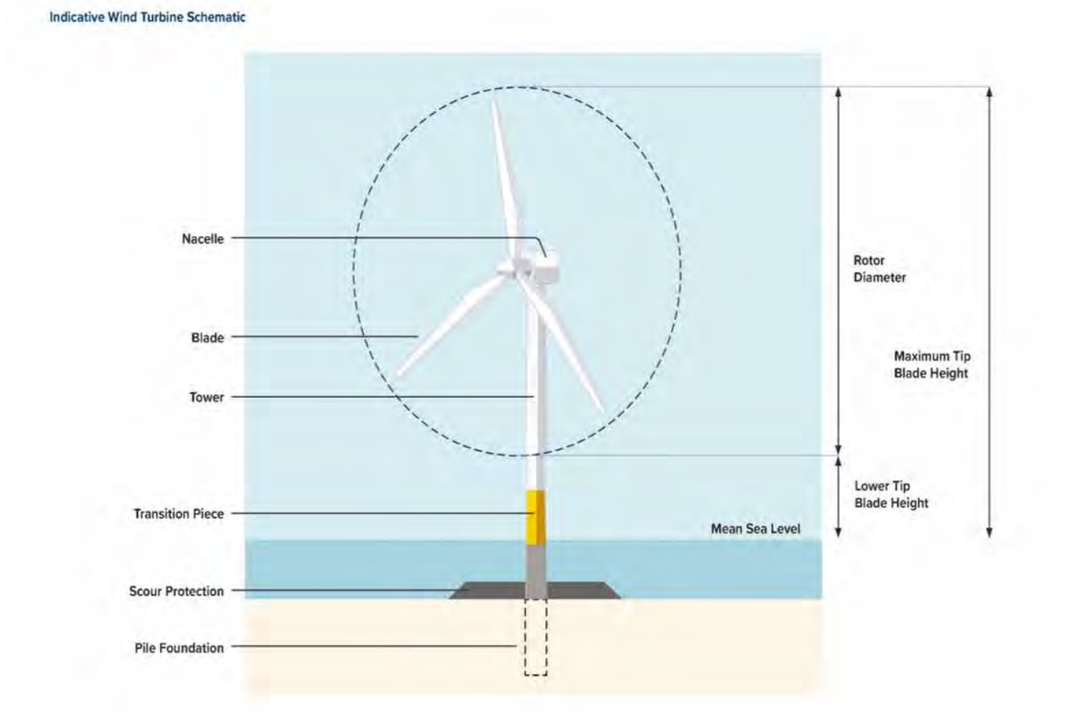


Plate 3-1 Indicative Wind Turbine Schematic

115. **Table 3-2** sets out high level details of the foundation types under consideration (noting additional options for the offshore platforms) with **Plate 3-2** providing an indicative example of what each wind turbine foundation type looks like. The foundation types currently being considered are set out in **Table 3-2**.

Table 3-2 Offshore Infrastructure Foundation Types Under Consideration

Foundation Type	Description
Monopile	Monopiles are usually constructed from steel, with dimensions dependent on the size of the wind turbines, seabed / ground conditions, metocean conditions, and installation and transportation methods. The piles are installed vertically into the seabed using piling hammers and / or vibrational methods with the driving method determined by seabed conditions. In the most challenging seabed conditions such as stiff clays or rock, piles may be installed by a mix of driving and drilling.
Piled Jacket	The piled jacket foundation structure is initially positioned on the seabed, with piles then driven through 'skirts' and fixed into place by means of grouting. Pre-piling can also be used, whereby the piles are installed first in a different campaign, with installation of the jackets undertaken at a later stage. This way the installation of the piles can already be completed before the jackets are on location. 'Templates' are used to ensure that the jacket legs align with the piles and which also keeps the piles vertical during driving.
Suction Bucket Jacket	Suction installed foundations penetrate the seabed by self-weight with suction applied after so that pressure difference drives the bucket into the seabed to a target depth, which is normally less than 20m. This foundation type offers several advantages over conventional piled jacket structures due to its efficient installation with the jacket and bucket foundations installed in one go, and its suitability for sites with shallow bedrock, although seabed obstructions such as boulders need clearing in advance.
Elevator Platform	This foundation type is only under consideration for the offshore platforms (i.e. not the wind turbines). Elevator platforms combine the advantages of traditional fixed platforms with the versatility offered by a mobile unit. Elevator platforms can be fabricated at local yards without extensive equipment or specialist expertise. When complete they need only tugs and strand jacks for installation and relocation. The elevator platform concept is somewhat similar to a jack up vessel, the platform itself forming the hull for float out and "legs" penetrating this which can be extended into contact with the seabed which then raises the platform out of the water. These are then locked into place for the lifetime of the structure.
Gravity Base	This foundation type is only under consideration for the offshore platforms (i.e. not the wind turbines). Gravity base foundations sit on the seabed and are typically heavy ballasted structures made of steel and / or concrete. This foundation type primarily relies on its weight to maintain the stability of the platform(s). The gravity base is placed on a pre-prepared area of seabed which may include removal of soft, mobile sediments and other obstructions such as boulders, with the area levelled in preparation for the placement of the gravity base through the installation of a layer of rock / gravel.

116. Scour of the seabed may occur around the foundations, and scour protection measures may be required, with the following protection methods potentially being considered:

- Solid protective aprons made of preformed concrete or plastic;
- Concrete mattresses;
- Rock filled bags;
- Flow energy dissipation (frond) devices (e.g. frond mattresses); and
- Rock and gravel placement.

117. Installation of scour protection normally involves seabed preparation such as provision of a gravel bedding layer and / or seabed levelling.

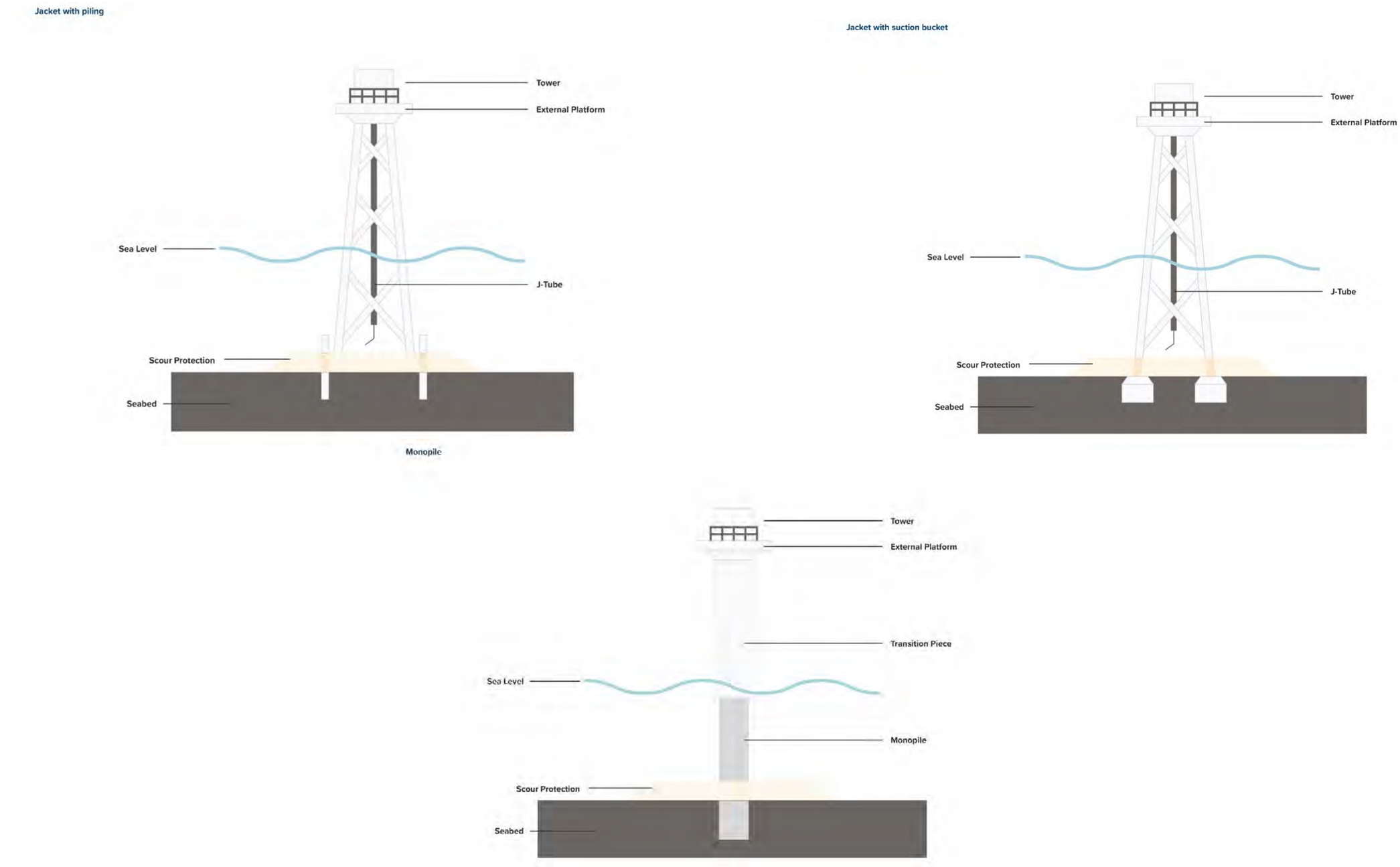


Plate 3-2 Potential Wind Turbine Foundation Types

3.4.1.3 Offshore Platforms

118. **Table 3-1** identifies the realistic worst-case scenario used in the scoping exercise with respect to the number of offshore platforms potentially required for the Project. Up to three offshore platforms will be potentially required.

119. The type of foundations being considered for these platforms are the same as those being considered for the wind turbines, with the addition of the elevator platform and gravity bases (as per **Table 3-2**). It should be noted that the final design may incorporate different foundations on the offshore platforms compared to the wind turbines. **Plate 3-3** providing an indicative example of what each offshore platform foundation type looks like.

3.4.1.4 Inter-Array Cables

120. Inter-array cables will connect the wind turbines to the Offshore Substation Platform(s) OSP(s), as discussed in **Section 3.4.2** The length of each inter-array cable will be dependent on the final wind farm layout; however, the most realistic maximum length of the total inter-array cabling for DBD is likely to be up to approximately 400km. The final location and length of the inter-array cabling will be determined post-consent, subject to the final layout of the wind turbines.

121. The inter-array cables will be buried (where feasible) in the seabed, typically to a depth of 1m, but burial depth may range from 0.5m to 7.5m depending on ground conditions encountered and will be determined by a Burial Assessment Study (BAS) and a Cable Burial Risk Assessment (CBRA). Cables can be buried via several different techniques depending on the seabed conditions along the route. These include ploughing, jetting, trenching or post-lay burial. Decisions on the burial method will be made following further seabed characterisation and engineering design work, resulting in the identification of realistic worst-case scenarios during the EIA process to allow assessment, as well as consideration of the impacts on the designated features of the Dogger Bank SAC.

122. Where cable burial is not possible due to hard ground conditions or the presence of existing infrastructure on / under the seabed, alternative cable protection measures could be used, and this could include rock placement, grout / sand bags, concrete mattresses and / or polyethylene ducting. The appropriate level of protection will be determined based on an assessment of the risks posed to the Project in specific areas which will underpin the development of worst-case scenarios through the EIA process.

3.4.2 Offshore Export Cable Corridor

123. The export cables will be HVDC and there could be up to four export cables laid in the offshore Export Cable Corridor (ECC). Small fibre optic cables may also be installed alongside the export cables for cable monitoring and communication with the wind farm. Dependant on the export cable configuration, there may also be neutral metallic return cable(s) installed alongside the export cables.

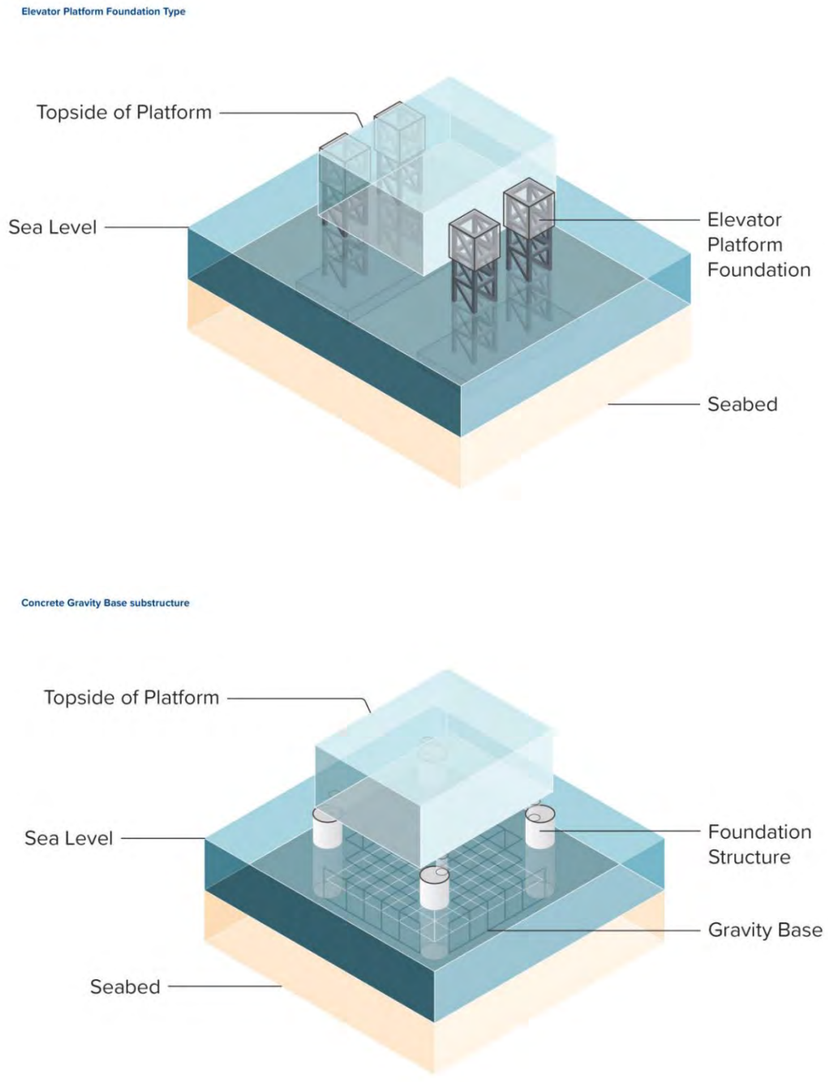


Plate 3-3 Potential Offshore Platform Foundation Types

124. Export cables will be installed in multiple trenches and protected in line with good industry practice. The export cables will be installed in separate installation campaigns per trench. The method of installation of offshore cables will depend on the seabed conditions along the cable route which, along with appropriate burial depths will be determined by a BAS and a CBRA. This will take account of risk to the cable across the seabed from damage by external factors.

125. Cable protection, where required, can take various forms with those methods under consideration described in **Table 3-3**.

Table 3-3 Offshore Cable Protection Methods Under Consideration

Cable Protection Method	Description
Rock Placement	In this technique, an engineered berm comprising differing sized rocks covers the cable. The rocks are normally delivered to the seabed using a fall pipe vessel with smaller rocks placed first to protect the cable from the larger rocks. The size and shape of the outer rocks can be engineered in a trapezium shape to specifically mitigate the risk from both anchor strike and dragging.
Grout / Sand Bags	Grout / sand filled bags may be used in conjunction with other cable lay protection methods, primarily (but not limited to) at cable / pipeline crossings.
Rock Bags	Rocks contained in wire or rope netted bags can be deployed via crane on to the seabed. Accurate positioning can be achieved by this method.
Concrete Mattress	Interlocking concrete slabs can be lowered to the seabed on a frame. Once the position of the frame is correct, the release mechanism is triggered, and the mattress is deployed over the cable. Mattresses provide an alternative protection system where more irregularly shaped protection (e.g. rock placement) may increase the risk of snagging from trawling activity.
Frond Mattress	A frond mattress has the additional characteristic of having buoyant fronds which slow water velocity directly above the cable, increasing sediment deposition, and therefore assisting with the protection provided by the mattress itself.
Polyethylene Ducting	Polyethylene ducting or polymer shells are installed on the submarine cable before cable laying, typically in interlocking half shell sections. These ducts or shells have good wear resistance and can protect the cable from abrasion. They can provide bend restriction, impact protection, stability, abrasion resistance and are often used in combination with mattresses and rock placement.

126. It is likely that the offshore export cables will have to cross other cables and / or pipelines. Detailed methodology for the crossing of cables and pipelines by the export cables will be determined in collaboration with the owners of the infrastructure to be crossed. A number of techniques can be utilised, including:

- Pre-lay and post lay concrete mattresses;
- Pre-lay and post lay rock dumping;
- Pre-lay steel structures; and
- Other appropriate approaches.

127. All methods will be pre-agreed with the asset owner and subject to the most appropriate industry and technical standards.

3.4.3 Landfall

128. With regard to the Onshore and Offshore Scoping Areas, the electricity will be transmitted to shore from the Array Area by offshore export cables which will make landfall south east of Skipsea (as described in **Chapter 4 Site Selection and Consideration of Alternatives**, **Section 4.2**).

129. Dependant on the engineering constraints of the proposed landfall, different cable installation methodologies will be considered. It is assumed that suitable technologies will include trenchless solutions. Such techniques involve drilling pilot holes between the entry (onshore) and the exit (offshore) points. These are then enlarged by a larger cutting tool passing through the holes. Cable ducts are then installed through the openings created, providing a conduit for export cables to be pulled through at a later date.

130. Trenchless cable installation would be drilled from an onshore construction compound and will exit the seabed in an exit pit at a suitable site with a water depth of approximately 10m below LAT. The length of the trenchless cable installation would also depend upon factors such as seabed topography, shallow geology / soil conditions, selected cable installation methodology, coastal erosion and environmental constraints.

131. The offshore and onshore export cables will be jointed in an onshore TJB. It is assumed there will be a maximum of three TJBs overall. The TJB is an underground structure that houses the joints between the offshore and onshore export cables together with a separate fibre optic link box in the same excavation as the TJB.

3.4.4 Onshore Export Cable Corridor

132. The onshore export cables will be installed within the onshore ECC via open cut trenching methods and, where required, using trenchless crossings. A maximum temporary construction corridor of 52m is assumed for the onshore ECC, this is increased to up to 80m for trenchless crossings. This width accounts for the cable trenches, haul road, topsoil storage, drainage, etc.

133. Where Horizontal Directional Drilling (HDD) is used as one of the selected trenchless techniques, jointing bays will be used to pull the cables into the preinstalled ducts installed during the HDD process and to join the cable lengths to each other. Link boxes are used for earthing cables and will be installed inside a protective concrete chamber. The jointing bays are sub-surface structures, while the link boxes will require access (for inspections) from the surface during the operation phase and will therefore be located at or above ground level. At the jointing location, there will be one link box per joint.

3.4.5 Onshore Converter Station Zone

134. OCS(s) are required to connect DBD to the transmission grid. The OCS(s) will be located in the vicinity of the grid connection point at Birkhill Wood Substation. The OCS(s) will contain the necessary electrical and auxiliary equipment and components for transforming the power from the wind farm to 400kV to meet the UK Grid Code for connection to the transmission grid. Infrastructure within the OCS zone may incorporate energy storage and balancing infrastructure (ESBI), such as battery banks. Since ESBI is evolving technology, a range of technologies are under development and hence will be considered and assessed within the PEIR and ES. The system could be housed in single or multiple building(s), several containers, in an open yard or a combination of the above within the OCS zone. The realistic worst-case scenario will be set out in the PEIR and confirmed in the ES (e.g. maximum height, footprint, number and type of buildings). The key indicative construction parameters for the OCS(s) and EBSI known at this stage are set out in **Table 3-1.**

135. Construction of infrastructure within the OCS zone will include:

- Establishing access roads and construction site perimeter fencing;
- Site clearance and installation of environmental mitigation requirements;
- Site preparation / levelling for the temporary construction compounds and the permanent OCS(s) site including drainage;
- Installation of underground utility / drainage and foundations for buildings and equipment; Dependent upon the onsite ground conditions at the OCS(s) location, piling may be required to support the construction of buildings and heavy equipment;
- Construction of building(s) and installation of electrical equipment;
- Construction of permanent finishes e.g. internal roads and gravel areas;
- Installation of permanent perimeter fencing around entire OCS(s) area; and
- Landscaping to minimise visual impact.

136. The need, location and extent of landscaping and / or BNG at the OCS(s) will be identified and agreed with relevant stakeholders during DBD's design process.

3.5 Construction Programme

137. Construction of the Project is expected to begin no earlier than 2029 and based on this date, construction is expected to be completed no later than 2035.

3.6 Operation, Maintenance and Decommissioning

138. Throughout the operational life of the Project O&M activities will be required. The overall O&M strategy will be finalised once the location of a suitable port / harbour is identified, and the technical specifications of the wind farm are known. The production of an O&M plan will be conditioned in the relevant DML(s) which will provide detail on anticipated maintenance activities.

139. Maintenance activities will include:

- Scheduled maintenance (preventative);
- Unscheduled maintenance (corrective); and
- Emergency / special maintenance (corrective).

140. It is anticipated that the Project's assets would have an operational life of a minimum of 35 years. At the end of the operation phase, it is a condition of The Crown Estate lease, as well as a statutory requirement (through the provisions of the Energy Act 2004 (as amended)), that the Project is decommissioned.

141. It is anticipated that when decommissioning takes place, all offshore structures above the seabed (foundations and electrical infrastructure) will be removed, and the site of the onshore OCS(s) will be restored. The process of removing or leaving in situ the electrical cables, both offshore and onshore, on decommissioning will be agreed through the Decommissioning Programme post-consent in consultation with relevant stakeholders. The decommissioning sequence will be undertaken in reverse of the construction sequence, involving similar types and numbers of vessels and equipment.

142. A Decommissioning Programme and associated schedule will be developed during the Project's lifespan to take account of the latest best practice and new technologies. The approach and methodologies of the decommissioning activities will be compliant with the relevant legislation, guidance and policy requirements at the time of decommissioning.

4 Site Selection

4.1 Site Selection Process Overview

143. This chapter sets out an overview of the site selection process adopted for the Project and the consideration of alternatives. The aim of the site selection process is to understand the relevant constraints (environmental and engineering) and identify preferred options for siting the landfall, offshore and onshore export cables and OCS(s) and related infrastructure and evaluate reasonable alternatives. This process aims to ensure a project design that is robust and deliverable whilst avoiding and minimising environmental impacts as far as practicable.

144. Site selection is an iterative process with selection and refinement of the development area ongoing throughout the EIA process. For the purposes of Scoping, the Applicant has sought to develop a Scoping boundary which gives consideration to key constraints known at this time. However, the Scoping Area has also been developed to provide sufficient flexibility to accommodate further refinement of onshore and offshore infrastructure. In addition, the Scoping Area provides a level of flexibility to allow for due consideration of potential opportunities for coordination as required by NPS EN-5 which are currently being explored by the Applicant. The scope of the site selection exercise is outlined below and will be further explained within the PEIR and ES.

145. As noted in **Chapter 1 Introduction**, an opportunity was identified by the Applicant to compress the layout and maximise the capacity of the third phase of the Dogger Bank Wind Farm, namely DBC, which resulted in the identification of the DBD Array Area in the eastern part of the original DBC site. This site sits within the Dogger Bank Offshore Development Zone, which was previously defined as part of the Offshore Wind Leasing Round 3 process (The Crown Estate, 2019). The Project was therefore included in The Crown Estate's collective 'plan-level' HRA for offshore wind farms in Leasing Round 3 or the 2017 Offshore Wind Extensions Opportunity (The Crown Estate, 2023).

146. Following outcomes of the HND process led by National Grid ESO, an onshore grid connection point for the Project has been identified at the proposed Birkhill Wood Substation (National Grid ESO, 2024a) (see **Chapter 1 Introduction**). This substation will be developed and constructed by NGET as part of a separate planning application on land in the vicinity of the existing Creyke Beck substation north of Hull and does not form part of this Project.

147. The identification of the DBD Array Area and grid connection point has been explained in the preceding paragraphs and are not discussed further in this chapter.

148. Site selection work has been progressed based on the grid connection point at the newly proposed Birkhill Wood Substation to define potential wider zones in which to site the OCS(s) and related infrastructure (such as the ESBI) (herein 'OCS zones') and an onshore and offshore ECC from the Array Area. The short list options identified have been used to define the Onshore and Offshore Scoping Areas for the Scoping Report. The main steps of the site selection process are outlined in **Plate 4-1**.

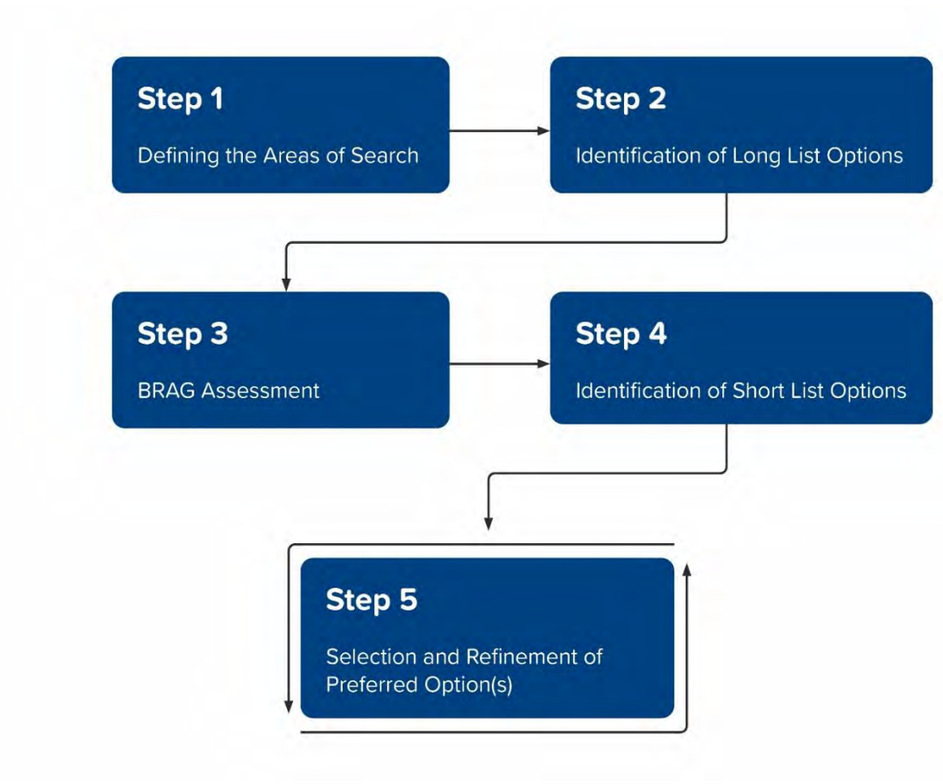


Plate 4-1 Site Selection Process Flowchart

149. Site selection design principles and engineering assumptions were developed based on industry guidance, professional judgment, and adhered to at each stage of the process to provide a systematic framework for decision making. These principles and assumptions consider whether an option is technically feasible and appropriately considers environmental constraints. The development area will be further refined as more information becomes available regarding the scale, layout and design of the proposed infrastructure and the environmental constraints present.

150. The first step of the site selection process involved defining the Areas of Search (AoS) for the landfall, offshore and onshore ECC and OCS zone (Step 1), which are broad geographical areas within which further site selection will be undertaken to narrow down the area and identify potential options.

151. A constraints mapping exercise was subsequently undertaken to establish a long list of feasible options for each infrastructure element of the Project (Step 2). This was based on the site selection design principles, environmental constraints and engineering assumptions. The key principles and assumptions used within this exercise have been provided in **Sections 4.2.2**, **4.3.2**, **4.4.2**, and **4.5.2**. Options deemed to be unfeasible due to insurmountable constraints, or those with alternatives which had greater engineering, economic and environmental risks were discounted at this stage.

152. Environmental and engineering considerations associated with each long list option were evaluated using a Black-Red-Amber-Green (BRAG) assessment (Step 3) for various topics as outlined in **Table 4-1**. The assessment involved classifying the risk or opportunity that would be presented by each option during the construction, operation and decommissioning stages using the following colour-coded criteria:

- **Black** – Potential impediment to development with respect to environment, consenting or engineering risks;
- **Red** – High environmental, consenting or engineering risk to development;
- **Amber** – Medium environmental, consenting or engineering risk to development; and
- **Green** – Low environmental, consenting or engineering risk to development.

153. Although the BRAG assessment was based on pre-mitigation risks, mitigation measures such as micro-siting around constraints and using trenchless crossing techniques were considered when summarising the BRAG ratings for each topic. Professional judgment was used to determine whether mitigation options would be available and likely to reduce the degree of risk posed by a constraint.

154. The BRAG assessment outcomes enabled the identification of the short list options, including proposed alternatives, based on a balanced and holistic view of the risks and opportunities behind each option (**Step 4**). This shortlisting has helped to define the Onshore and Offshore Scoping Areas, noting the need for flexibility at this stage for infrastructure refinement and potential coordination.

155. Where multiple options are shortlisted, further investigation to understand the scale of environmental and engineering risks and mitigation requirements will be undertaken to conclude the preferred option(s). The selected preferred option(s) will then be further refined through the EIA process (**Step 5**).

Table 4-1 Environmental and Engineering Topics Considered in the BRAG Assessment

Infrastructure Element	BRAG Topics
Offshore ECC	Shipping and Navigation, Marine Physical Processes, Other Marine Users, Archaeology, Marine Mammals, Fish and Shellfish Ecology, Commercial Fisheries, and Benthic and Intertidal Ecology
	Engineering (such as number of offshore cable and pipeline crossings and seabed geology)
Landfall, onshore ECC and OCS zone	Traffic and Transport, Noise and Vibration, Military and Civil Aviation, Landscape and Visual, Land Use and Land Quality, Hydrology and Flood Risk, Ecology and Archaeology
	Engineering (such as cliff heights, site topography and number of complex obstacle crossings)

4.2 Landfall

4.2.1 Defining the Landfall Area of Search (Step 1)

156. The landfall AoS (as shown in **Figure 4-1**) was initially established by considering the entire Holderness coastline between Scarborough and north of the Humber Estuary. Coastal urban settlements such as Filey and Bridlington and internationally designated marine ecological sites, including the Flamborough and Filey Coast Special Protection Area (SPA) and Flamborough Head Special Area of Conservation (SAC), the Flamborough Headland Heritage Coast and concentrated areas of Annex I habitats along this coastline were excluded from the AoS. The total length of coastline contained within the initial landfall AoS was 59.1km.

157. The most northerly extent of the initial landfall AoS was established at Scarborough due to the location of the North Riding Forest Park, North York Moors National Park and the North Yorkshire and Cleveland Heritage Coast being situated north of this point with various designated coastal ecological sites and Heritage Coasts further north. It was considered that there are viable landfall options south of Scarborough and that these options would be less constrained, with fewer risks associated with their development.

158. The most southerly extent of the initial landfall AoS was established at the northern bank of the Humber Estuary, as it was considered that the estuary itself would present too many constraints for offshore ECC routeing and subsequently making landfall. These constraints included heavy shipping traffic within the Humber, the Humber Estuary Ramsar / SAC / SPA / Site of Special Scientific Interest (SSSI) / Important Bird Area (IBA) and large extents of Annex I habitats extending from the estuary mouth inland.

159. Landfall options were considered within this initial AoS. However, prior to the identification of the offshore and onshore ECC AoS, a number of landfall options were discounted at an early stage due to significant environmental and engineering constraints, as discussed in **Section 4.2.2**

160. Siting the landfall beyond Skipsea and Bridlington would require either an offshore or onshore ECC that would be excessively long and would have a greater impact on the environment and communities. Therefore, the initial landfall AoS was subsequently refined to the coastline between Skipsea and Withernsea, as illustrated on **Figure 4-1**.

4.2.2 Identification of Long List Options and BRAG (Steps 2 and 3)

161. The process for identifying a long list of options began for the landfall, as offshore and onshore ECC can only connect via viable landfall locations. Key site selection design principles for landfall identification include but are not limited to:

- Avoid coastal areas over 30m in height;
- Avoid and minimise impacts to internationally and nationally designated ecological sites (e.g. SAC, SPA, SSSI, MCZ) as far as possible;
- Minimise impacts to landscape / seascape and cultural heritage designations (e.g. National Landscapes, and Heritage Coasts);

- Ensure sufficient inland space to accommodate set back from the coast to reduce risks associated with coastal erosion; and

- Avoid areas with substantial infrastructure or urban land use (e.g. urban settlements, coastal defences, holiday and caravan parks).

162. A total of 21 landfall options were identified within the initial landfall AoS. Key rationale for excluding landfall options at the long list stage were direct overlaps with nationally designated ecological and heritage sites and important marine habitats, unsuitable cliff heights for landfall cable installation works and interactions with existing and planned offshore developments, resulting in complex offshore ECC crossings in the nearshore. Seven options were taken forward to the BRAG assessment.

4.2.3 Identification of Short List Option for defining the Scoping Area (Step 4)

163. Based on the BRAG assessment, six of the seven landfall options were removed due to a number of reasons, including but not limited to:

- Potential interactions with infrastructure and underground utilities at gas storage facility sites and planned developments within the area; and

- High potential for buried archaeology within the landfall area.

164. The shortlisted option taken forward is located south-east of Skipsea, on the northern edge of the MCZ designations within the area. While there are other landfall options with comparably low onshore environmental risks, it was considered that the selected landfall was the only option which provided an opportunity to potentially avoid or minimise impacts to the Holderness Inshore MCZ and Holderness Offshore MCZ. The broader landfall area included within the Scoping Area allows for engineering flexibility in approaching the landfall and onshore access to the landfall area.

4.3 Offshore Export Cable Corridor

4.3.1 Defining the Offshore Export Cable Corridor Area of Search (Step 1)

165. The AoS for the offshore ECC was essentially informed by existing constraints as well as ensuring there was optionality to capture the most feasible potential routes. The southern extent of the offshore ECC AoS was established as the most direct route from the southern edge of the refined landfall AoS to the south-eastern corner of the Dogger Bank SAC within UK territorial waters (**Figure 4-1**), avoiding any planned or existing nationally significant infrastructure where possible.

166. The northern extent of the offshore ECC AoS was initially defined as the most direct line possible from the northern extent of the landfall to the western boundary of the Dogger Bank SAC within UK territorial waters. This was then extended further to allow for a larger area outside the Dogger Bank SAC in order to provide flexibility for route selection. The offshore ECC AoS is illustrated on **Figure 4-1**.

4.3.2 Identification of Long List Options (Steps 2 and 3)

167. The key driving factors for offshore ECC routeing were to minimise the length of offshore export cables within marine designated ecological sites such as the Dogger Bank SAC, Holderness Offshore MCZ and Holderness Inshore MCZ, to determine the shortest and most direct route to the landfall where practicable and to provide flexibility to account for potential future changes to the Dogger Bank SAC so far as possible. Key site selection design principles for offshore ECC routeing include but are not limited to:

- Minimise cable length where practicable;

- Minimise the number of crossings of existing offshore cables, pipelines and wells. Where unavoidable, crossings should be at 90 degrees where practicable;

- Minimise interactions with other existing offshore wind farms, Agreement for Lease areas and areas allocated for Carbon Capture and Storage (CCS);

- Maintain required separation distances from other offshore infrastructure and ensure sufficient space for offshore export cable installation (including anchor spread of installation vessels) whilst maintaining an appropriate safety buffer with existing sub-sea cables and pipelines;

- Avoid and minimise impacts to internationally and nationally designated ecological sites (e.g. SAC, MCZ) and ecologically important sandbanks and potential reefs (Annex 1 habitats) as far as possible;

- Avoid protected wrecks as far as practicable and minimise interactions with other wrecks and obstructions;

- Avoid aggregate dredging areas, foul ground and disposal sites; and

- Avoid any known areas of high Unexploded Ordnance (UXO) concentration, firing range and other military practice and exercise areas.

168. Several offshore ECC options were identified, each branching in the nearshore to connect to the landfall options under consideration (discussed in **Section 4.2.2**), including options to take into account future potential extension of the Dogger Bank SAC. All offshore ECC options were taken forward to the BRAG assessment.

4.3.3 Identification of Short List Options for defining the Scoping Area (Step 4)

169. Based on the BRAG assessment, the majority of offshore ECC options were removed, leaving a short list of those that all exit the Dogger Bank SAC to the north of the array site.

170. The shortlisted options were informed by considerations including but not limited to:

- Total length of offshore ECC;
- Number of cable and pipeline crossings;
- Extent of cabling and cable crossings within the Dogger Bank SAC and potential future SAC extension (as far as possible and potential cable protection requirements;
- Avoidance of existing and planned marine infrastructure; and
- Overlap with the CCS geological store site.

171. At this stage, optionality was retained for the offshore ECC to further investigate and appraise their environmental, economic and engineering risks, as well as accounting as far as possible at this stage for the potential future extension of the Dogger Bank SAC. Therefore, it was decided that the Offshore Scoping Area should cover a broader area to the north-west of the array site to allow for this optionality.

4.4 Onshore Export Cable Corridor

4.4.1 Defining the Onshore Export Cable Corridor Area of Search (Step 1)

172. The onshore ECC AoS included land between the northern and southern extents of the refined landfall AoS and the OCS zone AoS and is illustrated on **Figure 4-2**. The extent of the onshore ECC AoS was defined to align with identifiable boundaries of physical and environmental constraints such as: urban settlements; industrial areas; designated ecological and heritage sites; the Hull-Scarborough railway line; and the presence of major roads, allowing for sufficient flexibility for corridor routeing into the OCS zone AoS from both the west and east.

4.4.2 Identification of Long List Options (Steps 2 and 3)

173. Broad corridors were identified to create the long list of onshore ECC options. The key driving factors for onshore ECC routeing were to determine the most direct route to the OCS zone AoS as practicable whilst minimising interactions with environmental and engineering constraints. Key site selection design principles for onshore ECC routeing include but are not limited to:

- Locate the corridor as close as practicable to land parcel boundaries to minimise impacts to landowners;
- Avoid stand-alone residential properties, urban settlements and other areas with substantial infrastructure (e.g. airfields and industrial parks);
- Avoid mature and ancient woodlands as far as practicable;
- Avoid and minimise impacts to internationally and nationally designated ecological sites (e.g. SAC, SPA, SSSI), landscape areas (National Landscapes) and heritage assets (e.g. Scheduled Monuments and Listed Buildings) as far as possible;
- Minimise interactions with other infrastructure assets (e.g. onshore wind farms and solar farms); and
- Minimise the number of utility, road, rail and watercourse crossings.

174. Onshore ECC options were identified originating from the seven landfall locations refined at the long list stage (see **Section 4.2.2**). In total, 54 onshore ECC options were taken forward to the BRAG assessment (including branching routes to the OCS zone AoS).

4.4.3 Identification of Short List Options for defining the Scoping Area (Step 4)

175. Based on the BRAG assessment, a number of onshore ECC options were removed for a number of reasons, including but not limited to:

- Unavoidable overlap with above-ground infrastructure associated with solar farm development(s);
- Engineering constraints associated with acute bends and space restrictions; and
- High-risk crossings of a nationally designated ecological site with potential for unfavourable ground conditions for trenchless techniques.

176. Following this assessment, two main onshore ECC options (with three branching routes each on approach to the OCS zone AoS) were included in the short list. Although not presented at this stage, these options have helped to define the Onshore Scoping Area which provides further flexibility to potentially coordinate with other local developments. At this stage, optionality is also retained for the onshore ECC to further investigate and appraise the environmental, economic and engineering risks.

4.5 Onshore Converter Station Zone

4.5.1 Defining the Onshore Converter Station Zone Area of Search (Step 1)

177. The grid connection point at Birkhill Wood Substation was provided by National Grid ESO, located on land north-west of the existing Creyke Beck Substation. The OCS zone AoS was initially established as a 3km search radius around the grid connection point.

178. This 3km radius was set to minimise the length of the connection between the OCS(s) and the Birkhill Wood Substation. Minimising this distance was considered appropriate to reduce cable reactive power issues, mitigate transmission losses and minimise adverse effects on economic efficiency. The OCS zone AoS is illustrated on **Figure 4-2**.

4.5.2 Identification of Long List Options (Steps 2 and 3)

179. As with other offshore wind farm developments and given the early stage in the project development process, the exact layout and dimensions of infrastructure associated with the OCS(s) is still to be finalised, resulting in broad areas identified within the AoS which could accommodate the construction and operational requirements of the indicative infrastructure. Key site selection design principles for OCS zone identification include but are not limited to:

- Avoid residential properties, with a 250m buffer applied;
- Avoid areas with substantial infrastructure or urban land use (e.g. housing developments, golf courses and camp sites);
- Avoid overlaps with Flood Zones 2 and 3 with respect to coastal and river flooding and areas with high-risk surface water flooding;
- Avoid and / or minimise impacts to areas of local amenity value, important existing habitats and landscape features, including ancient woodlands, historic hedgerows, surface and groundwater sources and nature conservation areas (based on the Horlock Rules); and
- Avoid interactions with existing infrastructure such as utilities, onshore wind farms, solar farms and battery storage developments as far as possible.

180. From the nine OCS zone options initially identified, two options were excluded due to significant unavoidable overlap with extant planning permissions. The remaining seven options were taken forward to the BRAG assessment.

4.5.3 Identification of Short List Options for defining the Scoping Area (Step 4)

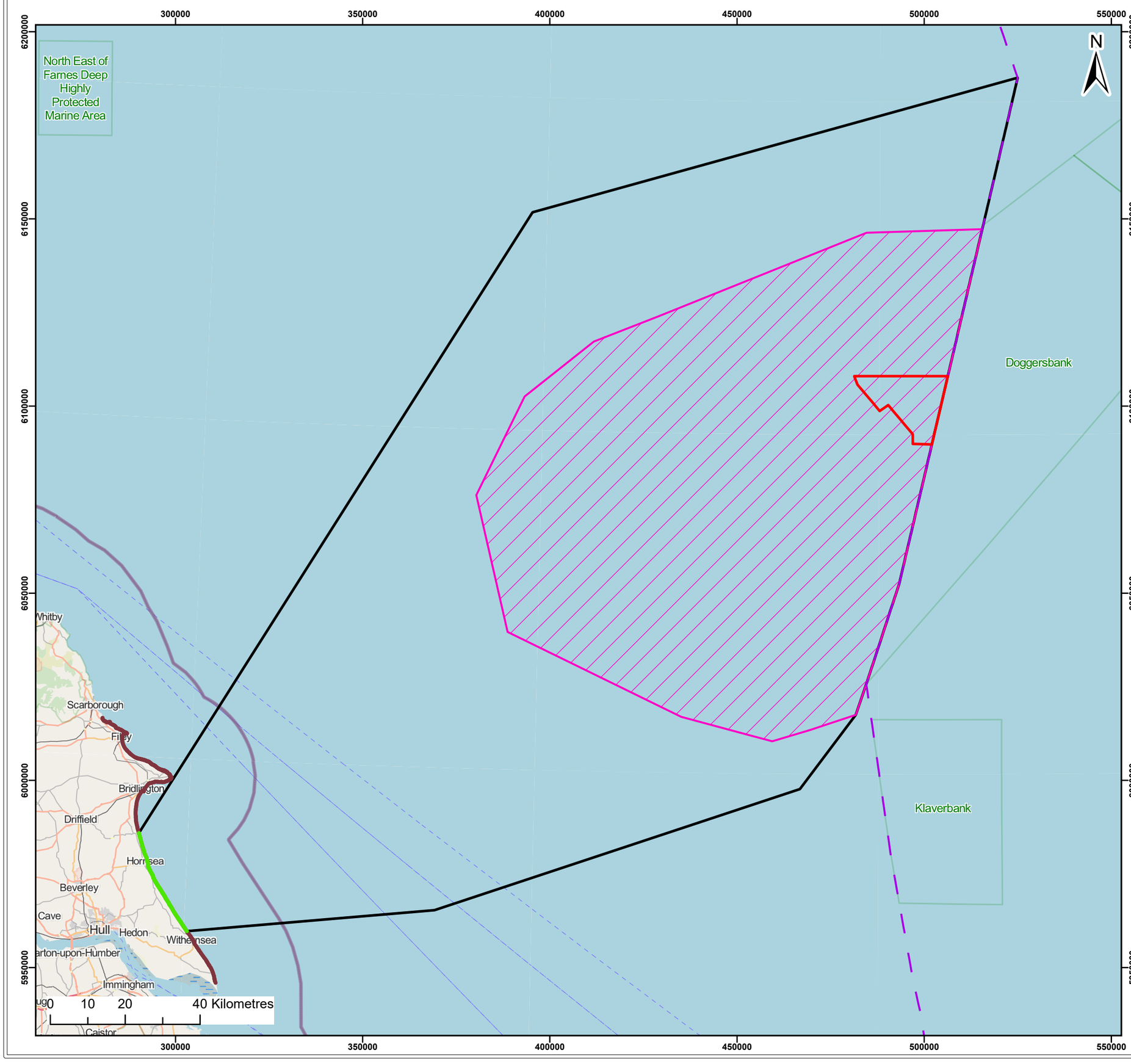
181. Based on the BRAG assessment, four OCS zone options were removed, leaving three options in the short list. OCS zone options were removed for a number of reasons, including but not limited to:

- Unfavourable traffic access with major accommodation works required to enable access;
- High potential for landscape and visual impacts due to local landscape designation and proximity to sensitive receptors; and
- Overlap / interaction with planned developments and existing utilities within the zone options.

182. At this stage, optionality is retained for the three OCS zones to further investigate and appraise their environmental, economic and engineering risks. Cable corridor routeing into and out of the OCS zone options have also been taken into consideration for the Onshore Scoping Area. Therefore, the OCS zone options have helped to define the Onshore Scoping Area which also provides some flexibility for potential co-ordination with other local developments.

4.6 Next Steps (Step 5)

183. As illustrated on **Plate 4-1** Step 5 (Selection and Refinement of Preferred Options) will continue post-scoping and through the EIA process. Following selection of the preferred option(s) for the offshore and onshore ECC and OCS zone, the Offshore and Onshore Development Areas will be refined based on evolving engineering design, site-specific environmental and engineering surveys and stakeholder engagement. Further details of the site selection process and consideration of alternatives will be provided within the PEIR and ES.



Legend:

- Dogger Bank D Array Area
- Offshore Export Cable Corridor Area of Search
- Initial Landfall Area of Search
- Refined Landfall Area of Search
- Territorial Waters
- Dogger Bank Special Area of Conservation

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Landfall and Offshore Export Cable Corridor Areas of Search

Figure: 4-1

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0027

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/04/2024	AB	AG	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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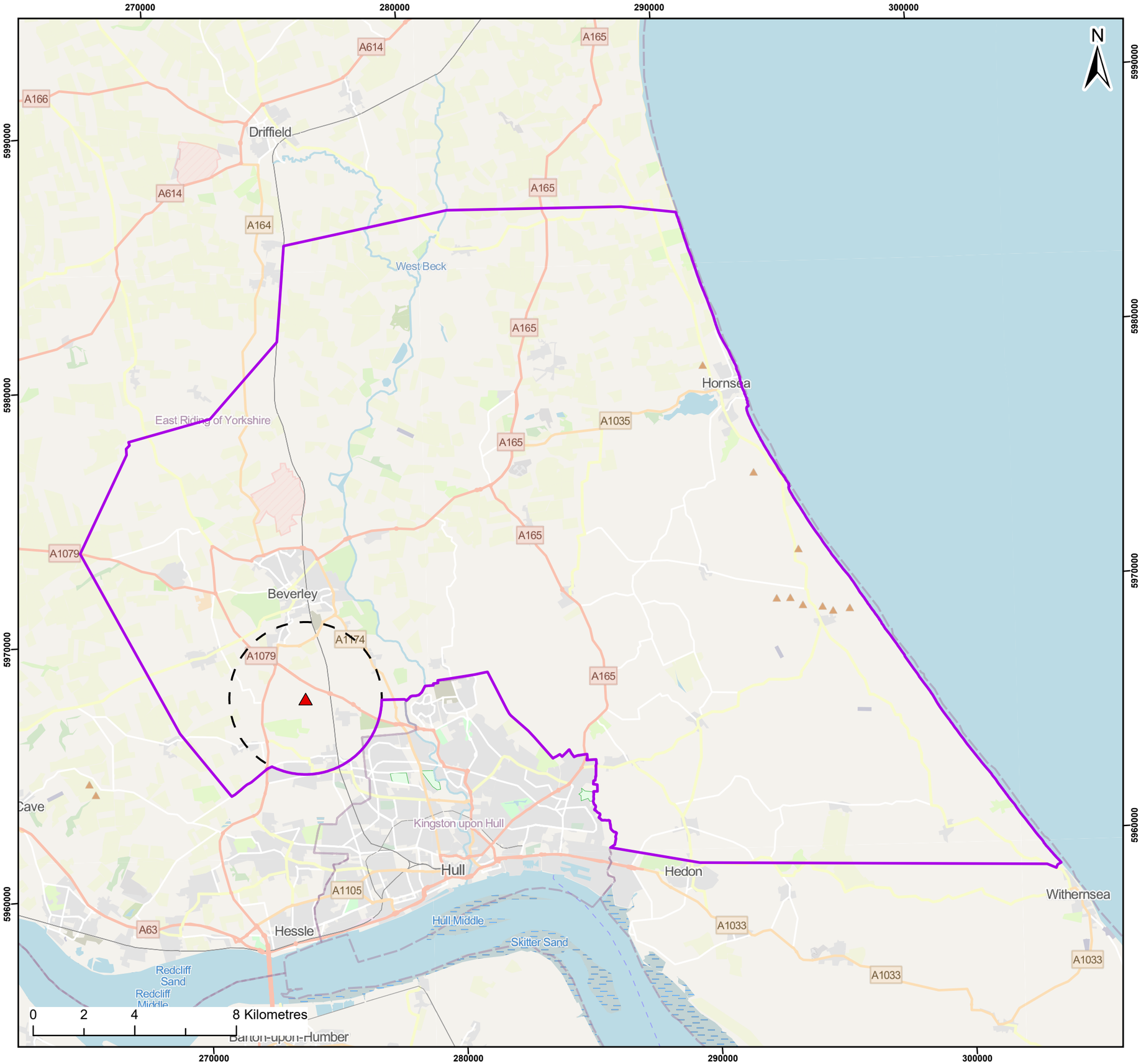

Legend:

- Onshore Export Cable Corridor Area of Search
- Onshore Converter Station Area of Search
- Grid Connection Point

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Onshore Export Cable Corridor Area of Search and Onshore Converter Station Zone Area of Search

Figure: 4-2

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0028

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	26/04/2024	AB	AG	A3	1:150,000

Co-ordinate system: British National Grid

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5 EIA Methodology

5.1 Methodology Overview

184. The EIA will be undertaken in accordance with the Planning Act 2008 and the EIA Regulations. Moreover, the approach to the EIA process and the production of the resulting ES and other related DCO application documents will be informed by the documents noted in Chapter 2 Policy and Legislative Context and any additional Topic- and receptor-specific guidance documents.

185. The outputs of the EIA will be a PEIR followed by a final ES in support of the DCO application. It is intended that the PEIR will serve as a draft ES and will include full impact assessment for topics as far as possible and where data is sufficient, for the purposes of maximising the benefits of stakeholder consultation. Information gaps and other limitations and assumptions will be transparently documented in the PEIR. The final ES will update the assessments to incorporate any stakeholder feedback, any design evolution since the PEIR was published and to reflect the final project information.

186. As the Project evolves and design refinements occur, including through consultation within the EPP (covered in **Chapter 6 Consultation**), the EIA process will take this into consideration to ensure that the ES only covers the likely effects associated with the final project design. This will ensure that the EIA is undertaken in a comprehensive but proportionate manner.

5.2 Characterisation of the Existing Environment

187. The characterisation of the existing environment will be undertaken to determine the baseline conditions in the area subject to potential change by the Project and relevant study areas will be defined on a topic-by-topic basis. This will involve the following steps:

- Define study areas for each receptor or receptor groups based on the zone of influence (ZOI) and relevant characteristics of the receptor (e.g. mobility or range);
- Review available information and document data sources;
- Review likely or potential impacts that might be expected to arise from the development;
- Determine if the available data is sufficient and of adequate quality to make EIA judgments with reasonable confidence;
- If further data is required, gather additional data in a targeted manner, directed at answering key questions and filling important information gaps; and
- Review all information gathered to ensure the existing environment can be sufficiently characterised with adequate detail.

188. Existing data from research, government and industry will be used, alongside data collected by the Applicant specifically for the Project. As described in **Section 1.3**, data collected as part of the consenting and post-consent monitoring process for other similar projects which overlap with the Project or are within the local area (e.g. DBC (offshore), and onshore for DBA, DBB and Dogger Bank South) will also be examined to increase efficiency and support proportionate assessment. In addition, opportunities for coordination with other planned developments are currently being explored by the Applicant to share relevant information. The existing data sources and proposed data collection are outlined in the respective subsections of each technical topic chapter within this Scoping Report. The most recent publicly available data from similar projects will be used at the time of production of the EIA where applicable.

189. Consideration will also be given to the evolution of the baseline in the absence of the Project (the 'no development' scenario). Anticipated trends (e.g. natural processes) in baseline conditions will be identified and considered in each assessment. Of particular importance are trends relating to climate change and biodiversity loss. Predictions of how the baseline will evolve over the lifetime of the Project will be presented in topic chapters to reflect natural changes in the baseline environment that may occur in the absence of the Project.

190. The Cumulative Effects Assessment (CEA) identifies projects which may be under construction or operation at the same time as the Project (see **Section 5.7 Cumulative Effects**).

191. It is envisaged that the characterisation approach of each topic will be subject to review following the receipt of the Scoping Opinion from the Planning Inspectorate (on behalf of the Secretary of State) following submission of this Scoping Report, as well as ongoing discussions with statutory and non-statutory bodies as part of the EPP and other stakeholder engagement and consultation activities. It is recognised that the characterisation approach may evolve over time with the collection of new data from the study area and as the project design evolves (see **Chapter 6 Consultation**).

5.3 Assessment of Impacts

192. Potential impacts to be considered within the EIA will be informed by feedback received through an ongoing programme of stakeholder engagement and consultation throughout the EIA process. The EPP will also inform the scope of impact assessments for topics and receptors covered within the EIA (see **Chapter 6 Consultation**). Following receipt of the Scoping Opinion, an Impact Register will be kept to assist in tracking potential impacts through the EIA process through to DCO application.

193. The EIA team will make balanced assessments using existing and new data, experience and expert judgment. As discussed above, technical consultation through the EPP will be a critical tool in the development of the assessment methodology for each topic.

194. In order to ensure consistency across topics and provide a system of common tools and terms, a matrix approach will be used, where appropriate, to frame and present judgments made (see **Table 5-1** for an example). However, it should be noted that for each topic, the latest guidance or best practice will be adopted. Therefore, the definitions of receptor sensitivity, value and magnitude of impact will be tailored to each topic and / or receptor. The impact assessment will consider the potential impacts that may arise during the construction, operation and decommissioning of the Project.

195. The assessment will use the conceptual 'source-pathway-receptor' model. By applying this model, the assessment identifies potential impacts resulting from the proposed development or activities associated with the development on the environment and sensitive receptors within it. This model provides an easy-to-follow assessment process, ensuring transparency and clarity behind any conclusions or judgments made. The aspects of the model are defined as follows:

- Source – the origin of a potential impact (e.g. an activity such as cable installation and the resulting impact such as the re-suspension of sediments);
- Pathway – the means by which a receptor is exposed to the impact (e.g. from the example above, re-suspended sediment could settle and smother the seabed); and
- Receptor – the element of the receiving environment that is impacted, which could be an element of the physical, ecological, or human environment (e.g. from the example above, species living on or in the seabed).

196. In general, the impact assessment for each topic will use the 'source-pathway-receptor' model when describing potential impacts. For certain topics, however, it may be appropriate to use other assessment models, which will be documented in detail within the respective approach to impact assessment subsection under each topic. For instance, the navigation and shipping assessment will require a risk assessment approach.

5.3.1 Determining Receptor Sensitivity

197. The ability of a receptor to adapt to change, tolerate and / or recover from potential impacts will be key in assessing its sensitivity to the impact under consideration. For ecological receptors, tolerance could relate to short term changes in the physical environment. For human environment receptors, tolerance could relate to disruptions and displacement and therefore impacts on safety, quality of life and the economy. The times required for recovery will also be an important consideration in determining receptor sensitivity.

198. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status or is regarded as locally, regionally, nationally or internationally important. For ecological receptors, value could be determined based on their role within ecosystem function.

199. The overall receptor sensitivity is determined by considering a combination of tolerance, adaptability and recoverability. This is achieved through applying known research and collected information, coupled with previous experience and expert judgment. The value of a receptor may also be considered when determining receptor sensitivity. However, it should be noted that a receptor with high value does not necessarily equate to high sensitivity. For instance, an Annex II species (under the Habitats Directive) would have a high value, but if it was highly tolerant of changes in its environment or had high recoverability, then its sensitivity should reflect these characteristics, rather than defaulting to its protected status.

200. The definitions of sensitivity and value will be clearly defined by the assessor of each EIA topic within the context of that assessment and will be applicable only to that particular topic. Reference will be made to any relevant topic- and receptor-specific guidance.

5.3.2 Predicting the Magnitude and Nature of Impacts

201. The magnitude and probability of an impact occurring will be determined through a consideration of the following factors:

- Scale or spatial extent (e.g. small-scale versus large-scale or most the population versus a few individuals);
- Duration (e.g. short term versus long term);
- Likelihood (e.g. unlikely versus likely);
- Frequency (e.g. intermittent versus continuous); and
- Nature of change relative to the baseline (e.g. fundamental, irreversible changes versus barely discernible, reversible changes or adverse versus beneficial).

202. For certain topics such as air quality and noise, the definitions for magnitude of impact may be defined using standard threshold values based on relevant industry guidance or regulatory requirements.

203. The definitions of magnitude will be clearly defined by the assessor of each EIA topic within the context of that assessment and will be applicable only to that particular topic. Reference will be made to any relevant topic- and receptor-specific guidance.

204. **Table 5-1** outlines the requirements of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations') (Schedule 4, Regulation 5) and where these are being considered within the ES.

Table 5-1 EIA Regulations Requirements and Where this is Included in the Scoping Report

Schedule 4 Regulation	A Description of the Likely Significant Effects of the Development on the Environment Resulting from:	Where this is Addressed within the Scoping Report
5(a)	Construction and existence of the development, including, where relevant, demolition works	All chapters cover construction, operational and decommissioning effects.
5(b)	Use of natural resources, in particular…	
	Land and soil	Chapter 8.2 Geology and Ground Conditions Chapter 8.5 Soils and Land Use Chapter 9.2 Human Health
	Water	Chapter 8.4 Water Resources and Flood Risk Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation Chapter 9.2 Human Health
	Biodiversity	Chapter 7.4 Benthic and Intertidal Ecology Chapter 7.5 Fish and Shellfish Ecology Chapter 7.6 Marine Mammals Chapter 7.7 Intertidal and Offshore Ornithology Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation
5(c)	Emissions of…	
	Pollutants	Chapter 7.3 Marine Water and Sediment Quality Chapter 7.4 Benthic and Intertidal Ecology Chapter 7.5 Fish and Shellfish Ecology Chapter 7.6 Marine Mammals Chapter 7.7 Intertidal and Offshore Ornithology Chapter 7.14 Offshore Air Quality Chapter 8.2 Geology and Ground Conditions Chapter 8.3 Onshore Air Quality and Dust Chapter 8.4 Water Resources and Flood Risk Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation Chapter 9.2 Human Health
5(d)	Noise and vibration	Chapter 7.4 Benthic and Intertidal Ecology Chapter 7.5 Fish and Shellfish Ecology Chapter 7.6 Marine Mammals Chapter 7.7 Intertidal and Offshore Ornithology Chapter 7.15 Offshore Airborne Noise Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation Chapter 8.8 Onshore Noise and Vibration Chapter 9.2 Human Health
	Light	Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation Chapter 8.10 Landscape and Visual Impact
	Heat and radiation	Chapter 7.4 Benthic and Intertidal Ecology Chapter 7.5 Fish and Shellfish Ecology Chapter 7.6 Marine Mammals Chapter 8.5 Soils and Land Use Chapter 9.2 Human Health
	Creation of nuisances	Covered in other topics of air quality, light and noise and vibration.
	Disposal and recovery of waste	Chapter 8.2 Geology and Ground Conditions
	Risks to…	
	Human health	Chapter 7.8 Commercial Fisheries Chapter 7.9 Shipping and Navigation Chapter 7.10 Aviation, Radar and Miliary Chapter 7.13 Other Marine Users Chapter 8.2 Geology and Ground Conditions Chapter 8.3 Onshore Air Quality and Dust Chapter 8.4 Water Resources and Flood Risk Chapter 8.5 Soils and Land Use Chapter 8.8 Onshore Noise and Vibration Chapter 8.9 Traffic and Transport

Schedule 4 Regulation	A Description of the Likely Significant Effects of the Development on the Environment Resulting from:	Where this is Addressed within the Scoping Report
		Chapter 9.2 Human Health Chapter 9.3 Socio-Economics, tourism and recreation
	Cultural heritage	Chapter 7.11 Offshore Archaeology and Cultural Heritage Chapter 8.7 Onshore Archaeology and Cultural Heritage
	The environment (due to accidents or disasters)	Chapter 7.3 Marine Water and Sediment Quality Chapter 7.9 Shipping and Navigation Chapter 8.2 Geology and Ground Conditions Chapter 8.4 Water Resources and Flood Risk Chapter 8.9 Traffic and Transport Chapter 9.5 Major Accidents and Disasters
5(e)	Cumulation of effects with other existing and/or approved projects	All topic chapters include a section covering cumulative effects.
5(f)	The impact of the Project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the Project to climate change	Chapter 9.4 Climate Change

5.4 Evaluation of Significance

205. Once the receptor sensitivity and magnitude of impact have been determined, the effect significance will be predicted by using quantitative or qualitative criteria, as appropriate, which will integrate information on both dimensions. Wherever possible, matrices such as that presented in **Table 5-2** will be used to aid the evaluation of effect significance to maintain consistency throughout the EIA process and transparently illustrate how expert judgment has been applied. However, for each topic, best practice methodology based on the most current guidance will be followed, and when considered more appropriate by the assessor than the version set out in **Table 5-2**, an alternative approach to the use of a matrix will be adopted. In such cases, the alternative approach will be fully described and justified within the relevant topic chapter.

206. It should be noted that ‘no change’ or ‘no resultant effect’ may be used where there is no impact or no pathway for an impact to affect a receptor, although ideally, such impacts would be scoped out prior to the assessment being undertaken.

207. A description of how effect significance is evaluated, and the interpretation of different significance levels will be provided within each topic chapter. This approach will ensure that the definitions of significance are transparent and relevant to each topic under consideration.

208. In general, major and moderate adverse effects are deemed to be significant, and as such, may require additional mitigation. In certain circumstances, a moderate effect may not be considered significant, and in such circumstances, a rationale will be clearly stated by the assessor. Moreover, whilst minor and negligible effects are not significant in their own right, these may still contribute to significant effects cumulatively or in-combination and will be taken forward to the CEA and in-combination assessments where appropriate.

Table 5-2 Effect Significance Matrix

		Adverse Impact				Beneficial Impact			
		High	**Medium**	**Low**	**Negligible**	**Negligible**	**Low**	**Medium**	**High**
Receptor Sensitivity	**High**	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Negligible	Negligible	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

209. The EIA Regulations require a description of the measures envisaged to avoid, prevent, reduce or where possible offset any significant adverse effects on the environment. Three types of mitigation have been defined, consistent with IEMA guidance (IEMA, 2016):

- Primary (Design) - Modifications to the location or design made during the pre-application phase that are an inherent part of the Project, and do not require additional action to be taken;
- Tertiary (Inherent) - Actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard or best practices, used to manage commonly occurring environmental effects; and
- Secondary (Additional) - Actions that will require incorporation in order to reduce any likely significant adverse effects to an acceptable level following the initial impact assessment, i.e. so that residual effects are acceptable.

210. Primary and tertiary mitigation will both be embedded within the impact assessment at the relevant point in the EIA (e.g. in this Scoping Report, PEIR or ES) and will be listed where relevant within each topic chapter. As primary and tertiary mitigation would be incorporated into the Project’s design, impacts will be assessed with this mitigation in place. Where secondary (additional) mitigation is required, impacts may be re-assessed and the ‘residual effect’ identified. All mitigation will be included within a Commitment Register.

211. Draft or outline copies of relevant mitigation and management plans will be appended to the ES and / or submitted with the DCO application as relevant.

212. Where the impact assessment identifies that an aspect of the development is likely to give rise to a significant adverse effect, secondary (additional) mitigation measures will be proposed, where possible, and discussed with relevant authorities and stakeholders to avoid the impacts or reduce their magnitude to acceptable levels (e.g. bringing down the resultant effect to non-significant).

213. In addition, where possible enhancement measures to deliver BNG will also be sought, noting that delivery of terrestrial BNG will become mandatory from November 2025 onwards based on the requirements of the Environment Act 2021 for NSIPs.

214. In some circumstances, it may be necessary to specify monitoring requirements as part of mitigation measures. Monitoring may be required to verify an assumption that an assessment and its conclusions are reliant upon, address specific assessment limitations, and / or confirm the efficacy of the proposed mitigation measures once implemented. Monitoring requirements should be proportionate and directly relevant to the findings of the impact assessment and / or relate to key uncertainties.

5.5 EIA Support Tools

215. To support the development of the Project and attendant EIA process, the Project will incorporate the use of a Commitment Register and an Impacts Register, to aid stakeholder engagement and ensure comprehensive records are maintained and updated through the pre-application phase and for the DCO application.

216. The Commitment Register will record all commitments and will include information on how the commitments will be legally secured in the form of an Excel spreadsheet. The Commitment Register will be used in consultation with relevant stakeholders to provide a clear record of project commitments.

217. An Impacts Register will be developed to deliver both proportionate EIA and ensure all impacts are transparently set out across all EIA technical topics. The Impacts Register will be in the form of an Excel spreadsheet identifying potential impacts and effects resulting from the construction, operation and decommissioning phases of the Project. The register will be updated throughout the EIA, recording the assessments presented in the Scoping Report, PEIR and ES and may also be used to record any outcomes from Expert Topic Groups (ETG) where appropriate.

218. The Impacts Register will be used to direct consultations with consultees to ensure appropriate discussions of issues and provide a transparent log of assessments and impacts, providing the following functions:

- Detailing all potential impacts associated with the Project and providing a unique identification reference which can be traced through the subsequent steps / documents;
- Setting the scope of the EIA at Scoping, PEIR and ES with appropriate justification, including references to agreements reached with stakeholders through the Scoping Opinion and the EPP;
- Stating the magnitude, sensitivity and significance for impacts considered in detail in the PEIR and ES stage for all potential impacts associated with all activities, in all phases of the Project;
- Identifying commitments (by linking to the Commitment Register) to reduce or eliminate likely significant effects; and
- Defining the worst-case scenario for any given impact.

5.6 Residual Effect and Confidence

219. Where pre-mitigation effects are significant and additional mitigation has been proposed, impacts will be reassessed, and the post-mitigation or ‘residual’ effect will be determined. If the impact does not require additional mitigation or none is possible, the residual effect would remain the same.

220. Once the significance of a potential effect has been evaluated, a confidence level may be assigned by the assessor to assist in the understanding of the judgment. This will be undertaken on a simple scale of high-medium-low whereby high confidence assessments are made on the basis of robust empirical evidence, medium confidence assessments are based on secondary research, and low confidence assessments are based on extrapolation and / or proxy data.

5.7 Cumulative Effects

221. Planning Inspectorate Advice Note Nine: Rochdale Envelope and Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (The Planning Inspectorate, 2018; The Planning Inspectorate, 2019) provide guidance on the CEA process in which a staged approach is recommended. The scope of the CEA will be established with consultees and other stakeholders including other developers as the EIA progresses.

222. The scale and nature of the development will determine the spatial and temporal boundaries that need to be considered when establishing the Project’s ZOI and thus potential for interactions with other plans and projects.

223. Other projects and development plans will be grouped into ‘tiers’ based on the project status and availability of information for use within the CEA. The Planning Inspectorate Advice Note Seventeen groups other projects into a three-tier system and guidance from Natural England (Parker *et al*., 2022) proposes a seven-tier system.

224. The Planning Inspectorate Advice Note Seventeen acknowledges that the availability of information on other plans and projects and their current status will determine the Applicant's ability to undertake the CEA. Thus, only plans and projects that are accessible, reasonably well-defined, and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CEA. Where projects are not fully defined a worst-case scenario approach will be taken within the assessment. The Advice Note also identifies the types of plans and projects that should be screened for inclusion in the CEA, which are separated into three tiers based on the level of certainty. For projects which have the least certainty (Tier 3 projects) an assessment will be carried out where possible although this may potentially be qualitative and/or very high-level dependent on the available information.

225. Guidance from Natural England (Parker *et al*., 2022) for cumulative and in-combination assessments use a seven-tier system to inform the level of data availability for projects when undertaking cumulative and in-combination assessments and help to determine which projects to include in the assessment.

226. Natural England's CEA guidance relates to the offshore wind marine environment and focuses on other DCO projects rather than projects consented via other regimes e.g. under the Town and Country Planning Act 1990 or, via Marine Licence under the Marine and Coastal Access Act 2009. For this reason, it is considered that the PINS' tiered approach will be used as default for the CEA. However, the Natural England guidance will be used in relation to DCO projects for offshore wind and the marine environment.

227. Projects that are sufficiently implemented and are expected to be completed before the commencement of the proposed Project will be considered as part of the baseline for the EIA. Where possible, the Applicant will use consented project parameter information (if available) as opposed to as built parameters to allow for the possibility that further build out could take place up to the limits set out in the DCO. The CEA will differentiate between other projects which are assumed to be under construction or operational as part of the assessment of the future baseline.

228. The CEA will focus only on other plans and projects that are likely to result in a significant cumulative effect. For some environmental topics, the CEA will have a large spatial scale and involve many plans and projects (e.g. those with highly mobile receptors), whereas for others, the CEA will be narrower (e.g. those with spatially fixed receptors).

229. Therefore, the scope of the CEA will be established on a topic-by-topic basis and will correspond with the topic-specific study area(s). Professional judgment will also be applied when deciding whether to include or exclude specific plans and projects from further assessment, which will be clearly recorded by the assessor. Moreover, any assumptions or limitations in relation to other plans and projects will also be documented.

230. Offshore plans and projects that may be considered include but are not limited to the following:

- Other offshore wind farms;
- Aggregate extraction and dredging;
- Licensed disposal sites;
- Navigation and shipping;
- Commercial fisheries;
- Sub-sea cables and pipelines;
- Potential port and harbour development;
- Oil and gas activities, carbon capture and storage, and hydrogen projects; and
- UXO clearance.

231. Onshore plans and projects that may be considered include but are not limited to the following:

- Other offshore wind farm infrastructure;
- Other energy generation infrastructure;
- Major building and / or housing developments;
- Installation or upgrade of roads and other transport infrastructure;
- Installation or upgrade of cables and pipelines;
- Industrial facilities which may have emissions (to air or water) or generate significant traffic volumes; and
- Coastal protection works.

232. In addition, the Applicant is currently exploring opportunities for wider coordination as required by NPS EN-5. Where coordination with other project(s) is taken forward this will be factored into the cumulative assessment. However, a worst–case approach will be taken to ensure that if one project goes ahead without the other project this is factored into the assessment.

5.8 In-Combination Effects

233. In addition to the CEA, the impact assessment will consider the potential for in-combination effects on individual receptors. The objective will be to identify where the accumulation of residual effects on a single receptor, and the relationship between those effects, gives rise to synergistic effects and a need for additional mitigation. When considering the potential for in-combination effects, it is assumed that any residual effect determined as 'no change' or 'no resultant effect' will not result in a significant in-combination effect. However, where a series of negligible or greater residual effects are identified, they will be considered further.

234. For the purposes of this assessment, two types of in-combination effects have been identified:

- Inter-relationships are defined as effects arising from residual effects associated with different environmental topics acting together on a single receptor (e.g. the combination of air quality and noise impacts on human receptors).

- Interactions are defined as effects arising from residual effects associated with different aspects of the same environmental topic acting together on a single receptor (e.g. the combination of habitat loss and disturbances on a specific intertidal species).

235. Potential inter-relationships are identified within this Scoping Report and will be elaborated further as the EIA progresses (see **Chapter 10 Inter-Relationships**).

5.9 Transboundary Effects

236. Regulation 32 of the EIA Regulations sets procedures to address issues associated with a development that may have a significant effect on the environment in another European Economic Area (EEA) Member State.

237. The procedures involve providing information to the Member State(s) and for the Planning Inspectorate to enter into consultation with the State(s) in question regarding the significant transboundary effects and their associated mitigation measures. The methodology of the transboundary effects assessment will refer to the guidelines outlined under the Planning Inspectorate's Advice Note Twelve Transboundary Impacts and Process (The Planning Inspectorate, 2020).

238. Transboundary effects, like cumulative effects, are considered on a topic-by-topic basis for offshore topics and are not expected to be relevant to onshore topics. The screening of plans and projects for the transboundary effects assessment will be consulted upon with the relevant stakeholders. Where transboundary effects are scoped into the EIA these are shown in **Chapter 11 Transboundary Impacts**.

6 Consultation

6.1 Introduction

239. Consultation with interested parties (prior to the submission of the DCO application) is an inherent part of the DCO process prescribed in the Planning Act 2008. Ongoing engagement and consultation with a range of stakeholders and local communities alongside these statutory requirements, is a standard and integral part of the EIA and wider pre-application process.

240. Engagement and consultation with stakeholders have been ongoing since February 2023 to introduce the Project to stakeholders and the local community. Following the confirmation of an updated grid connection from National Grid ESO in March 2024 to connect to a new substation at Birkhill Wood, in East Riding of Yorkshire (see **Section 1.1**), further engagement has been undertaken with relevant stakeholders as part of the EPP (as described in **Section 6.4**) to update stakeholders as required.

241. Given the Array Area of the Project has not changed, elements of consultation undertaken to date for the offshore proposals remain valid. Whilst the location and scope of onshore infrastructure has changed, input from stakeholders previously provided will still be considered where relevant.

242. This chapter provides a brief overview of the consultation requirements and the proposed approach to consultation as the EIA process progresses throughout the pre-application phase for the Project.

6.2 Statutory Consultation Requirements

243. A particular emphasis of the Planning Act 2008 is pre-application consultation with all potentially affected stakeholders and interested parties, including local communities, requiring the Applicant to undertake consultation with prescribed bodies, and stakeholders (under Section 42 of the Planning Act 2008), with landowners and those with an interest in land (under Section 44), with local communities (under Section 47) and more widely with the public through the publication of a proposed application (under Section 48).

244. The Applicant will develop a Statement of Community Consultation (SoCC) and consult with the local authorities (as prescribed in Section 43 of the Planning Act 2008) on what information should be included in the SoCC.

245. The SoCC will set out how the Applicant proposes to consult with the local community, as prescribed in Section 47 of the Planning Act 2008 and detail how the local community can comment on the Project; and how community views will be considered and where appropriate incorporated into the development or design of the Project. The Applicant will make the SoCC available for public inspection, advertise where the SoCC may be inspected and carry out consultation in accordance with it.

246. The Applicant will notify the Secretary of State, prior to consulting under Section 42, of a proposed DCO application in accordance with Section 46 of the Planning Act 2008.

247. Having regard to the relevant responses to publicity and consultation and the account taken of such responses is an integral part of the statutory consultation requirements. The Applicant will prepare a Consultation Report to accompany the DCO application as required under Section 37. The Consultation Report will provide details of both the non-statutory consultation and statutory consultation carried out in compliance with Sections 42, 47 and 48 of the Planning Act 2008, record the views of all stakeholders and how feedback has been taken into account in the DCO application and the Project design.

248. The PEIR will be presented and consulted on as part of a Statutory Consultation. The PEIR will provide an initial evaluation of the environmental information available for the Project, including descriptions of the likely impacts of development and construction, and proposed measures to reduce or avoid anticipated adverse effects. The PEIR is intended to allow those taking part in the consultation to understand the nature, scale, location and likely significant environmental effects of the Project, such that they can make an informed contribution to further development of proposals and to the EIA process.

249. The final siting and design will consider all feedback received through consultation, alongside further environmental and technical assessments, and engagement with, and information gathered from stakeholders. Further details of how the consultation process has informed design will be provided in the Consultation Report that will form part of the application for development consent.

6.3 Approach to Stakeholder Engagement

250. The Applicant recognises that continuous and targeted engagement with stakeholders, regulators, and communities who may be affected by the Project is key to developing the Project and will seek to ensure meaningful stakeholder engagement is maintained throughout the pre-application phase.

251. The aim of effective stakeholder engagement on the Project will be to:

- Identify and actively engage with prescribed bodies, statutory consultees, local authorities, statutory undertakers (utilities), landowners and those with an interest in the land, local communities, elected representatives, national and international organisations and special interest groups.
- Develop and carry out a consultation, communications and engagement strategy in accordance with the requirements for pre-application consultation under the Planning Act 2008.
- Communicate effectively with a range of different stakeholders and groups to further understanding of the Project, develop relationships with those from whom input will be sought.
- Provide accessible channels of communication and contact with the Project to facilitate comment on proposals and where appropriate, use responses to help shape and finalise the Project.

252. Engagement will continue throughout the EIA process to ensure that those interested in the Project are kept informed of progress, that participation in consultation and engagement activities are maximised and that those with an interest in the proposals have adequate time and opportunity to inform the design development.

253. The Applicant will continue to regularly communicate with stakeholders and communities and will continue to develop those dialogues to shape the proposals presented during periods of consultation.

254. The Applicant is continuing to keep the Planning Inspectorate and other stakeholders (such as Natural England and the MMO) up to date with how the Project is progressing with the planning application and the key milestones. This is in addition to the technical consultation described below.

6.4 Technical Consultation

255. Consultation with technical consultees is crucial to the development of EIA. An EPP has been established and followed during the ongoing EIA and HRA process to streamline technical consultation where there are multiple interested or responsible stakeholders. The EPP is a voluntary mechanism designed to encourage upfront agreement on the nature, volume and range of supporting evidence required by the Planning Inspectorate to make an informed decision with respect to the DCO application. The EPP also helps incorporate feedback from relevant stakeholders into the EIA and HRA process and ensures compliance with the requirements of the EIA Regulations and Habitats Regulations.

256. As the Project evolves and additional information becomes available, including the specific nature of mitigation measures, further impacts may be scoped out. If so, this would continue to be discussed with relevant stakeholders and documented through the EPP and set out in the Impacts Register and agreement logs which will form the basis for the Statement(s) of Common Ground (SoCG).

257. The EPP includes a Steering Group and a number of ETG. ETG meetings provide the opportunity to allow technical stakeholders to discuss defined topics (e.g. marine ecology), establishing a firm basis for dialogue and presentation of views and evidence in advance of the DCO application. The aim of ETGs is to agree key aspects (such as baseline data, impact assessment methods and mitigation) prior to the DCO application.

258. The topics and member bodies currently included within the EPP, alongside the EPP meetings to date for the Project are presented in **Table 6-1**. The topics and member bodies may be refined to align with changes to the project scope or geographical boundary and depending on additional consultation requirements identified during the EIA and HRA process.

259. Consultation with technical stakeholders may also occur outside of the EPP framework and will occur on a topic-specific and ongoing basis. Specific meetings will be held with a range of stakeholders (e.g. commercial fishing, aviation and radar, transboundary and shipping and navigation stakeholders) as required.

Table 6-1 Evidence Plan Process Groups and Meetings to Date for the Project

Group		Members	Date(s) of Meeting
Steering Group		• PINS • Environment Agency • Historic England • MMO • Natural England • ERYC • Hull City Council	• First Meeting: 12th July 2023 • Second Meeting: 29th April 2024
ETG1	Marine Physical Processes, Benthic Ecology, and Fish Ecology (EIA and HRA)	• Natural England • MMO • Cefas • NEIFCA • The Wildlife Trusts	• 13th September 2023
ETG2	Offshore Ornithology (EIA and HRA)	• Natural England • MMO • RSPB	• First Meeting: 25th October 2023 • Second Meeting: 23rd May 2024
ETG3	Marine Mammal Ecology and Underwater Noise (EIA and HRA)	• Natural England • MMO • Cefas • The Wildlife Trusts • Whale and Dolphin Conservation (written consultation only)	• 21st November 2023
ETG4	Offshore Ornithology Compensation (HRA)	• Natural England • MMO • RSPB Supported by specific meetings held with other stakeholders as appropriate	• 28th May 2024

Group		Members	Date(s) of Meeting
ETG5	Seabed Compensation (HRA) and Measures of Equivalent Environmental Benefit (MEEB)	• Natural England • MMO • Cefas • Joint Nature Conservation Committee (JNCC) Supported by specific meetings held with other stakeholders as appropriate	• First Meeting: 16th October 2023 • Second Meeting: 2nd May 2024
ETG6	Onshore Ecology, Ornithology, and Land Use	• Environment Agency • Natural England • Yorkshire Wildlife Trust • ERYC • RSPB (*formerly included Hull City Council)*	• 14th September 2023
ETG7	Onshore and Offshore Archaeology	• Historic England • Humber Archaeology Partnership (ERYC and Hull City Council) • MMO (written consultation for offshore archaeology only)	• First Meeting: 18th September 2023. • Second Meeting (Offshore): 16th May 2024.
ETG8	Traffic and Transport	• National Highways • ERYC • Hull City Council	• 7th November 2023
ETG9	Landscape and Visual Assessment	• Environment Agency • Natural England • Historic England • ERYC • Hull City Council	• N/A
ETG10	Water Resources and Flood Risk, Geology and Ground Conditions	• Environment Agency • ERYC • Beverley and North Holderness Internal Drainage Board (IDB) (*formerly included Hull City Council and South Holderness IDB)*	• 26th October 2023
ETG11	Air Quality, Noise and Vibration, Socio-Economics, Tourism and Recreation	• ERYC • Hull City Council	• 6th November 2023

6.5 Community Consultation

260. The local community and local interest groups are important stakeholders who can provide insight and local knowledge for the Project. The Applicant is committed to carrying out its duty to consult with the local community under Section 47 of the Planning Act 2008 and recognises the benefits of open, transparent and accessible consultation and engagement.

261. The Applicant will consult using a variety of methods such as providing clear consultation materials in accessible formats, adopt an inclusive consultation approach such as provision of larger font materials, different ways to record and submit feedback to the proposals, commit to early notification through mailers, letters, posters, advertising and digital engagement to ensure that consultations are promoted widely.

262. The Applicant will work with local authorities to find the best way to engage and consult communities, take into account those with protected characteristics and consult on the SoCC informally and formally with the host authority. At a local level, engagement with parish and town councils, communities and interest groups will support in finding the best mechanisms to consult with those affected by or interested in the development.

263. Public exhibition events will be focal points for the local community to explore the consultation materials and discuss the proposals with members of the project team.

264. The Applicant will aim to facilitate public exhibitions held in locations that are accessible and in suitable venues within the consultation zone, served by public transport and provide space for separate conversations to be carried out;

- Provide pre-recorded sessions and an online question and answer webinar;
- Offer meetings with local representatives, interest groups, briefings with elected representatives; and
- Provide information through adverts and articles in the local press, project specific website, newsletters, posters, direct mail and social media platforms.

265. The Applicant will offer a range of ways for the public to contact the project team and report their views following consultation.

266. This approach to consultation, using various consultation methodologies, reflects the Applicant's commitment to meaningful engagement and to capture the views of local communities from individuals, community groups and those with protected characteristics.

7 Offshore Topics

7.1 Introduction

267. This chapter of the Scoping Report presents the existing environment within the Offshore Scoping Area (**Figure 1-1**) and the potential likely effects of the construction, operation and decommissioning of the Project on the offshore environment. The proposed approach to data collection and assessment are also detailed within the chapter. Each chapter outlines which impacts are proposed to be scoped into or out of the EIA.

268. It should be noted that topic-specific study areas are defined in the chapters below based on the spatial, temporal and technical considerations of the impacts on relevant receptors and are intended to cover the area within which an effect can reasonably be expected.

269. A description of the Project's offshore infrastructure is provided in **Chapter 3 Project Description**.

7.2 Marine Physical Processes

270. This section of the Scoping Report considers the potential likely effects of the Project associated with marine physical processes, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the proposed landfall.

271. The marine physical processes assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.3 Marine Water and Sediment Quality;**
- **Chapter 7.4 Benthic and Intertidal Ecology;**
- **Chapter 7.5 Fish and Shellfish Ecology;** and
- **Chapter 7.11 Offshore Archaeology and Cultural Heritage**.

7.2.1 Study Area

272. The Marine Physical Processes Study Area (hereafter referred to as 'the Study Area') is the Offshore Scoping Area, Dogger Bank and the wider southern North Sea (**Figure 7-1**). The assessment of the effects on marine physical processes considers the direct footprint of the Project (near-field) and the wider areas of the seabed and coast that could potentially be affected (far-field). 'Zones of influence' will be determined as part of the PEIR / ES based on an understanding of tidal ellipses and wave data relative to the direct footprint of the Project.

7.2.2 Existing Environment

7.2.2.1 Bathymetry

273. Within the Offshore Scoping Area, the minimum and maximum water depths across the Array Area are 20m below Lowest Astronomical Tide (LAT) and 30m below LAT, respectively (**Figure 7-1**) (EMODnet, 2020). Water depths along the offshore ECC are between 10m and 25m below LAT on the top of Dogger Bank and become deeper towards the west reaching a maximum depth of up to 70m below LAT. As the offshore ECC approaches the coast, water depths become shallower from 40m below LAT approximately 20km offshore, reaching 0m at the coast (**Figure 7-1**) (EMODnet, 2020).

7.2.2.2 Tidal Currents

274. An understanding of tidal currents in the Study Area provides insight into how they drive sediment transport. The tidal regime in the southern North Sea is strongly influenced by predominantly semi-diurnal tides that enter from the Atlantic Ocean (Department for Business, Enterprise and Regulator Reform (BERR), 2008a). Modelled peak flows for mean spring tides of 0.2-0.4m/s occur in the Array Area (**Figure 7-2**), with peak flows gradually increasing landward along the offshore ECC, from 0.2m/s furthest offshore, to up to 1.6m/s closer to the coast.

7.2.2.3 Waves

275. Given its open sea location, the Offshore Scoping Area is exposed to relatively high levels of wave energy. Wave data collected between July 2022 and June 2023 for Dogger Bank A and Dogger Bank B show that the most frequent waves approach from the north (**Figure 7-3**). BERR (2008a) described annual mean significant wave heights of 1.75m to 2.00m (**Figure 7-4**) which correspond broadly with the significant wave heights recorded by the Dogger Bank A and Dogger Bank B wave buoys. Wave heights decrease gradually along the offshore ECC, to less than 1.0m to 1.25m closer to the coast.

7.2.2.4 Stratification

276. The Flamborough Front is a tidal mixing front that is present in the southern North Sea off the east coast of England between spring and early autumn (Miller and Christodoulou, 2014). This tidal mixing front forms in the water column at the boundary between stratified water and vertically mixed water. The position of the front is controlled by surface buoyancy and mechanical mixing from tides and wind.

7.2.2.5 Bedload Sediment and Transport

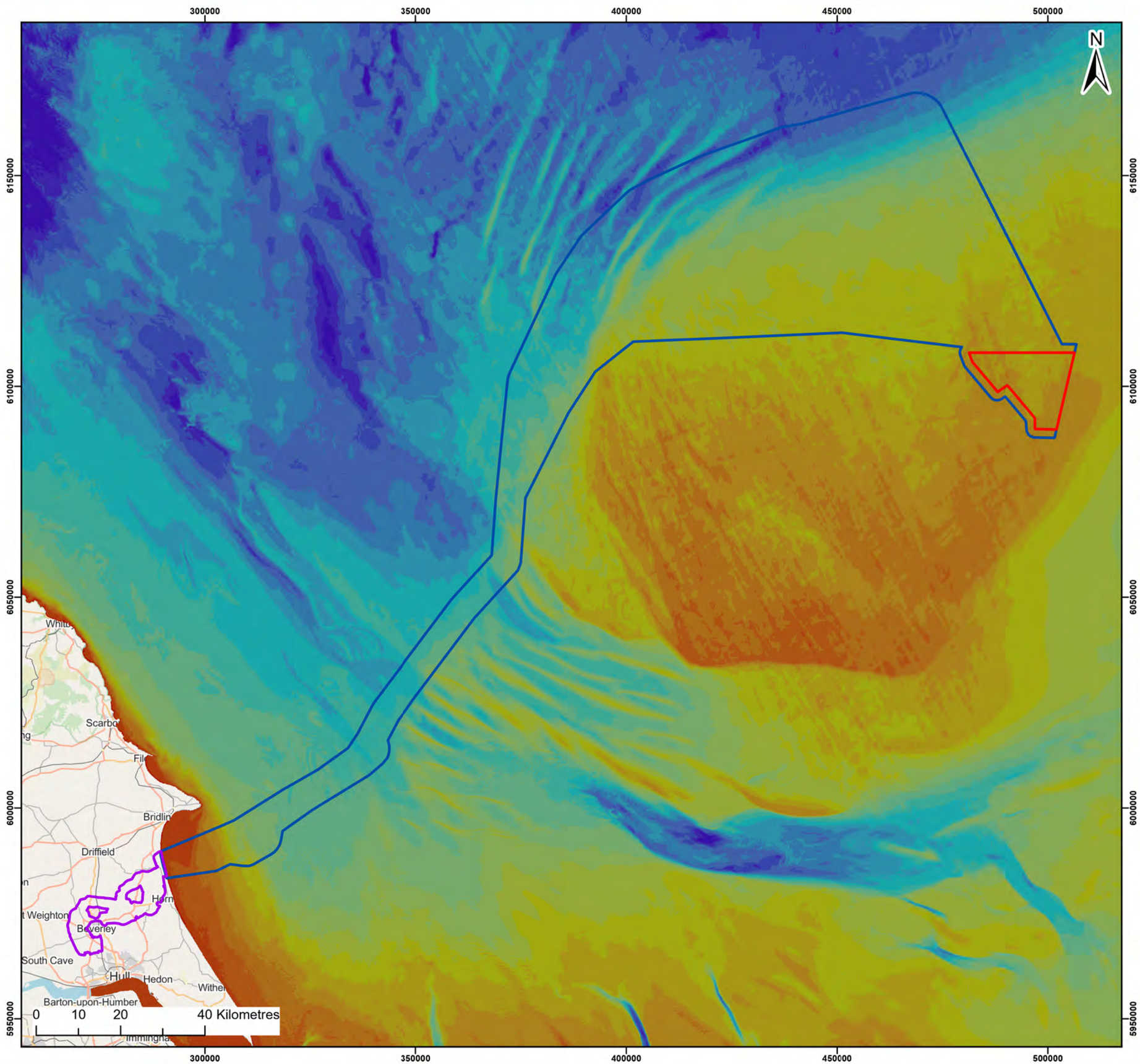
277. British Geological Survey (BGS) showed that the seabed within the Array Area comprises sand, slightly gravelly sand, and slightly gravelly, muddy sand (**Figure 7-5**). The offshore ECC is dominated by gravelly sand further offshore that becomes initially sand-dominated and then coarser-grained gravel and sandy gravel towards the coast.

7.2.2.6 Suspended Sediment Concentrations

278. The Centre for Environment, Fisheries and Aquaculture Sciences (Cefas) (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015. Average concentrations within the Array Area are about 2mg/l, initially decreasing along the offshore ECC and then increasing up to about 30mg/l in shallower water near the coast (**Figure 7-6**).

7.2.2.7 Coastal Processes

279. The offshore ECC will make landfall along the Holderness coast in the East Riding of Yorkshire (**Figure 7-1**). This stretch of coast comprises low till cliffs and a cohesive (till) shore platform. Waves are the predominant driver of sediment transport, and they approach the possible landfall location from the north-east with a maximum significant wave height of over 2m (Pye and Blott, 2015). The predominant waves drive sediment transport towards the south.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area

Bathymetry (m) (LAT)

- < -90
- -89.9 - -85
- -84.9 - -80
- -79.9 - -75
- -74.9 - -70
- -69.9 - -65
- -64.9 - -60
- -59.9 - -55
- -54.9 - -50
- -49.9 - -45
- -44.9 - -40
- -39.9 - -35
- -34.9 - -30
- -29.9 - -25
- -24.9 - -20
- -19.9 - -15
- -14.9 - -10
- -9.9 - 0
- > 0

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK
WIND FARM

Title:

Marine Physical Processes Study Area
and Offshore Bathymetry

Figure: 7-1

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0009

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Co-ordinate system: WGS 1984 UTM Zone 31N

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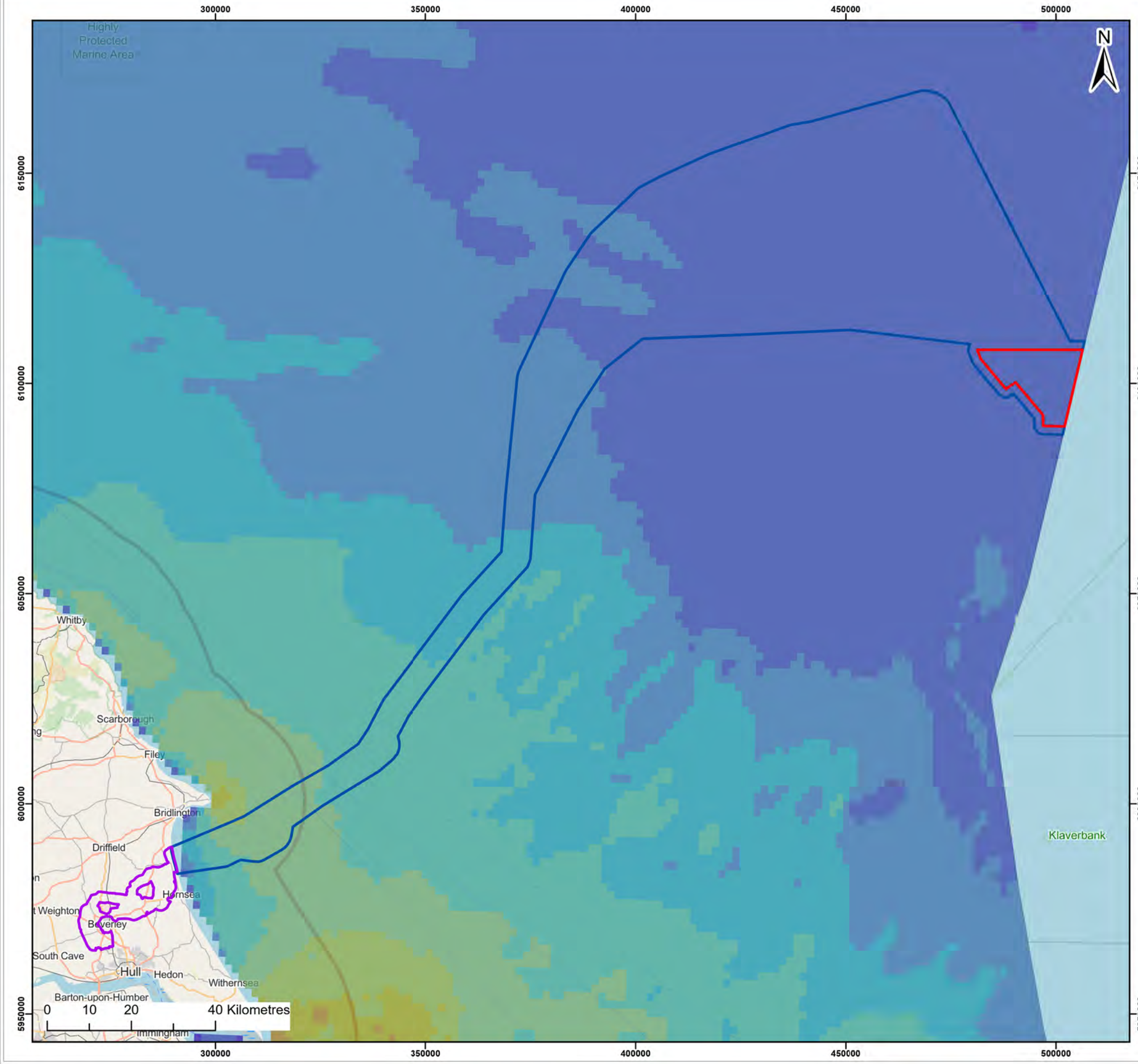

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area

Peak Flow of Mean Spring Tide (m/s)

- < 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- > 2

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Peak Flow for a Mean Spring Tide

Figure: 7-2

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0010

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03	07/06/2024	JH	AB	A3	1:900,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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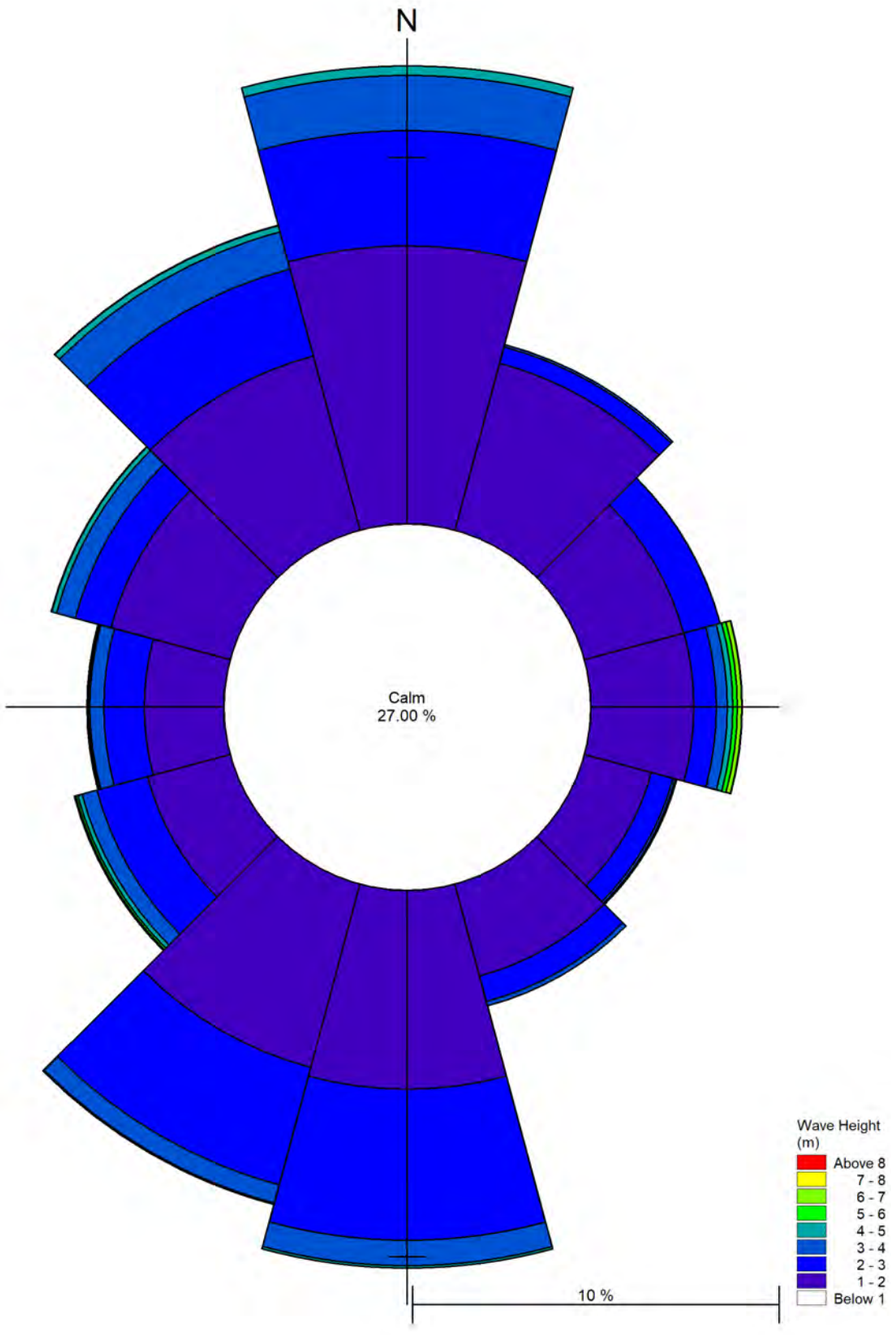
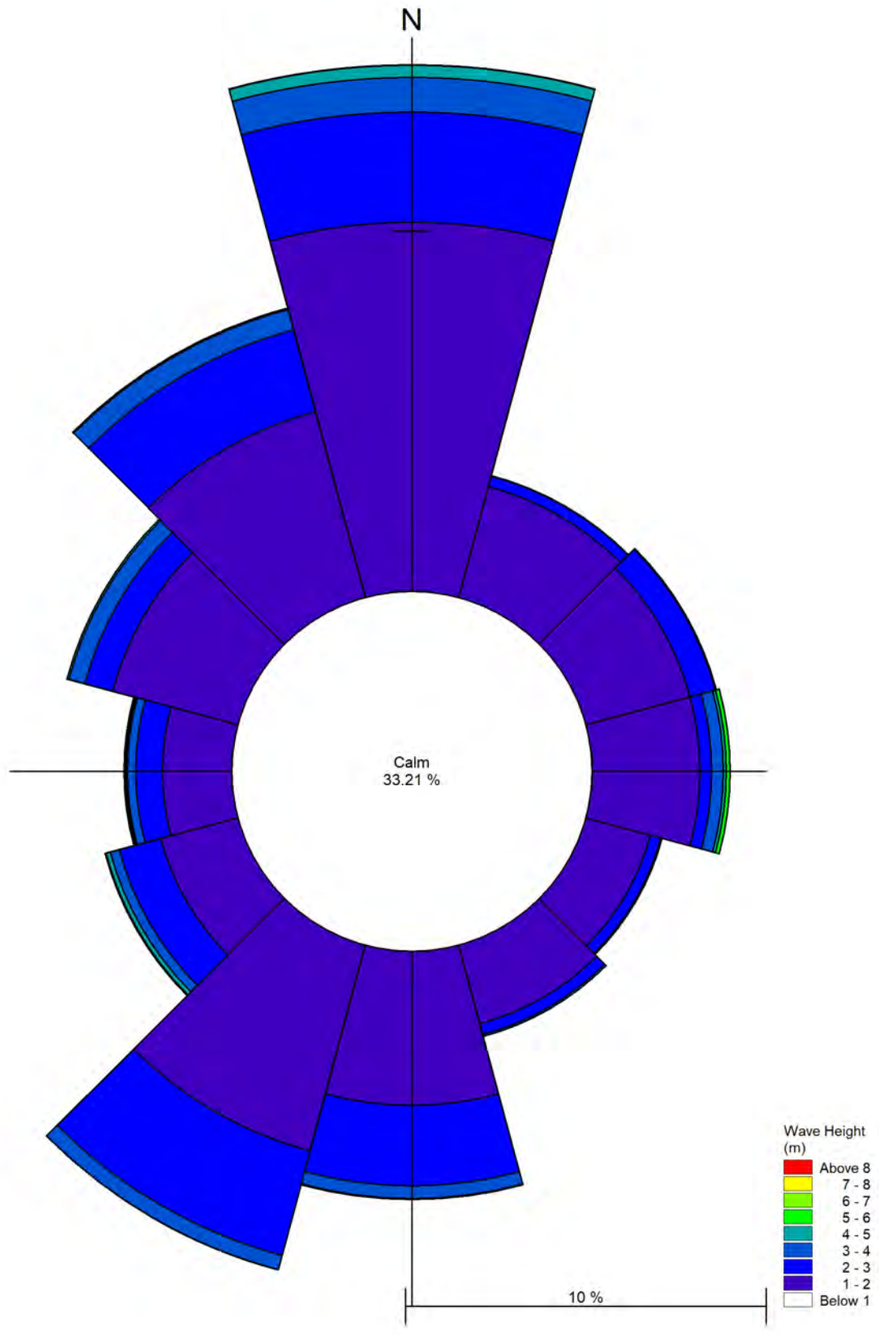


Dogger Bank A



Dogger Bank B

Legend:

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Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Wave Roses at Dogger Bank A (left)
and Dogger Bank B (right)

Figure:	Drawing No:				
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Co-ordinate system:

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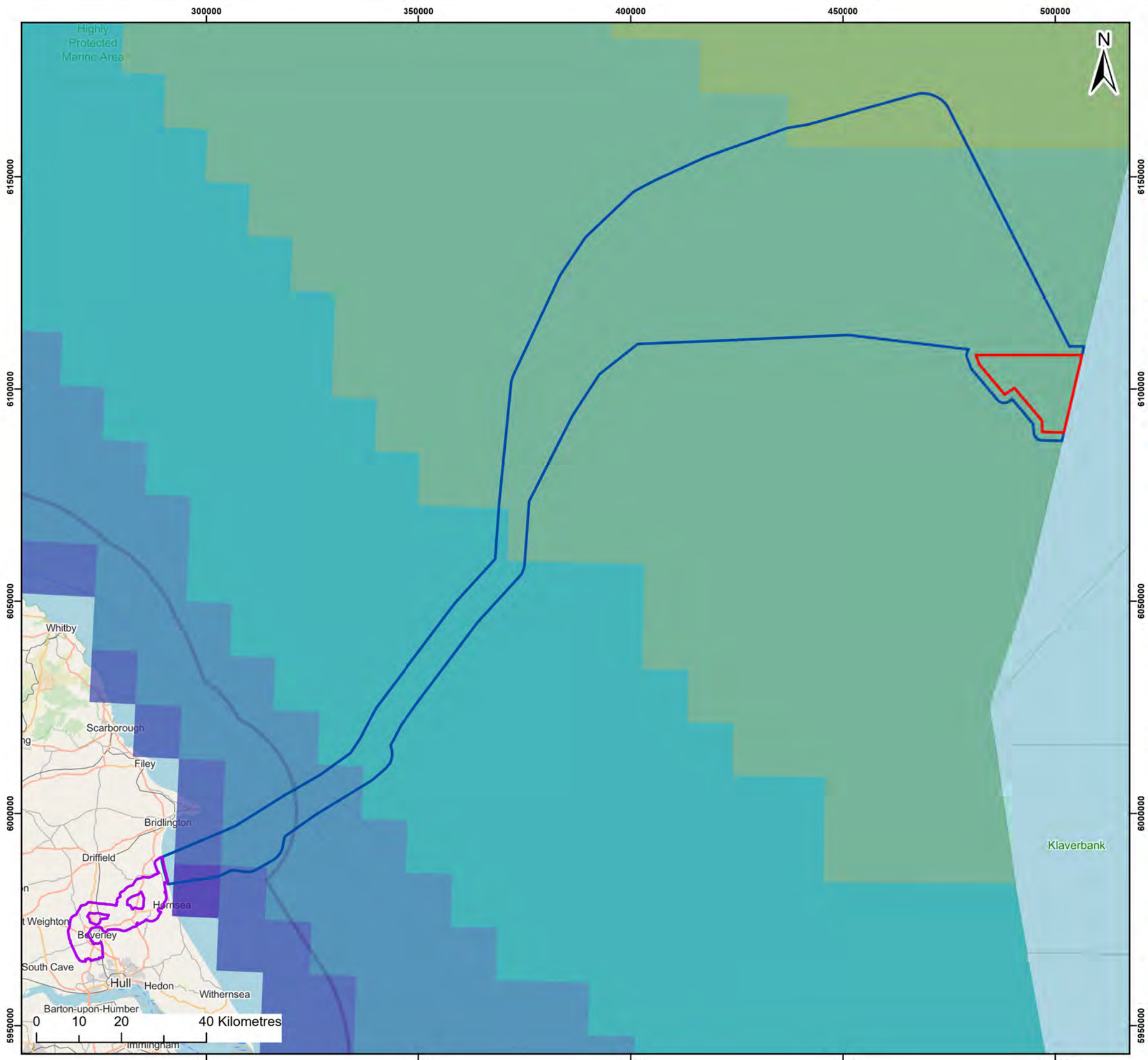

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area

Annual Mean Significant Wave Height (m)

- < 1.00
- 1.01 - 1.25
- 1.26 - 1.50
- 1.51 - 1.75
- 1.76 - 2.00
- 2.01 - 2.25
- 2.26 - 2.50
- 2.51 - 2.75
- 2.76 - 3.00
- > 3.00

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Annual Mean Significant Wave Height

Figure: 7-4

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0011

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Co-ordinate system: WGS 1984 UTM Zone 31N

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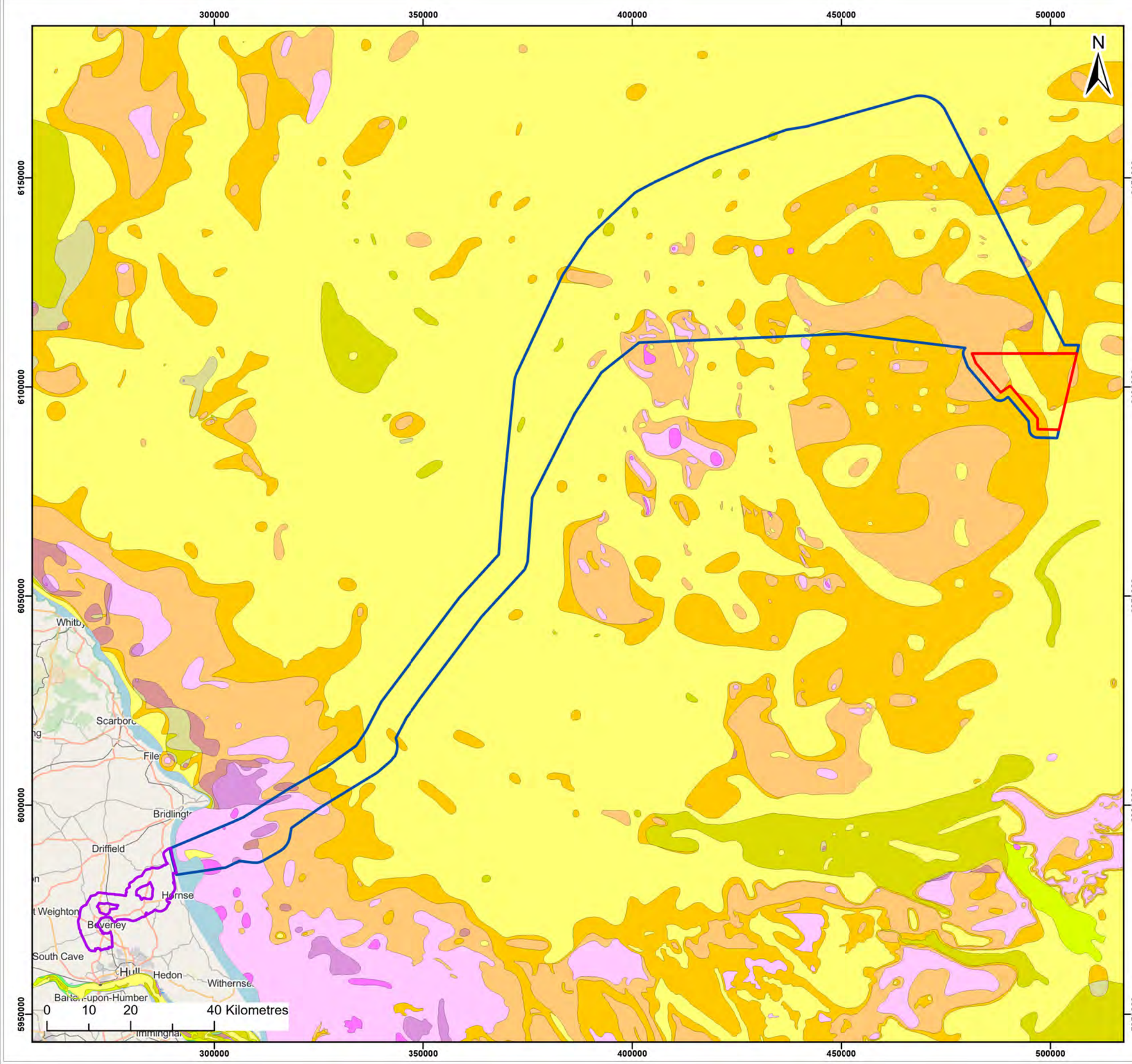

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area

Seabed Sediment

- Mussel Deposit
- Gravel
- Gravelly Mud
- Gravelly Sand
- Muddy Gravel
- Mud
- Muddy Sandy Gravel
- Muddy Sand
- Slightly Gravelly Mud
- Slightly Gravelly Muddy Sand
- Slightly Gravelly Sand
- Slightly Gravelly Sandy Mud
- Sand
- Gravelly Muddy Sand
- Sandy Gravel
- Sandy Mud
- Gravel, Sand & Silt
- Diamicton
- Clay & Sand
- Palaeozoic or Quaternary Rock & Sediment
- Palaeozoic or Quaternary Rock or Diamicton
- Undifferentiated Rock

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Seabed Sediments

Figure: 7-5

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0012

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 31N

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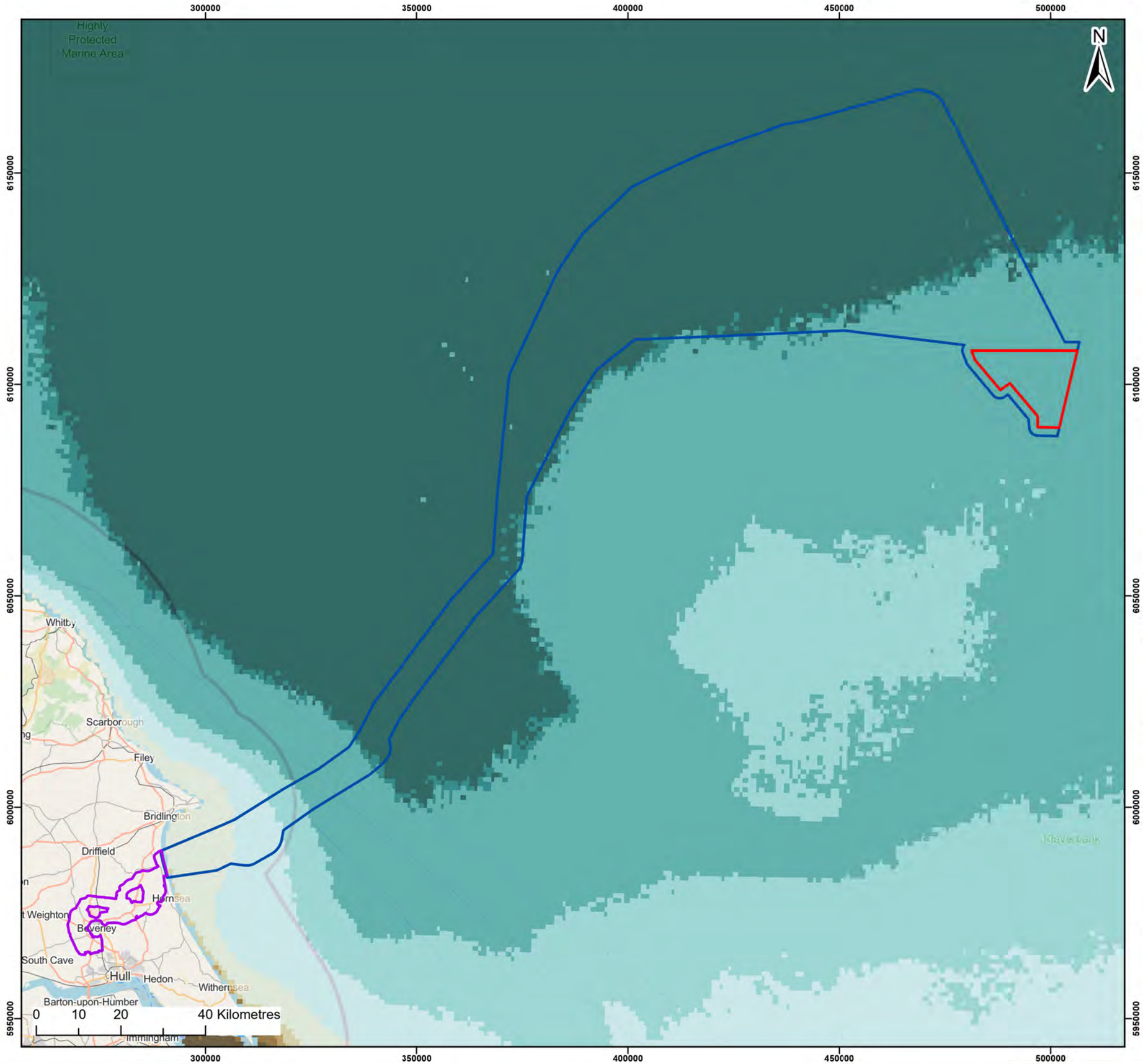

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area

Average Suspended Particulate Matter (SPM) 1998 - 2015 (mg/l)

- 0
- 1
- 2
- 3
- 5
- 10
- 15
- 20
- 30
- > 30

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Average Suspended Particulate Matter (SPM) 1998 - 2015

Figure: 7-6

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0013

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	07/06/2024	JH	AB	A3	1:900,000
02	15/04/2024	AB	DB	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.2.2.8 Coastal Erosion

280. The Holderness coast is one of the most rapidly eroding coasts in Europe and has been actively eroding since Roman times, predominantly through cliff slumping. Average long-term rates of erosion vary from about 1m/year to 2m/year. If these rates are linearly extrapolated into the future, it would mean that the Holderness cliffs would retreat landward by approximately 60m to 120m over the next 60 years. Additionally, the future rates may be higher due to climate-change-induced sea-level rise. Also, rates calculated over longer periods of time include a high amount of spatial and temporal variability. Periods of rapid erosion (10s of m/year) may be followed by years when little or no erosion of the cliff occurs, and this is averaged out over the long term. Related to cliff erosion is the downcutting of the shore platform which extends from the foot of the cliff into deeper water.

7.2.3 Potential Impacts

7.2.3.1 Potential Impacts during Construction

281. Potential impacts during the construction phase of the Project will arise from disturbance of the seabed during foundation and cable installation activities (including seabed preparation and / or cable protection).

7.2.3.1.1 Impacts on Waves and Tidal Currents

282. The physical presence of structures in the water column has the potential to influence waves and tidal currents. During the construction phase, offshore structures will be installed incrementally. Therefore, the impact on the wave and tidal regimes will gradually increase as each structure is installed until construction is complete and the wind farm becomes operational. As the greatest impact on wave and tidal currents will be from the physical presence of the offshore infrastructure of the completed wind farm, the impacts on wave and tidal currents during construction have been scoped out of the EIA, as they will be proportionately smaller than during the operation phase, which has been scoped into the EIA accordingly (see **Section 7.2.3.2**).

283. Construction impacts on waves and currents at the coast are also scoped out of the EIA. This is because, given the limited scale of the construction activities towards the coast, changes to physical processes are effectively zero. However, changes to sedimentary processes during construction are scoped in (see **Section 7.2.3.1**), where there is potential for interruption of sediment transport pathways driven by the physical processes (mainly waves).

7.2.3.1.2 Impacts on Bedload Sediment Transport at the Landfall

284. The main aspect of the landfall, in the context of potential effects on physical processes, is the method that will be used to construct the connection between the offshore export cable and the onshore cable. A variety of methods could be adopted that are likely to involve one or more coffer dams and / or the use of HDD. The use of coffer dams has the potential to create a partial and temporary barrier to longshore sediment transport in the coastal zone (depending on their cross-shore locations). This potential impact is therefore scoped into the EIA for further consideration.

7.2.3.1.3 Impacts on Bedload Sediment Transport and Seabed Morphological Change Offshore

285. During construction offshore, there is potential for changes in bedload sediment transport and seabed morphology due to seabed preparation (levelling) for foundations (and associated scour protection) and cable installation, including sand wave clearance. These impacts are therefore scoped into the EIA for further consideration.

286. In the case of Unexploded Ordnance (UXO), any assessments will be indicative only. A detailed UXO survey will be completed prior to construction. The exact type, size and number of possible detonations and duration of UXO clearance operations is therefore not known at this stage. This means that any assessments for UXO clearance in the EIA will be for information only and are not part of the DCO application. A separate Marine Licence application(s) will be made prior to construction for UXO investigation and clearance works, with an accompanying assessment of UXO clearance impacts on Marine Physical Processes.

7.2.3.1.4 Impacts on Suspended Sediment Concentrations

287. Potential impacts during construction include temporary disturbance of the seabed due to the installation activities for cables and foundations (including seabed preparation, ploughing / trenching, cable burial and HDD) which release sediment into the water column resulting in increased suspended sediments and potential changes to seabed levels. Nearshore cable installation could result in changes to coastal geomorphology due to deposition or erosion. These impacts are therefore scoped into the EIA for further consideration. The impacts will be considered separately and in combination for the Array Area and for the offshore ECC.

7.2.3.1.5 Indentations on the Seabed Due to Installation Vessels

288. There is potential for certain vessels used during the installation of the foundations and cable infrastructure to directly impact the seabed. This applies to those vessels that utilise jack-up legs or several anchors to hold station and to provide stability for a working platform. Where legs or anchors (and associated chains) have been inserted into the seabed and then removed, there is potential for an indentation to remain, proportional to the dimensions of the object. However, the disturbance footprint would be limited in scale and any impacts would be temporary in nature with indentations infilling through natural processes over the course of a few days to months. Nevertheless, these impacts are scoped into the EIA for further consideration.

7.2.3.2 Potential Impacts during Operation

289. Potential impacts during the operational phase of the Project will arise due to the physical presence of infrastructure on the seabed and within the water column.

7.2.3.2.1 Impacts on Waves and Tidal Currents

290. Potential impacts during operation could occur due to the physical presence of infrastructure (i.e. foundations and cable protection), which may result in localised changes to waves and tidal currents due to physical blockage effects. These impacts are therefore scoped into the EIA for further consideration.

7.2.3.2.2 Impacts on Bedload Sediment Transport and Seabed Morphological Change

291. Previous studies have concluded that minimal impacts can be expected on the prevailing bedload sediment transport conditions, both within the Array Area as well as further afield, provided that the foundations are adequately spaced (which will vary depending on the details of the foundations and wind farm layout) (Cooper and Beiboer, 2022). Impacts on sediment transport are likely to be localised to the areas immediately surrounding the individual foundations in the form of seabed scour where the sediment is soft enough to be mobilised. Impacts from scour at each foundation are therefore scoped into the EIA for further consideration.

292. Where the offshore export cables are buried, there would be no impact on bedload sediment transport. However, it is possible that cable protection would be required at locations where the seabed is characterised by hard geology, at cable and pipeline crossing locations, and at the landfall. The impacts that cable protection may have on the marine physical processes primarily relate to the potential for interruption of sediment transport, both offshore and at the coast, and the footprint presented on the seabed. These impacts are therefore scoped into the EIA for further consideration.

7.2.3.2.3 Impacts on Suspended Sediment Concentrations

293. There is potential for sediments to be re-suspended by scouring effects or due to disturbance of the seabed, should cable repair and maintenance be required. Consideration will be given to likely changes in suspended sediment concentrations due to scour and or cable repair during the operational phase and are therefore scoped into the EIA for further consideration.

7.2.3.2.4 Indentations on the Seabed Due to Installation Vessels

294. This potential impact is scoped into the EIA for further consideration for the reasons described in **Section 7.2.3.1**.

7.2.3.2.5 Impacts on Water Circulation (Flamborough Front)

295. The Array Area may interact with the Flamborough Front, the boundary between two distinct water masses in the southern North Sea, which extends off the East Riding of Yorkshire coast. The potential effects on the Flamborough Front as a result of the DBD Array Area are scoped in and will be assessed as part of the EIA.

7.2.3.3 Potential Impacts during Decommissioning

296. It is anticipated that the potential decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-1)**

7.2.4 Potential Cumulative Effects

297. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect marine physical processes. Therefore, cumulative effects related to marine physical processes are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

298. The CEA will be based on the 'zone of influence' identified during the PEIR / ES, which will define the geographical extent of potential effects of the Project. The DBD Array Area is directly adjacent to the DBC array area and the offshore ECC is adjacent to the DBS ECC in the nearshore. Hence, the CEA will consider potential cumulative impacts with the existing wind farms and any other projects and marine users within the zone of influence (such as aggregate extraction and dredging, sub-sea cables, oil and gas activity and carbon capture and storage).

7.2.5 Potential Transboundary Effects

299. There is potential for the effects on tidal currents and waves to cross into adjacent international waters, with potential secondary effects on sediment transport or seabed morphology. Therefore, transboundary impacts are scoped in and will be assessed as part of the EIA. Changes to the wave and tidal regimes during operation of the Project will be modelled for the worst-case foundation layout.

300. Cumulative sediment plumes predicted for operation of DBA, DBB, DBC, and Sofia Offshore Wind Farms only disperse up to about 15km into Dutch waters and do not cross into German, Danish or Norwegian waters. Scour of the seabed is limited to the immediate vicinity of the turbine foundations and therefore no effects from scour processes are predicted to cross international boundaries.

7.2.6 Summary of Scoping Proposals

301. **Table 7-1** outlines the marine physical processes impacts which are proposed to be scoped in or out of the EIA. These may be refined through the Evidence Plan Process (EPP) and other consultation activities, and as additional project information and site-specific data become available.

Table 7-1 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Marine Physical Processes

Potential Impact	Construction	Operation	Decommissioning
Impacts on waves and tidal currents	X	✓	X
Impacts on bedload sediment transport at the landfall	✓	✓	✓
Impacts on bedload sediment transport and seabed morphological change offshore	✓	✓	✓
Impacts on suspended sediment concentrations	✓	✓	✓
Indentations on the seabed due to installation vessels	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Impacts on water circulation (Flamborough Front)	x	✓	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	x	✓	x

7.2.7 Approach to Data Gathering

302. As part of the EIA process, the existing environment with respect to the marine physical processes will be described, including but not limited to:

- Bathymetry;
- Shallow geology;
- Tidal currents;
- Waves;
- Seabed sediment distribution;
- Bedload sediment transport;
- Suspended sediment concentrations and transport;
- Morphological change; and
- Anticipated trends in baseline conditions.

303. The information outlined in **Table 7-2** has been considered during the production of this Scoping Report and will be considered further within the PEIR / ES where relevant matters are scoped into the EIA process.

Table 7-2 Desk-Based Data Sources for Marine Physical Processes

Data Source	Date	Data Contents
EMODnet – Bathymetry data	2020	Seabed elevation and topography
BERR Atlas tidal currents	2008	Mean spring tidal range Peak flows on mean spring tides
BERR Atlas waves	2001 to 2008	Significant wave height
BGS seabed sediments	Pre-1987	Seabed sediment composition
Cefas suspended sediment concentrations	1998 to 2015	Annual suspended sediment concentrations between 1998 and 2015
Physical and sedimentary processes data collected for the DBA, DBB, DBC and Sofia Offshore Wind Farms	2011 to 2014	Grab samples Particle size analysis data Numerical modelling of changes to suspended sediment and resulting seabed level, and changes to wave and tidal regimes Sub-surface geology Bathymetry

304. The following surveys are anticipated to be undertaken to inform the assessment. Surveys will be undertaken in accordance with relevant guidelines and agreed upon in advance with stakeholders where required. **Table 7-3** outlines the completed and proposed baseline surveys to be carried out.

Table 7-3 Completed and Proposed Baseline Surveys for Marine Physical Processes

Survey	Timing	Spatial Coverage
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	Completed in 2022	Array Area
	To be completed in 2024 / 2025	Offshore ECC
Grab sampling and particle size analysis	Q2 / Q3 2023	Array Area
	To be completed in 2024 / 2025	Array Area and Offshore ECC
Wave data collection at Dogger Bank A and Dogger Bank B wave buoys	Completed in 2022 and 2023	Dogger Bank

305. Other data and information to inform the EIA include:

- UK Atlas of Marine Renewable Energy;
- Wavenet wave buoys;
- United Kingdom Hydrographic Office (UKHO) tidal diamonds and historical charts;
- United Kingdom Climate Projections 2018 (UKCP18);
- BGS 1:250,000 seabed sediment, quaternary geology and bedrock geology mapping;
- Admiralty Charts and UKHO bathymetry data;

- ERYC coastal monitoring data; and
- Baseline geophysical, geotechnical, metocean and environmental surveys undertaken to support the ES for DBA, DBB, DBC and Sofia Offshore Wind Farms.

7.2.8 Approach to Assessment

306. The assessment of effects on marine physical processes will be based on a 'source-pathway-receptor' conceptual model, whereby the source is the initiator event, the pathway is the link between the source and the receptor impacted by the effect, and the receptor is the receiving entity. An example of this type of conceptual model is shown by cable installation which disturbs sediment on the seabed (source). This sediment is then transported by tidal currents until it settles back to the seabed (pathway). The deposited sediment could change the composition and elevation of the seabed (receptor).

307. The conceptual model will be supported by bespoke numerical modelling of tidal currents and waves to determine their influence on morphological (sediment transport) changes of the seabed. The modelling will quantify the existing conditions and the changes caused by the presence of the wind turbine foundations and associated structures. Simulations will be run for the baseline conditions and for the situation with the wind turbines and associated structures in place for the realistic worst-case scenarios. Modelling of the cumulative impact of the Project with the as-built forms of other completed wind farm projects and estimates of project layouts for wind farms in the consenting process (e.g. Dogger Bank South) will also be completed.

308. In addition, previous numerical modelling work has been undertaken specifically for the Dogger Bank Zone - DBA, DBB, DBC and Sofia Offshore Wind Farms (Forewind, 2013; Forewind, 2014). The results of this historical modelling will be used alongside the results of the new models as part of the conceptual evidence-based assessment of potential effects of the Project.

309. For the effects on marine physical processes, the assessment will follow two approaches. The first type of assessment will cover impacts directly affecting receptors which possess their own intrinsic morphological value. The impact assessment will incorporate a combination of the sensitivity of the receptor, its value (if applicable) and the magnitude of the change to determine the significance of effect.

310. In addition to identifiable receptors, the second type of assessment will cover changes to the marine physical processes which in themselves are not necessarily impacts to which significance can be ascribed (such as an increase in suspended sediment concentrations). However, such changes may indirectly impact other receptors such as benthic habitat. In this case, the magnitude of impact is determined in a similar manner to the first assessment method but the significance of effect on other receptors is made within the relevant EIA topic chapters pertaining to those receptors.

311. The assessment will be undertaken in accordance with following standards and guidance:

- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2012);
- Guidance on Environmental Impact Assessment in Relation to Dredging Applications (Office of the Deputy Prime Minister, 2004);
- Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) requirements: Version 2 (Cefas, 2004);
- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry (BERR, 2008b); and
- Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment (Collaborative Offshore Windfarm Research into the Environment (COWRIE), 2009).

312. Marine physical processes will be included within the EPP (as set out in **Chapter 6 Consultation**) and engagement with key stakeholders will take place to agree the approach to data collection and the specific assessment methods to be employed as part of the EIA.

7.2.9 Scoping Questions to Consultees

313. The following questions are posed to consultees to help them frame and focus their response to the marine physical processes scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the marine physical processes impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the marine physical processes impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.3 Marine Water and Sediment Quality

314. This chapter of the Scoping Report considers the potential likely effects of the Project associated with marine water and sediment quality, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

315. The marine water and sediment quality assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.2 Marine Physical Processes;**
- **Chapter 7.4 Benthic and Intertidal Ecology;**
- **Chapter 7.5 Fish and Shellfish Ecology;**
- **Chapter 7.6 Marine Mammals;** and
- **Chapter 7.7 Intertidal and Offshore Ornithology.**

7.3.1 Study Area

316. The Marine Water and Sediment Quality Study Area (hereafter referred to as 'the Study Area') would be limited to the extent of any sediment plume that may arise during the construction of the Project. This would also encompass the potential operational and decommissioning impacts that may arise, as these would be lesser in magnitude than construction impacts. The Study Area would be identified at the PEIR stage and refined at the ES stage once further assessment on the potential extent of any sediment plume is carried out (see **Chapter 7.2 Marine Physical Processes**).

7.3.2 Existing Environment

7.3.2.1 Sediment: Physical Properties

317. Sediment grain size is important to inform assessment of the risk of contamination. This is because finer grained materials (silts and clays) function as a sink for contaminants and therefore have a greater potential to retain contaminants than larger grained materials. For example, sediments composed of finer particles, notably the silt / clay fraction, can absorb hydrocarbons from sea water and be incorporated into the sediment system. Sediment grain size also assists in predicting the extent of any sediment plume, i.e. coarser material, when suspended, is likely to settle back to the seabed quicker than finer grained material and would not give rise to significant sediment plumes.

318. Seabed habitats within the vicinity of the DBD Array Area are comprised of coarser grained sediments, namely sand and mixed coarse substrates. The rest of the Offshore Scoping Area and along the Holderness coast is characterised by sand, with some areas namely closer to the coast, which are dominated by coarser, gravel dominant sediments (**Figure 7-7**).

319. Site-specific sediment sampling was undertaken in 2023 within the DBD Array Area (Fugro, 2024). The Particle Size Distribution analysis undertaken on these samples support the BGS sediment data shown on **Figure 7-7**. Additional surveys carried out to inform the environmental impact assessment of DBC (which the Project falls directly within the original footprint) and Sofia Offshore Wind Farm (which is within close proximity to the Project) (Forewind, 2014) also support the data shown on **Figure 7-7**.

7.3.2.2 Sediment: Chemical Properties

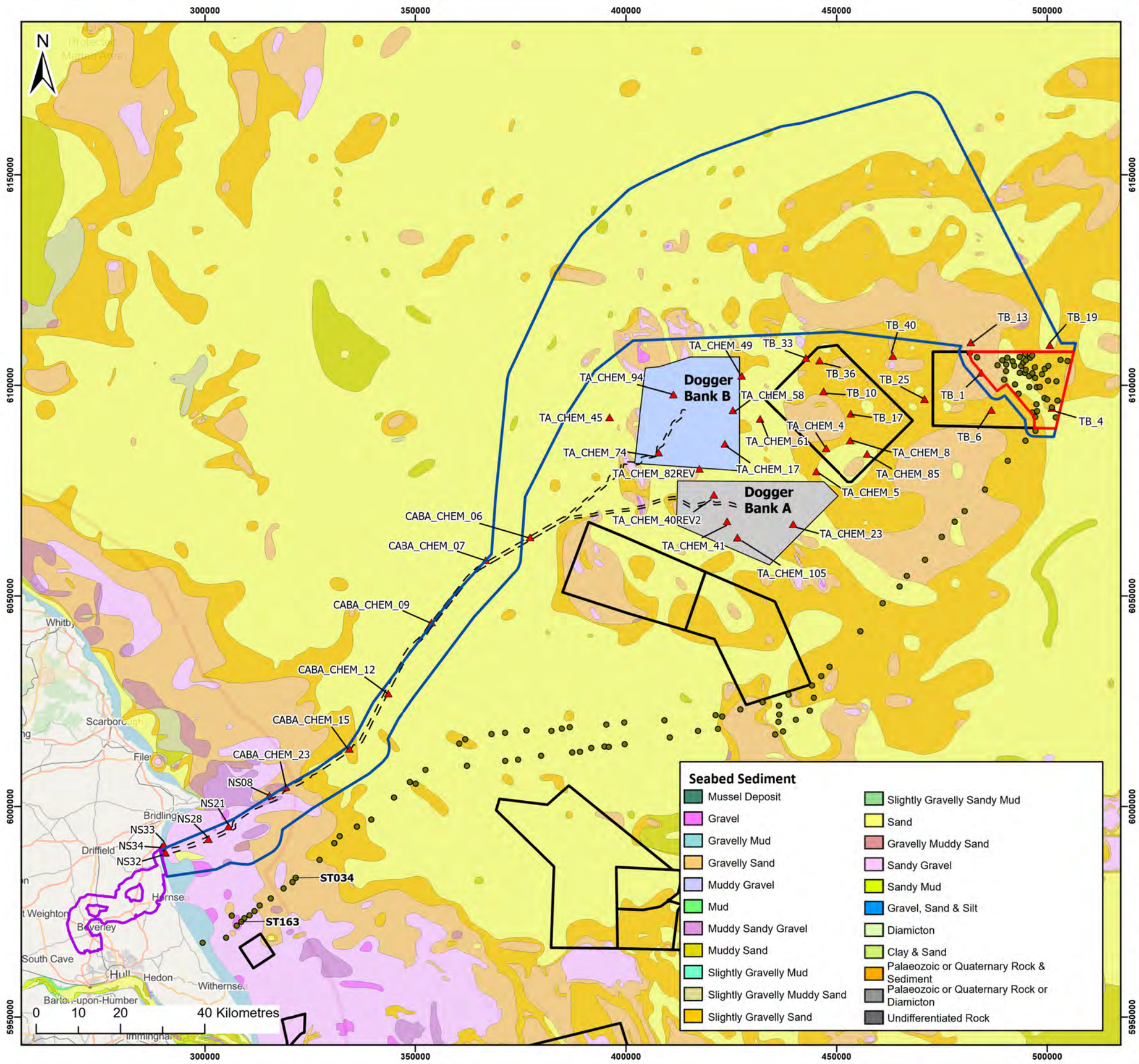
320. Sediment chemical composition within the Offshore Scoping Area can be informed by the site-specific survey undertaken across the DBD Array Area in 2023 (Fugro, 2024). Due to amendments to the offshore ECC, a further survey will be undertaken to characterise the offshore ECC.

321. Sediment contaminant concentration data is compared to the Cefas Action Levels (AL), sediment guidelines developed by Cefas to determine the potential risk of contaminated sediments to the marine environment. Whilst the majority of sediments assessed using these levels arise from dredging activities, in the absence of other guidelines, it has become commonplace to use these action levels to provide an indication of risk to marine water quality as part of the EIA and WFD Compliance Assessment process (Environment Agency, 2017).

322. The 2023 survey results generally indicate low concentrations of contaminants within the DBD Array Area (see **Appendix C** for the tabulated results which are summarised here) and between the Array Area and landfall. The location of these samples is shown on **Figure 7-7**. Some exceedances of Cefas AL1 were present within samples closest to the shore. Contaminant levels would be expected to be higher close to shore, due to the presence of shore-based chemical inputs and the presence of industry and ports and as such this is expected to be similar at the landfall.

323. Polycyclic aromatic hydrocarbons (PAH) concentrations were below levels of concern in all but one sample (ST163) where C1- and C2-naphthalene were present in concentrations above Cefas AL1. Results for heavy metals also indicate these contaminants are not present at levels of concern. Arsenic exceeded Cefas AL1 in the two samples closest to the Holderness Coast (ST163 and ST034) (**Figure 7-7**). No other exceedances were detected. All polychlorinated biphenyl (PCB) and organotin (tributyltin (TBT) and dibutyltin) results were below the limit of detection across all samples.

324. These results indicate it is unlikely that Environmental Quality Standards (EQS) for contaminants within the water column would be exceeded. Furthermore, the predominantly sandy coarse nature of the seabed sediments within the Array Area and at locations between the Array Area and landfall (**Appendix C**) significantly reduces the risk of resuspension into the water column and subsequent transportation over long distances.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Dogger Bank A
- Dogger Bank B
- Proposed/Consented Wind Farms
- Dogger Bank A & B Offshore Wind Farm Export Cables
- Sediment Sample Location
- 2023 Benthic Survey Sample Stations

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Sediment Sample Locations

Figure:	Drawing No:				
7-7	PC3991-RHD-OF-ZZ-DR-Z-0055				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
04	07/06/2024	JH	AB	A3	1:900,000
03	15/04/2024	AB	SM	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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325. An additional survey is planned in Q3 2024 to collect sediment samples across the offshore ECC. Given the proximity of the existing data above to the DBD Array Area and offshore ECC it is anticipated that analysis results from this survey will reflect the data presented above.

7.3.2.3 Water Quality: Suspended Sediment Concentrations

326. Cefas (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015 and found that Dogger Bank is characterised by values lower than 2mg/l. This value is in line with other estimates recorded for the area (Eleveld *et al.,* 2006) and high bed shear stresses in the area have been seen to coincide with low concentrations of suspended matter (Stanev *et al.,* 2008). These values increase closer to the Holderness coast to approximately 30mg/l in shallower water near the coast. Potential effects on suspended sediment concentrations have been scoped in for assessment **Chapter 7.2 Marine Physical Processes** and as such are not proposed to be assessed as part of this topic.

7.3.2.4 Water Quality: Chemical and Physicochemical Parameters

327. The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, as amended by The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019, continue to enforce the Directive of the European Parliament and of the Council 2000/60/EC establishing a framework for community action in the field of water policy (generally known as the WFD) following implementation of the European Union (Withdrawal) Act 2018.

328. Water quality is an important component for compliance with the requirements of the WFD and therefore the information collected for the transitional and coastal water bodies is relevant for characterising the offshore ECC. Within 1 nautical mile (nm) off the coast, the offshore ECC passes through the Yorkshire South coastal water body (GB640402491000) (**Figure 7-8**). The Yorkshire South coastal water body is classified as a heavily modified water body due to coast protection and flood defence measures, and navigation, ports and harbours, and has a current overall status of 'Moderate'. It has an Ecological status of 'Moderate', due to the quality of surface water supporting elements within the water body. It has a chemical status of 'Fail' due to levels of benzo[ghi]perylene, mercury and its compounds, polybrominated diphenyl ethers (PBDE) and TBT compounds (Environment Agency, 2024a).

329. The nearest bathing waters to the scoping area for the proposed landfall area (**Figure 7-8**) are listed below. They are classified over a four-year rolling period based on bacteriological parameters as either excellent, good, sufficient or poor. The latest status classifications for each bathing water in 2023 (Environment Agency, 2024b) were:

- Skipsea (within) – good;
- Hornsea (~5km to the south) – excellent; and
- Fraisthorpe (~4km to the north) – good.

330. The Quality Status Report (QSR) 2010 (OSPAR, 2010) evaluates the quality status of the North-East Atlantic and reflects ten years of joint monitoring and assessment by OSPAR Contracting Parties. Dogger Bank and the Project are in Region II 'Greater North Sea'. For this region, the report concludes that concentrations of metals, PAH and PCB are unacceptable at many, notably coastal monitoring sites. Recommendations include targets to reduce pollution from nutrients and hazardous substances, and the oil and gas sector focussing on problem areas and regional hotspots.

331. Since the QSR 2010, the OSPAR Intermediate Assessment 2017 found that contaminant concentrations have continued to decrease in the majority of areas assessed, especially for PCB. Although concentrations are generally below levels likely to adversely affect marine species in the areas assessed, they mostly have not yet reduced to background levels (where these are specified). Despite the downward trend in concentrations, concerns remain in the Southern North Sea and the English Channel with respect to high levels of mercury, lead, and one of the most toxic PCB congeners (CB 118), which remain at levels where adverse ecological effects cannot be ruled out. There is also some evidence of increasing concentrations of PAH and cadmium in the open waters of the Southern North Sea.

7.3.3 Potential Impacts

7.3.3.1 Potential Impacts during Construction

332. Potential impacts during construction could result from disturbance of seabed sediments during installation activities for cables and foundations (including seabed preparation). This has the potential to cause:

- Remobilisation of existing contaminated sediments; and
- Accidental pollution.

333. However, it is proposed that these impacts are scoped out of the EIA for the following reasons:

- Sediments within the DBD Array Area and along the length of the offshore ECC are largely sandy or coarse in nature thus significantly reducing the likelihood that large volumes of sediment will be suspended during construction of both the wind turbines and installation of the offshore export cables. Additionally, disturbance would be short term and would cease following completion of the Project's construction. Modelling of sediment suspension for DBC and Sofia Offshore Wind Farms confirms this assertion and concluded that maximum concentrations of suspended solids were noted within the immediate vicinity of the works and dispersed to background levels within 50km of their offshore ECC and within 8km of the foundations (Forewind, 2014). It should be noted that this has been scoped into the EIA with regards to marine physical processes (see **Chapter 7.2 Marine Physical Processes**) and further consideration will be given in this chapter with regards to marine water and sediment quality.

- Site-specific contamination data collected from within the DBD Array Area and south-east of the offshore ECC in 2023 (**Appendix C**from Fugro, 2024) indicates there are negligible concentrations of chemicals within the sediments that could potentially be disturbed. The coarse and sandy nature of the sediments within the Offshore Scoping Area further reduces this risk such that it is considered unlikely that construction activities could cause exceedances of EQS. An equivalent assessment undertaken for DBC (of which a small part is co-located within the footprint of the DBD Array Area) and Sofia Offshore Wind Farm concluded that a deterioration in water quality due to re-suspension of contaminated sediments would have a negligible effect (Forewind, 2014).

- Further sediment samples will be taken within the offshore ECC. Given its proximity to the 2023 survey area and the coarse nature of the sediments indicated on **Figure 7-7** it is considered likely that contaminant levels will be equivalent. However, as this evidence is not available to support this it is proposed that the offshore ECC is scoped in pending the results of sampling.

- Any coatings and treatments to be used will be suitable for use in the marine environment and will be used in accordance with guidelines approved by the Health and Safety Executive and the Environment Agency's Pollution Prevention Control Guidelines, or a Chemical Risk Assessment (CRA) would be required as set out as part of the Project Environmental Management Plan (PEMP) or similar.

- All vessels and the carriage and use of chemicals must comply with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). A PEMP or similar will also be put in place to ensure all works are undertaken in line with best practice for working in the marine environment and inclusive of a Marine Pollution Contingency Plan, which will include emergency plans and mitigation for a range of potential marine pollution incidents. Also, best practice measures for the storage, use and disposal of lubricant and chemicals will be undertaken throughout the construction phase.

7.3.3.2 Potential Impacts during Operation

334. Potential impacts during operation could arise as a result of disturbance to the seabed due to scour and routine maintenance activities. These activities have the potential to cause:

- Remobilisation of existing contaminated sediments; and

- Accidental pollution.

335. Impacts associated with operation and maintenance activities within the DBD Array Area and along the offshore ECC would be limited in terms of timeframe and scale and would cease following completion of the works. Any maintenance activities, such as the replacement of inter-array cables, would likely be smaller in temporal and spatial scale and magnitude than the proposed construction activities.

336. There is the potential for accidental spillages during operation as a result of the use of lubricants and chemicals required to maintain the Project. However, in addition to the control measures required under the MARPOL Convention Regulations, standard best practice will be applied and secured through a PEMP or similar and completed for the storage, use and disposal of lubricant and maintenance chemicals throughout all phases of the Project.

337. Scour around the wind turbine foundations would be small in scale, localised and unlikely to exceed suspended sediment concentrations in the Dogger Bank area during stormy conditions (Forewind, 2014). Additionally, whilst scouring will be an ongoing process, it will eventually reach equilibrium and cease. It is therefore proposed to scope operational impacts from temporary increases in suspended sediments associated with the Project out of the EIA.

338. As for construction, sediments in the DBD Array Area and between the Array Area and the landfall are coarse in nature and do not harbour significant levels of contaminants as shown in the 2023 survey data. Chemicals to be used and / or discharged would be provided or a CRA would be carried out as required in the PEMP or similar. Additionally, O&M vessels would comply with MARPOL. It is therefore proposed to scope operational impacts of remobilising existing contaminants associated with the Project out of the EIA.

7.3.3.3 Potential Impacts during Decommissioning

339. It is anticipated that the potential decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. As such it is proposed to scope out impacts on marine water quality.

7.3.4 Potential Cumulative Effects

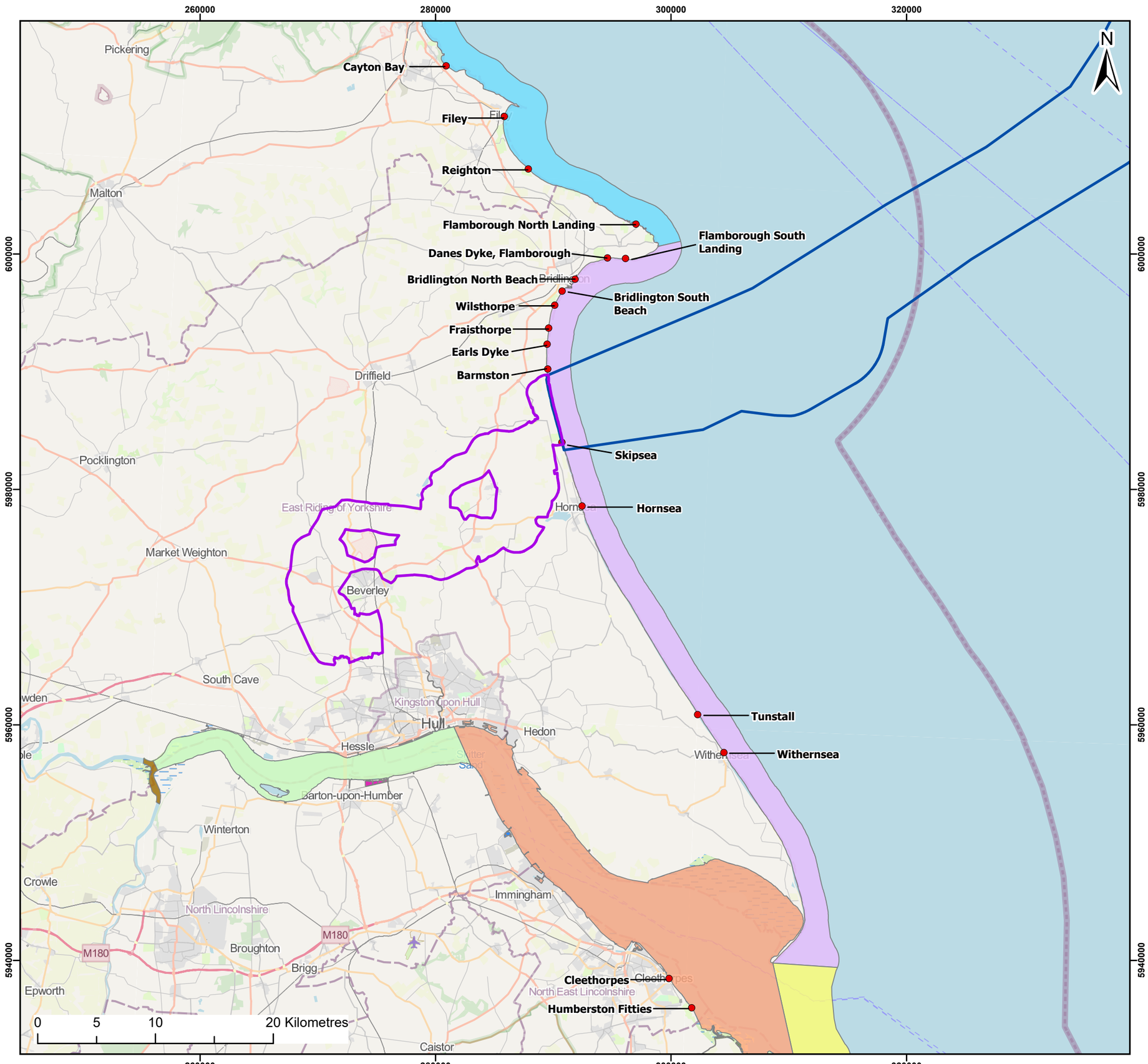
340. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

341. As set out above, significant effects on water quality are not anticipated during the construction, operation and decommissioning of the Project due to the negligible levels of contamination currently found within the sediments. The assessment is proposed to focus on the potential effects arising from the installation of the export cable within the scoping boundary. As shown on **Figure 7-7**, these areas are located in a predominantly sandy environment and any sediment suspended would therefore be short-lived, temporary and would dissipate to within background levels quickly. This is evidenced in an equivalent assessment undertaken for DBC and Sofia Offshore Wind Farms (Forewind, 2014). As such, this topic is proposed to be scoped out of the EIA, because there is no pathway for cumulative impacts which would lead to likely significant effects on water quality in the North Sea. Therefore, cumulative effects in relation to the offshore wind farm infrastructure are scoped out of the EIA.

7.3.5 Potential Transboundary Effects

342. All impacts on marine water quality associated with the construction and operation of wind farm infrastructure within the Array Area and offshore ECC are scoped out of the EIA, as sediment analysis data within the DBD Array Area shows negligible concentrations of contaminants are present (**Appendix C**) and any disturbance would be restricted to small scale and temporary impacts. As such, there would be no pathway for significant transboundary effects.

343. Therefore, it is proposed that all transboundary impacts related to marine water and sediment quality are scoped out of the EIA.



Legend:

- Offshore Scoping Area
- Onshore Scoping Area
- Bathing Waters Monitoring Locations

WFD Transitional & Coastal Water Bodies

- Barrow Clay Pits
- Humber Lower
- Humber Middle
- Humber Upper
- Lincolnshire
- North Killingholme Haven Pits
- Northcoates Point Lagoon
- Yorkshire North
- Yorkshire South

Project:
Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Water Framework Directive (WFD)
Water Bodies and Protected Areas

Figure: 7-8
Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0015

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Co-ordinate system: WGS 1984 UTM Zone 31N

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7.3.6 Summary of Scoping Proposals

344. **Table 7-4** outlines the marine water and sediment quality impacts which are proposed to be scoped in or out of the EIA. These may be refined through the EPP and other consultation activities and as additional project information and site-specific data become available.

345. Due to the limited impacts proposed to be scoped in it is proposed that this topic will be assessed within **Chapter 7.2 Marine Physical Processes** to align with the assessment on suspended sediment.

Table 7-4 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Marine Water and Sediment Quality

Potential Impact	Construction	Operation	Decommissioning
Remobilisation of existing contaminated sediments – Array Area	X	X	X
Remobilisation of existing contaminated sediments – Offshore ECC	✓	X	X
Accidental pollution	X	X	X
Cumulative impacts	X	X	X
Transboundary impacts	X	X	X

7.3.7 Approach to Data Gathering

346. **Table 7-5** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 7-5 Desk-Based Data Sources for Marine Water and Sediment Quality

Data Source	Date	Data Contents
Sediment quality survey of the DBD Array Area and areas south-east of the offshore ECC.	Q3 2023	Sediment contaminant concentrations and particle size analysis.
Environment Agency's Catchment Data Explorer (https://environment.data.gov.uk/catchment-planning)	2024	Information on the status of coastal and transitional water bodies.
MMO Public Register - Other plans or projects within the scoping area and Humber Estuary	2022 / 2024	Publicly available sediment / water quality data.
Environment Agency	Most recently available data	Background concentration data for the discharge location.
Dogger Bank Teesside A & B Environmental Statement	2014	Sediment quality data.
Dogger Bank Creyke Beck A & B Environmental Statement	2013	Sediment quality data.

347. A site-specific sediment survey to include chemical contaminant analysis was undertaken as part of the wider benthic ecology survey requirement and will be reported as part of the benthic ecology assessment (see **Chapter 7.4 Benthic and Intertidal Ecology**). This has provided sediment samples from within the DBD Array Area and between the Array Area and the landfall. An additional survey is planned to characterise the offshore ECC, including sediment and contaminant sampling.

348. Surveys will be undertaken in line with the MMO's sediment sampling guidelines relating to disposal to sea and agreed in advance with stakeholders, such as the Environment Agency and Cefas, where required. **Table 7-6** outlines the proposed baseline surveys to be carried out.

Table 7-6 Proposed Baseline Surveys for Marine Water and Sediment Quality

Survey	Timing	Spatial Coverage
Sediment quality survey	Q2 / Q3 2024	Offshore ECC.

7.3.8 Approach to Assessment

349. Impacts arising from the Project on marine water and sediment quality will not be included within an EPP. Liaison with key stakeholders will take place to agree the approach to data collection, and the specific assessment methods to be employed as part of this process.

350. As proposed above, the assessment will be presented in **Chapter 7.2 Marine Physical Processes** and will be informed by the above baseline data and the results of the marine physical processes assessment (i.e. in terms of suspended sediment behaviour and potential for dispersal). The assessment of potential effects will be undertaken in line with the EIA methodology set out in **Chapter 5 EIA Methodology**.

7.3.9 Scoping Questions to Consultees

351. The following questions are posed to consultees to help them frame and focus their response to the marine water and sediment quality scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the marine water and sediment quality impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the marine water and sediment quality impacts that have been scoped out from further consideration within the EIA?
- Do you agree that the assessment can be undertaken within **Chapter 7.2 Marine Physical Processes**?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.4 Benthic and Intertidal Ecology

352. This chapter of the Scoping Report considers the potential likely effects of the Project associated with benthic and intertidal ecology, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

353. The benthic and intertidal ecology assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.2 Marine Physical Processes;**
- **Chapter 7.3 Marine Water and Sediment Quality;** and
- **Chapter 7.5 Fish and Shellfish Ecology**.

7.4.1 Study Area

354. The Benthic and Intertidal Ecology Study Area (hereafter referred to as 'the Study Area') covers a total of 13,652.57km^2. It includes the Offshore Scoping Area with a buffer of 10km. The buffer is based on previous project experience and will be further refined during the EIA process using information from **Chapter 7.2 Marine Physical Processes**.

355. The extent of the Study Area will provide a regional context on benthic and intertidal ecology and also cover potential effects outside of the Array Area and offshore ECC (see **Figure 7-9**).

7.4.2 Existing Environment

7.4.2.1 Intertidal Zones

356. The intertidal zone within the Study Area predominantly comprises of mobile sediments (see **Figure 7-10**) and sandy cliffs. The intertidal zone that encompasses the landfall falls just within and to the north of the Holderness Inshore MCZ, which is characterised by a long beach of relatively mobile sediments and is designated for:

- High energy circalittoral rock;
- Intertidal sand and muddy sand;
- Moderate energy circalittoral rock;
- Subtidal coarse sediment;
- Subtidal mixed sediments;
- Subtidal mud; and
- Subtidal sand.

357. Both abundance and diversity of flora and fauna in the intertidal zones are likely to be low in areas of high sediment movement and where scour around hard structures occur. Other areas may support higher abundances and greater levels of diversity due to more sheltered conditions, lower sediment mobility and no coastal defence structures being present. Site-specific intertidal surveys will be undertaken in the summer of 2024 (July to September) to record the habitat types present at the landfall and, in turn, to characterise the ecological interest within the intertidal area.

7.4.2.2 Offshore Zone

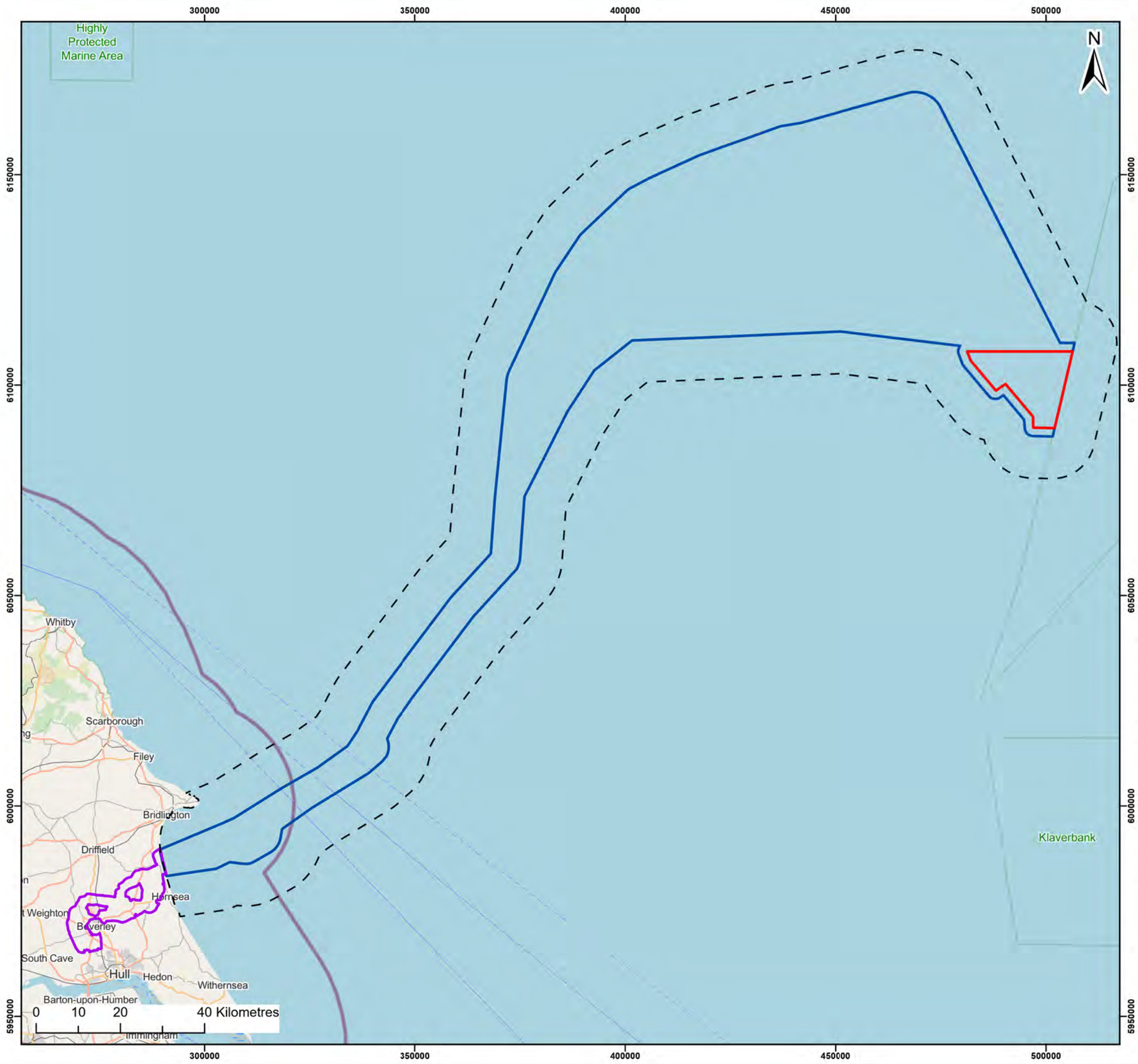
358. Site-specific benthic surveys were undertaken in 2023 along the previous scoping boundary (as set out in the original DBD Scoping Report (Royal HaskoningDHV, 2023)) to characterise the benthic ecology within the Study Area to feed into the PEIR. The Array Area remains unchanged and therefore further surveys are not required. However, further site-specific benthic surveys will be undertaken to cover the new sections of the Study Area that have not previously been surveyed (the offshore ECC).

359. To inform this Scoping Report, the predictive seabed habitats derived from EUSeaMap (European Marine Observation and Data Network (EMODnet), 2024), DBS Offshore Wind Farm, Dogger Bank Teesside A & B (now Dogger Bank C and Sofia Offshore Wind Farms respectively) Array Area survey, and the geophysical surveys for the original DBD scoping area that overlaps with the current benthic Study Area have been used and will be ground truthed during the proposed benthic surveys.

360. The findings of the 2023 DBD geophysical and benthic survey shows that the predominant benthic habitat present in the DBD Array Area consists of slightly gravelly sand (with the area being more sandy than gravelly), sparsely populated by polychaetes, bivalves, and amphipods (Fugro, 2023). Other monitoring surveys of the Dogger Bank SAC for both research (carried out by the Senckenberg Research Institute (Sonnewald & Turkay, 2012; Sonnewald & Janssen, 2012)) and pre-construction baseline characterisations, have shown that these sediment types and infaunal communities dominate this region and therefore the 2023 survey provides a good characterisation of the site.

361. The Dogger Bank South export cable corridor runs adjacent to the Study Area from landfall to approximately 75km offshore. The findings from the 2022 Dogger Bank South benthic survey show the sediment composition near the coast to be primarily classified as gravel, with the rest of their export cable corridor mainly comprising of sand / muddy sand with varying proportions of shell fragments. Gravel was noted as being absent along the majority of the export corridor after approximately 50km offshore (RWE, 2023).

362. The EUSeaMap (EMODnet, 2023) project conducts broad-scale predictive modelling to predict habitats within the North Sea based on known environmental characteristics which are cross-checked with extant survey data. The EUSeaMap (EMODnet, 2023) predictions, shown on **Figure 7-10**, have been used to determine the anticipated habitat types within the Study Area in the absence of site-specific information.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Benthic and Intertidal Ecology Study Area

Source: © Haskoning DHV UK Ltd, 2024; © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Benthic and Intertidal Ecology Study Area

Figure: 7-9

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0057

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03	07/06/2024	JH	AB	A3	1:900,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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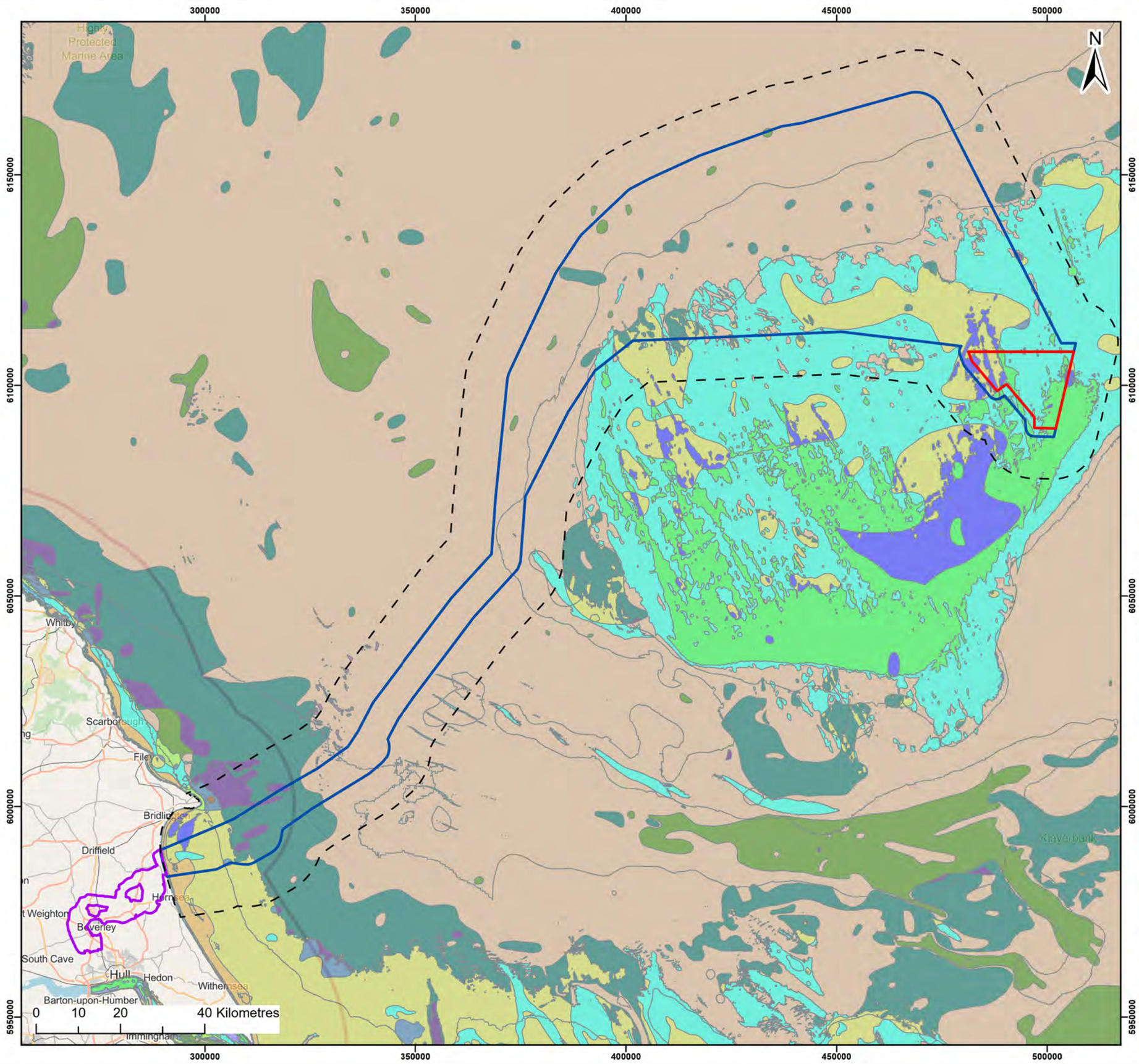

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Benthic and Intertidal Ecology Study Area

EUSeaMap 2023 EUNIS Classification Group

- A3.1: Atlantic and Mediterranean high energy infralittoral rock
- A3.2: Atlantic and Mediterranean moderate energy infralittoral rock
- A3: Infralittoral rock and other hard substrata
- A4.1: Atlantic and Mediterranean high energy circalittoral rock
- A4.27: Faunal communities on deep moderate energy circalittoral rock
- A4.2: Atlantic and Mediterranean moderate energy circalittoral rock
- A4.33: Faunal communities on deep low energy circalittoral rock
- A5.13: Infralittoral coarse sediment
- A5.14: Circalittoral coarse sediment
- A5.15: Deep circalittoral coarse sediment
- A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand
- A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand
- A5.27: Deep circalittoral sand
- A5.33: Infralittoral sandy mud
- A5.34: Infralittoral fine mud
- A5.35: Circalittoral sandy mud
- A5.36: Circalittoral fine mud
- A5.37: Deep circalittoral mud
- A5.43: Infralittoral mixed sediments
- A5.44: Circalittoral mixed sediments
- A5.45: Deep circalittoral mixed sediments
- A5.611: [Sabellaria spinulosa] on stable circalittoral mixed sediment
- No EUNIS habitat assigned

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Seabed Habitat

Figure:	Drawing No:				
7-10	PC3991-RHD-OF-ZZ-DR-Z-0018				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
03	07/06/2024	JH	LA	A3	1:900,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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363. The European Nature Information System (EUNIS) (EMODnet, 2023) habitat types show the majority of the Study Area is predicted to comprise of circalittoral fine sand (A5.25). However, as shown on **Figure 7-10**, the benthic habitats within the Study Area are predicted to be predominately infralittoral fine sand (A5.23) or circalittoral fine sand (A5.25) with areas of circalittoral coarse sediment (A5.14) and infralittoral coarse sediment (A5.13). There are also small sections of circalittoral muddy sand (A5.26) found just to the north-west of the Dogger Bank area (see **Figure 7-10**).

364. The benthic habitats in the section of the Study Area closer to shore are more heterogeneous, with more coarse and mixed sediments predicted. Such as infralittoral coarse sediments (A5.13), circalittoral coarse sediments (A5.14), circalittoral mixed sediments (A5.44) and circalittoral fine sand (A5.25) (see **Figure 7-10**).

365. In summary, it is expected that the dominant benthic communities within the Offshore Scoping Area will be those associated with these predicted sediments, as described by EUNIS (EMODnet, 2023), such as:

- Infralittoral coarse sediment (A5.13) – This habitat experiences high exposure that prevents the accumulation of organic matter and fine sediments. The habitat provides a wide range of interstitial spaces that are suitable for many invertebrates, mainly being bivalves and infaunal polychaetes;
- Circalittoral coarse sediment (A5.14) – Characterised by a robust fauna including venerid bivalves;
- Infralittoral fine sand (A5.23) - This habitat is characterised by a range of taxa including polychaetes, bivalve molluscs and amphipod crustacea;
- Infralittoral muddy sand (A5.24) – This habitat is characterised by a range of taxa including venerid bivalves, amphipods, echinoderms and Piddocks;
- Circalittoral fine sand (A5.25) - This habitat is characterised by a range of taxa including polychaetes, bivalve molluscs and amphipod crustacea;
- Circalittoral muddy sand (A5.26) – This habitat is characterised similar to A5.24 except that these habitats tend to be more stable than the infralittoral counterparts and as such support a richer infaunal community;
- Circalittoral sandy mud (A5.35) – Characterised by *Amphirua filiformis*, *Mysella bidentata* and *Abra nitida*; and
- Circalittoral mixed sediments (A5.44) – A wide range of infaunal polychaetes, bivalves, echinoderms and burrowing anemones such as *Cerianthus lloydii* are often present in such habitat and the presence of hard substrata (shells and stones) on the surface enables epifaunal species to become established, particularly hydroids such as *Nemertesia* spp and *Hydrallmania falcata*. The combination of epifauna and infauna can lead to species rich communities.

7.4.2.3 Designations

366. The Study Area contains a number of protected areas designated as a result of the habitats they contain and the species they support. These sites, and their designated features in relation to benthic and intertidal habitats, are detailed on **Figure 7-10. Figure 7-11** shows these sites in relation to the Study Area. The designated sites within this area will be considered further through the EIA, Habitats Regulations Assessment (HRA) and MCZ Assessment.

7.4.2.4 Protected Habitats and Species

367. Annex I sandbanks slightly covered by seawater all the time occur where areas of sand form distinct elevated bathymetric features which are predominantly surrounded by deeper water and where the top of the sandbank is in less than 20m water depth. As shown on **Figure 7-11**, instances of this feature occur throughout the Study Area, both within designated sites (**Table 7-7**) and outside of them. A section of the Offshore Scoping Area overlaps with Flamborough Head, which is an Annex 1 sandbank, due to the 10km buffer.

Table 7-7 Designated Sites for Benthic Features Within the Benthic and Intertidal Ecology Study Area

Site	Designating Features
Dogger Bank SAC	Sandbanks which are slightly covered by sea water all the time.
The Humber Estuary SAC, SPA, Ramsar and SSSI	Sandbanks which are slightly covered by sea water all the time; Estuaries; Mudflats and sandflats not covered by seawater at low tide; Coastal lagoons; Salicornia and other annuals colonising mud and sand; Atlantic salt meadows; Embryonic shifting dunes, *Glauco-Puccinellietalia maritimae*; Shifting dunes along the shoreline with *Ammophila arenaria* (‘White dunes’); Fixed dunes with herbaceous vegetation (‘Grey dunes’); Dunes with *Hippophae rhamnoides*; Sea lamprey, *Petromyzon marinus*; and River lamprey, *Lampetra fluviatilis*.

Site	Designating Features
Flamborough Head SAC	Reefs; Vegetated sea cliffs of the Atlantic and Baltic coasts; and Submerged or partially submerge sea caves.
Holderness Offshore MCZ	North Sea glacial tunnel valleys; Subtidal coarse sediment; Subtidal sand; Subtidal mixed sediments; and Ocean quahog, *Arctica islandica*.
Holderness Inshore MCZ	Intertidal sand and muddy sand; High energy circalittoral rock; Moderate energy circalittoral rock; Spurn Head (subtidal) and “the Binks”; Subtidal coarse sediment; Subtidal sand; Subtidal mud; and Subtidal mixed sediments.
Swallow Sand MCZ	Subtidal coarse sediment; Subtidal sand; and North Sea glacial tunnel valley.

368. Reefs are protected under Annex I of the Habitats Directive. These can be either biogenic (made up of hard matter created by living organisms) or of geogenic (formed by non-biogenic substrata) origin. As shown on **Figure 7-11**, there are patches of Annex I reef found within the offshore ECC between the landfall out to approximately 50km offshore. A portion of the offshore ECC is designated for the Holderness Inshore MCZ (72.15km^2) and Holderness Offshore MCZ (181.54km^2), where the rocky interest features of the site are made up of cobble boulder and post glacial deposits. There is also a small section of the offshore ECC, within the 10km buffer, that overlaps with the Swallow Sand MCZ (6.07km^2).

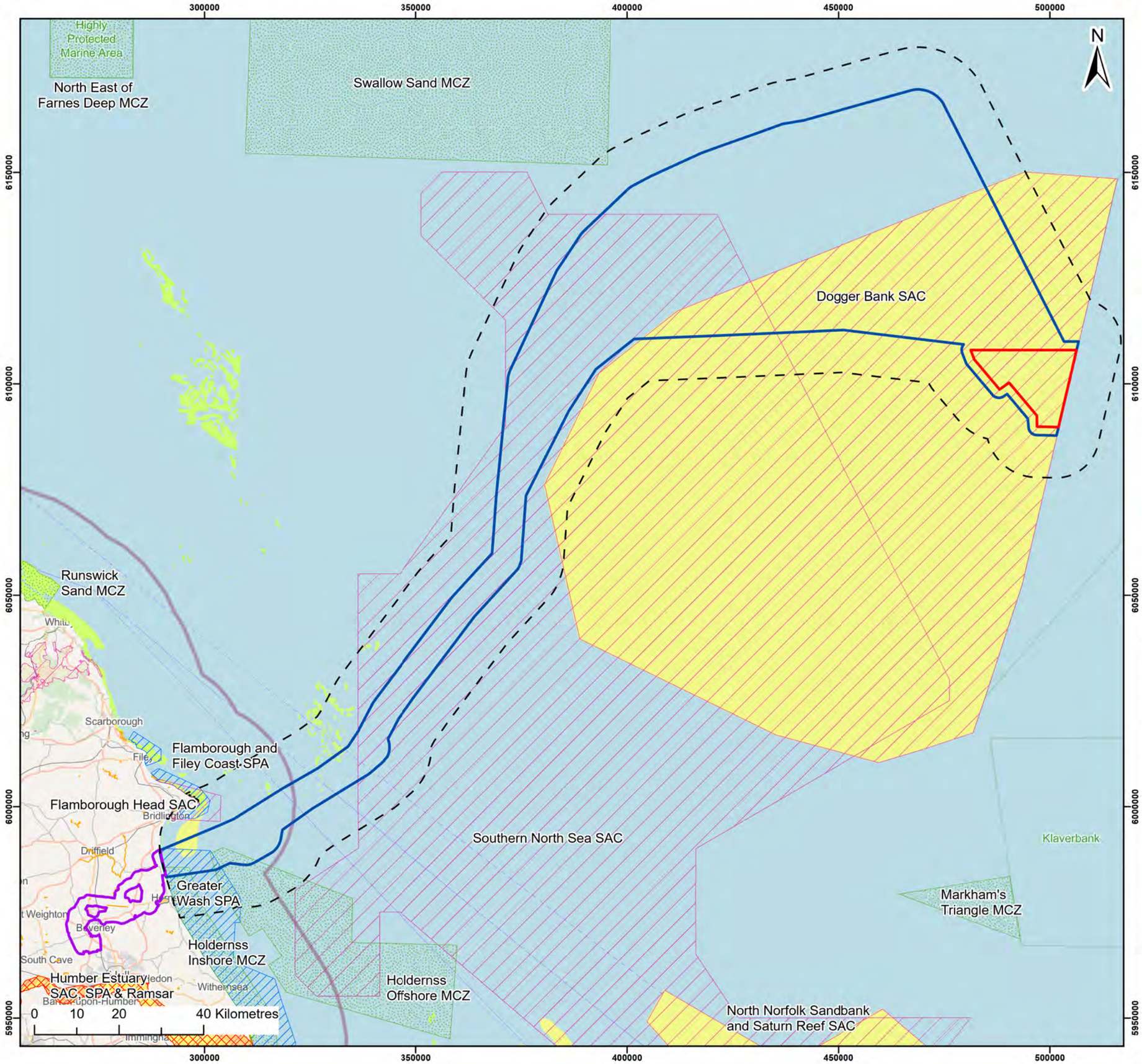
369. However, there are currently no known areas of biogenic reef within the Study Area and the two MCZs only overlap with a small proportion of the Study Area. The benthic survey in 2023 noted the potential for stony reef in some areas of the original scoping boundary (Fugro, 2023). The benthic survey for the new areas of the scoping boundary (the offshore ECC) will determine whether there are any reefs within the offshore ECC that meet the criteria for protection under Annex I of the Habitats Directive. However, it is noted that the previous surveys mentioned in **Section 7.4.2.2** have only shown potential and no confirmation of any Annex I habitats.

370. *Sabellaria spinulosa*, although not a protected species is on the list of species designated as being of ‘principal importance for the purpose of conserving biodiversity’ under the Natural Environment and Rural Communities Act 2006. S. spinulosa is a common species, however, some aggregations may form biogenic reefs in the right conditions. Annex I S. spinulosa reefs represent a priority habitat (biogenic reefs) under the European Commission (EC) Directive 92/43/EEC, known as the EU Habitats Directive. *S. spinulosa* was noted within the 2023 benthic survey, although it was not confirmed to be a biogenic reef (Fugro, 2023). However, they are quite common in offshore environments and may be shown to be present after the updated site-specific benthic surveys (for further information, see **Table 7-10**).

371. The Study Area also contains several UK Biodiversity Action Plan (BAP) habitats, which whilst not afforded a Protected status are valuable ecological receptors. These habitats are predicted to mainly be composed of the following:

- Coarse and mixed sediments with moderate to high infaunal diversity and scour tolerant epibenthic communities;
- Sandy sediments with low infaunal diversity;
- Sparse epibenthic communities;
- Fine muddy sands with moderate species diversity, characterised by bivalves in areas of moderate to high wave exposure; and
- Coarse littoral barren sand occurring within the intertidal area.

372. The previous benthic survey from 2023 and the updated survey for 2024 will be used to characterise the benthic communities of the Study Area along with identifying rare, sensitive and valuable habitats and species that may be present for the purpose of informing the assessment. The 2023 benthic survey data can be seen on **Figure 7-12**.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Benthic and Intertidal Ecology Study Area
- Annex I Sandbank
- Annex I Reef
- Marine Conservation Zone
- Ramsar
- Special Area of Conservation
- Special Protection Area
- Site of Special Scientific Interest

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Designated Sites and Protected Benthic Habitats

Figure: 7-11

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0019

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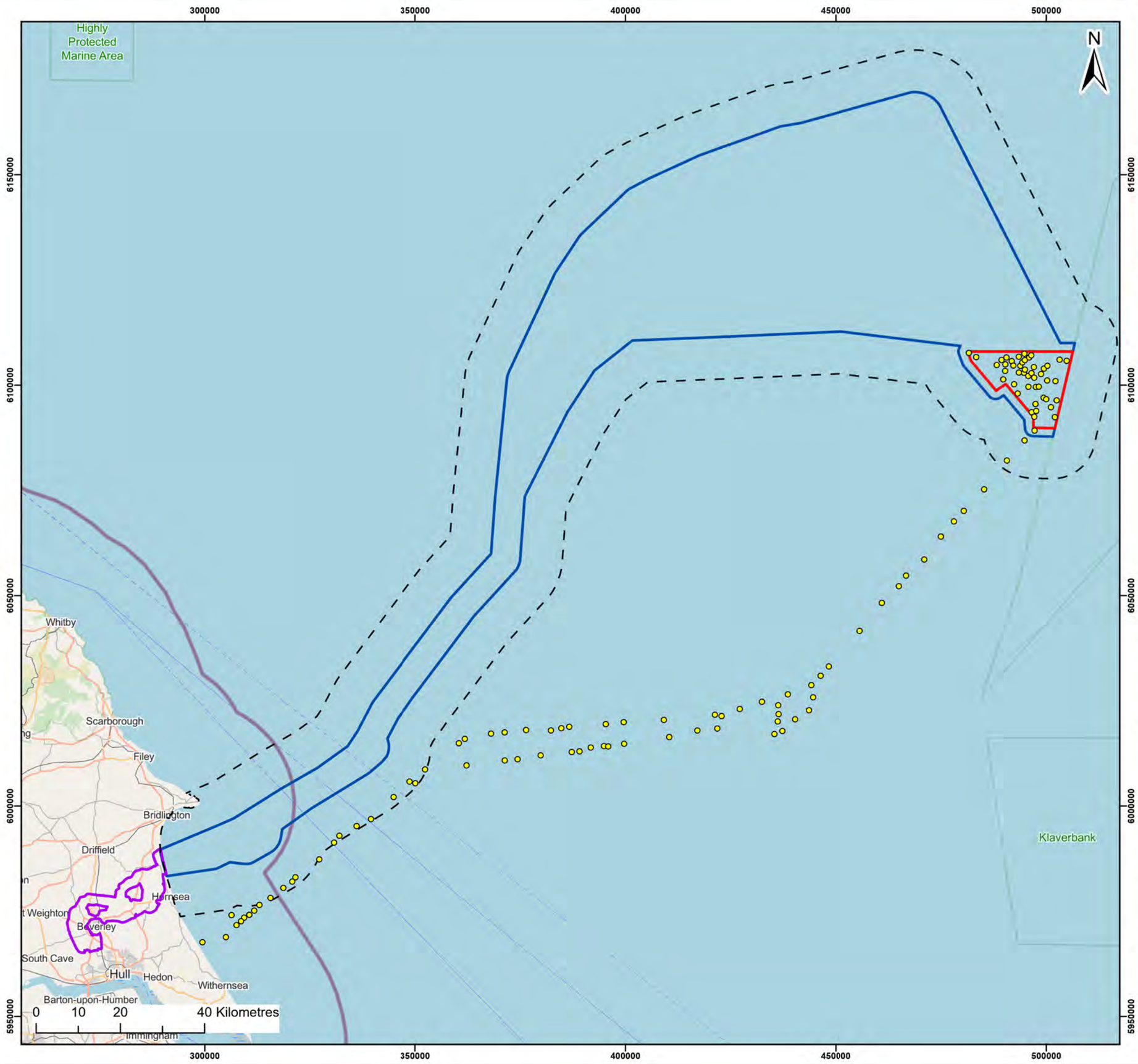

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Benthic and Intertidal Ecology Study Area
- 2023 Benthic Survey Sample Stations

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: 2023 Benthic Survey Area in Relation to the New Study Area

Figure: 7-12

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0021

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Co-ordinate system: WGS 1984 UTM Zone 31N

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7.4.3 Potential Impacts

373. A range of potential impacts on benthic and intertidal ecology have been identified which may occur during the construction, operation, and decommissioning phases of the Project. These impacts include those issues identified as requiring consideration in the Overarching NPS EN-1, the NPS EN-3, (DESNZ, 2023a; DESNZ, 2023b).

374. **Chapter 7.2 Marine Physical Processes** will assess any changes to hydrodynamics from the Project, such as impacts on waves and tidal currents, bedload sediment transport and seabed morphological changes, and suspended sediment concentrations. All of these can impact benthic ecology and the results of that chapter's assessment will be taken into account for the following impacts discussed for construction (**Section 7.4.3**), operation (**Section 7.4.3.2**) and decommissioning (**Section 7.4.3.3**).

7.4.3.1 Potential Impacts during Construction

375. Potential impacts during the construction phase of the Project will arise from disturbance of the seabed during the installation of foundations, cables, and any erosion or other protection (such as rock or concrete mattresses).

376. Impacts which span the life of the Project (e.g. habitat loss / alteration) will be considered as part of the operational phase assessment and are therefore not considered in the construction phase assessment to avoid duplication.

7.4.3.1.1 Temporary Habitat Loss / Physical Disturbance

377. There is potential for direct physical disturbance of the seabed construction activities such as the installation of foundations, cables, seabed preparation (dredging), sandwave levelling, and indentations on the seabed from jack-up vessels. Areas affected by installation activities would be relatively small scale in relation to the wider environment. They will be local in nature, limited to the footprint of the activity, and seabed recovery is expected quickly following cessation of installation activities, given the likely tolerance and recoverability of the habitats present. This impact is proposed to be scoped into the EIA.

7.4.3.1.2 Increased Suspended Sediments and Sediment Re-Deposition

378. The installation of foundations, cables, and any erosion or other protection (such as rock or concrete mattresses) may cause an increase of suspended sediment concentrations and sediment re-deposition in the water column. Such concentrations have the potential to affect benthos through blockage of filter feeders and / or smothering sessile species once the sediment settles out of the water column and is deposited on the seabed. The Dogger Bank Teesside A & B ES judged the effect of suspended sediment concentrations for their Array Areas to be negligible in terms of magnitude and to have a low sensitivity (Forewind, 2014).

379. Light attenuation is highly correlated with levels of suspended matter, and the availability of light can affect phytoplankton biomass. There is currently limited research on the effects of light attenuation due to increased suspended sediments and sediment re-deposition from OWF. However, this impact will be assessed qualitatively as part of increased suspended sediments and sediment re-deposition, using the modelling from **Chapter 7.2 Marine Physical Processes**. Wang *et al.* (2023) noted phytoplankton and zooplankton to be both positively or adversely affected by the 'shading effect', leading to a ±10% fluctuation of primary production.

380. The Study Area falls within the Dogger Bank SAC, an area designated the Annex I habitat sandbanks which are slightly covered by seawater all the time (see **Table 7-7**). Therefore, increased suspended sediment concentrations have been scoped into the EIA.

7.4.3.1.3 Remobilisation of Contaminated Sediments

381. The Project has carried out site-specific sediment chemistry analysis in summer 2023 at 28 sample stations located in the DBD Array Area and along the previous offshore ECC. An additional survey will be undertaken to characterise the offshore ECC which includes the areas not surveyed previously. Sediment samples were analysed for total hydrocarbon content (THC), polycyclic aromatic hydrocarbons (PAHs), metal content, polychlorinated biphenyls (PCBs), and organotins. For further detail on methods and results, see **Chapter 7.3 Marine Water and Sediment Quality**.

382. THC, PCB and organotin concentrations were below Cefas Action Level One at all sample stations. All metals tested were below Cefas Action Level One at all sample stations, except arsenic, which was above Cefas Action Level One at the two sample stations furthest inshore along the offshore ECC. Arsenic levels were below Cefas Action Level Two at these two sites. However, PAH concentrations were below sediment quality guideline levels at all sample stations except the station furthest inshore along the original offshore ECC. Overall, no sampled sediment contaminant concentrations exceeded Cefas Action Level Two.

383. These results indicate that it is unlikely for Environmental Quality Standards for contaminants within the water column would be exceeded. Furthermore, the predominantly sandy coarse nature of the seabed sediments within the Offshore Scoping Area significantly reduces the risk of resuspension into the water column and therefore being transported over long distances.

384. Previous site-specific surveys of sediment contaminants have also been undertaken for the nearby Dogger Bank Teesside A & B (now known as Dogger Bank C (DBC) and Sofia respectively) wind farm sites. The Project falls directly within the original footprint of DBC and within close proximity to Sofia Offshore Wind Farm. The results of these site-specific surveys indicate that the levels of contaminants in the offshore wind farm areas (which covers both the Array Area and parts of the offshore ECC), where sediment re-suspension concentrations are predicted to be the largest due to cable and foundation installation, is relatively low. Contaminant levels are higher in the inshore portion of the Offshore Scoping Area, potentially due to the presence of shore-based chemical inputs and industry / ports. However, no sampled sediment contaminant concentrations exceeded Cefas Action Level Two (Forewind, 2013; Forewind, 2014), as found for this Project.

385. Since completion of the 2023 benthic survey, an offshore ECC to the north of the original offshore ECC has been selected, which is reflected in the offshore Scoping Area (**Figure 1-1**). This offshore ECC lies to the north of the 2023 benthic survey extent up until the Array Area. Given the agreement in the trends between the site-specific 2023 benthic survey (Fugro, 2023), and surveys undertaken by other projects in the region (Forewind, 2013; Forewind, 2014), namely that all sediment contaminants are below Cefas Action Level Two, and only rise above Cefas Action Level One in the inshore region, it is expected that the same spatial pattern of contaminant levels will be present in the newly considered offshore ECC. This will be verified in new surveys, scheduled to be carried out in 2024.

386. Given the site-specific data available, it is proposed that the impact of remobilisation of contaminated sediments is scoped in, although specifically only for the offshore ECC which is yet to be surveyed. It is proposed that for the foundation installation in the DBD Array Area that has been surveyed, remobilisation of contaminated sediment is scoped out of the EIA. Primary survey data collected across this area of the Project does not indicate significant levels of chemicals within the sediments that could potentially be disturbed. The coarse and sandy nature of the coastal and offshore sediments further reduces this risk. For further detail and justification, see **Chapter 7.3 Marine Water and Sediment Quality**, where remobilisation of contaminated sediments is also proposed to only being scoped in specifically for the offshore ECC and scoped out for the Array Area.

7.4.3.1.4 Pollution Events Resulting from the Accidental Release of Pollutants

387. Any coatings and treatments to be used will be suitable for use in the marine environment and will be used in accordance with guidelines approved by the Health and Safety Executive and the Environment Agency's Pollution Prevention Control Guidelines. A CRA would be required as set out as part of the Project Environmental Management Plan (PEMP) or similar if this is not the case.

388. All vessels and the carriage and use of chemicals must comply with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). A PEMP or similar will also be put in place to ensure all works are undertaken in line with best practice for working in the marine environment and inclusive of a Marine Pollution Contingency Plan, which will include emergency plans and mitigation for a range of potential marine pollution incidents. Also, best practice measures for the storage, use and disposal of lubricant and chemicals will be undertaken throughout the construction phase.

389. As a result of these embedded mitigation measures and the commitments that would be secured in the PEMP, it is considered that the risk of a spill occurring is low and with the appropriate management measures in place. Should a spill occur, the risk to the marine environment is effectively mitigated. The PEMP will be agreed with the relevant stakeholders prior to the start of construction. Therefore, it is considered that no significant effect would occur and as a result of these mitigation measures, it is proposed that this impact is scoped out of the EIA.

7.4.3.2 Introduction of Marine Invasive Non-Native Species from Vessel Traffic

390. The potential risk of spreading or introducing invasive non-native species will be mitigated by employing biosecurity measures in accordance with the following relevant regulations and guidance:

- International Convention for the Prevention of Pollution from Ships (MARPOL). The MARPOL sets out appropriate vessel maintenance;
- The Environmental Damage (Prevention and Remediation (England) (Amendment) Regulations 2019, which set out a 'polluter pays principle' where the operators who cause a risk of significant damage or cause significant damage to land, water or biodiversity will have the responsibility to prevent damage occurring, or if the damage does occur will have the duty to reinstate the environment to the original condition; and
- The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention 2004), which provide global regulations to control the transfer of potentially invasive species.

391. These commitments would be secured in the PEMP via a condition in the deemed Marine Licence of the DCO. The PEMP will be agreed with relevant stakeholders prior to the start of construction.

392. With the appropriate mitigations in place through commitments secured in the PEMP, it is not anticipated that INNS will have a significant impact. Therefore, it is proposed that with this embedded mitigation, introduction of marine INNS from vessel traffic during the construction phase is scoped out of the EIA.

7.4.3.2.1 Disturbance from Noise and Vibration

393. Research into the effects of underwater noise in relation to benthic and intertidal ecology is ongoing. However, it is likely that there is habituation to noise created by the existing shipping which occurs in the area. There may be reactions from some benthic species to episodic noise such as that from pile driving (Lovell *et al.,* 2005; Heinisch and Weise, 1987). Any impact is likely to be localised and temporary. The latest research will be considered and presented within the EIA.

394. Other underwater noise sources during construction (e.g. vessel traffic) are unlikely to cause significant effects on benthic receptors. There is no evidence to suggest this low level of noise and vibration has a significant effect on benthic ecology. Unexploded Ordnance (UXO) clearance required ahead of construction would also have small spatial and temporal impacts due to the nature of the activity and would therefore not have the potential of likely significant effect on benthic ecological receptors. However, piling may provide a source and pathway to benthic receptors, it is therefore proposed that this impact should be scoped into the EIA for further consideration in relation to piling only.

395. In the case of UXO, any assessments will be indicative only. A detailed UXO survey will be completed prior to construction. The exact type, size and number of possible detonations and duration of UXO clearance operations is therefore not known at this stage. This means that any assessments for UXO clearance in the EIA will be for information only and are not part of the DCO application. A separate Marine Licence application(s) will be made prior to construction for UXO clearance works, with an accompanying assessment of UXO clearance impacts on benthic and intertidal ecology.

7.4.3.3 Potential Impacts during Operation

396. Potential impacts during operation will mostly result from the physical presence of infrastructure on the seabed (i.e. foundation, and any cable protection above the seabed) which will result in habitat loss / alteration. Maintenance activities also have the potential to result in temporary impacts, similar to those occurring during construction, but smaller in extent and therefore of a lower magnitude.

397. As piling will be completed during the construction phase, any effects of underwater noise and vibration are unlikely to cause significant effects on benthic receptors and therefore are proposed to be scoped out of the EIA for the operation phase.

398. Any changes in marine physical processes and marine water and sediment quality will be considered in **Chapter 7.2 Marine Physical Processes** and **Chapter 7.3 Marine Water and Sediment Quality**.

7.4.3.3.1 Temporary Physical Disturbance / Physical Disturbance

399. There is potential for ongoing physical disturbance of the seabed during the operation phase from maintenance activities such as indentations on the seabed from jack-up vessels required for cable repairs or reburial. In general, the impacts from planned maintenance should be temporary, localised and smaller in scale than during construction. However, it is proposed that temporary physical disturbance of the seabed due to O&M activities should be scoped into the EIA for further consideration.

7.4.3.3.2 Habitat Loss / Alteration

400. The presence of foundations on the seabed, cable / scour protection, and any erosion or other protection (such as rock or concrete mattresses) would result in a relatively small footprint of lost habitat in the context of the habitat from the surrounding region. A Decommissioning Programme for the Project has not yet been developed but will be prepared prior to the commencement of construction works. At this stage, it is assumed that this would result in habitat loss / alteration, as noted in **Chapter 3 Project Description**, it is anticipated that when decommissioning takes place, all offshore structures above the seabed will be removed.

401. Therefore, it is proposed that habitat loss / alteration during the operation phase is scoped into the EIA for further consideration. It is also acknowledged that there is potential for habitat loss following decommissioning, which is dependent on infrastructure removal, these impacts will be assessed and considered as part of the decommissioning phase assessment.

7.4.3.3.3 Increased Suspended Sediment Concentrations and Sediment Re-Deposition

402. As any potential for temporary physical disturbance during operation from O&M activities has been scoped in, any potential impacts related to the suspension of fine sediments and sediment re-deposition during operation have therefore also been scoped into the EIA for further consideration.

7.4.3.3.4 Remobilisation of Contaminated Sediments

403. The 2023 benthic survey (Fugro, 2023) which collected contamination data across the Project (survey locations shown on **Figure 7-7** in **Chapter 7.3 Marine Water and Sediment Quality**) does not indicate significant levels of chemicals within the sediments that could potentially be disturbed. The coarse and sandy nature of the coastal and offshore sediments further reduces this risk. Teesside A & B ES also concluded that a deterioration in water quality due to re-suspension of contaminated sediments would have a negligible impact (Forewind, 2014).

404. Sediment disturbance as a result of O&M activities could lead to the mobilisation of contaminants (if present) that could be harmful to benthic habitats and species. However, based on the information presented in **Chapter 7.3 Marine Water and Sediment Quality** in regard to the potential for contamination to exist withing the Offshore Scoping Area, this impact has been scoped out of the EIA.

7.4.3.3.5 Pollution Events Resulting from the Accidental Release of Pollutants

405. As noted in **Chapter 7.3 Marine Water and Sediment Quality**, the potential impacts from pollution events from operational vessels are not considered to result in significant effects on benthic and intertidal receptors. The potential impacts will be to a lesser degree than in the construction phase, due to fewer vessels required during operation. The embedded mitigation measures and the PEMP will be utilised to reduce spillage risk and establish appropriate management measures, as described in **Section 7.4.3.1**, will also cover the Project's operation phase. Additionally, O&M vessels would comply with MARPOL. Therefore, it is proposed that this impact is scoped out of the EIA.

7.4.3.3.6 Interactions of Electro-Magnetic Field (including Potential Cumulative Electro-Magnetic Field Effects)

406. Potential impacts from Electro-Magnetic Field (EMF) from operational cables are not considered to result in significant effects on benthic and intertidal receptors. NPS EN-3 states that where cables are buried to 'a depth of at least 1.5m below the seabed, the Applicant should not have to assess the effect of the cables on intertidal habitat during the operational phase of the offshore wind farm'. It is currently expected that where cables can be buried, the target depth would be 0.5m but will vary dependant on the ground conditions encountered. There is also the potential that it is not possible to bury cables at all locations (e.g. at crossings or in hard substrate) and therefore there may be sections of surface laid cables with cable protection. The assessment will consider a realistic worst-case scenario based on the extent of cables with the potential to be buried at less than 1.5m depth.

407. A comparison of EMF field strength across ten different cables and wind farms (Normandeau *et al.,* 2011) suggests that EMF may be detectable above background levels up to 10m from the vicinity of the cable. However, this decreases at lower voltages and this area of water in which EMF effects are present is also reduced via cable protection measures including burial. Any effects are likely to be highly localised, as EMFs are strongly attenuated and decrease as an inverse square of distance from the cable (Gill and Barlett, 2010).

408. Bochert & Zettler (2006) report that brown shrimp (*Crangon crangon*), common starfish (*Asterias rubens*) and ragworm (*Hediste diversicolor*) do not react when exposed to EMF. Gibb *et al*. (2014) states that there is no evidence of EMF impacting S. spinulosa. However, the impacts of EMF on shellfish are scoped into the EIA for further consideration, as described in **Chapter 7.5 Fish and Shellfish Ecology**.

409. Based on the evidence provided above and the assessment carried out on the Teesside A & B projects that concluded minor adverse effects due to a low magnitude of impact (Forewind, 2014), it is expected that EMF will be assessed as having negligible or minor impacts on benthic and intertidal receptors. However, this impact has been scoped into the EIA for further consideration.

7.4.3.3.7 Introduction of Marine Invasive Non-Native Species from Vessel Traffic

410. The potential impacts from the introduction of marine INNS from operational vessels are not considered to result in significant effects on benthic and intertidal receptors. The potential impacts will be to a lesser degree than in the construction phase, due to fewer vessels required during operation. Embedded mitigation measures related to biosecurity in the marine environment described in **Section 7.4.3.1** will also cover the Project's operation phase. Therefore, it is proposed that this impact is scoped out of the EIA.

7.4.3.3.8 Colonisation of Introduced Substrate, including Invasive Non-Native Species

411. The sub-sea structures are expected to be colonised by a range of species leading to a localised increase in biodiversity. The presence of the structures would also provide habitat for mobile species and serve as a refuge for fish. This represents a change from the baseline ecology. Overall, the area available for colonisation would be low and to date, there is no evidence of significant changes of the seabed beyond the vicinity of the foundation structures due to the installation of wind farms (Lindeboom *et al*., 2011). It is therefore proposed that this impact should be scoped into the EIA for further consideration. It is also acknowledged that there is potential for colonisation of introduced substrate following decommissioning, which is dependent on infrastructure removal, these impacts will be assessed and considered as part of the operational phase assessment.

7.4.3.3.9 Disturbance from Noise and Vibration

412. Noise and vibration generated by the operational wind turbines can be conducted through the tower and foundations into the water. Monitoring studies of underwater noise from operational turbines have shown the noise levels from North Hoyle, Scroby Sands, Kentish Flats and Barrow wind farms to be only marginally above ambient noise levels.

413. Other underwater noise sources during operation (e.g. vessel traffic) are unlikely to cause significant effects on benthic receptors due to the limited spatial and temporal extent of impacts to the receptors. There is no evidence to suggest this low level of noise and vibration has a significant effect on benthic ecology.

414. As piling will be completed during the construction phase, any effects of underwater noise and vibration are unlikely to cause significant effects on benthic receptors and therefore are proposed to be scoped out of the EIA for the operation phase.

7.4.3.3.10 Sediment Heating from Export Cables

415. The energy running through the offshore export cables has the potential to heat the nearby benthic ecology. Recent evidence indicates that the surface temperature difference of operational power cables in comparison to inert sections of the same cable was negligible at a sensitivity level of 0.06oC (Taormina *et al.,* 2018; 2020). In addition, modelling of heating for high-voltage direct current (HVDC) cables with similar specifications to that of high capacity OWF export cables (525kV) suggests that even for a worst-case scenario of bundled high voltage cables, any increases in temperature will be limited to a very narrow band above the cables with negligible heat transfer (Brakelmann and Stammen, 2017).

416. The footprint of any effect will therefore be narrow; less than a 1m strip surrounding the cable (although it is not possible to define the area precisely), the cables for the Project will look to have a burial depth between 0.5m to 9m. Modelling suggests that a cable-induced temperate increase at 20cm below the surface will be below 2oC at cable burial depths great than 0.35m to 0.55m. At cable burial depths over 1.5m, any temperate change at 20cm below the surface is likely to be negligible (Brakelmann and Stammen, 2017).

417. The Study Area does not lie at a fringe of the North Sea, meaning that benthic assemblages are relatively typical of a North Sea environment. The Project does not coincide with the northern or southern limits of the distributional ranges of species under consideration. Therefore, it is unlikely that temperature changes will be ecologically significant at a local scale, i.e. the footprint of a heating effect. Since the footprint is so small the potential for population level effects is considered to be negligible.

418. Considering the above evidence regarding ecological risks of sediment heating from cables is negligible, it is proposed to scope out the potential impacts from sediment heating from export cables.

7.4.3.4 Potential Impacts during Decommissioning

419. It is anticipated that the potential decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. Note that the magnitude of impact for underwater noise would be reduced in decommissioning due to the lack of piling.

420. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-8**). The exceptions are habitat loss / alteration and colonisation of introduced substrate, which are to be assessed for decommissioning as part of the operation phase. However, it will be included within the decommissioning section and summarised from the operational assessment.

7.4.4 Potential Cumulative Effects

421. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect benthic and intertidal ecology receptors. Therefore, cumulative effects related to benthic and intertidal ecology are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

422. Offshore wind projects and other activities (such as oil and gas operations) relevant to the assessment of cumulative effects on benthic and intertidal ecology will be identified through a screening exercise. The potential impacts considered in the CEA will be in line with those described for the project-alone assessment, though it is possible that some will be screened out on the basis that the impacts are highly localised (i.e. they occur only within the wind farm site) or where management measures in place for the Project and other projects will reduce the risk of impacts happening.

423. The CEA for benthic and intertidal ecology will specifically consider cumulative noise impacts, habitat loss and changes to seabed habitat.

7.4.5 Potential Transboundary Effects

424. There is potential for transboundary effects upon benthic ecology receptors due to the Project's construction, O&M and decommissioning activities. Potential transboundary impacts, including those associated with underwater noise and sediment plumes, will be assessed as with the other cumulative impacts, and the Applicant, where possible, will liaise with developers in other European Economic Area (EEA) Member States to obtain up to date project information to inform the assessment. In relation to the spread of INNS, appropriate mitigation and biosecurity precautions will be described in the ES to manage and prevent the spread.

425. The North Sea Programme 2022 to 2027 (Noordzeeloket, 2022) outlines the management and use of the North Sea territorial waters within the Netherland's territory. The programme outlines a Natura 2000 designated site that lies adjacent to the Array Area. It is therefore proposed that transboundary impacts are scoped into the EIA for further consideration.

7.4.6 Summary of Scoping Proposals

426. **Table 7-8** outlines the benthic and intertidal ecology impacts which are proposed to be scoped in or out of the EIA. These may be refined through the EPP and other consultation activities, and as additional project information and site-specific data become available.

Table 7-8 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Benthic and Intertidal Ecology

Potential Impact	Construction	Operation	Decommissioning
Temporary habitat loss / physical disturbance	✓	✓	✓
Habitat loss / alteration	x	✓	✓
Increased suspended sediments and sediment re-deposition	✓	✓	✓
Remobilisation of contaminated sediments (DBD Array Area)	x	x	x
Remobilisation of contaminated sediments if present (offshore ECC)	✓	x	✓
Pollution events resulting from the accidental release of pollutants	x	x	x
Underwater noise and vibration	✓	x	✓
Interactions of EMF, including potential cumulative EMF effects	x	✓	x
Introduction of marine INNS from vessel traffic	x	x	x
Sediment heating from export cables	x	x	x
Colonisation of introduced substrate	x	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.4.7 Approach to Data Gathering

427. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR / ES where relevant matters are scoped in for the EIA process.

428. A number of benthic ecology datasets have been reviewed and collated to inform this Scoping Report. The datasets considered to be relevant to the Study Area are listed in **Table 7-9.**

Table 7-9 Desk-Based Data Sources for Benthic and Intertidal Ecology

Source	Summary	Coverage of the Benthic and Intertidal Ecology Study Area
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) (EMODnet, 2023)	EUSeaMap 2016 is a predictive habitat map which covers the seabed of a large area of European waters including the North Sea. Habitats are described in the EUNIS and Marine Strategy Framework Directive predominant habitat classifications and predicted based on a number of physical parameters. Associated confidence maps are also available which give a breakdown of confidence in predicted habitats into high, medium, and low categories.	Predictive maps are available for the full Study Area.
Technical reports for Strategic Environmental Assessment (SEA) Areas 2 and 3 (Department for Environment, Food and Rural Affairs (Defra), 2009)	Description of survey data published in the SEA for Areas 2 (northern North Sea) and 3 (southern North Sea).	Broad-scale data with regional coverage.
JNCC resources	Annex I Sandbanks in the UK Version 3 shows the potential and high confidence mapped extents of Annex I habitat 'Sandbank' within the boundaries of the UK continental shelf. Annex 1 Reefs in UK waters Version 8.2 shows the potential and high confidence mapped extents of Annex I habitat 'Reef' in UK waters.	Available for the full Study Area.
JNCC resources and Natural England Open Data	Details of SSSI, SAC, SPA and MCZ.	Available for the full Study Area.
OneBenthic	Database of benthic datasets (e.g. seabed macrofauna, sediment particle size).	Available for the full Study Area.
Dogger Bank A, B and C Offshore Wind Farms	Benthic survey data.	Available for parts of the Study Area.
The Crown Estate, De Rijke Noordzee, Cefas, Flanders Marine Institute, Offshore Wind Evidence and Change Programme, North Sea Net Gain Project (Marine Environmental Data and Information Network (MEDIN), 2022)	Detailed maps which model community types and distributions of key benthic species in the North Sea.	Available for the full Study Area.

429. In addition to the data in **Table 7-9**, the following data (**Table 7-10**) has already been, or is proposed to be, collected for the assessment.

Table 7-10 Completed and Proposed Baseline Surveys for Benthic and Intertidal Ecology

Dataset	Spatial Coverage	Survey Year
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	Array Area and previous ECC	2023
Grab sampling, eDNA and drop-down video	Array Area and previous ECC	2023
Intertidal walkover surveys	Landfall location(s)	2024
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	Offshore ECC	2024/25
Grab sampling, eDNA and drop-down video	Offshore ECC	2024/25

7.4.8 Approach to Assessment

430. The assessment of the potential impacts upon the benthos will be cross-referenced, where relevant, to the assessments for **Chapter 7.2 Marine Physical Processes**, **Chapter 7.3 Marine Water and Sediment Quality**, and **Chapter 7.5 Fish and Shellfish Ecology**. The impact assessment, in common with other receptors, will consider the following:

- Magnitude / extent: the size or amount of impact – e.g. area of seabed directly or indirectly impacted;
- Sensitivity of receptors;
- Duration: time for recovery (may vary with receptor sensitivity) and duration of activity causing an impact;

- Reversibility of the impact; and
- Timing and frequency.

431. Sensitivity of features will be based upon the Marine Life Information Network's (MarLIN) Marine Evidence-based Sensitivity Assessment (MarESA) (Tyler-Walters *et al.* 2018) where available. The framework determines sensitivity based on resistance (tolerance) and resilience (recoverability), which are defined as:

- Resistance: the likelihood of damage (termed intolerance or resistance) due to a pressure; and
- Resilience: the rate of (or time taken for) recovery (termed recoverability, or resilience) once the pressure has abated or been removed.

432. Site-specific surveys as set out in **Table 7-10** will also be carried out.

433. The assessment for benthic and intertidal ecology will consider the Project Design Envelope, following the guidelines from Planning Inspectorate Advice Note Nine: Rochdale Envelope (2018) and establish a topic-specific and receptor-led realistic 'worst-case scenario' upon which the assessment will be made. The worst-case scenario will be outlined in the PEIR and ES.

434. Benthic and intertidal ecology will be included within the EPP (as set out in **Chapter 6 Consultation**) and further liaison with key stakeholders will take place to agree the approach to data collection, and the specific assessment methods to be employed as part of the EIA as part of this process.

7.4.9 Scoping Questions to Consultees

435. The following questions are posed to consultees to help them frame and focus their response to the benthic and intertidal ecology scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the benthic and intertidal ecology impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the benthic and intertidal ecology impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.5 Fish and Shellfish Ecology

436. This chapter of the Scoping Report considers the potential likely effects of the Project associated with fish and shellfish ecology, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

437. The fish and shellfish ecology assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.2 Marine Physical Processes**;
- **Chapter 7.3 Marine Water and Sediment Quality**;
- **Chapter 7.4 Benthic and Intertidal Ecology**;
- **Chapter 7.6 Marine Mammals**;
- **Chapter 7.7 Intertidal and Offshore Ornithology**; and
- **Chapter 7.8 Commercial Fisheries**.

7.5.1 Study Area

438. The Fish and Shellfish Ecology Study Area (hereafter referred to as 'the Study Area') is defined as International Council for the Exploration of the Sea (ICES) Rectangles 40F1, 40F2, 39F0, 39F1, 39F2, 39F3, 38F0, 38F1, 38F2, 38F3, 37E9, 37F0, 36E9 and 36F0. The Study Area covers a total of 57,315.37km^2, and includes ICES rectangles that fall within the Array Area and offshore ECC. The minimum distance between the Array Area and offshore ECC, and the Study Area boundary is 7km.

439. The extent of the Study Area provides a regional context for fish and shellfish ecology, including potential effects outside of the Array Area and offshore ECC as shown in **Figure 7-13**.

440. In the case of long-distance underwater noise impacts, the use of a 'wider Study Area' will be used. The extent of this wider Study Area will be determined by the outcomes of site-specific underwater noise modelling which will inform the PEIR.

7.5.2 Existing Environment

441. An initial desk-based review of existing literature and data sources was undertaken to support this scoping exercise.

7.5.2.1 Fish

442. Dogger Bank supports a wide range of fish and shellfish species, many of which have high commercial importance, with the region supporting significant commercial fisheries for over 300 years. The distribution of fish communities in the North Sea is broadly related to changes in water depth and temperature (Daan *et a*l., 1990). In shallow waters (50m - 100m depth) in the central and northern North Sea (ICES Divisions IVa and IVb) the commercial fish assemblages are dominated by haddock Melanogrammus aeglefinus, whiting *Merlangius merlangus*, herring *Clupea harengus*, dab *Limanda limanda* and plaice P*leuronectes plattessa.* The Study Area is located within ICES Division IVb.

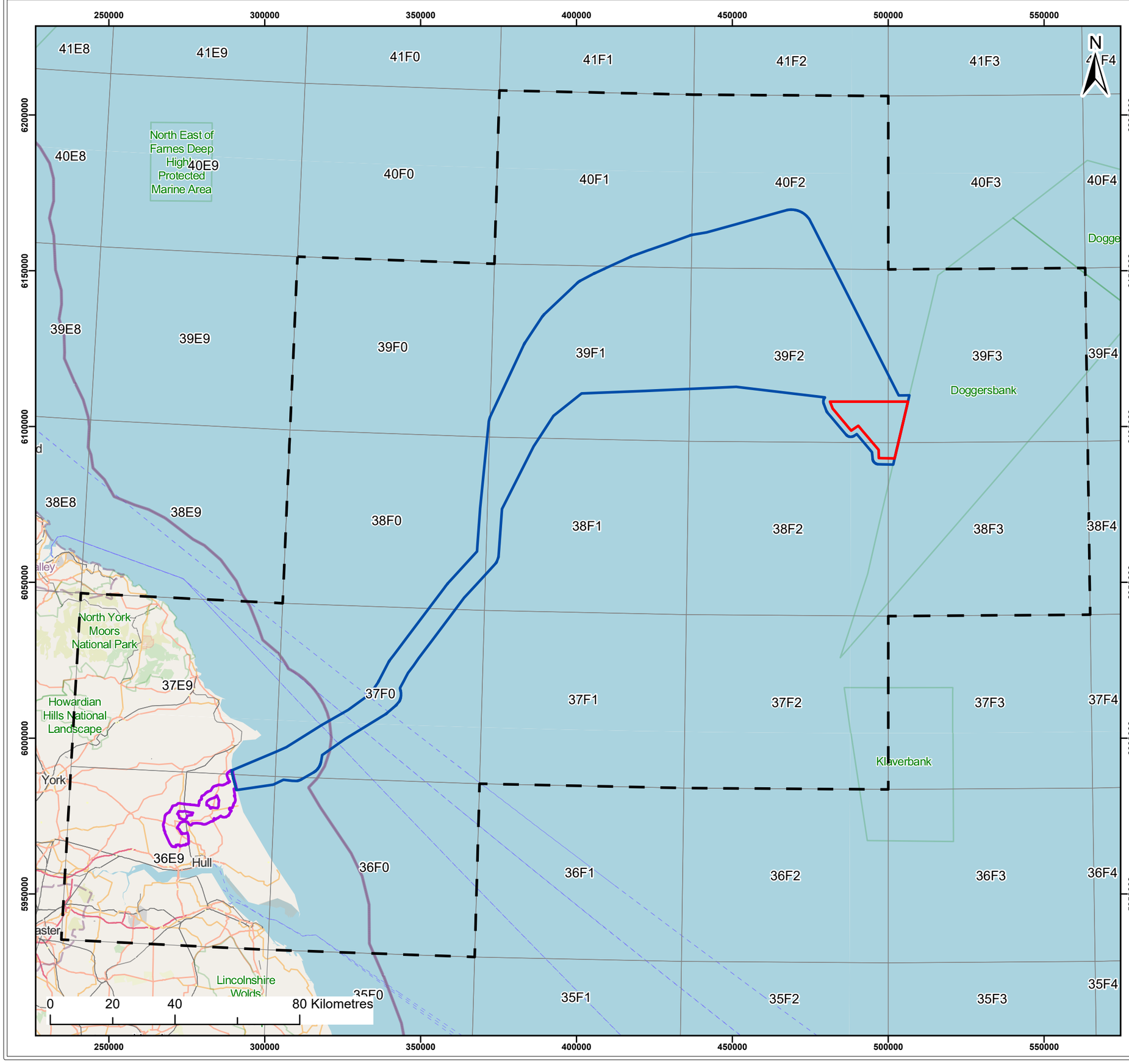
443. Scientific trawling (independent of commercial data) of the Study Area reveals that the key species contributing to the similarity of fish assemblages in the region are solenette *Buglossidium luteum*, dab, common dragonet *Callionymus lyra*, and sand goby *Pomatoschistus minutus* (Callaway *et al.,* 2002).

444. Environmental DNA (eDNA) analysis of samples collected in a site-specific offshore survey campaign carried out in summer 2023, detected the presence of 22 distinct fish taxa within the Study Area. Water samples were collected in the near surface (~1m below surface) and bottom (~5m above seafloor) layers of the water column at 20 different sample locations within the Study Area. Atlantic mackerel *Scomber scombrus* was the most relatively abundant taxon detected in the surface samples (detected at every sample station). Other commonly detected taxa included Clupeidae, including sprat Sprattus sprattus, Pleuronectiformes including plaice and dab, and the Ammodytidae family indicating the presence of sandeel *Ammodytes marinus*. Detected species of conservation concern included Atlantic horse mackerel *Trachurus trachurus*, haddock, and cod *Gadus morhua*, which are listed as 'vulnerable' on the International Union for Conservation of Nature (IUCN) Red List (Fugro, 2023). Cod is also listed as a Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) 'Threatened and/or declining species'. For the full list of fish taxa detected by eDNA analysis, see Fugro (2023).

445. Based on Coull *et al. (*1998) and Ellis *et al.* (2012) data, a number of fish species have been identified as having spawning and / or nursery areas coinciding with the Study Area, and these are displayed in **Figure 7-14** and **Figure 7-15**, and listed in **Table 7-11** with their corresponding conservation importance and hearing sensitivities.

446. Both mackerel and cod have known populations across the region. Cod are known to use regions within both the proposed Array Area and the wider Study Area as spawning grounds, with peak spawning activity occurring in February following a southerly winter migration. Plaice and dab are the most abundant flat fish found within the region, with plaice playing an important role in local fisheries.

447. Both herring and sandeel have been identified as having spawning and nursery grounds within the Study Area (see **Figure 7-14** and **Figure 7-15**). Both of these species are highly sensitive to changes in substrate composition. Herring populations within the Study Area increase during the summer and autumn, with spawning peaking between August and October, preferring to lay their eggs on the seabed on clean gravel substrates (Coull *et al*., 1998). This specific seabed spawning habitat preference makes herring sensitive to activities that disturb the seabed, with herring also being sensitive to underwater noise.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- ICES Rectangles

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Fish and Shellfish Ecology Study Area

Figure:	Drawing No:				
7-13	PC3991-RHD-OF-ZZ-DR-Z-0024				
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Co-ordinate system: WGS 1984 UTM Zone 31N

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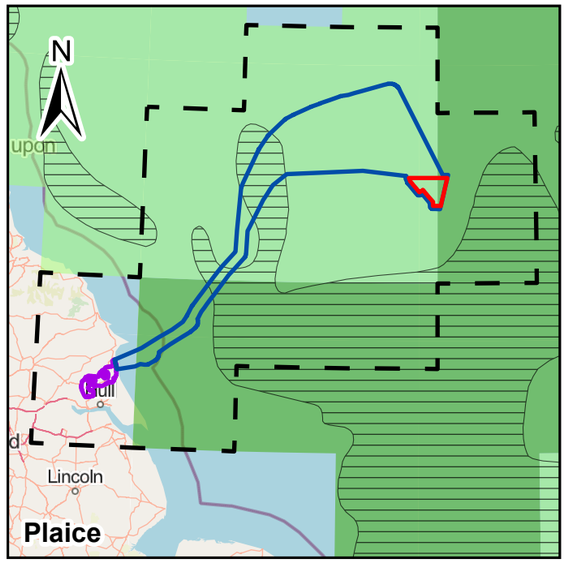

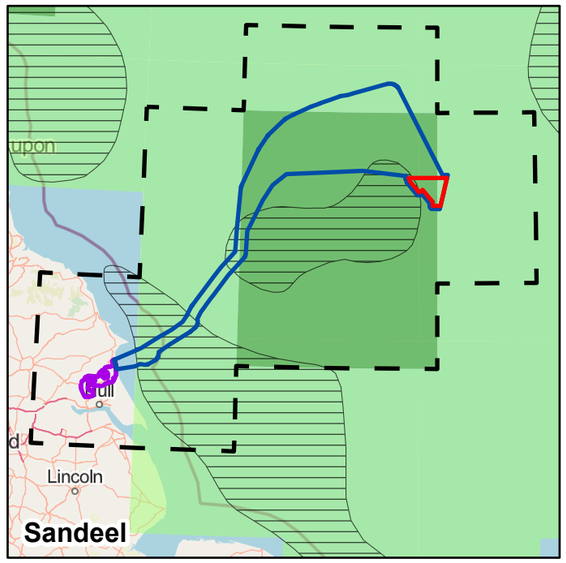

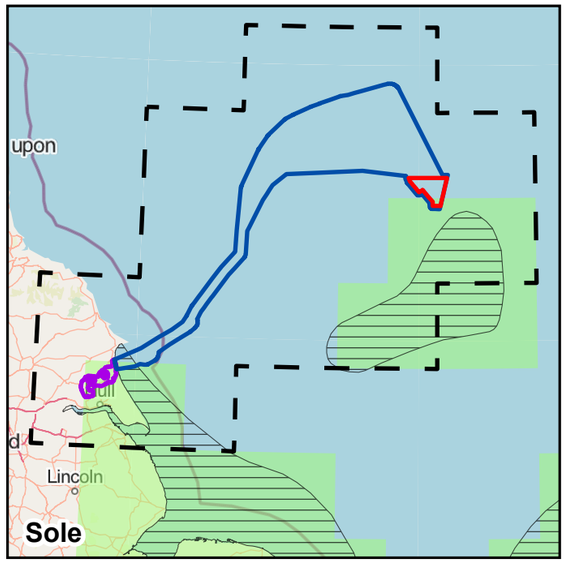

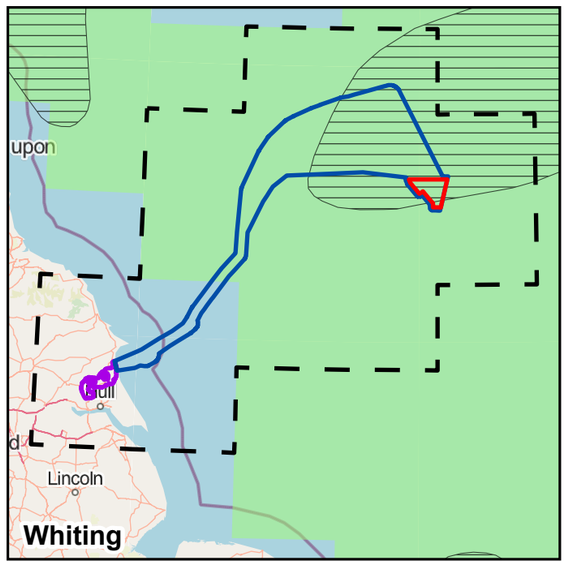

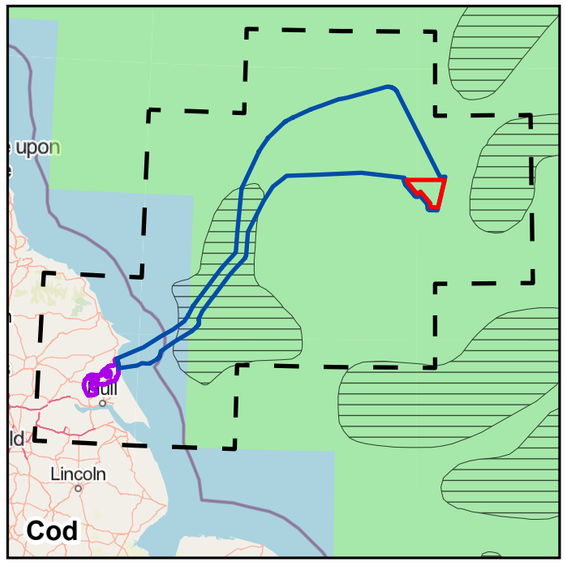

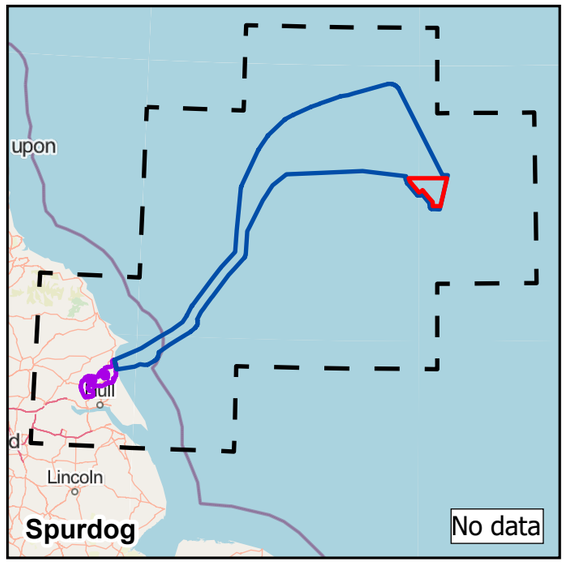

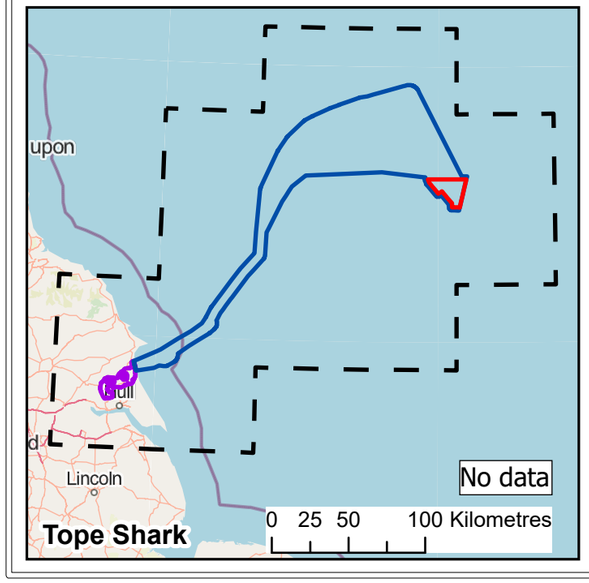

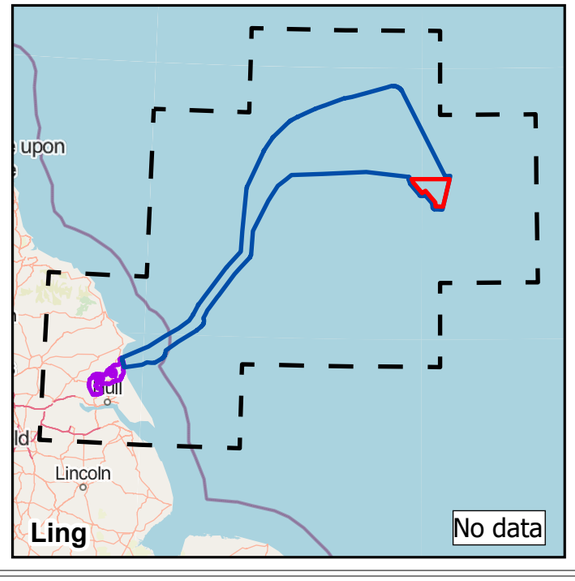

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Spawning Grounds *(Coul et al, 1998)*

Spawning Grounds *(Ellis et al, 2010)*

- High Intensity
- Low Intensity

Source: © Haskoning DHV UK Ltd, 2024; © Cefas, 2023 [Data Source, Ellis et al., 2012 and Coul et al., 1998]; © OpenStreetMap (and) contributors, CC-BY-SA

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Fish Spawning Areas
(Sheet 1 of 2)

Figure: 7-14

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0026

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	07/06/2024	JH	AB	A3	1:4,000,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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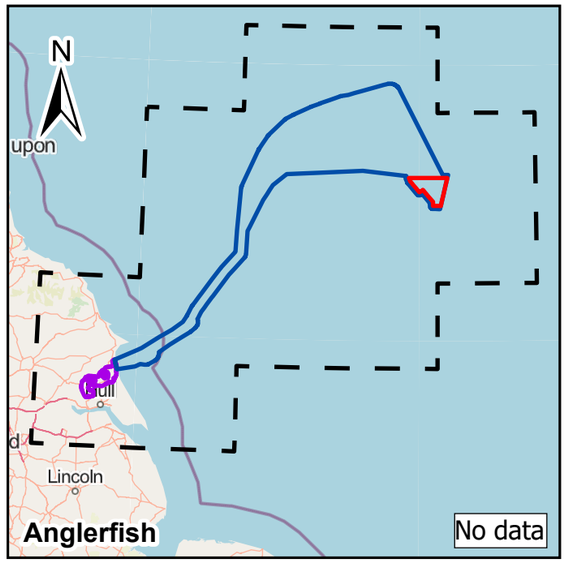

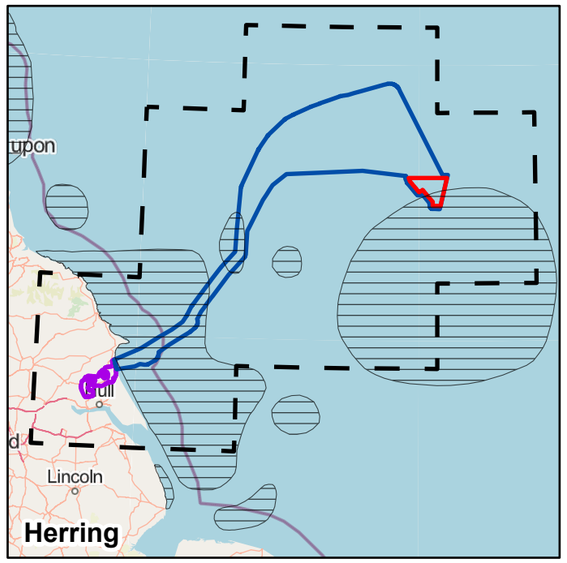

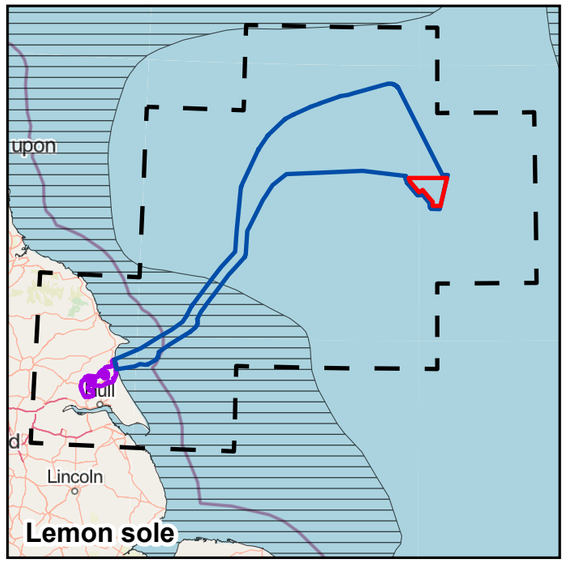

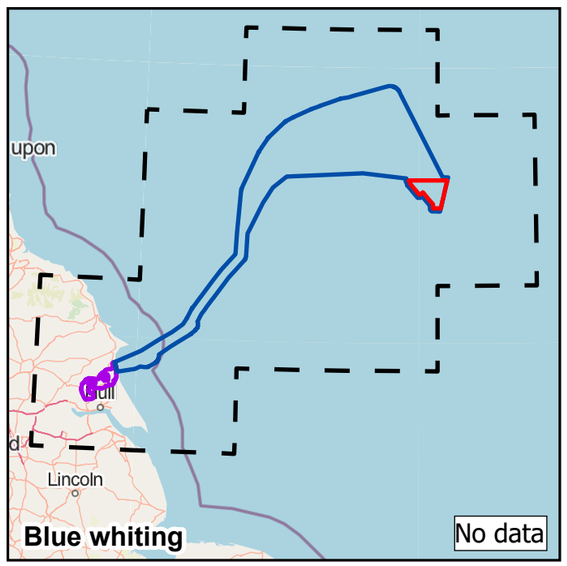

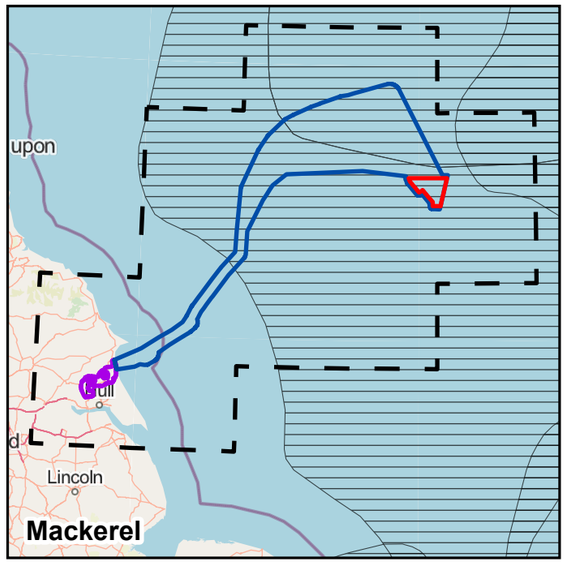

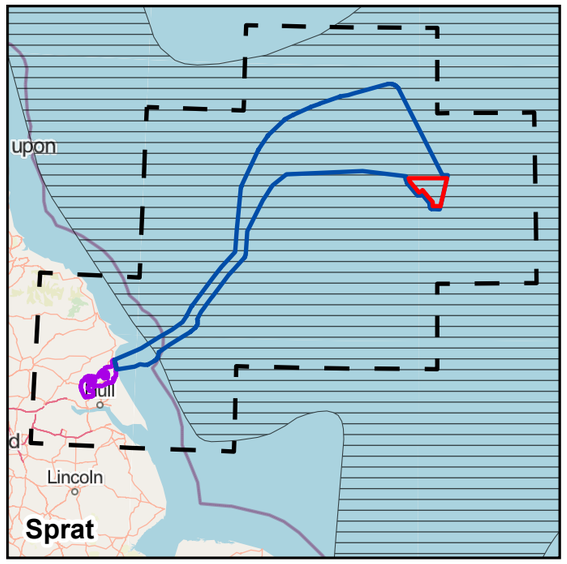

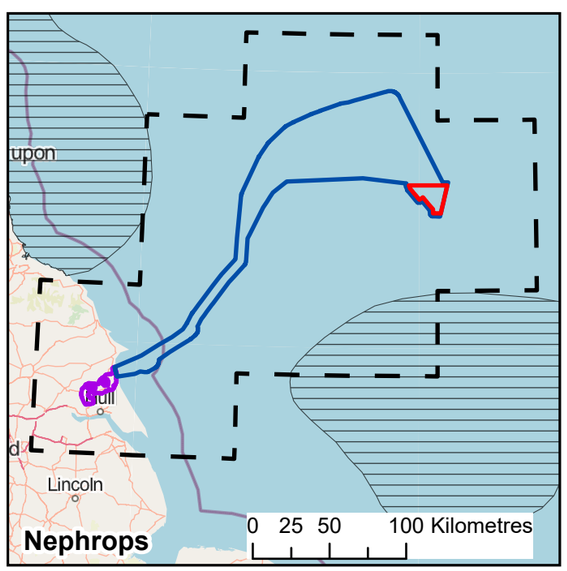

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Spawning Grounds *(Coul et al, 1998)*

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Fish Spawning Areas (Sheet 2 of 2)

Figure: 7-14

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0026

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 31N

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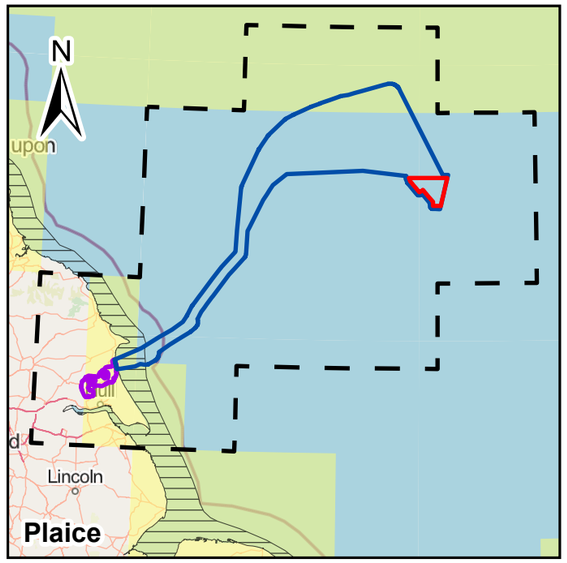

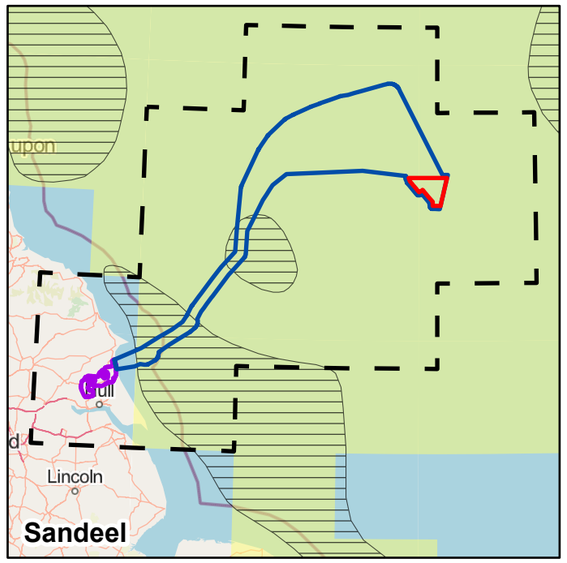

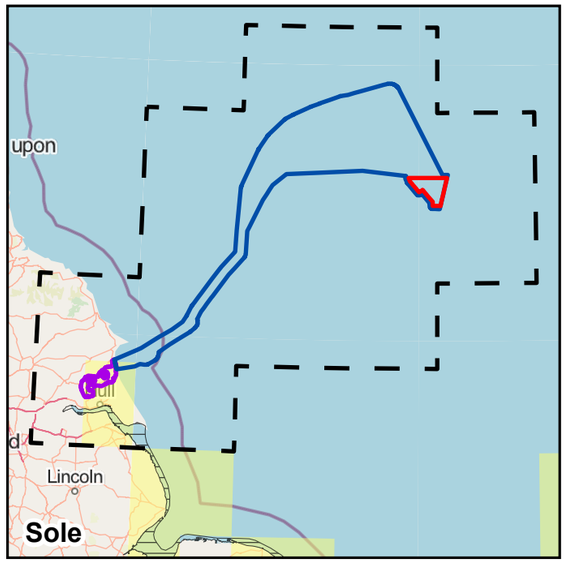

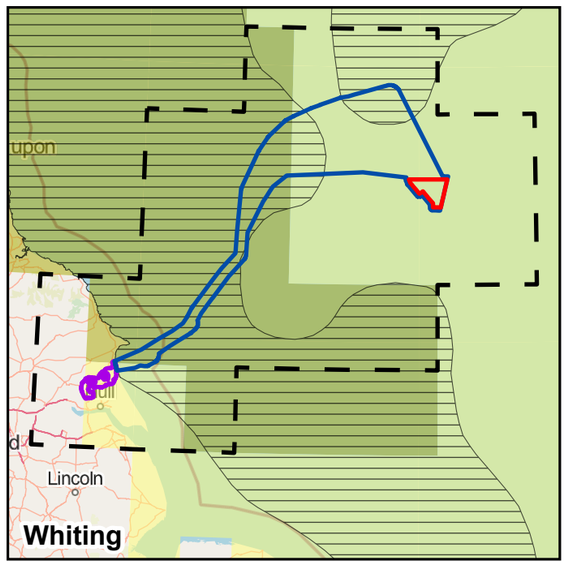

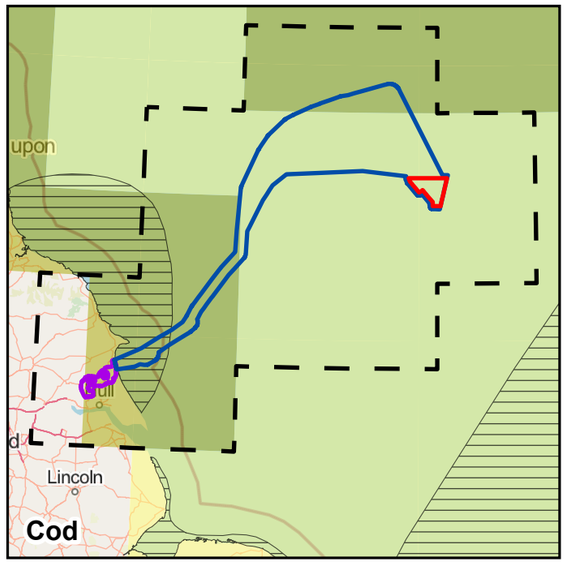

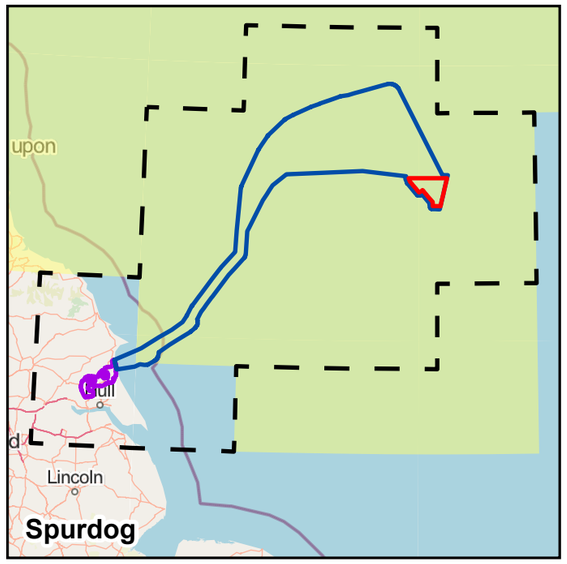

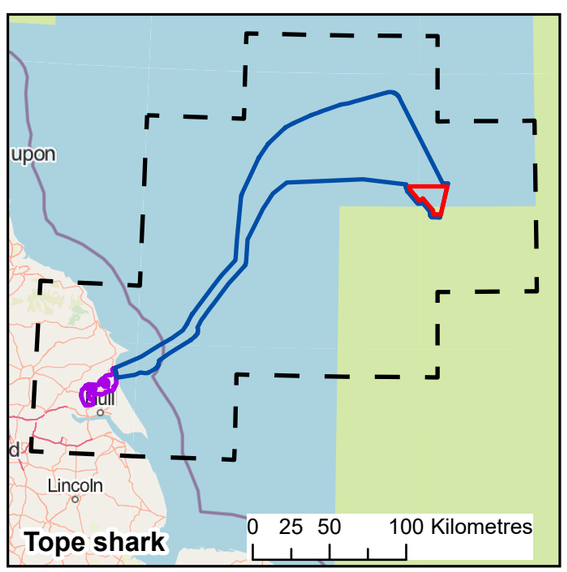

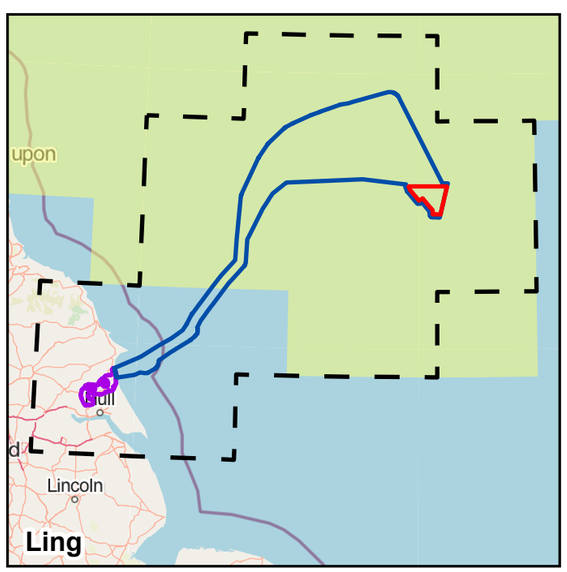

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Nursery Grounds 1998 *(Coul et al, 1998)*

Nursery Grounds 2010 *(Ellis et al, 2010)*

- High Intensity
- Low Intensity

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Fish Nursery Areas (Sheet 1 of 2)

Figure:	Drawing No:				
7-15	PC3991-RHD-OF-ZZ-DR-Z-0027				
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Co-ordinate system: WGS 1984 UTM Zone 31N

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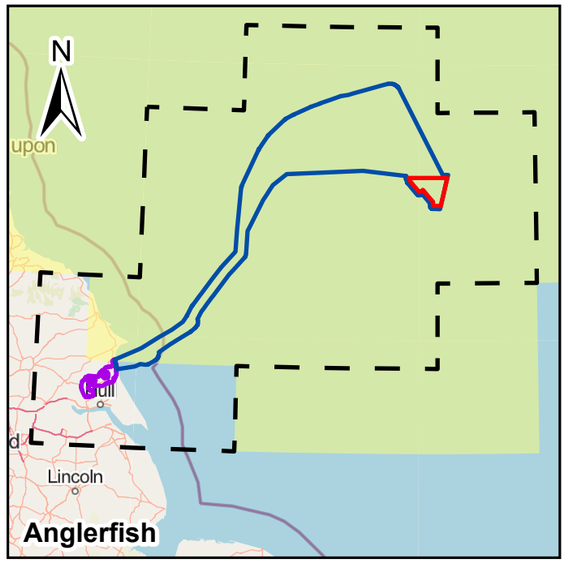

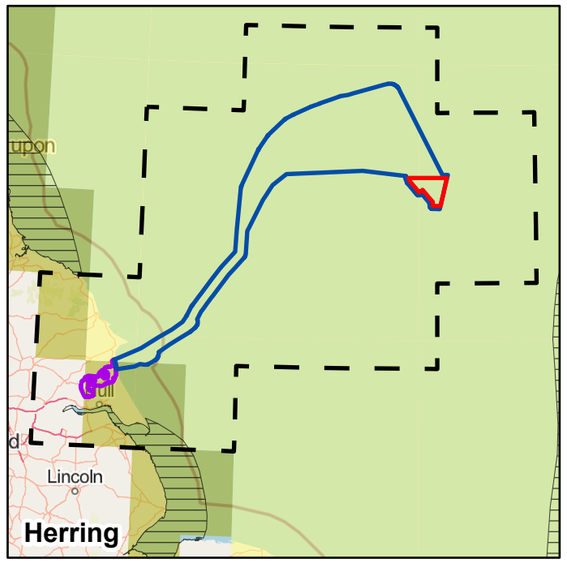

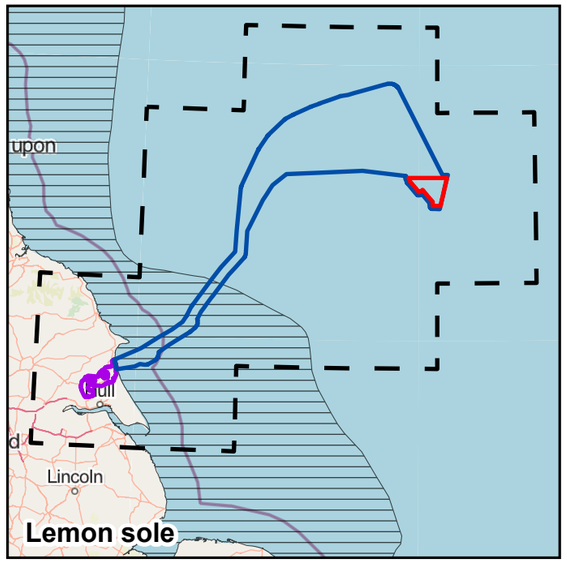

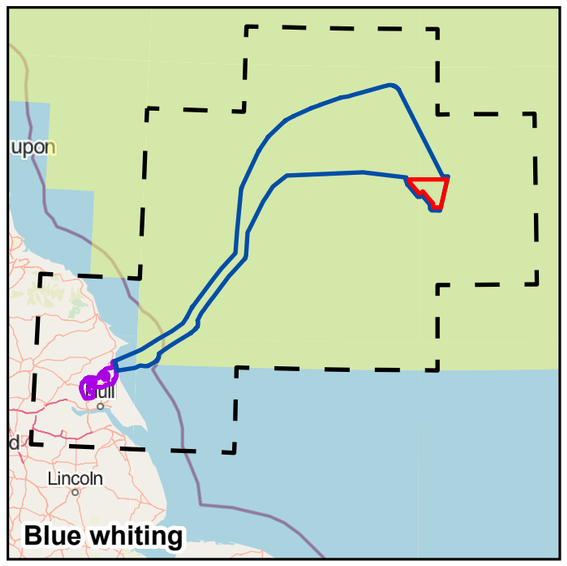

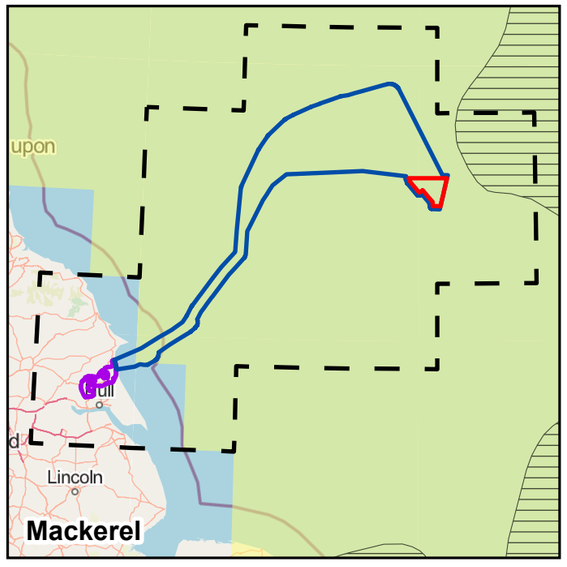

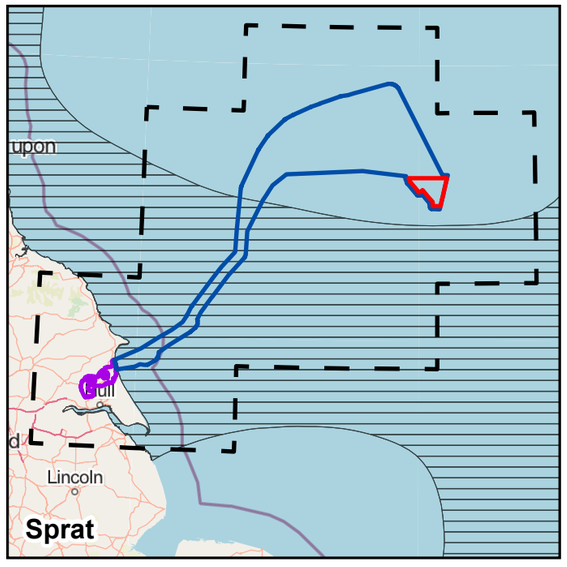

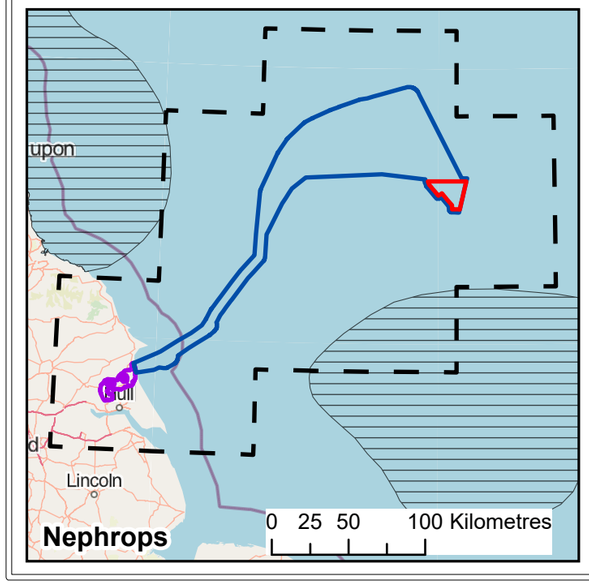

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Nursery Grounds 1998 *(Coul et al, 1998)*

Nursery Grounds 2010 *(Ellis et al, 2010)*

- High Intensity
- Low Intensity

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Fish Nursery Areas
(Sheet 2 of 2)

Figure:	Drawing No:
7-15	PC3991-RHD-OF-ZZ-DR-Z-0027

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: WGS 1984 UTM Zone 31N

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Table 7-11 Spatial Overlap between the Fish and Shellfish Ecology Study Area and Spawning and Nursery Areas of Key Fish and Shellfish Species (Coull et al., 1998; Ellis et al., 2012)

Species	Hearing Group	Areas Overlapping the Study Area		Conservation Designation
		Spawning	Nursery	
Plaice *Pleuronectes plattessa*	Group 1: Fish with no swim bladder or other gas chamber	Yes (high intensity)	Yes (low intensity)	International Union for Conservation of Nature (IUCN): (Least Concern)
Sandeel *Ammmodytidae,sp.*	Group 1: Fish with no swim bladder or other gas chamber	Yes (high intensity)	Yes (low intensity)	The lesser sandeel is a Priority Species under the UK Post-2010 Biodiversity Framework.
Sole *Solea solea*	Group 1: Fish with no swim bladder or other gas chamber	Yes (low intensity)	Yes (low intensity)	IUCN: data deficient
Whiting *Merlangius merlangus*	Group 3: Fish in which hearing involves a swim bladder or other gas volume	Yes (low intensity)	Yes (high intensity)	UK BAP, IUCN (Least Concern)
Cod *Gadhus morhua*	Group 3: Fish in which hearing involves a swim bladder or other gas volume	Yes (low intensity)	Yes (high intensity)	IUCN Status Global: (Vulnerable) Europe: (Least Concern)
Spurdog *Squalus acanthias*	Group 1: Fish with no swim bladder or other gas chamber	No	Yes (low intensity)	UK BAP, OSPAR, IUCN (Vulnerable)
Tope shark *Galeorhinus galeus*	Group 1: Fish with no swim bladder or other gas chamber	No	Yes (low intensity)	UK BAP, IUCN (Vulnerable)
European hake *Merluccius merluccius*	Group 3: Fish in which hearing involves a swim bladder or other gas volume	No	Yes (low intensity)	UK BAP
Ling *Molva molva*	Group 3: Fish in which hearing involves a swim bladder or other gas volume	No	Yes (low intensity)	UK BAP
Anglerfish *Lophius piscatorius*	Group 1: Fish with no swim bladder or other gas chamber	No	Yes (low intensity)	UK BAP
Herring *Clupea harengus*	Group 3: Fish in which hearing involves a swim bladder or other gas volume	Yes (undetermined intensity)	Yes (high intensity)	UK BAP, IUCN (Least Concern)
Lemon sole *Microstomus kitt*	Group 1: Fish with no swim bladder or other gas chamber	Yes (undetermined intensity)	Yes (undetermined intensity)	-
Blue whiting *Micromesistius moutassou*	Group 3: Fish in which hearing involves a swim bladder or other gas volume	No	Yes (low intensity)	UK BAP
Mackerel *Scomber scombrus*	Group 1: Fish with no swim bladder or other gas chamber	Yes (high intensity)	Yes (low intensity)	UK BAP, IUCN (Least Concern)
Sprat *Sprattus sprattus*	Group 3: Fish in which hearing involves a swim bladder or other gas volume	Yes (undetermined intensity)	Yes (undetermined intensity)	-

448. Dogger Bank was until recently an extensive sandeel fishing ground within UK waters, with the species also acting as a key component of food webs across the area, serving as a prey species for a wide range of predators including fish, birds and marine mammals (Cefas, 2007). However, a new byelaw for the Dogger Bank SAC implemented by the MMO prohibits bottom towed fishing gear, and hence the sandeel fishery (MMO, 2022).

449. Within the region, the specific habitats of importance to herring and sandeel are poorly understood and are often present as small and distinct areas within the wider benthic mosaic. In general, sandeel rarely occur in sediments where the mud content (particle size <0.63µm) is greater than 4%, and they are absent in substrates with a mud content greater than 10% (Holland *et al*., 2005; Wright *et al.,* 2000).

450. A number of elasmobranch species are found within UK waters, with species including small-spotted catshark *Scyliorhinus canicula*, spurdog *Squalus acanthias* and thornback ray *Raja clavata*, and basking shark having a known presence within the Study Area. Other elasmobranch species present within UK waters may also have a presence within the Study Area including tope Galeorhinus galeus, cuckoo ray Leucoraja naevus, blue skate *Dipturus batis* and flapper skate *Dipturus intermedius*. Blue skate and flapper skate are classed as critically endangered on the IUCN Red List.

451. The migratory species Atlantic salmon *Salmo salar*, sea trout *Salmo trutta*, European eel *Anguilla anguilla*, smelt *Osmerus eperlanus* are all known to have populations within the Study Area. These species transition between freshwater and marine environments throughout their life histories and are likely susceptible to barrier effects that may impact their ability to migrate to and from spawning grounds (Gill *et al*., 2012).

7.5.2.2 Shellfish

452. A number of shellfish species are found across the region, including decapod crustaceans such as European lobster *Homarus gammarus*, edible crab *Cancer pagurus*, Norway lobster *Nephrops norvegicu*s and brown shrimp *Crangon crangon*. The presence of European lobster and edible crab is associated with areas of rocky reef and exposed coastline within the Study Area, and Norway lobster are more abundant in regions of softer sediment into which they are able to burrow.

7.5.3 Potential Impacts

453. A range of potential impacts on fish and shellfish ecology have been identified which may occur during the construction, operation, and decommissioning phases of the Project. These impacts include those issues identified as requiring consideration in the Overarching NPS EN-1, the NPS EN-3, (DESNZ, 2023a; DESNZ, 2023b).

7.5.3.1 Potential Impacts during Construction

454. Potential impacts during construction will arise from physical disturbance of seabed habitats and suspension of sediment during cable and foundation installation work (including seabed preparation).

455. Impacts which span the life of the Project (e.g. long term habitat loss, introduction of hard substrate) will be considered as part of the operation phase assessment (see **Section 7.5.3.2**) and are therefore not considered in the construction phase assessment to avoid duplication.

7.5.3.1.1 Accidental Release of Pollutants

456. Any coatings and treatments to be used will be suitable for use in the marine environment and will be used in accordance with guidelines approved by the Health and Safety Executive and the Environment Agency's Pollution Prevention Control Guidelines, or a CRA would be required as set out as part of the Project Environmental Management Plan (PEMP) or similar.

457. All vessels associated with the carriage and use of chemicals must comply with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). The PEMP or similar, will ensure all works are undertaken in line with best practice for working in the marine environment. The PEMP will be inclusive of a Marine Pollution Contingency Plan, which will include emergency plans and mitigation for a range of potential marine pollution incidents. Also, best practice measures for the storage, use and disposal of lubricant and chemicals will be undertaken throughout the construction phase.

458. As a result of these embedded mitigation measures and the commitments that would be secured in the PEMP, it is considered that the risk of a spill occurring is low and with the appropriate management measures in place. Should a spill occur, the risk to the marine environment is effectively mitigated. The PEMP will be agreed with the relevant stakeholders prior to the start of construction. Therefore, it is considered that no significant effect would occur and as a result of these mitigation measures, it is proposed that this impact is scoped out of the EIA.

7.5.3.1.2 Temporary Habitat Loss / Physical Disturbance

459. Demersal fish, including the egg and larval stages of certain species, will be prone to direct physical disturbance during the construction phase from the installation of the wind farm infrastructure (namely foundations, scour protection and cables). This will especially be the case if disturbance coincides with key spawning or migration periods. The level of effect will be dependent upon the habitat in question, its distribution in the wider area and the presence of a species that is reliant on that habitat.

460. Mobile species have low vulnerability to impacts of this type. Less mobile species, or those of lower individual ranges such as sandeel that exhibit a high site fidelity and will burrow in sediments, are more likely to have high vulnerability. Therefore, the potential impact of temporary habitat loss / physical disturbance on sensitive fish and shellfish receptors will be scoped into the EIA. Specific assessment on habitat loss and disturbance to spawning and nursery areas for potentially vulnerable receptors (e.g. Atlantic herring and sandeel) will be included in the EIA.

7.5.3.1.3 Increased Suspended Sediments and Sediment Re-Deposition

461. The impact of increased suspended sediment concentrations and associated sediment settlement have the potential to cause indirect effects, and result in a change in predation success for species reliant on hunting by sight. Further, sediment plumes may result in the smothering of demersal eggs and alter habitats of importance to fish and shellfish species for foraging or breeding purposes. This is particularly true for species of limited mobility and those species that have specific substrate requirements.

462. Therefore, the potential impact of increased suspended sediments and sediment re-deposition on sensitive fish and shellfish receptors will be scoped into the EIA.

7.5.3.1.4 Remobilisation of Contaminated Sediments if Present

463. The Project has carried out site-specific sediment chemistry analysis in summer 2023 at 28 sample stations located in the DBD Array Area as well as areas between the Array Area and the landfall. Further survey will be undertaken to characterise the offshore ECC. Sediment samples were analysed for total hydrocarbon content (THC), polycyclic aromatic hydrocarbons (PAHs), metal content, polychlorinated biphenyls (PCBs), and organotins. For further detail on methods and results, see **Chapter 7.3 Marine Water and Sediment Quality**. THC, PCB and organotin concentrations were below Cefas Action Level 1 at all sample stations. All metals tested were below Cefas Action Level 1 at all sample stations, except Arsenic, which was above Cefas Action Level 1 at the two sample stations closest to shore. Arsenic levels were below Cefas Action Level 2 at these two sites, however, PAH concentrations were below sediment quality guideline levels at all sample stations except the station closest to shore. Overall, no sampled sediment contaminant concentrations exceeded Cefas Action Level 2.

464. These results indicate it is unlikely that Environmental Quality Standards for contaminants within the water column would be exceeded. Furthermore, the predominantly sandy coarse nature of the seabed sediments within Offshore Scoping Area significantly reduces the risk of resuspension into the water column and transported over long distances.

465. Previous site-specific surveys of sediment contaminants have also been undertaken for nearby Dogger Bank Teesside A & B (now known as Dogger Bank C (DBC) and Sofia respectively) wind farm sites. The Project falls directly within the original footprint of DBC and within close proximity to Sofia Offshore Wind Farm. The results of these site-specific surveys indicate that the levels of contaminants in the offshore wind farm areas (which covers both the Array Area and the offshore ECC) where sediment re-suspension concentrations are predicted to be the largest due to cable and foundation installation is relatively low. Contaminant levels are higher in the inshore portion of the Offshore Scoping Area, potentially due to the presence of shore-based chemical inputs and the presence of industry and ports. However, no sampled sediment contaminant concentrations exceeded Cefas Action Level 2 (Forewind, 2013; Forewind, 2014), as found for this Project.

466. Since completion of the 2023 benthic survey, a new ECC area is being considered and this is reflected in the Offshore Scoping Area under consideration. The new ECC route lies to the north of the 2023 benthic survey extent. Whilst the deviation from the previous survey extent varies, closer to shore the distance is considered small enough (approximately 6km to 15km) that the sediment contaminant results of the 2023 benthic survey remain sufficiently relevant and informative to produce a baseline. Given the agreement in the trends between the site-specific 2023 benthic survey (Fugro, 2023), and surveys undertaken by other projects in the region (Forewind, 2013; Forewind, 2014), namely that all sediment contaminants are below Cefas Action Level 2, and only rise above Cefas Action Level 1 in the inshore region, it is expected that the same spatial pattern of contaminant levels will be present in the newly considered ECCs. This will be verified in new surveys along the offshore ECC to the landfall, scheduled to be carried out in 2024.

467. Given the site-specific data available, it is proposed that the impact of remobilisation of contaminated sediments is scoped in specifically only for the offshore ECC, pending the results of sampling along these routes. It is proposed that for the foundation installation in the DBD Array Area that has been surveyed, remobilisation of contaminated sediment is scoped out of the EIA, as data collected in the vicinity of the Project does not indicate significant levels of chemicals within the sediments that could potentially be disturbed. The coarse and sandy nature of the coastal and offshore sediments further reduces this risk. For further detail and justification, see **Chapter 7.3 Marine Water and Sediment Quality**, where remobilisation of contaminated sediments is also proposed to be scoped out for cable and foundation installation within the Array Area.

468. Should the results of planned benthic sampling in 2024 demonstrate low levels of contamination, the Applicant would look to scope remobilisation of contaminated sediments out for the offshore ECC of further assessment through the Evidence Plan Process (EPP).

7.5.3.1.5 Underwater Noise and Vibration

469. Underwater noise generated by pile driving, Unexploded Ordnance (UXO) clearance and other construction activities may result in disturbance and displacement of fish species and have the potential to affect spawning behaviour, nursery areas and migration patterns. Therefore, the potential impact of underwater noise and vibration on fish and shellfish receptors will be scoped into the EIA.

470. In the case of UXO, any assessments will be indicative only. A detailed UXO survey will be completed prior to construction. The exact type, size and number of possible detonations and duration of UXO clearance operations is therefore not known at this stage. This means that any assessments for UXO clearance in the EIA will be for information only and are not part of the DCO application. A separate Marine Licence application(s) will be made prior to construction for UXO investigation and clearance works, with an accompanying assessment of UXO clearance impacts on fish and shellfish receptors.

7.5.3.1.6 Changes in Fishing Pressure

471. The construction of offshore infrastructure could result in changes to fishing activity within the DBD Array Area but also in the wider area due to displacement of fishing activity into other areas (see **Chapter 7.8 Commercial Fisheries**). This could in turn result in changes to fishing pressure on fish and shellfish populations.

472. As highlighted in **Chapter 7.8 Commercial Fisheries**, **Section 7.8.3.2**, the introduction in 2022 of a byelaw prohibiting the use of bottom towed gear across the Dogger Bank SAC will have resulted in the removal of any dredge, trawl or seine net fishing activity across the Array Area and offshore ECC. The presence of the byelaw can be expected to result in a significant reduction in fishing activity within the section of the Study Area which overlaps with the Dogger Bank SAC.

473. Changes in in fishing activity will be assessed in **Chapter 7.8 Commercial Fisheries**, and the findings will inform the resultant impact assessment on fish and shellfish ecology. The potential impact of changes in fishing pressure on fish and shellfish receptors will be scoped into the EIA.

7.5.3.2 Potential Impacts during Operation

474. Potential impacts during operation will mostly result from loss of habitat and changes to seabed substrata from the physical presence of infrastructure (i.e. foundations and any cable protection above the seabed). Maintenance activities may result in disturbance to seabed habitats; however, these would be similar to those during construction but at a lower magnitude.

7.5.3.3 Accidental Release of Pollutants

475. Any coatings and treatments to be used will be suitable for use in the marine environment and will be used in accordance with guidelines approved by the Health and Safety Executive and the Environment Agency's Pollution Prevention Control Guidelines, or a CRA would be required as set out as part of the Project Environmental Management Plan (PEMP) or similar.

476. All vessels and the carriage and use of chemicals must comply with the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78). A PEMP or similar will also be put in place to ensure all works are undertaken in line with best practice for working in the marine environment and inclusive of a Marine Pollution Contingency Plan, which will include emergency plans and mitigation for a range of potential marine pollution incidents. Also, best practice measures for the storage, use and disposal of lubricant and chemicals will be undertaken throughout the construction phase.

477. As a result of these embedded mitigation measures and the commitments that would be secured in the PEMP, it is considered that the risk of a spill occurring is low and with the appropriate management measures in place. Should a spill occur, the risk to the marine environment is effectively mitigated. The PEMP will be agreed with the relevant stakeholders prior to the start of construction. Therefore, it is considered that no significant effect would occur and as a result of these mitigation measures, it is proposed that this impact is scoped out of the EIA.

7.5.3.3.1 Habitat Loss / Alteration

478. The presence of foundations and scour protection (see **Chapter 3 Project Description**, **Section 3.4.1.2**) on the seabed and cable protection would result in a relatively small footprint of lost habitat in the context of the habitat from the surrounding region. The level of effect will be dependent upon the habitat type in question, the scarcity of said habitat in the wider area and the presence of a species that are reliant on that habitat.

479. Therefore, it is proposed that the potential impact of habitat loss on fish and shellfish receptors phase is scoped into the EIA. It is anticipated that when decommissioning takes place, all offshore structures above the seabed (foundations and electrical infrastructure) will be removed, see **Chapter 3 Project Description**. It is also acknowledged that there is potential for habitat loss following decommissioning dependant on infrastructure removal, these impacts will be assessed and considered as part of the decommissioning phase assessment.

7.5.3.3.2 Temporary Habitat Loss / Physical Disturbance

480. Maintenance activities may disturb the seabed leading to temporary habitat loss or physical disturbance. For example, conducting repairs on the inter-array cables, where they must be brought to the surface and then re-laid will disturb the seabed. The magnitude of disturbance will be greatly reduced in comparison to the construction phase, as any disturbance will be limited to the area around the infrastructure requiring maintenance, which is likely to happen infrequently. However, to allow impacts to be quantified and assessed, the potential impact of temporary habitat loss / physical disturbance from maintenance activities on fish and shellfish receptors will be scoped into the EIA.

7.5.3.3.3 Increased Suspended Sediments and Sediment Re-Deposition

481. Small volumes of sediment could be re-suspended during maintenance activities. This will occur infrequently, with local and temporary effects. However, to allow impacts to be quantified and assessed, (similarly to **Section 7.5.3.1.3**), potential impacts related to the suspension of fine sediments and their redeposition during operation will be scoped into the EIA.

7.5.3.3.4 Remobilisation of Contaminated Sediments if Present

482. As set out in **Section 7.5.3.1**, site-specific surveys of sediment contaminants have been undertaken to inform the Project. The results of these site-specific surveys show that only in two sample stations closest to shore are any contaminants above Cefas Action Level 1 or sediment quality guideline levels. The low levels of contaminants in the region are corroborated by similar studies carried out by other nearby OWF projects (Forewind, 2013; Forewind 2014).

483. As for construction, sediments in the vicinity of the DBD Array Area and offshore ECC are coarse in nature and unlikely to not harbour significant levels of contaminants due to a lack of chemical inputs. Impacts associated with operation and maintenance activities within the DBD Array Area and along the offshore ECC would be limited in terms of timeframe and scale and would cease following completion of the works. Any activities, such as the replacement of inter-array cables, would be smaller in scale and magnitude than the proposed construction activities.

484. For further detail of contaminant levels, in the region, see **Chapter 7.3 Marine Water and Sediment Quality**, where remobilisation of contaminated sediments is also proposed to be scoped out of the EIA during operation.

485. Given the low level of sediment contamination in the region demonstrated by site-specific sampling, corroborated by surveys undertaken by other nearby projects, and the low likelihood and scale of any remobilisation of sediments occurring during operation (e.g. during cable repair), the impact of remobilisation of existing contaminated sediments is scoped out of the EIA for the operational phase.

7.5.3.3.5 Underwater Noise and Vibration

486. The main source of underwater noise during operation (in addition to ambient noise) originates form the wind turbine gearbox and generator, in addition to any surface vessels undertaking O&M activities.

487. Monitoring studies of underwater noise from operational wind turbines have shown the noise levels from North Hoyle, Scroby Sands, Kentish Flats and Barrow wind farms to be only marginally above ambient noise levels (Stober and Thomsen, 2021).

488. Operational noise impacts are considered highly unlikely to cause physical damage to fish or shellfish species (Nedwell *et al.,* 2007a; Nedwell *et al.,* 2007b; MMO, 2014) and it follows that any behavioural disturbance would be limited to the area immediately surrounding the wind turbines. Therefore, the potential impact of underwater noise and vibration on fish and shellfish receptors will be scoped out of the EIA.

7.5.3.3.6 Electro-Magnetic Field Effects

489. Potential impacts from EMF from operational cables will also be considered. NPS EN-3 states that where cables are buried to 'a depth of at least 1.5m below the seabed, the applicant should not have to assess the effect of the cables on intertidal habitat during the operational phase of the offshore wind farm'. It is currently expected that where cables can be buried, the target depth would be 0.5m but will vary dependant on the ground conditions encountered.

490. There is also the potential that it is not possible to bury cables at all locations (e.g. at crossings or in hard substrate) and therefore there may be sections of surface laid cables with cable protection. The assessment will consider a realistic worst-case scenario based on the extent of cables with the potential to be buried at less than 1.5m depth. Therefore, the potential impact of EMF effects on fish and shellfish receptors will be scoped into the EIA.

7.5.3.3.7 Sediment Heating from Export Cables

491. The energy running through the offshore export cables has the potential to heat the nearby sediment. Recent evidence indicates that the surface temperature difference of operational power cables in comparison to inert sections of the same cable was negligible at a sensitivity level of 0.06oC (Taormina *et al*., 2018; 2020). In addition, modelling of heating for high-voltage direct current (HVDC) cables with similar specifications to that of high capacity OWF export cables (525kV) suggests that even for a worst-case scenario of bundled high voltage cables, any increases in temperature will be limited to a very narrow band above the cables with negligible heat transfer (Brakelmann and Stammen, 2017).

492. The footprint of any effect will therefore be narrow; less than a 1m strip surrounding the cable (although it is not possible to define the area precisely), noting the cables for the Project will look to have a burial depth between 0.5m – 9m. Modelling suggests that a cable-induced temperate increase at 20cm below the surface will be below 2°C at cable burial depths great than 0.35m – 0.55m. At cable burial depths over 1.5m, any temperate change at 20cm below the surface is likely to be negligible (Brakelmann and Stammen, 2017).

493. The Study Area does not lie at a fringe of the North Sea, meaning that benthic and fish assemblages are relatively typical of a North Sea environment. The Project does not coincide with the northern or southern limits of the distributional ranges of species under consideration. Therefore, it is unlikely that temperature changes will be ecologically significant at a local scale, i.e. the footprint of a heating effect. Since the footprint is so small the potential for population level effects is considered to be negligible.

494. Considering the above evidence regarding ecological risks of sediment heating from cables is negligible, it is proposed to scope out the potential impacts from sediment heating from export cables.

7.5.3.3.8 Introduction of Hard Substrate

495. Concrete and steel structures may be colonised by a range of benthic invertebrate species, potentially increasing ecological diversity and with the potential to act as fish aggregating devices. The potential effect on fish and shellfish species will be dependent on the foundation structure used, and the volume and type of scour protection used. The fish aggregation effect of introduced hard substrate may not always benefit the existing communities and species, for example there may be increased predation on existing benthic invertebrates. Therefore, the potential impact of introduction of hard substrate on fish and shellfish receptors will be scoped into the EIA.

7.5.3.3.9 Changes in Fishing Pressure

496. O&M activities associated with the offshore infrastructure could result in changes to fishing activity within the DBD Array Area but also in the wider area due to displacement of fishing activity into other areas. This could in turn result in changes to commercially targeted fish stocks (see **Chapter 7.8 Commercial Fisheries**). Therefore, the potential impact of changes in fishing pressure on fish and shellfish receptors will be scoped into the EIA.

7.5.3.4 Potential Impacts during Decommissioning

497. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. Note that the magnitude of impact for underwater noise would be reduced in decommissioning due to the lack of piling.

498. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-12**).

7.5.4 Potential Cumulative Effects

499. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect fish and shellfish receptors. Therefore, cumulative effects related to fish and shellfish ecology are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

500. Offshore wind projects and other activities (such as oil and gas operations) relevant to the assessment of cumulative effects on fish and shellfish ecology will be identified through a screening exercise. The potential impacts considered in the CEA will be in line with those described for the project-alone assessment, though it is possible that some will be screened out on the basis that the impacts are highly localised (i.e. they occur only within the DBD Array Area) or where management measures in place for the Project and other projects will reduce the risk of impacts happening.

501. The CEA for fish and shellfish ecology will specifically consider cumulative noise impacts, habitat loss and changes to seabed habitat.

7.5.5 Potential Transboundary Effects

502. There is potential for transboundary effects upon fish and shellfish ecology receptors due to the Project's construction, O&M and decommissioning activities. Potential transboundary impacts, including those associated with underwater noise and sediment plumes, will be assessed as with the other cumulative impacts and the Applicant, where possible, will liaise with developers in other EEA Member States to obtain up to date project information to inform the assessment.

503. Therefore, the potential impact of transboundary effects on fish and shellfish receptors will be scoped into the EIA.

7.5.6 Summary of Scoping Proposals

504. **Table 7-12** outlines the fish and shellfish ecology impacts which are proposed to be scoped in or out of the EIA. These may be refined through EPP and other consultation activities and as additional project information, and site-specific data become available.

Table 7-12 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Fish and Shellfish Ecology

Potential Impact	Construction	Operation	Decommissioning
Accidental release of pollutants	x	x	x
Temporary habitat loss / physical disturbance	✓	✓	✓
Habitat loss / alteration	x	✓	✓
Increased suspended sediment and sediment-redeposition	✓	✓	✓
Remobilisation of contaminated sediments if present (Array Area)	x	x	x
Remobilisation of contaminated sediments if present (offshore ECC)	✓	x	x
Underwater noise and vibration	✓	✓	✓
Changes in fishing pressure	✓	✓	✓
EMF effects	x	✓	x
Sediment heating from export cables	x	x	x
Introduction of hard substrate	x	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.5.7 Approach to Data Gathering

505. **Table 7-13** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 7-13 Desk-Based Data Sources for Fish and Shellfish Ecology

Data Source	Date	Data Contents
Fish spawning and nursery grounds (Coull *et al.*, 1998; Ellis *et al.*, 2012)	1998 and 2012	Both studies map the distribution of predicted spawning and nursery habitats of a number of key fish and shellfish species in waters around the UK.
Marine Information Network (MarLIN)	2024	Details of marine species, biotopes and sensitivity assessments. Broadscale and not specific to the Study Area.

Data Source	Date	Data Contents
National Biodiversity Network (NBN) Atlas	2024	An open access online portal for biological data in the UK. There is UK wide coverage for species distributions, collated from a variety of organisations.
Ocean Biodiversity Information System (OBIS)	2024	A global open-access data source for biological data.
MMO Landings Data (weight and value) by species	2013 to 2023	MMO landings data (weight and value) by species. Data is available for the ICES rectangles relevant to the Study Area.
International Bottom Trawl Survey (IBTS)	2023	The IBTS Working Group (IBTSWG) coordinates fishery-independent multispecies bottom trawl surveys within the ICES area. Data collected in spring and autumn provides estimates of stock abundance (CPUE) of commercially important demersal species. Data is available for the ICES rectangles relevant to the Study Area.
ICES International Herring Larvae Surveys (IHLS)	2013-2023	ICES programme of IHLS in the North Sea and adjacent areas, in operation since 1967. Provides quantitative estimates of herring larval abundance.
Dogger Bank A, B, C, South, Sofia and Hornsea Four Offshore Wind Farms	Various	These projects provide a baseline characterisation for fish and shellfish, supported by project site-specific surveys. Some baseline characterisations overlap with the Study Area.
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) (EMODnet, 2021).	2021	EUSeaMap 2021 is a predictive habitat map which covers the seabed of a large area of European waters including the North Sea. Habitats are described in the EUNIS and Marine Strategy Framework Directive predominant habitat classifications and predicted based on a number of physical parameters.

506. In addition to the desk-based sources set out in **Table 7-13**, the following site-specific data has already been, or is proposed to be, collected to inform the assessment as shown in **Table 7-14.**

Table 7-14 Completed and Proposed Baseline Surveys for Fish and Shellfish Ecology

Data Source	Date	Data Contents
Site specific benthic survey (Fugro, 2023)	2023	Array Area - Sediment Particle Size Distribution (PSD), drop-down video, macrofaunal community composition (grab sample), sediment chemistry.
Site specific eDNA survey (Fugro, 2023)	2023	Array Area - Environmental DNA samples have been collected from approximately 1m below sea surface and approximately 5m from the seafloor, identifying 22 distinct fish taxa in the
Site-specific benthic survey	Planned for 2024	Offshore ECC. Sediment Particle Size Distribution (PSD), drop-down video, macrofaunal community composition (grab sample), sediment chemistry.

507. Natural populations within the Study Area will be characterised via a review of existing literature, environmental data and fish landings data. Commercial landings data will be sourced from the MMO. Fisheries data provides information on the broad scale spatial and temporal distribution of fishing effort and species landed and will be integrated in detail for the assessment. However, fisheries reporting is largely limited to commercial species with many non-commercial species discarded at sea, or not selected for with the fishing gear type.

508. The North Eastern Inshore Fisheries Conservation Authority (NEIFCA) will be consulted for local inshore fisheries data, such as shellfish potting surveys, that may have been carried out on the region, out to 6nm.

509. Site-specific eDNA collected from near the surface and near the seabed within the DBD Array Area and between the Array Area and the landfall will be used to generate presence-absence and relative abundance data for finfish.

510. A program of geophysical and benthic sampling will be undertaken across the proposed Array Area and offshore ECC (see **Chapter 7.3 Marine Water and Sediment Quality** and **Chapter 7.4 Benthic and Intertidal Ecology** for details). This will provide valuable information to characterise the seabed (including particle size analysis and contaminant analysis), alongside information on the benthic assemblage in general.

511. Given that fish are highly mobile, data sets with large-scale coverage are of more relevance for characterising the natural fish and shellfish resource. The existing data described in **Table 7-13** available for this area are sufficient to undertake a robust assessment, as such further site-specific surveys in addition to those outlined above will not be undertaken.

7.5.8 Approach to Assessment

512. The assessment will be undertaken in accordance with following standards and guidance:

- NPS EN-1 and EN-3 (DESNZ, 2023a; DESNZ, 2023b);
- East Inshore and East Offshore Marine Plans (HM Government, 2014);
- IEMA: Delivering Proportionate EIA (2017); and
- Chartered Institute of Ecology and Environmental Management (CIEEM): Guidelines for Ecological Impact Assessment (EcIA) (2018).

513. Key receptor groups will be defined (e.g. Atlantic herring and sandeel) and used as the basis for the assessment, with the sensitivity of each receptor group clearly explained within the PEIR and ES.

514. The footprint of potential habitat loss and disturbance will be calculated and used as the basis for the impact assessment where appropriate.

515. Site-specific Particle Size Analysis (PSA) data will be combined with other publicly available spatial datasets to inform the baseline for sandeel and herring spawning habitat suitability, following the methods of MarineSpace (2013a and 2013b) where relevant. The appropriateness of the suite of data used in MarineSpace (2013a and 2013b), may be different, given the time elapsed since 2013, and these data sources, and others, will be re-appraised for inclusion within the herring and sandeel habitat suitability modelling. Any deviations from the MarineSpace (2013a and 2013b) methods will be justified and discussed through the ETG process.

516. Site-specific underwater noise modelling will also be undertaken for the Project for all relevant potential underwater noise sources. In general, Popper *et al*. (2014) guidelines will be used to inform noise impact thresholds for mortality, recoverable injury, and TTS on fish, larvae and eggs. Hawkins *et al.* (2014) will be used as a basis for a conservative 135dB single-strike sound exposure level (SELSS) behavioural disturbance threshold in the case of spawning herring only. This threshold is considered precautionary due to the fact that this piling sound level will occur tens of kilometres away from a piling location, and therefore the soundwave will lose its impulsivity. It should be noted that the authors Hawkins *et al.* (2014) explicitly state that the 135dB SELss is not appropriate to use as a threshold for impact assessments, but in the absence of more suitable thresholds, this will be precautionarily used for assessment.

517. The assessment of impacts on fish and shellfish ecology will be further informed by physical processes and geophysical and benthic data from the DBD benthic ecology assessments.

518. The assessment for fish and shellfish ecology will consider the Project Design Envelope, following the guidelines from Planning Inspectorate Advice Note Nine: Rochdale Envelope (2018) and establish a topic-specific and receptor led realistic worst-case scenario upon which the assessment will be made. The realistic worst-case scenario will be outlined in the PEIR and ES.

519. Fish and shellfish ecology will be included within the EPP (as set out in **Chapter 6 Consultation**) and further liaison with key stakeholders will take place to agree the approach to data collection, and the specific assessment methods to be employed as part of the EIA as part of this process.

7.5.9 Scoping Questions to Consultees

520. The following questions are posed to consultees to help them frame and focus their response to the fish and shellfish ecology scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the fish and shellfish ecology impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the fish and shellfish ecology impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.6 Marine Mammals

521. This chapter of the Scoping Report considers the potential likely effects of the Project associated with marine mammals, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

522. The marine mammal assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.2 Marine Physical Processes;**
- **Chapter 7.3 Marine Water and Sediment Quality;**
- **Chapter 7.4 Benthic and Intertidal Ecology;**
- **Chapter 7.5 Fish and Shellfish Ecology;**
- **Chapter 7.8 Commercial Fisheries;** and
- **Chapter 7.9 Shipping and Navigation.**

7.6.1 Study Area

523. As highly mobile marine predators, the status and activity of marine mammals known to occur within or adjacent to the Offshore Scoping Area will be considered in the context of their Management Unit (MU) population shown on **Figure 7-16** and **Figure 7-17**.

7.6.2 Existing Environment

524. Within the North Sea region, the occurrence of eight different marine mammal species have been identified (Gilles *et al.,* 2023; Hammond *et al.,* 2013; Paxton *et al*., 2016; Hammond *et al.,* 2017; Waggitt *et al.*, 2019; Special Committee on Seals (SCOS), 2022):

- Baleen whales:
  - Minke Whale *Balaenoptera acutorostrata*;
- Toothed whales:
  - Harbour porpoise *Phocoena phocoena*;
  - Bottlenose dolphin *Tursiops truncatus*;
  - White-beaked dolphin *Lagenorhynchus albirostris*;
  - Short-beaked common dolphin *Delphinus delphis*;
  - Atlantic white-sided dolphin *Lagenorhynchus acutus*;
- Pinnipeds:
  - Grey seal *Halichoerus grypus*; and
  - Harbour seal *Phoca vitulina*.

525. Rare visitors to the North Sea are long-finned pilot whales *Globicephala melas*, humpback whales *Megaptera novaeangliae*, killer whales *Orcinus orca*, Risso's dolphin *Grampus griseus* and fin whales *Balaenoptera physalus* (Organisation Cetacea (ORCA), 2023; Sea Watch Foundation (SWF), 2024).

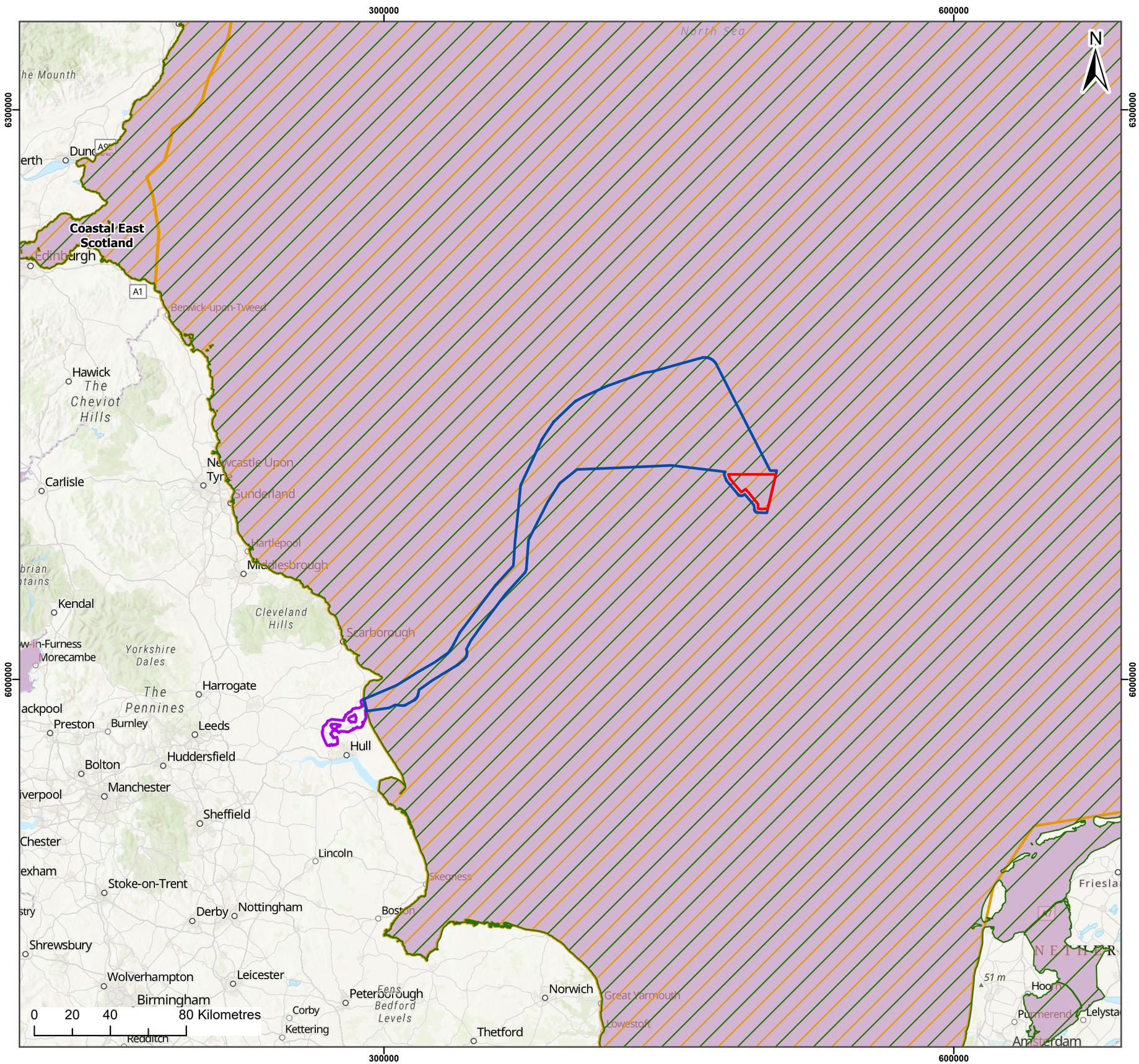
526. In the summer of 2022, a large-scale survey of marine mammals studied their distribution and abundance in the North-East Atlantic (Small Cetacean Abundance in the North Sea (SCANS) IV) (Gilles *et al.,* 2023). The Array Area is situated within survey block NS-H, where harbour porpoise was the most sighted species. Within this survey block, species abundance was estimated to be at 55,691 (Confidence Limit (CL): 33,863 – 87,685) harbour porpoise, 96 (CL: 1 – 344) bottlenose dolphin, 157 (CL: 3 – 484), white-beaked dolphins, 1,061 (CL: 231 – 2,771) minke whale and no sightings of short- beaked common dolphin.

527. The offshore ECC is situated within survey blocks NS-H and NS-C, with a small area of the scoping boundary being within NS-G. Within survey block NS-C, harbour porpoise is the most common species, with an estimated abundance of 36,286 (CL: 23,346 – 56,118). Other species present include bottlenose dolphin (estimated abundance of 2,520 (CL: 25 – 6,616)), white-beaked dolphin (estimated abundance of 894 (CL: 12 – 2,387)), short-beaked common dolphin (estimated abundance of 192 (CL: 6 – 724)), and minke whale (estimated abundance of 412 (CL: 4 – 1,392)). Within survey block NS-G, only harbour porpoise, white-beaked dolphin, and minke whale were reported, with harbour porpoise being the most common.

528. The results of the SCANS-IV surveys indicated a decrease in abundance of harbour porpoise compared to the surveys for SCANS-III (58,066 animals; CL: 32,372 – 91,372) (Hammond *et al.,* 2017). There are growing suggestions that the distribution of North Sea harbour porpoise within their range is shifting southwards (Hammond *et al.,* 2013*;* Hammond *et al.,* 2021; Nachtsheim *et al.,* 2021; Ijsseldijk *et al.,* 2020).

529. Further cetacean distribution maps of the North-East Atlantic, provided by Waggitt *et al.,* (2019), show similar results indicating that harbour porpoise would be the most likely species to be present in the Offshore Scoping Area year-round. The maps also indicate higher summer densities on the north-east coast of England for minke whale and white-beaked dolphins, albeit in much smaller numbers than those of harbour porpoise (Waggitt *et al.,* 2019). The Joint Cetacean Protocol Phase III report (Paxton *et al.,* 2016) shows similar results, indicating varying areas of higher densities for harbour porpoise, minke whale and white-beaked dolphins.

530. Bottlenose dolphin presence was not recorded in survey block N (in which the Project will be located) during the SCANS-III surveys, however, during SCANS-IV an estimated population of up to 157 (CL: 3 – 484) bottlenose dolphin was recorded in block NS-H (within which the Project is located). This block and block NS-C were the only two blocks in the central North Sea in which bottlenose dolphins were sighted. SCANS-IV survey included both the coastal and the offshore ecotype of bottlenose dolphin in their counts.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Bottlenose dolphin MU -Coastal East Scotland and Greater North Sea
- Harbour porpoise MU -North Sea
- Common dolphin, White-beaked dolphin, and Minke Whale Management Unit - Celtic and Greater North Seas (CGNS)

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Management Units for Cetaceans

Figure: 7-16

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0073

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03	07/06/2024	JH	AB	A3	1:2,000,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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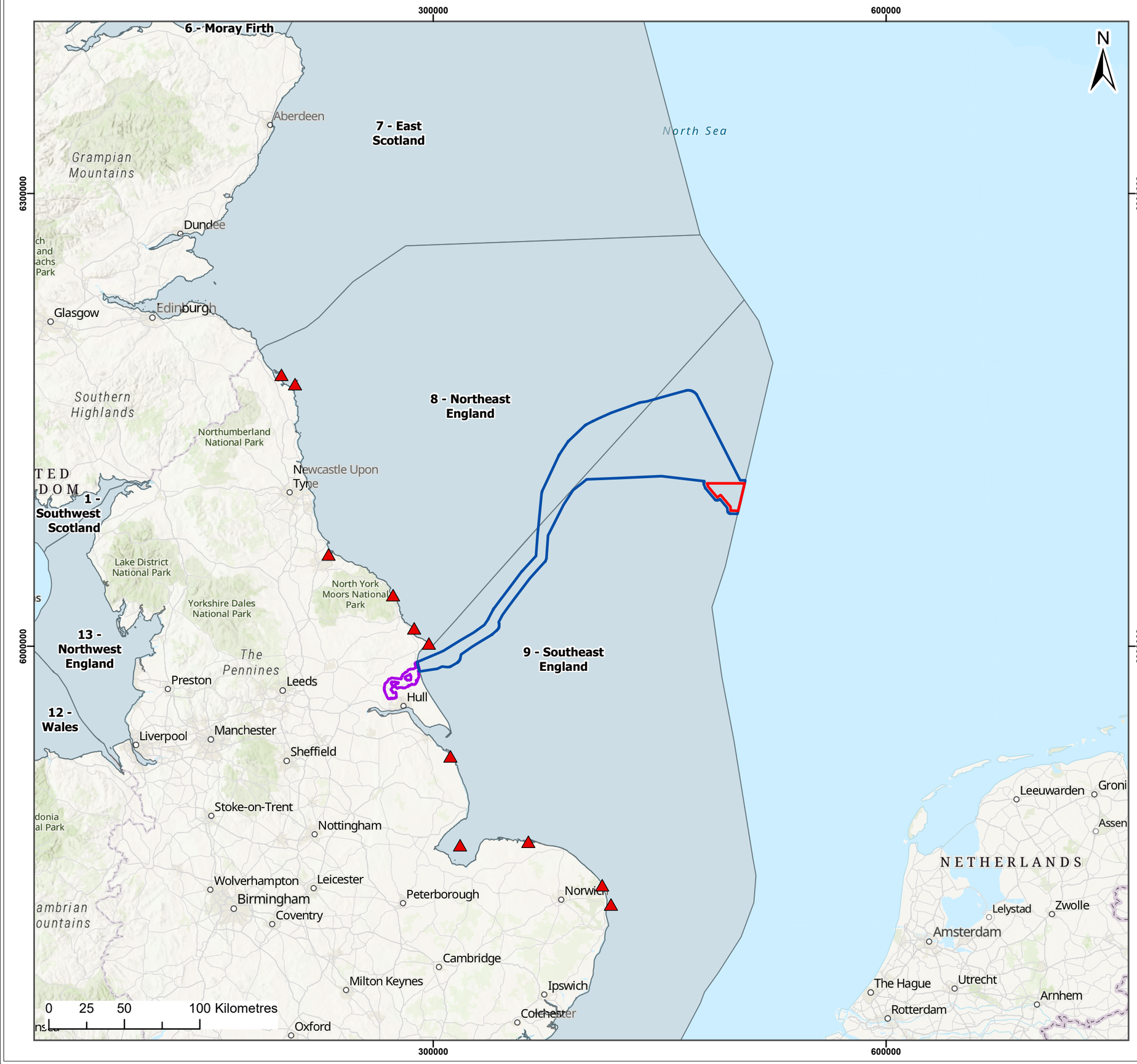

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Seal Management Unit
- Seal Haul Out Sites

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Management Units for Seals

Figure: 7-17

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0052

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03	07/06/2024	JH	AB	A3	1:2,500,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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531. There has been an increase in bottlenose dolphin presence along the coastline of north-east England in recent years. Photographic evidence has linked these individuals with those populations associated with the Moray Firth and Aberdeenshire coast (Cheney *et al.*, 2013; Aynsley, 2017). They have also been recorded approximately 300 miles outside of what would be considered their 'normal' home range (Cheney *et al*., 2018), with one individual from the Moray Firth population being recorded as far south and east as The Netherlands (Aynsley, 2017).

532. Further evidence that bottlenose dolphin are indeed utilising the coastal area of Northumberland, was confirmed in most recent research by Sharpe and Berggren (2024) in which dolphin click detection was recorded year-round at three nearshore locations with peaks in May and September. As such, this coastal population of bottlenose dolphin (associated with the Moray Firth population) will be assessed for any potential impacts within the offshore ECC and at landfall. Given the distance between the Array Area and the coastline, and that there is no evidence to suggest that this Moray Firth population of bottlenose dolphin use the Array Area further offshore, there is not expected to be any potential for impact to this bottlenose dolphin population due to activities at the Array Area itself. Nearshore bottlenose dolphin will be assessed as part of both the Coastal East Scotland (CES) MU and the wider Greater North Sea (GNS) MU, while offshore bottlenose dolphin will be assessed as part of the wider GNS MU population.

533. Both grey and harbour seals are utilising the North Sea along the north-east coast of England, with a few haul-out sites situated along the North Sea coast. Harbour seals remain more localised to their specific haul-out sites and are concentrated in coastal and inshore waters. Particularly high abundances are in The Wash area, from which they spread out up to 273km, their maximum known foraging range (Carter *et al*., 2022). Grey seals, on the other hand, are venturing far offshore, with maximum traveling ranges of 448km to forage. Haul-out clusters of abundances are found nearshore off the east coast of England, but modelled hotspots are extending all the way to the fringes of Dogger Bank (Russel *et al.,* 2017; Carter *et al.,* 2022).

534. The Holderness coast lies just north of the Humber Estuary, in which a survey was carried out for the Humber Gateway Offshore Wind Farm. Aerial and vessel-based surveys recorded 78 grey seals and eight harbour seals in the study area (RPS Planning Transport & Environment, 2005). Furthermore, the Humber provides an important area for grey seal pup production (Carter *et al.,* 2022), particularly during August and breeding (SCOS, 2022).

535. The desk-based findings outlined above are in line with site-specific surveys carried out for Teesside A & B (now known as DBC and Sofia Offshore Wind Farms respectively) (Forewind, 2014) between January 2010 and January 2012, where generally low numbers of harbour porpoise were observed during the boat-based surveys. Sightings increased during spring 2011, but occurrence was highest (n=81 individuals) in September 2011. The modelled absolute abundance was 8,358 harbour porpoise (and 9,344 potential harbour porpoise). Minke whale abundance were absent during the boat-based surveys, but 68 animals were recorded in May and June 2010. Sporadic sightings of white-beaked dolphins led to an estimated absolute abundance of 194 animals. Low in numbers were grey seals, typically below 15 throughout the year, but also harbour seals with a total of nine individuals.

536. The desk-based findings outlined above are in line with site-specific surveys carried out for Creyke Beck A & B (now known as DBA and DBB Offshore Wind Farms respectively) (Forewind, 2013) between November 2009 and July 2011, where harbour seal sightings were absent, whereas 52 grey seals were sighted during aerial surveying (Forewind, 2013). They further modelled absolute abundance estimates of 7,426 harbour porpoises (and 9,635 potential harbour porpoise), 29 minke whales and 93 white-beaked dolphins.

537. Digital aerial surveys of an area encompassing the Array Area and a 4km buffer were conducted from October 2021 and continued monthly until September 2023. Surveys were undertaken using high-resolution camera systems to capture digital still imagery to assess the abundance and distribution marine megafauna within the survey area. The digital aerial baseline surveys conducted for the Project indicate the key species observed in the survey area were harbour porpoise, common dolphin, minke whale, grey seal, and several unidentified species groups (seals, marine mammals and porpoise / dolphin).

538. A full assessment of the baseline conditions will be undertaken through the EIA process and will inform, alongside the results of the site-specific aerial surveys, the species to be taken forward for further assessment. However, it is expected that there would be only seven marine mammal species found to be present in the area and therefore taken forward for assessment, with all other species expected to be rare. These are:

- Harbour porpoise;
- White-beaked dolphin;
- Bottlenose dolphin;
- Common dolphin;
- Minke whale; and
- Harbour and grey seal.

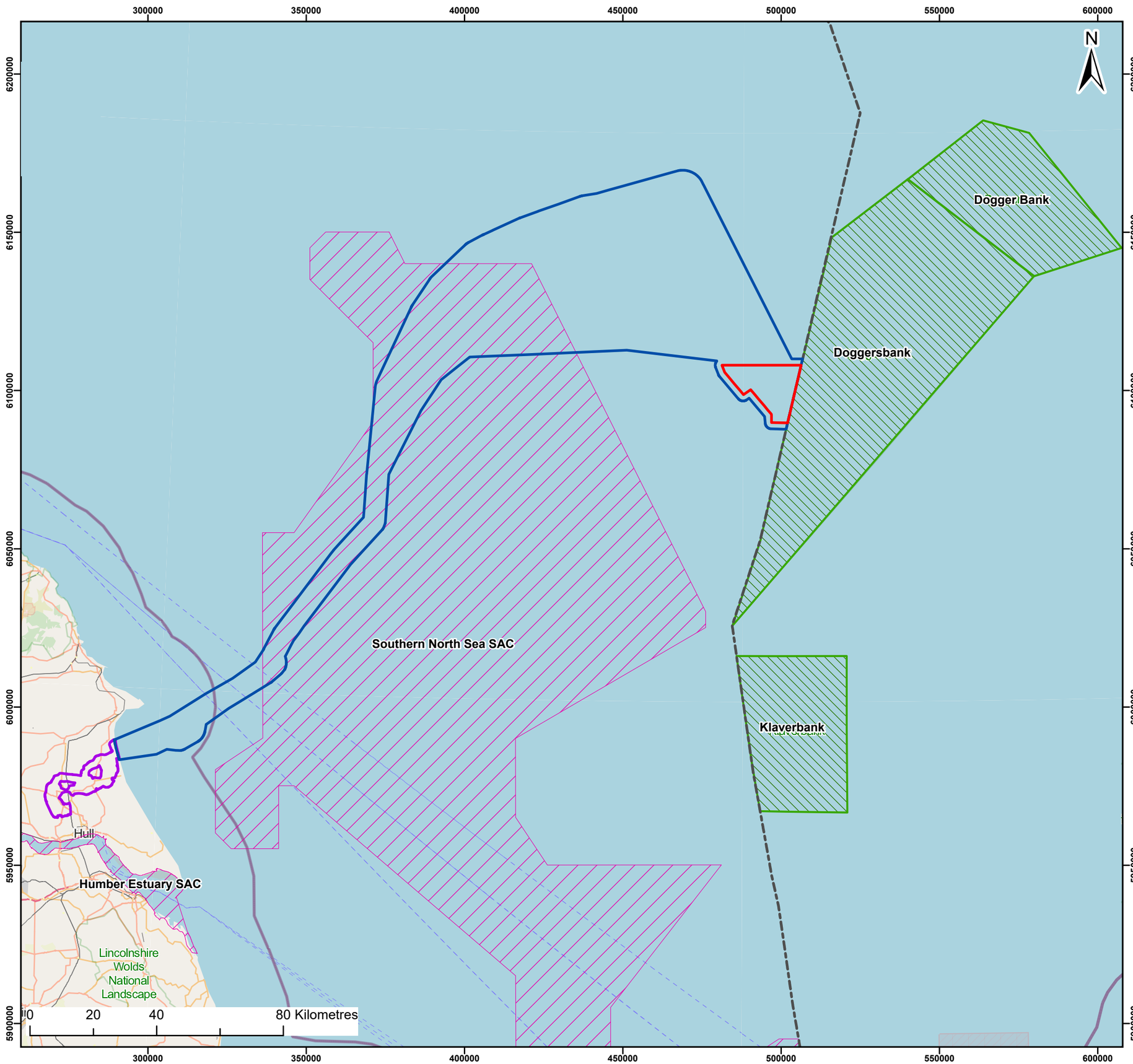
7.6.2.1 Management Units

539. The MUs for harbour porpoise, bottlenose dolphin, minke whale, white-beaked dolphin, common dolphin are shown on **Figure 7-16.** The MUs for harbour and grey seal, including key haul-out sites are shown on and **Figure 7-17**.

7.6.2.2 Designations

540. The Offshore Scoping Area lies within the Dogger Bank Special Area of Conservation (SAC), however marine mammals are non-qualifying features at the site, yet it is an important location for harbour porpoise, grey seal, and harbour seal. The offshore ECC would traverse the Southern North Sea (SNS) SAC, which is the seasonal designated area of the SAC that has persistently higher densities of harbour porpoise during summer months (April to September inclusive) (**Figure 7-18**).

541. There are several SACs within the surrounding area. The closest is the Humber Estuary SAC, approximately 44km from the ECC, with a major haul-out site nearby at Donna Nook (59km). The Wash and North Norfolk Coast SAC lies approximately 103km from the nearest point of the ECC and is designated for harbour seal, with major haul-out sites The Wash (103km) and Blakeney Point (134km). The Berwickshire and North Northumberland Coast SAC for grey seal lies approximately 175km north of the ECC.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Special Area of Conservation
- Natura 2000 Site
- UK Waters International / Exclusive Economic Zone Boundary

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

UK and Overseas Designated Areas for Marine Mammal Species

Figure: 7-18

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0074

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Co-ordinate system: WGS 1984 UTM Zone 31N

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542. Flamborough Head SAC is located approximately 6km from the ECC and although not designated for any marine mammals, the number of grey seals using Flamborough Head as a haul-out site have increased over the past few years. The Yorkshire Wildlife Trust (2023) recorded over 500 grey seals during their August surveys.

543. In terms of designated sites overseas, the Array Area borders directly with the Dutch and German Dogger Bank Natura 2000 sites to the east. The Dutch Dogger Bank has been assessed for harbour porpoise, grey and harbour seal, whereas the German Dogger Bank only features harbour porpoise and harbour seal. Approximately 70km south lies the Natura 2000 site Klaverbank, designated for harbour porpoise, grey and harbour seal.

544. A Habitats Regulations Assessment (HRA) screening exercise will be undertaken to consider the potential for likely significant effects on designated sites.

7.6.3 Potential Impacts

7.6.3.1 Potential Impacts during Construction

545. In the case of UXO, any assessments will be indicative only. A detailed UXO survey will be completed prior to construction. The exact type, size and number of possible detonations and duration of UXO clearance operations is therefore not known at this stage. This means that any assessments for UXO clearance in the EIA will be for information only and are not part of the DCO application. A separate Marine License application(s) will be made prior to construction for UXO investigation and clearance works, with an accompanying assessment of UXO clearance impacts on Marine Mammals (and will include site-specific underwater noise modelling). A European Protected Species (EPS) licence (or Marine Wildlife Licence) will also be applied for in the case of UXO clearance being required.

7.6.3.1.1 Underwater Noise

7.6.3.1.1.1. Physical and Auditory Injury Resulting from Impact Piling, Other Construction Activities and Vessel Noise

546. The key potential impacts during construction for marine mammals are expected to be those from underwater noise, principally from piling activities. Potential impacts of underwater noise due to piling are auditory injury: both Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS). Therefore, this has been scoped into the EIA for further consideration.

547. Site-specific underwater noise modelling will be undertaken to inform the assessments for piling and will take into account soft-start and ramp-up procedures, as well as the number of piles to be installed each day, and the number that may be installed at the same time. It is expected that the underwater noise modelling will be undertaken using the Southall *et al*. (2019) thresholds as current best practice.

548. The potential for PTS and TTS due to other construction activities (such as dredging, cable laying, and rock placement), as well as construction vessels is not expected to be significant. Underwater Noise modelling undertaken for other offshore wind projects in the North Sea show PTS cumulative ranges (i.e. the noise over a period of 24 hours (PTScum)[1]) to have the potential to cause PTS or TTS within 100m of the construction activity or vessel (with the exception of up to 500m or 1,000m for rock placement activities (for PTS and TTS respectively), or up to 150m or 250m for dredging (for PTS and TTS respectively)[2]. This is considered unlikely to be of significant risk to any marine mammal species, however, this will be confirmed through site-specific underwater noise modelling and therefore the potential for any auditory injury (PTS or TTS) related to these construction activities has been scoped into the EIA. This may be later scoped out (following agreement through the ETG) should the underwater noise modelling show very limited potential for any PTS or TTS onset.

7.6.3.1.1.2. Behavioural Impacts Resulting from Impact Piling, Other Construction Activities and Vessel Noise

549. Underwater noise during piling, as well as from other construction activities (such as cable installation activities), along with the presence of vessels offshore, has the potential for disturbance effects. These impacts have therefore been scoped into the EIA.

550. Where disturbance thresholds are available, site-specific underwater noise modelling will be undertaken to inform the assessments. It is expected that this will include the Lucke *et al*. (2009) disturbance threshold for harbour porpoise. A review will be undertaken to identify potential suitable disturbance thresholds for other marine mammal species. However, it is expected that an alternative assessment approach would be required.

551. For disturbance effects of underwater noise, a dose response curve approach will be used wherever there is data available. At present, it is expected that a dose response curve approach would only be possible for harbour porpoise, grey seal, and harbour seal, and for impact piling. It is currently expected that this assessment would utilise the information provided within Graham *et al.* (2017) for harbour porpoise, and Whyte *et al.* (2020) for grey seal and harbour seal, as well as the results of the underwater noise modelling to inform this assessment. The best available dose response curves (at the time of writing) will be used to inform these assessments.

552. For disturbance effects, where a dose response curve approach is not possible due to a lack of information, the potential for disturbance will use reported and observed disturbance ranges wherever there is the information to do so (including the Effective Deterrence Ranges (EDR) for harbour porpoise (Joint Nature Conservation Committee (JNCC) *et al.,* 2020) and the disturbance range for seal species due to piling as reported by Russel *et al.* (2016). A review of the reported disturbance ranges for each marine mammal species, and for each potential noise source, will be undertaken to determine whether an assessment can be undertaken. Where there is no information on potential disturbance ranges, then TTS may be used to inform the disturbance assessment as a proxy for disturbance.

[1] Based on either the National Marine Fisheries Services (NMFS) (2018) or Southall et al. (2019) thresholds

[2] Including at Norfolk Boreas (Norfolk Boreas Limited, 2019), East Anglia ONE North (East Anglia ONE North Limited, 2019), both the Dudgeon Extension and Sheringham Shoal Extension Projects (Equinor New Energy Limited, 2022), and Hornsea Project Four (Orsted Hornsea Project Four Limited, 2021)

7.6.3.1.1.3. Barrier Effects Due to Underwater Noise

553. Underwater noise during piling, as well as disturbance associated with underwater noise from other construction activities (such as cable installation activities), along with the presence of vessels offshore, has the potential to cause a barrier to movement for marine mammal species. The significance of this will depend on the known movements of marine mammals in the area. Any areas affected would be relatively small in comparison to the swimming range of marine mammals. Additionally, any effects would not be continuous throughout the offshore construction period. The potential for a barrier effect as a result of disturbance and displacement due to underwater noise is unlikely to be significant but has been scoped into the EIA for further assessment.

7.6.3.1.2 Disturbance at Seal Haul-Out Sites

554. Disturbance from landfall works, and vessel transits to and from the Project and the port of origin for construction vessels (location to be confirmed) has the potential to disturb seals at haul-out sites (as shown on **Figure 7-17**), for example those seals hauled out near Flamborough Head, as mentioned above in **Section 7.6.2.2**. Depending on the route and proximity to the haul-out sites (note that for DBA and DBB vessel mobilisation has been largely from international ports, with UK ports being used for crew transfers). The potential for disturbance at seal haul-out sites will take into account the most recent and robust research, guidance and information available and has therefore been scoped into the EIA for further consideration.

555. The potential for any disturbance of seals from haul-out sites foraging at sea will also be determined.

7.6.3.1.3 Changes to Prey Resource

556. As outlined in **Section 7.5.3.1**, the potential impacts on fish species and therefore abundance and distribution of prey resource for marine mammals during construction can result from:

- Temporary habitat loss / physical disturbance;
- Increased suspended sediments and sediment re-deposition;
- Re-mobilisation of existing contaminated sediments if present;
- Underwater noise and vibration; and
- Changes in fishing pressure.

557. The potential for any changes to the prey resource for marine mammals during construction has been scoped into the EIA for further consideration, taking into account the assessments made for benthic ecology (see **Chapter 7.4 Benthic and Intertidal Ecology**) and fish and shellfish ecology (see **Chapter 7.5 Fish and Shellfish Ecology**).

7.6.3.1.4 Vessel Interaction

558. Despite the potential for marine mammals to detect and avoid vessels, ship strikes are known to occur (Wilson *et al.,* 2007). An increase in vessel traffic could potentially lead to an increase in vessel collision risk, although marine mammals are considered likely to avoid vessels and therefore avoid collision.

559. To ensure there is no risk of vessel collision for marine mammals, the Project has committed to best practice measures for all vessel movements and through all phases of the Project. These best practice measures will be secured through inclusion in the PEMP for all phases of the Project. These best practice measures are based on existing guidance to reduce collision risk for marine mammals such as the Marine Code of Conduct developed by the SWF[3] and The Scottish Marine Wildlife Watching Code developed by NatureScot[4] . Measures include:

- Vessel movements, where possible, will follow set vessel routes and hence areas where marine mammals are accustomed to vessels;
- Vessel movements will be kept to the minimum number that is required;
- Vessels will avoid deliberately approaching marine mammals when sighted;
- Vessels will avoid abrupt changes to course or speed should marine mammals approach the vessel or bow-ride;
- Allowing for vessel safety concerns, vessels will maintain a steady speed, and direction, to allow any marine mammal to predict where the vessel may be headed, and to move out of the way or avoid surfacing in the path of the vessel;
- Additionally, where possible and safe to do so, transiting vessels will maintain distances of 600m or more off the coast, particularly in areas near known seal haul-out sites during sensitive periods;
- Operators of all vessels will be made aware of the risk and measures to avoid marine mammal collisions during mobilisation briefings;
- A Vessel Code of Conduct will be developed prior to construction based on the latest information and guidance, and include the measures as outlined above; and
- The Vessel Code of Conduct will include a protocol to report any collisions.

560. With the inclusion of the above embedded mitigation measures, it is considered highly unlikely that there would be any potential risk of vessel collision to marine mammals, however, an assessment will be undertaken to confirm the potential risk, and therefore the increased risk of collision with marine mammals during construction has been scoped into the EIA.

[3] https://www.seawatchfoundation.org.uk/marine-code-of-conduct/

[4] https://www.nature.scot/sites/the-scottish-marine-wildlife-watching-code

7.6.3.1.5 Changes to Water Quality

561. Increased suspended sediment is unlikely to have any direct or indirect impacts on marine mammals. Marine mammals often inhabit turbid environments and cetaceans utilise sonar to sense the environment around them, and there is little evidence that turbidity affects cetaceans directly (Todd *et al.,* 2014). Pinnipeds are not known to produce sonar for prey detection purposes; however, it is likely that other senses are used instead of, or in combination with, vision. Studies have shown that vision is not essential to seal survival, or ability to forage (Todd *et al.,* 2014). The wind farm site is predominantly composed of sand and would settle quickly once disturbed. Therefore, any effects associated with an increase in suspended sediments have been scoped out of the EIA.

562. With regard to deterioration in water quality associated with the release of sediment bound contamination, it is proposed that these impacts would occur during cable and foundation installation. The sampling stations in the 2023 benthic survey indicate low concentrations of contaminants within the DBD Array Area and between the Array Area and landfall. Some exceedances of Cefas Action Level One were present within samples closest to the shore (see **Chapter 7.3 Marine Water and Sediment Quality**). Contaminant levels would be expected to be higher close to shore, due to the presence of shore-based chemical inputs and the presence of industry and ports and as such this is expected to be similar at the landfall.

563. As such, this impact during construction has only been scoped into the EIA for the offshore ECC. For the Array Area, this impact has been scoped out of the EIA, as the samples collected did not indicate significant levels of chemicals within the sediments that could potentially be disturbed.

564. With regards to the potential for accidental spillages, control measures as required under International Convention for the Prevention of Pollution from Ships (MARPOL) will be in place, as well as standard good practice measures to be secured within a PEMP (see **Chapter 7.3 Marine Water and Sediment Quality** for further detail on embedded mitigation to control accidental spillages).

7.6.3.2 Potential Impacts during Operation

565. Potential impacts to marine mammal receptors during the operation phase will be similar in nature to impacts assessed for construction, but lower in magnitude due to the absence of pile driving, and fewer vessels required for O&M activities than construction.

7.6.3.2.1 Underwater Noise

7.6.3.2.1.1. Physical and Auditory Injury Resulting from Operational Turbine Noise, Operation and Maintenance Activities and Vessels

566. Potential impacts of underwater noise from operational wind turbines are auditory injury: both PTS and TTS. The potential for auditory injury has been scoped into the EIA and will be assessed based on underwater noise modelling, taking into account the number of turbines to be installed.

567. O&M activities are expected to be similar to the other construction activities (such as dredging, cable laying, and rock placement), with similar types of vessels present. As for the construction phase (see **Section 7.6.3.1**), the potential for PTS and TTS has been scoped in to the EIA for O&M activities and vessel presence, although may be scoped out at a later stage depending on the underwater noise modelling results.

7.6.3.2.1.2. Behavioural Impacts Resulting from Operational Turbine Noise, Operation and Maintenance Activities and Vessel Noise

568. Potential impacts of underwater noise from operational wind turbines include the potential for disturbance (i.e. behavioural impacts), which has been scoped into the EIA. The potential for disturbance from underwater noise during the operation phase will be based on a review of information collected as part of monitoring studies for other offshore wind farms.

569. Potential behavioural impacts from O&M activities have been scoped into the EIA. However, they are expected to be lower in magnitude than those during construction, due to the absence of pile driving, and fewer vessels required for O&M activities. As for construction activities and vessel presence, the potential for disturbance will be assessed following a similar approach to that set out in **Section 7.6.3.1**.

7.6.3.2.1.3. Barrier Effects Due to Underwater Noise

570. Underwater noise due to the operation of the wind turbines, as well as disturbance associated with underwater noise from O&M activities along with the presence of vessels offshore, has the potential to cause a barrier to movement for marine mammal species. The significance of this will depend on the known movements of marine mammals in the area. The potential for a barrier effect as a result of disturbance and displacement due to underwater noise is unlikely to be significant but has been scoped into the EIA for further assessment.

7.6.3.2.2 Disturbance at Seal Haul-Out Sites

571. Disturbance from landfall works, and vessel transits to and from the Project and the local port also has the potential to disturb seals at haul-out sites (as shown on **Figure 7-17**), depending on the route and proximity to the haul-out sites. The potential for disturbance at seal haul-out sites will take into account the most recent and robust research, guidance and information available and has therefore been scoped into the EIA for further consideration.

572. The potential for any disturbance of seals from haul-out sites foraging at sea will also be determined.

7.6.3.2.3 Changes to Prey Resource

573. As outlined in **Section 7.5.3.2,** potential impacts to fish species during operation, and therefore abundance and distribution of prey resource for marine mammals during operation, can result from:

- Long term habitat loss
- Temporary habitat loss / physical disturbance;
- Increased suspended sediments and sediment re-deposition;

- Re-mobilisation of existing contaminated sediments if present;
- Underwater noise and vibration;
- Electro-magnetic field (EMF) effects;
- Introduction of hard substrate; and
- Changes in fishing pressure.

574. The potential for any changes to the prey resource for marine mammals during operation has been scoped into the EIA for further consideration.

7.6.3.2.4 Changes to Water Quality

575. As outlined in **Section 7.6.3.1**, some level of sediment bound contamination is present between the Array Area and landfall. However, the likelihood of any remobilisation of sediments occurring during operation (e.g. during cable repair) is very low. The impact of remobilisation of existing contaminated sediments is scoped out of the EIA for operational impacts associated with the Project (see **Chapter 7.3 Marine Water and Sediment Quality** for further details).

7.6.3.2.5 Physical Barrier Effects

576. Monitoring studies at Nysted and Rødsand have indicated that operational activities have had no impact on regional seal populations (Teilmann *et al.,* 2006; McConnell *et al.,* 2012). Tagged harbour seals have been recorded within two operational offshore wind farm sites (Alpha Ventus in Germany and Sheringham Shoal in UK) with the movement of several of the seals suggesting foraging behaviour around wind turbines (Russell *et a*l., 2014). Both harbour porpoise and seals have been shown to forage within operational offshore wind farms (e.g. Lindeboom *et al.,* 2011; Russell *et al.,* 2014), indicating no restriction to movements in operational offshore wind farm sites.

577. **Plate 7-1** shows tagged grey seal movements around the UK coastlines, from 114 grey seal (left) and 239 harbour seals (right). These tagging studies indicate that grey seal associated with haul-out sites on the east coast of England forage at significant distances offshore, with grey seals travelling through the Offshore Scoping Area (Carter *et al.,* 2020). For harbour seal, the tagging studies show a smaller foraging range than for grey seal, with limited potential for connectivity with the Offshore Scoping Area. However, as noted above, seals are known to still utilise operational wind farm areas, and there is no indication that the physical structures would cause a barrier to their movement or a reduction in their foraging.

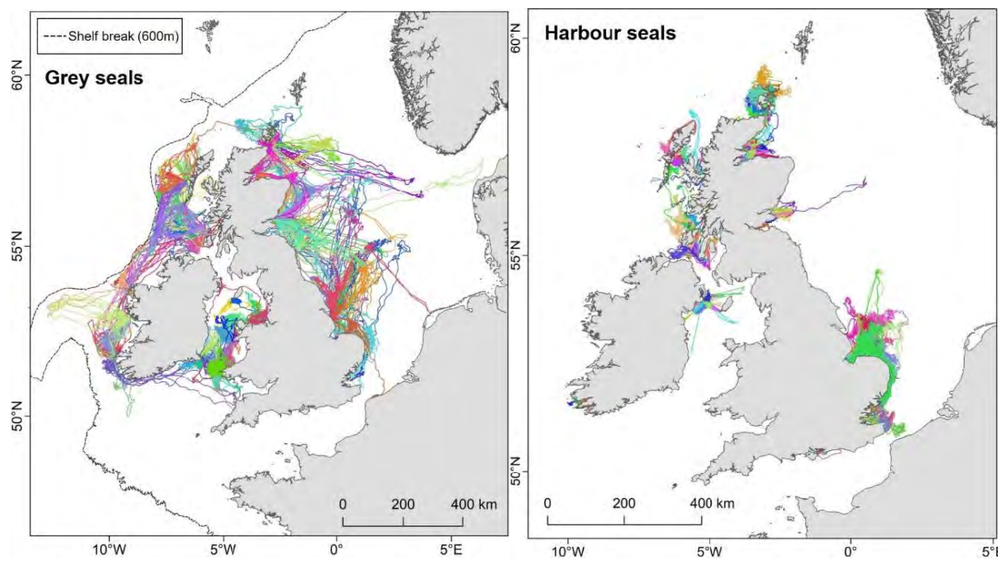


Plate 7-1 Tagged Grey Seal Movements along the East Coast of England (Carter et al., 2020)

578. Effects on harbour porpoise are more difficult to assess as various operational activities may influence the species differently. Teilman and Carstensen (2012) have found that harbour porpoise may habituate itself to the wind farm post-construction (possibly due to habitat enrichment and reduced fishing) but the physical presence of the wind turbines is unlikely to create a barrier to the species (Tougaard *et al.,* 2005).

579. The spacing between wind turbines would allow animals to move between infrastructure and through the operational wind farm site. This means that animals can be expected to move between infrastructure and through the operational wind farm, irrespective of layout.

580. Based on the limited potential for any disturbance (or barrier to movement) due to the presence of the wind farm infrastructure, and that the spacing would allow for marine mammals to transit through the wind farm site while maintaining distance between themselves and the infrastructure, it is not anticipated that there would be any potential for a significant barrier effect to marine mammal movement. However, due to a lack of information on the potential for a barrier effect to harbour porpoise (and other marine mammal species), this potential effect pathway will be considered further, and has therefore been scoped into the EIA.

7.6.3.2.5.1. Vessel Interaction

581. As outlined for construction, the increased risk of collision with marine mammals during operation is considered unlikely, however, will be scoped into the EIA. The commitment to best practice measures and a Vessel Code of Conduct to be secured through the Project's PEMP, as detailed in **Section 7.6.3.1**, will significantly reduce any potential for marine mammals to collide with vessels during O&M activities.

7.6.3.2.5.2. Effects from Electro-Magnetic Field

582. EMF occurs as a result of electricity transmission through conductive objects, such as transmission cables, and comprises an electric field (E field) and a magnetic field (B field). Many marine organisms have evolved sensory abilities to use electric and magnetic cues in essential aspects of life history, such as prey detection, predatory behaviour, and navigation and these behaviours may be impacted by EMF emissions in the water column (Hutchinson *et al*., 2020).

583. Current information on the effects of EMF on marine mammals is limited, however, there is no evidence to date that marine mammal activity will change as a result of the presence of increased EMF in the environment from inter-array cables. Magnetic field intensities reduce as a function of distance from the source and are highly localised, decreasing rapidly with distance from the cable, from 7.85µT at 0m, to 1.47µT at 4m, based on the average wind farm inter-array cable buried 1m below the seabed (Normandeau *et al*., 2011). This is well below the detectable level for magneto-receptive marine mammal species of 5µT (Normandeau *et al.,* 2011). It is therefore proposed that these impacts are scoped out of the EIA.

7.6.3.3 Potential Impacts during Decommissioning

584. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. Note that the magnitude of impact for underwater noise would be reduced in decommissioning due to the lack of piling.

585. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-15**).

7.6.4 Potential Cumulative Effects

586. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect marine mammal receptors. Therefore, cumulative effects related to marine mammals are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

587. Potential cumulative effects could arise from:

- Piling at other offshore wind farms in combination with that being undertaken at the Project site;
- Other construction activities at other offshore wind farms in combination with that being undertaken at the Project site (vessels presence, cable installation works, dredging, seabed preparation and rock placement);
- Carbon capture storage projects, offshore mines, and gas storage projects;
- Geophysical surveys for other offshore wind farms;
- Aggregate extraction and dredging, and disposal sites;
- Oil and gas developments, decommissioning, and seismic surveys;
- Sub-sea cable and pipelines;
- Coastal works (such as ports and harbours); and
- UXO clearance (other than for the Project).

588. Cumulative impacts to be considered include all those that are assessed as having a higher effect significance within the Project's impact assessments and are expected to include underwater noise, collision risk, and changes in prey resource.

7.6.5 Potential Transboundary Effects

589. There is potential for transboundary effects upon marine mammal receptors due to the Project's construction, O&M and decommissioning activities.

590. There is a significant level of marine development being undertaken or planned by EEA Member States (i.e. Belgium, the Netherlands, Germany and Denmark) in the southern North Sea. Populations of marine mammals are highly mobile and there is potential for transboundary effects, especially when considering noise impacts. Transboundary impacts will be scoped into the EIA for further consideration, including cumulative transboundary impacts.

7.6.6 Summary of Scoping Proposals

591. **Table 7-15** outlines the marine mammal impacts which are proposed to be scoped in or out of the EIA. These may be refined through the EPP and other consultation activities, and as additional project information and site-specific data become available.

Table 7-15 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Marine Mammals

Potential Impact	Construction	Operation	Decommissioning
Underwater noise: physical and auditory injury resulting from impact piling during construction	✓	x	x
Underwater noise: behavioural impacts resulting from impact piling during construction	✓	x	x
Underwater noise: physical and auditory injury resulting from operational wind turbine noise	x	✓	x
Underwater noise: behavioural impacts resulting from operational wind turbine noise	x	✓	x
Underwater noise: physical and auditory injury resulting from noise associated with other construction and maintenance	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
activities (such as dredging and rock placement) and vessel noise			
Underwater noise: behavioural impacts resulting from other construction and maintenance activities (such as dredging and rock placement), and vessel noise (including disturbance to foraging areas)	✓	✓	✓
Underwater noise: barrier effects	✓	✓	✓
Disturbance at seal haul-out sites	✓	✓	✓
Vessel interaction (increase in risk of collision)	✓	✓	✓
Changes to prey resource	✓	✓	✓
Changes to water quality (sediment bound contaminants) in the Array Area	x	x	x
Changes to water quality (sediment bound contaminants) in the ECC	✓	x	x
Physical barrier effect	x	✓	x
Effects from EMF	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.6.7 Approach to Data Gathering

592. As part of the EIA process, the existing environment with respect to marine mammals will be described, including, but not limited, to the following:

- The study area for each marine mammal species based on their MUs relevant to the Project;
- The density of each marine mammal species within the survey area and a 4km buffer;
- The reference population of each marine mammal species; and
- Seal haul-out site locations and recent counts.

593. **Table 7-16** identifies the desk-based sources from previously conducted marine mammal surveys and other resources that will be accessed to inform the characterisation of the existing environment. Identification of potential sensitive receptors will be undertaken using the listed data sources, as well as the site-specific surveys.

Table 7-16 Desk-Based Data Sources for Marine Mammals

Data Source	Date	Data Contents
Creyke Beck Zone 3 Dogger Bank (2013)	Surveys undertaken from 2009 to 2011	Statistical analyses of high-definition aerial survey marine mammal observation survey data for the Dogger Bank development zone.
Teesside A & B Dogger Bank (2014)	Surveys undertaken from 2010 to 2012	• Site-specific boat-based survey. • High-definition aerial surveys since 2009.
Humber Gateway Offshore Wind Farm	Surveys undertaken from May 2004 to April 2005	Aerial and boat-based surveys.
Small Cetaceans in the European Atlantic and North Sea (SCANS-IV): Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys (Gilles *et al.,* 2023)	Survey undertaken in Summer 2022	Density and abundance estimates for cetacean species in the European Atlantic and North Sea.
Small Cetaceans in the European Atlantic and North Sea (SCANS-III): Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys (Hammond *et al.,* 2021)	Survey undertaken in Summer 2016	
Small Cetaceans in the European Atlantic and North Sea (SCANS-II): Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management (Hammond *et al.,* 2013)	Survey undertaken in Summer 2005	
Revised Phase III data analysis of Joint Cetacean Protocol (JCP) data resources (Paxton *et al.,* 2016)	Data from a range of sources, analysed and reported on in 2015 and 2016	Density mapping for the most common cetacean species in UK waters.
Joint Cetacean Data Protocol (online data	Various	Sightings and survey data from a large number of surveys within UK waters.

Data Source	Date	Data Contents
resource)[5]		
Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al.,* 2019)	Data from a range of sources, analysed and reported on in 2019	Density mapping for the most common cetacean species in European and North-East Atlantic waters for each month.
Scientific Advice on Matters Related to the Management of Seal Populations (SCOS, 2021 and 2022)	August surveys undertaken in years 2021 and 2022	Updated data and information on grey seal and harbour in the UK. Includes the most recent haul-out counts and population estimates for each seal Management Unit (MU) in the UK.
Seal telemetry data (e.g. Sharples *et al.,* 2008 & 2012; Carter *et al.,* 2017 & 2022; Jones *et al.,* 2017; Russel & McConnel 2014; Vincent *et al.,* 2017; Russel *et al.,* 2016; Matthiopolous *et al.,* 2004)	Various	Provides the results of seal tagging studies in the UK and Europe, to provide an indication of seal movements.
Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals (Carter *et al.,* 2022)	Data from a range of sources, analysed and reported on in 2022	Provides grey seal and harbour seal density estimates for UK waters, and for each seal designated SAC.
Sea Watch Foundation volunteer sightings off eastern England (SWF, 2024)	Public sightings database (currently available data from September 2022 to April 2024)	Public sightings database, records of marine mammals at locations around the UK.
MARINE life surveys from North Sea ferry crossings	Various	Visual survey data from ferry crossings in the North Sea.
Management Units for cetaceans in UK waters (Inter-Agency Marine Mammal Working Group (IAMMWG), 2023)	Data from a range of sources, analysed and reported on in 2022	MU areas and abundance estimates for the most comment cetacean species in the UK.
UK Cetacean Stranding Investigation Programme	Various	Strandings reporting and analysis for stranded cetaceans around England.

594. **Table 7-17** shows the baseline surveys that have been undertaken to inform the assessment.

Table 7-17 Baseline Surveys for Marine Mammals

Survey	Timing	Spatial Coverage
Digital aerial surveys for marine mammals baseline, following the transect methodology	24 months (October 2021 to September 2023)	Array Area plus 4km buffer area[6]

7.6.8 Approach to Assessment

595. Underwater noise modelling will be undertaken to inform the marine mammal assessments. Spatial noise impacts will be considered in the context of the site characterisation data to quantify the potential impact on the reference populations for marine mammals.

596. Where possible, the magnitude of effect will be quantified. The impact significance will be determined by a matrix approach supported by expert judgement, taking into account the value and sensitivity of the receptor.

597. Marine mammals will be included within the EPP (as set out in **Chapter 6 Consultation**) and further liaison with key stakeholders will take place to agree on the approach to data collection, and the specific assessment methods to be employed as part of the EIA as part of this process.

7.6.9 Scoping Questions to Consultees

598. The following questions are posed to consultees to help them frame and focus their response to the marine mammals scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the marine mammal impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the marine mammals impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

[5] https://www.ices.dk/data/data-portals/Pages/Cetaceans.aspx

[6] Aerial surveys are conducted over the Array Area only as standard practice for OWF marine mammal (and ornithological) baseline surveys.

7.7 Intertidal and Offshore Ornithology

599. This chapter of the Scoping Report considers the potential likely effects of the Project associated with intertidal and offshore ornithology, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, and the offshore ECC up to the landfall.

600. The intertidal and offshore ornithology assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.2 Marine Physical Processes;**
- **Chapter 7.3 Marine Water and Sediment Quality;**
- **Chapter 7.4 Benthic and Intertidal Ecology;**
- **Chapter 7.5 Fish and Shellfish Ecology;**
- **Chapter 7.9 Shipping and Navigation;**
- **Chapter 7.13 Other Marine Users;** and
- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation**.

7.7.1 Study Area

601. The Intertidal and Offshore Ornithology Study Area (hereafter referred to as 'the Study Area'), as defined for this desk-based assessment of intertidal and offshore ornithology, comprises the Offshore Scoping Area and discrete marine areas that have pathways to ornithological receptors as described below and presented on **Figure 7-19**.

602. The Offshore Scoping Area comprises:

- The Array Area – the area across which the wind turbines are placed, the completed wind farm area; and
- The offshore ECC – the route of the offshore export cables between the Array Area and the landfall search area along the Holderness coast, East Riding of Yorkshire (to MHWS).

603. Areas outside this footprint which also form part of the Study Area for the desk-based assessment include:

- Adjacent areas of marine habitat where birds or their supporting habitat or prey resources may experience direct effects from the wind farm during any development phase. In assessments for UK North Sea offshore wind farms, this area has previously been advised (in consultation with Statutory Nature Conservation Bodies (SNCBs)) to potentially extend to a 12km buffer distance around the Array Area and offshore ECC, albeit typically in a subset of compass directions, orientated towards designated sites where diver or seaduck species are qualifying features, as these bird species are considered particularly vulnerable to disturbance or displacement[7] .
- The breeding sites (typically on islands or coastal sites beyond these adjacent habitat areas) of birds using the wind farm footprint or adjacent habitat to forage for themselves or their offspring during the breeding season;
- The breeding sites of birds using the wind farm footprint or adjacent habitat for foraging, resting or moulting (i.e. non-breeding activities) during their non-breeding, wintering or migration periods; and
- The North Sea migration front of migratory bird species potentially crossing the Array Area during (typically one or two) migratory sea crossings between Britain and continental Europe per year.

604. In summary, the Study Area broadly comprises the North Sea, with emphasis on the southern North Sea in which the Project will be located. In describing or quantifying connectivity between the wind farm and internationally designated sites for breeding (sea)birds, reference will be made variously to the UK 'North Sea', 'North Sea & Channel', 'SW North Sea' or 'SW North Sea & Channel' waters Biologically Defined Minimum Population Scales (BDMPS), depending on species and season (Furness, 2015; Natural England, 2022).

7.7.2 Existing Environment

7.7.2.1 North Sea Seabirds

605. The digital aerial baseline surveys conducted for the Project indicate that the key species observed in the areas, and therefore of likely concern for the impact assessment are:

- Seabirds present during the breeding season (including months of their migration-free breeding season if applicable) (Furness, 2015): (Black-legged) kittiwake *Rissa tridactyla*, (northern) gannet *Morus bassanus*, (common) guillemot *Uria aalge*, razorbill *Alca torda*, (Atlantic) puffin *Fratercula arctica*, lesser black-backed gull *Larus fuscus*, common gull *Larus canus*, and Mediterranean gull *Ichthyaetus melanocephalus*;
- Seabirds present during the non-breeding season (or wintering period when delineated from migration / passage periods) (Furness, 2015): Kittiwake, gannet, guillemot, razorbill, puffin, great black-backed gull *Larus marinus*, herring gull *Larus argentatus*, common gull, black-headed gull *Chroicocephalus ridibundus*, little auk *Alle alle*, great northern diver *Gavia immer*, white-billed diver *Gavia adamsii* and velvet scoter *Melanitta fusca*; and

[7] When no designated sites featuring these species are present within this 12km distance, then the potentially affected distance around the Array Area is more likely to extend to 4km.

- Seabirds present during passage periods but not during biologically defined migration-free breeding or wintering periods (Furness, 2015): great skua *Stercorarius skua*, Arctic skua *Stercorarius parasiticus*, Arctic tern *Sterna paradisaea*, common tern *Sterna hirundo*, Sandwich tern *Thalasseus sandvicensis*, and Manx shearwater *Puffinus puffinus*.

606. These and other bird species recorded across the various seasons during baseline surveys will be accounted for during the impact assessment.

607. The North Sea is an important region in the global distributions of several species of seabird. In the breeding season, species of gulls, terns, auks, skuas, fulmar, cormorant and gannet, breed at island and coastal sites and forage the wider marine environment for fish and invertebrate prey for themselves and their offspring. Designated sites of national or international importance for breeding seabirds are found at locations along the entire east coast of Britain, and some breeding seabird species have foraging ranges in the order of magnitude of hundreds of kilometres (so that they have potential to use the waters in and around the Array Area despite being from distant breeding sites).

608. In the non-breeding season (or constituent 'wintering' and 'migration' seasons within this period (Furness, 2015)), many of the region's breeding seabirds remain present in the southern North Sea, often in fully offshore habitats such as those in which the wind farm is located. These populations using the offshore habitats during the non-breeding season are bolstered by individuals joining from more distant breeding populations in the UK northern North Sea (particularly north Scotland, Orkney and Shetland) and internationally from locations including the Faroes, Norway and Iceland (Furness, 2015). Some species of duck and diver which use freshwater habitats during the breeding season are associated with marine habitats in non-breeding seasons, and some designated sites of international importance for these species during non-breeding seasons are located in England's southern North Sea inshore waters.

7.7.2.2 North Sea Intertidal Birds

609. The overwintering bird surveys (November 2022, and October 2023 to March 2024) conducted for intertidal ornithology baseline characterisation for the 2023 landfall for the Project indicate that the key species groups observed foraging, loafing or roosting in areas on the Holderness coast representative of the Project landfall and intertidal areas, and therefore of likely concern for the impact assessment for the Project, are (in bold):

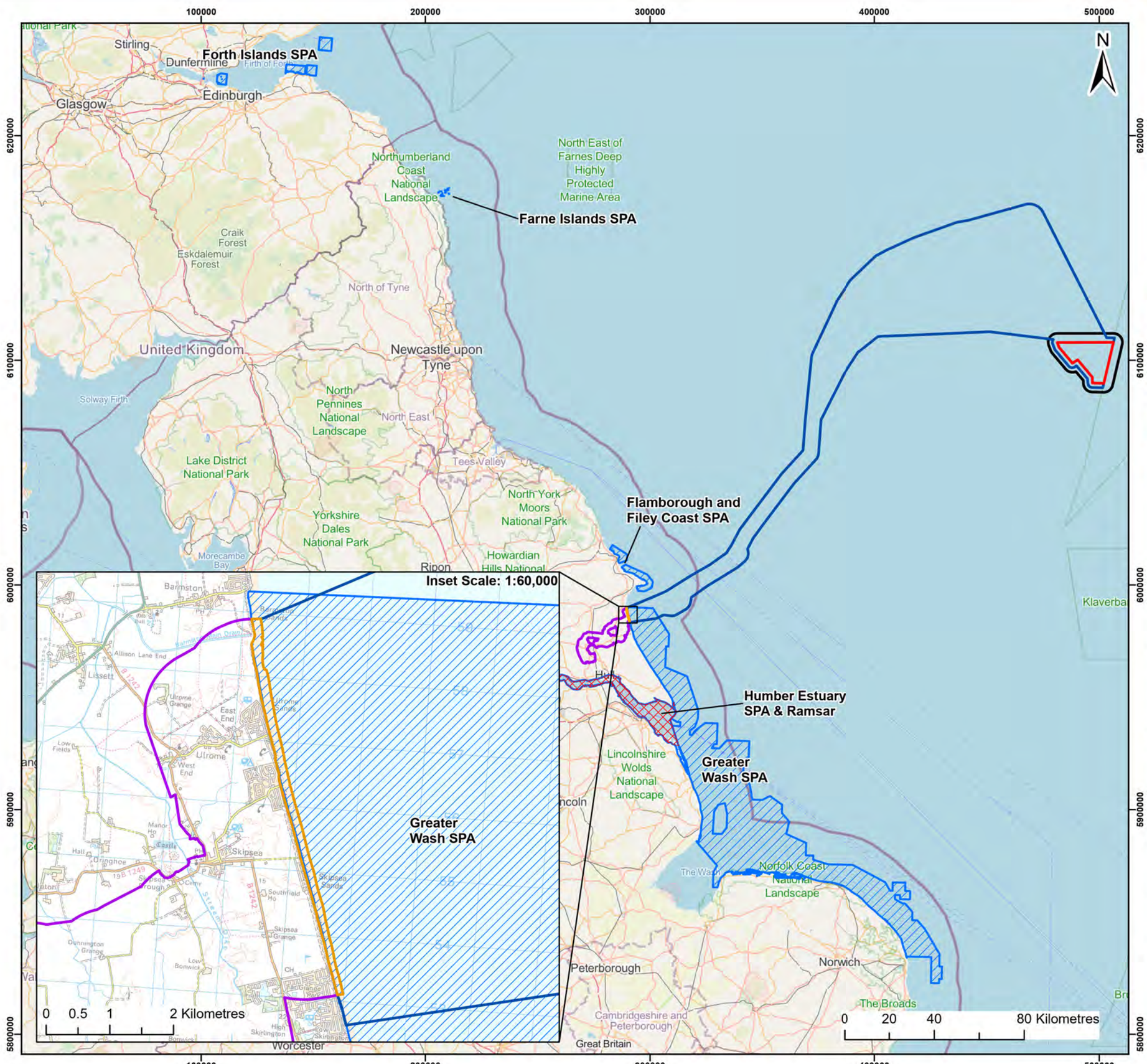
- **Gulls**: Great black-backed gull, herring gull, lesser black-backed gull, black-headed gull, Mediterranean gull and common gull;
- **Other inshore seabirds**: Cormorant *Phalacrocorax carbo*, great northern diver, plus flight-only records of red-throated diver *Gavia stellata* and little auk;
- **Inshore waterfowl**: Common scoter *Melanitta nigra*, (common) eider *Somateria mollissima*, Eurasian teal *Anas crecca*, mallard *Anas platyrhynchos*, whooper swan *Cygnus cygnus*, Brent goose *Branta bernicla*, greylag goose *Anser anser*, moorhen *Gallinula chloropus* and flight-only records of shelduck Tadorna tadorna, goosander Mergus merganser and Eurasian wigeon *Mareca penelope*;
- **Wading birds**: Golden plover *Pluvialis apricaria*, (northern) lapwing *Vanellus vanellus*, redshank *Tringa totanus*, oystercatcher *Haematopus ostralegus* and dunlin *Calidris alpina*; and
- **Owls and raptors**: Barn owl *Tyto alba*, kestrel *Falco tinnunculus*, merlin *Falco columbarius*, peregrine *Falco peregrinus* and marsh harrier *Circus aeruginosus*.

610. Baseline surveys of intertidal birds in the Onshore Scoping Area are to be completed, and any additional receptor species recorded in these remaining surveys will also be considered.

611. The Holderness coast is considered important for seabirds foraging in inshore waters, including terns in the breeding season and sea-ducks and divers in the non-breeding season – with much of these waters and the associated intertidal area of the Holderness coast designated as part of the Greater Wash SPA and Holderness Inshore MCZ. However, Project survey work off the Holderness coast to date, plus existing data from the same locality (e.g. Orsted, 2021), indicate that the area supports relatively low numbers of waterfowl, wading birds or owls and raptors.

612. The intertidal habitat comprises beaches of boulder clay with soft cliffs above and is lacking in either rocky intertidal or estuarine mudflat habitat. In contrast, the Humber Estuary, which is located on the inland side of the Holderness area, is rich in estuarine mudflats and therefore overwintering and passage waterfowl and wader populations in the region (and birds of prey which predate waterbirds) tend to be concentrated in this estuary. The Holderness beaches are used for coastal recreation (including as part of holiday parks) and therefore do not readily support beach-breeding seabirds such as terns. Breeding bird baseline surveys covering the Holderness coast within the original Project Scoping Area have not recorded individuals of any tern species.

613. The wider North Sea coast and estuaries of Britain form part of the east Atlantic flyway for migratory waterbirds (including waders, swans, geese and ducks) which undertake movements in variously latitudinal (north-south) and longitudinal (east-west) directions during their annual cycles. Intertidal areas of the North Sea coast include large expanses of sand and mudflat such as those protected by The Wash SPA and Lindisfarne SPA, and contrastingly rocky intertidal stretches such as those found within the Northumbria Coast SPA. The range of bird species for whose populations these international sites are designated, comprises species with a range of migratory strategies and timings. The flyway populations of a particular species furthermore include different subspecies, breeding populations and age classes which can result in some individuals of a species being in non-breeding or migratory stages in most or all calendar months of the year.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Offshore Survey Area (Array Area 4km Buffer)
- Intertidal Survey Area
- Ramsar
- Special Protection Area (SPA)

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Designated Sites with International Status for Bird Populations in Proximity to the Intertidal and Offshore Ornithology Study Area

Figure: 7-19

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0029

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	07/06/2024	JH	AB	A3	1:1,700,000
02	18/04/2024	AB	LMF	A3	1:1,700,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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614. As a result, one or more 'non-breeding' feature waterbird populations at international designated sites can be present in all months of the year rather than simply the winter months. However, the autumn and winter months frequently see peak assemblage sizes, and colder temperatures in these months mean that prey resources and energy intake are of critical importance (with the implication that impacts, such as disturbance, may have greatest potential effects at this time). See **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation** for further discussion.

7.7.2.3 Indicated Offshore Ornithology Receptors and their Seasonality

615. **Table 7-18** shows the species observed to be present within the Array Area, and indications of their biologically defined seasons in UK waters as identified by Furness (2015).

Table 7-18 Species Observed to be Present within the Array Area plus Biologically Defined Seasons in UK Waters Identified as Appropriate for each Species

Species	J	F	M	A	M	J	J	A	S	O	N	D
Arctic skua												
Arctic tern												
Black-headed gull*												
Common gull*												
Common tern												
Fulmar												
Gannet												
Great black-backed gull												
Great northern diver												
Great skua												
Guillemot												
Herring gull												
Kittiwake												
Lesser black-backed gull												
Little auk*												
Little gull *												
Manx shearwater												
Mediterranean gull*												
Puffin												
Razorbill												
Sandwich tern												
Velvet scoter*												
White-billed diver*												
Notes:												

Species	J	F	M	A	M	J	J	A	S	O	N	D

- Source is Furness (2015) except for species marked *
- First row within species: red = full breeding season, grey = non-breeding period, white = breeding season generally absent from UK waters.
- Second row within species: dark blue = migration-free breeding season, pale blue = migration seasons, grey = winter season, white = species considered generally absent from UK waters.
- * = following Cramp & Simmons (1977, 1983, 1985) as not covered by Furness (2015).

616. Potential offshore ornithology receptors may include offshore bird species and populations which form qualifying features of designated sites within the existing environment, in proximity or within breeding foraging range of a) the Array Area and b) the wider Offshore Scoping Area. The Array Area does not overlap with any ornithological designations, but on the basis of the project location and the assessments undertaken for earlier projects in the Dogger Bank Offshore Development Zone, it is considered likely that the following designated sites will be of particular relevance to the assessment (but noting that a full list of SPAs and Ramsar sites relevant to the Project will be presented in the Habitats Regulations Assessment (HRA) Screening Report):

- Flamborough and Filey Coast SPA: Qualifying features include breeding gannet, guillemot, kittiwake, razorbill and the breeding seabird assemblage (also including fulmar, puffin, herring gull, (European) shag Gulosus aristotelis and great cormorant). This SPA is 207km at its nearest point from the Array Area and 3.7km at its nearest point from the offshore ECC. Therefore, the Project is within potential breeding season foraging range of gannet (mean maximum foraging range (MMFR) 315.2km + 1 standard deviation (SD, 194.2km) across studies in Woodward *et al.* (2019)), guillemot (MMFR 55.5km + 1 SD 39.7), razorbill (MMFR 73.8km + 1 SD 48.4km), kittiwake (MMFR 156.1km + 1 SD 144.5km) and all other components of the breeding seabird assemblage qualifying feature of the SPA; whilst the proposed array is only within the potential foraging range of gannet, kittiwake and some members of the seabird assemblage qualifying feature such as puffin (MMFR 137.1km + 1 SD 128.5km).
- Farne Islands SPA: Qualifying features include breeding Arctic tern, common tern, guillemot, roseate tern Sterna dougallii, Sandwich tern, and the breeding seabird assemblage (142,490 individual seabirds also including kittiwake, shag, cormorant, and puffin, as well as additional component species fulmar, black-headed gull, great black-backed gull, lesser black-backed gull, herring gull and razorbill as advised by Natural England (Berwick Bank Scoping Opinion, Natural England 2021)). This site is 278km at its nearest point from the Array Area and 178.8km at its nearest point from the offshore ECC. Therefore, the Project is within potential breeding season foraging range of kittiwake, puffin, and some members of the breeding seabird assemblage feature including lesser black-backed gull (MMFR 127km + 1 SD 109km) whilst the proposed array is within the potential foraging range of kittiwake and fewer members of the breeding seabird assemblage feature (Woodward *et al.* 2019).
- Forth Islands SPA: Qualifying features include breeding Arctic tern, common tern, gannet, lesser black-backed gull, puffin, roseate tern, Sandwich tern, shag, and the breeding seabird assemblage (also including cormorant, guillemot, herring gull, kittiwake and razorbill). This site is 348km at its nearest point from the Array Area and 252.7km at its nearest point from the offshore ECC. Therefore, the Project is within potential breeding season foraging range of gannet and members of the seabird assemblage qualifying feature (kittiwake), while the Array Area is within potential breeding season foraging range of gannet alone.

617. The impact assessment will consider potential for impacts as appropriate to each species that is a qualifying feature of these and other seabird SPAs with potential connectivity to the Project (via foraging range or non-breeding season movement into the Project Area and its surrounds).

618. The Offshore Scoping Area overlaps with the Greater Wash SPA, designated for offshore bird species. Qualifying features include breeding common tern, little tern *Sternula albifrons* and Sandwich tern, and non-breeding red-throated diver, common scoter and little gull *Hydrocoloeus minutus*. The overlap between the SPA and the Offshore Scoping Area as mapped comprises an inshore part of the export cable corridor plus the landfall AoS, and is approximately 70.7km^2, or 2.0% of the total area of the SPA (3,536km^2) – but the actual footprint of the construction, operation and decommissioning area would occupy only a fraction of this area.

619. The impact assessment will consider potential for impacts on all species which are qualifying feature species of the Greater Wash SPA. Little tern, common tern and Sandwich tern are scoped into the EIA on a precautionary basis. The breeding tern features of the Greater Wash SPA are designated as such because the boundary of the SPA protects the (intertidal and offshore) foraging habitats of terns breeding within the region. This includes terns breeding at SPAs where they are also a qualifying feature. However, the Greater Wash SPA is expansive and terns using the Greater Wash SPA in the breeding season are likely to use only areas of the SPA that are within foraging range of their breeding colonies. The indicative foraging ranges provided by Natural England are 6km for little tern, 15km for common tern and 'up to 54km' for Sandwich tern (Woodward *et al*. 2019). The Project is beyond these foraging ranges from the breeding SPAs indicated to be linked to Greater Wash SPA at citation – Humber Estuary SPA, North Norfolk Coast SPA, Breydon Water SPA (Natural England, 2023).

620. Other potential offshore ornithology receptors in addition to those indicated by the designated features of SPAs include great black-backed gull, common gull, black-headed gull, Mediterranean gull, little auk, great northern diver and white-billed diver as identified above from results of baseline digital aerial surveys. Furthermore, migratory non-seabirds (largely waterbirds but also some raptors and other landbirds (Wright *et al.* 2012)) will be considered by the impact assessment as potential offshore ornithology receptors, where the species' migratory corridors indicate that individuals are likely to pass through the Array Area during migratory passages. Such passages are under-recorded by conventional digital aerial surveys as they may occur in concentrated shorter periods or during nocturnal hours, therefore these receptors and impacts will be assessed via modelling existing published data and information (predominantly Wright *et al.* 2012) against the location of the wind farm within the North Sea.

7.7.2.4 Indicated Intertidal Ornithology Receptors

621. On the basis of the project location and the assessments undertaken for earlier projects in the Dogger Bank Development Zone, it is considered likely that the following designated sites will be of particular relevance to the assessment (but noting that a full list of SPAs and Ramsar sites relevant to the Project will be presented in the HRA Screening Report).

622. The Offshore Scoping Area (including all intertidal parts of the Scoping Area) overlaps with the Greater Wash SPA which includes within its boundary 'intertidal mudflats and sandflats' (JNCC, 2020). Among qualifying features of the SPA, tern species may use intertidal areas for foraging or resting. Natural England will be consulted in the first instance to confirm what survey or desk-based evidence will be required to confirm whether terns of the Greater Wash SPA, or other intertidal birds of conservation concern, utilise any intertidal habitats subject to habitat loss or disturbance due to the Project.

623. The Offshore Scoping Area and potentially relevant SPAs and Ramsar sites are presented on **Figure 7-19**.

624. Other potential intertidal ornithology receptors in addition to those indicated by the designated features of the Greater Wash SPA include gull species, and relatively small populations of waterfowl, waders, owls and raptors, as outlined above.

7.7.3 Potential Impacts

7.7.3.1 Potential Impacts during Construction

625. Potential impacts during the construction phase of the Project will arise from increased presence of vessels, plant, partially built structures, temporary construction compounds and other activity in intertidal (landfall) and offshore habitats. Physical disturbance of the seabed and intertidal substrate during the installation of foundations and cables also has potential to cause (indirect) impacts on birds via habitat or prey availability.

626. Impacts which span the life of the Project (e.g. indirect habitat loss or alteration) will be considered as part of the operation phase assessment (see **Section 7.7.3.2**) and are therefore not considered in the construction phase assessment to avoid duplication.

7.7.3.1.1 Disturbance and Displacement

627. The primary direct impact on intertidal and offshore ornithology receptors during construction is disturbance and displacement of birds due to construction activities and vessel movement during the installation of offshore and landfall infrastructure. Construction activities including mechanical cutting, piling and HDD produce noise above water (i.e. airborne noise), noise underwater and visual imposition, which can directly disturb or displace birds from otherwise suitable habitat. Vessel movements from base ports to construction locations, and between and within construction locations, can directly disturb and displace birds from their intertidal and offshore habitats. Displaced birds can enter habitats with different quality for foraging, resting or breeding; and different densities of competitors of their own or other species, potentially leading to increased mortality relative to natural baseline levels. Direct disturbance and displacement of intertidal and offshore ornithology receptors during construction is therefore scoped into the EIA as detailed below:

- Array construction: Assessment of construction phase displacement concerning the Array Area will be quantitative, following recent Natural England guidance on previous offshore wind applications (e.g. Natural England, 2018; Vattenfall 2019). Gannet, guillemot, razorbill and puffin are species scoped into this assessment.

- Offshore export cable construction: Assessment of displacement concerning construction in the offshore ECC will be quantitative for red-throated diver (given their presence in the area, status as qualifying features of designated sites and sensitivity to disturbance effects) following Natural England guidance (e.g. Vattenfall, 2019; Equinor, 2022). Assessment of displacement effects on all other offshore receptor species due to construction works in the offshore ECC will be qualitative within the EIA.

- Construction vessel movements: Effects of vessel movements on intertidal and offshore ornithology receptors during the construction phase are scoped in for further (qualitative) assessment within the EIA. Assessment will include consideration of embedded mitigation measures to reduce the potential for impacts on intertidal and offshore ornithology receptors. These will evolve over the development process as the EIA progresses and in response to consultation and thus will be fed iteratively into the assessment process. These measures include those that have been identified as good or standard practice and include actions that should be undertaken to meet existing legislation requirements. The development and adherence to a Vessel Code of Conduct (**Chapter 7.6 Marine Mammals, Section 7.6.3.1**) is considered a relevant embedded mitigation measure relevant to the assessment of this impact.

- Landfall and intertidal construction: Construction of the offshore export cables within the offshore ECC including landfall, as considered for the Offshore Scoping Area, also carry potential risk of disturbance and displacement to intertidal ornithology receptors. Disturbance and displacement are of potentially greatest impact during winter when baseline energetic demands of thermal regulation are highest (Alves *et al.* 2013), and addition of stressors and disturbance-related flights can potentially affect survival or mortality rates. Red-throated diver are sensitive to disturbance and displacement effects and despite being an offshore species may also be in effective proximity to intertidal construction when feeding – therefore can be considered an intertidal ornithology receptor. Assessment of construction phase displacement of intertidal receptors concerning the cable landfall will be both quantitative and qualitative.

7.7.3.1.2 Accidental Pollution

628. As accidental pollution during construction is scoped out of the EIA for marine water and sediment quality (see **Chapter 7.3 Marine Water and Sediment Quality, Section 7.3.3.2**), it is proposed that such impacts are also scoped out of the EIA for intertidal and offshore ornithology on the basis that embedded mitigation measures such as the development of and adherence to a PEMP, including a Marine Pollution Contingency Plan. Such mitigation measures will avoid the risk of significant pollution events, and therefore, both intertidal and offshore ornithology receptors are extremely unlikely to be impacted by accidental pollution. These measures will be secured in the draft DCO.

7.7.3.1.3 Indirect Impacts via Habitats or Prey Availability

629. Construction activities have the potential to cause temporary loss or physical disturbance to supporting habitats for birds and habitats or aggregations of their prey (see **Chapter 7.4 Benthic and Intertidal Ecology and Chapter 7.5 Fish and Shellfish Ecology**). Works at the landfall location could impact intertidal foraging, roosting or nesting habitats for intertidal ornithology receptors. Physical disturbance of the seabed and intertidal substrate around works in offshore habitat could impact benthic or water column foraging habitat for offshore ornithology receptors. These construction activities can cause temporary loss or alteration of prey habitat (including habitat used by prey species at other periods of their daily or life cycles), disturb and displace prey fish and invertebrates, or reduce foraging birds' ability (in particular those of water-column foragers such as divers, scoters, auks and terns) to access or capture prey that are present through loss or alteration of underwater habitats or reduced visibility (see **Chapter 7.2 Marine Physical Processes, Section 7.2.3.1** and **Chapter 7.3 Marine Water and Sediment Quality, Section 7.3.3.1**). Therefore, indirect impacts on intertidal and offshore ornithology receptors via changes to habitat or prey availability is scoped into the EIA for further consideration, taking into account the assessments made for benthic and intertidal ecology (see **Chapter 7.4 Benthic and Intertidal Ecology)** and fish and shellfish ecology (see **Chapter 7.5 Fish and Shellfish Ecology**).

7.7.3.2 Potential Impacts during Operation

630. Potential direct impacts on intertidal and offshore ornithology receptors during operation will result from direct collision, displacement or barrier effects of wind turbines and offshore infrastructure, and long-term loss or alteration of habitat from the physical presence of wind turbines and any other infrastructure above the seabed or at landfall. Potential impacts will also result from maintenance activities undertaken during the operational phase, with these being similar to some of the activities during construction (e.g. vessel movements) but of lesser extent and therefore lower magnitude.

631. Impacts of displacement and barrier effects on seabird species, which are associated with the Array Area, will be considered together, whilst barrier effects in relation to migratory non-seabirds will be considered separately.

7.7.3.2.1 Collision Risk

632. Birds in flight within the Array Area while foraging, commuting or migrating through the area, are at risk of collision with wind turbine blades when flying at heights encompassed by the rotor swept area. Such collisions are considered to lead to direct mortality. Collision risk due to presence of wind turbines during the operation phase is therefore scoped into the EIA.

633. The flight height distributions of bird species have previously been modelled from meta-analysis of flight height studies and data, by Johnston *et al.* (2014a; 2014b). For the seabird species, kittiwake and other gulls, skuas and gannet are amongst the species considered to be at greatest risk of collision with wind turbines due to these species occurring more frequently at rotor swept heights. Potential collision risk to all species will be considered via their densities in flight within the Array Area and via use of Collision Risk Modelling (CRM) in line with standard practices and guidance for UK offshore wind assessments (Band, 2012; McGregor *et al*. 2018; Natural England, 2022), as well as any relevant updates to guidance that may become available. It is intended that the estimation of collision mortality would be undertaken primarily on the basis of the stochastic CRM (sCRM, McGregor *et al.* 2018), Collision risk impacts to kittiwake and gannet are scoped in for detailed assessment based on high frequency and estimated abundance of these species in baseline surveys of the Array Area.

634. Migratory movements of non-seabirds offshore, taking place typically twice per year (respectively, autumn and spring passage) will also be considered via the position and size of the Array Area relative to species' main migratory fronts and application of the British Trust for Ornithology (BTO) Strategic Ornithological Support Services – Migration Assessment Tool (SOSS-MAT) (Wright *et al.* 2012) and migratory collision risk subsection of the Band (2012) collision risk spreadsheet, and any relevant updates. Collision risk to migratory non-seabirds is scoped into the EIA.

7.7.3.2.2 Disturbance and Displacement

635. Direct disturbance and displacement of intertidal and offshore ornithology receptors during operation is scoped into the EIA, as detailed below:

- Displacement due to presence of the operational Array Area: Foraging and resting birds in offshore waters could be displaced due to the presence of infrastructure (most notably the operating turbines) and associated activities (e.g. vessel traffic) within the Array Area, therefore this displacement effect is scoped into the EIA for further consideration. Displacement could potentially lead to birds having to use habitats with lower foraging value (e.g. due to reduced prey availability or increased competition), potentially reducing prey intake, which could in turn lead to increased mortality rates. Displacement from the Array Area (and appropriate surrounding buffer[8]) due to the presence of the wind turbines will be assessed using the matrix-based approach (UK SNCBs, 2017; Natural England 2022). This provides predictions of the potential displacement induced mortality on the basis of a range of potential species-specific rates for the displacement of birds from the Array Area and buffer and of mortality amongst the displaced birds. It is also assumed that this encompasses the impacts resulting from barrier effects during the operation phase since both birds on sea and in flight are considered (see **Section 7.7.3.2.4**). Species for which displacement from the Array Area and appropriate buffer will be assessed are diver species, gannet, guillemot, razorbill and puffin, with the assumed rates of displacement and of mortality amongst displaced birds to be applied for each species being determined within the context of current guidance and best available evidence.

[8] For most seabird species a buffer of 2km is used although for particularly sensitive species (e.g. red-throated diver) the buffer may be considerably larger (UK SNCB 2017; UK SNCB, 2022).

- Disturbance and displacement in areas other than the Array Area: Maintenance activities and increased vessel movements have potential to cause disturbance and displacement at other locations including (but not limited to) the offshore ECC, landfall, and adjacent intertidal and marine areas through or past which vessels are transiting between ports and the Project Area for maintenance purposes. Much of this activity will occur as described for construction activities (see **Section 7.7.3.1**) but smaller in extent and therefore of a lower magnitude. Disturbance and displacement outside the Array Area during the operation phase is scoped into the EIA for further consideration and will be assessed quantitatively for red-throated diver (given their presence in the area, status as qualifying features of designated sites and sensitivity to disturbance effects) following Natural England guidance (e.g. Vattenfall 2019, Equinor 2022) and qualitatively for all other receptors.

7.7.3.2.3 Accidental Pollution

636. As accidental pollution during operation is scoped out of the EIA for marine water and sediment quality (see **Chapter 7.3 Marine Water and Sediment Quality, Section 7.3.3.2**), it is proposed that such impacts are also scoped out of the EIA for intertidal and offshore ornithology on the basis that embedded mitigation measures such as the development of and adherence to PEMP, including a Marine Pollution Contingency Plan. Such mitigation measures will avoid the risk of significant pollution events, and therefore, both intertidal and offshore ornithology receptors are extremely unlikely to be impacted by accidental pollution. These measures will be secured in the project draft DCO.

7.7.3.2.4 Barrier Effects

637. Operational wind turbines can result in birds perceiving the turbine array as an obstruction and altering their flight paths to avoid entering the Array Area. This includes the possibility that they will circumvent the Array Area when commuting to and from foraging areas, with the potential consequences of such effects likely to be greatest during the breeding season, when (as central place foragers) seabirds are frequently commuting between the nesting colony and foraging areas to provision chicks. In such circumstances, barrier effects may substantially increase flight distances (and times) and increase energy expenditure, potentially leading to impacts on survival rates or breeding productivity. For seabird species, the impacts from barrier effects are assumed to be encompassed within the assessment of displacement from the Array Area and appropriate buffer[8] during operation (and as determined using the matrix approach (UK SNCBs, 2017)), noting that it is the same species that are considered susceptible to both displacement and barrier effects.

638. A barrier effect can also occur for birds migrating through the Array Area, potentially causing longer migratory paths and impacting population dynamics of migrant birds. Barrier effects on intertidal and offshore ornithology receptors due to presence of wind turbines during the operation phase is therefore scoped into the EIA on a precautionary basis. Barrier impacts will be assessed a) within quantitative assessment (in tandem with displacement impacts) for seabird receptors and b) qualitatively for migratory non-seabird receptors.

7.7.3.2.5 Indirect Impacts via Habitats or Prey Availability

639. The presence of foundations on the seabed, cable / scour protection, pillars in the water column and any erosion protection to the offshore export cable such as rock or concrete mattresses, would result in long-term loss or alteration of supporting habitat for offshore ornithology receptors (albeit a relatively small footprint in the context of the scale of habitat available in the region and the scale of foraging ranges and other ranging behaviour of many offshore bird species). The presence of any above ground protection of the export cable at the landfall would result in long-term loss or alteration of supporting habitat for intertidal ornithology receptors. The loss or alteration of habitat could entail long-term loss or alteration of prey habitat (including habitat used by prey species at other periods of their daily or life cycles), and / or cause long-term displacement of prey fish and invertebrates. The potential for intertidal and offshore infrastructure to increase prey habitat availability e.g. as an anchoring structure for sessile invertebrates will also be considered. It is proposed that indirect impacts on intertidal and offshore ornithology receptors via long-term loss or alteration of habitat or prey availability during the operation phase is scoped into the EIA for further consideration.

640. It is also acknowledged that there is potential for long-term habitat loss or alteration following decommissioning which is dependent on infrastructure removal. These impacts will be assessed and considered as part of the operational phase assessment.

641. As for construction, there is potential for physical disturbance of the seabed and intertidal substrates during the operation phase from maintenance activities such as excavation and reburial of cables. These activities could cause temporary intertidal, benthic or water column habitat loss for intertidal and offshore ornithology receptors and / or their prey. In general, the impacts from planned maintenance should be temporary, localised and smaller in scale than during construction. It is proposed that indirect impacts via temporary habitat loss or physical disturbance of prey during the operation phase is scoped into the EIA for further consideration.

7.7.3.3 Potential Impacts during Decommissioning

642. It is anticipated that any decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower due to the smaller scale. For example, noise impacts would be lower due to absence of piling, and there would therefore be less indirect impacts on birds through potential disturbance to prey species.

643. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-19**).

7.7.4 Potential Cumulative Effects

644. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect intertidal and offshore ornithology receptors. Therefore, cumulative effects related to intertidal and offshore ornithology are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**, and any current best practice provided in Natural England Phase III Best Practice for Data Analysis and Presentation at Examination (Natural England, 2022).

645. The CEA will consider cumulative displacement / barrier effects and collision risk due to the presence of offshore infrastructure when considered alongside other projects.

7.7.4.1.1 Potential Transboundary Effects

646. Due to the likelihood that breeding seabirds of important populations or international designated sites may be present in the Offshore Scoping Area as a result of long-distance foraging, movement into the area during non-breeding periods or migration through the area, there is potential for transboundary effects upon offshore ornithology receptors due to the Project's construction, O&M and decommissioning activities.

647. Examples are SPAs in additional countries which include Manx shearwater or lesser black-backed gull as breeding qualifying features. The breeding foraging ranges of these species can result in potential for connectivity between individuals breeding at the SPA and the Array Area, dependent on the respective locations of the designated sites and the wind farm. SPA and Ramsar sites outside of the UK will be screened in or out for potential transboundary effects based on foraging ranges of breeding seabird qualifying features, and the distance of these sites from the Offshore Scoping Area.

7.7.4.1.2 Summary of Scoping Proposals

648. **Table 7-19** outlines the intertidal and offshore ornithology impacts which are proposed to be scoped in or out of the EIA. These may be refined through the EPP and other consultation activities (see **Chapter 6 Consultation**), and as additional project information and site-specific data become available.

Table 7-19 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Intertidal and Offshore Ornithology

Potential Impact	Ornithology Receptors where Scoped In	Construction	Operation	Decommissioning
Direct disturbance and displacement due to work activity in the Array Area, offshore ECC or landfall	Intertidal and Offshore	✓	✓	✓
Direct disturbance and displacement due to presence of wind turbines and other offshore infrastructure	Offshore (red-throated diver, gannet, auks)	✓	✓	✓
Barrier effect due to presence of wind turbines and other offshore infrastructure	Offshore (including migratory non-seabirds)	X	✓	X
Accidental pollution	Offshore and intertidal receptors	X	X	X
Indirect Impacts via Habitats or Prey Availability	Intertidal and Offshore	✓	✓	✓
Collision risk	Offshore (kittiwake, gannet, migratory non-seabirds)	X	✓	X
Cumulative impacts	Offshore and intertidal receptors	✓	✓	✓
Transboundary impacts	Offshore	✓	✓	✓

7.7.5 Approach to Data Gathering

649. As part of the EIA process, the existing environment with respect to intertidal and offshore ornithology will be described, including, but not limited to the following:

- The offshore ornithological baseline is established through a programme of monthly digital aerial surveys of the Array Area plus a 4km buffer (as per Natural England, 2022), over a 24-month period. The survey programme commenced in October 2021 and concluded in September 2023. The survey area for site-specific (digital aerial) baseline surveys for characterising the offshore ornithology baseline for the Project comprises the Array Area and a 4km buffer area surrounding the Array Area.
- Mean densities of flying birds of each species per calendar month across the baseline survey programme will be determined for use in standard Collision Risk Modelling;
- Peak abundance of birds (flying and sitting on the sea combined) within the Array Area plus an appropriate buffer area, will be determined for all species in each biologically relevant season considered for the species in UK waters (Furness, 2015). Mean peak abundances per season will be calculated for use in displacement estimation;
- The intertidal ornithological baseline will be established through a programme of monthly direct counting surveys (following BTO Wetland Bird Survey (WeBS) methodology) of birds in intertidal areas relevant to landfall or other intertidal construction for the Project. Spatial coverage will be achieved through vantage points plus walked transects as appropriate to view intertidal habitats. The Project is committed to one year of baseline surveys spanning the autumn passage, winter and spring passage periods (overall August to May). (The intertidal Study Area will also be covered by baseline breeding bird survey visits.) The sufficiency of this baseline survey programme for informing impact assessment will be discussed and agreed through the EPP. The survey programme will commence in August 2024 and is due to conclude in May 2025. The survey area as defined for site-specific surveys for characterising the intertidal ornithology baseline of the Project is shown on **Figure 7-19**.
- Peak abundances, foraging locations and roost locations of intertidal birds will be identified for use in assessing risk of disturbance from activities associated with the Project.

650. To achieve the above, the intertidal and offshore ornithology survey data from, respectively, the land-based and digital aerial surveys, will be analysed alongside the datasets and guidance materials in **Table 7-20** to inform characterisation of the existing environment. Any new data, tools or industry standard guidance which becomes available for EIA / HRA of offshore wind farms and birds will be taken into account as appropriate.

Table 7-20 Desk-Based Data Sources for Intertidal and Offshore Ornithology

Data Source	Date	Data Contents
Seabird Populations of Britain and Ireland (Mitchell *et al.* 2004)	2004	Seabird population estimates (regional, biogeographic region) following the Seabird 2000 national UK seabird census.
Dogger Bank A & B ornithology technical report (Burton *et al.* 2013)	2010/11	Boat-based surveys and aerial surveys of the Dogger Bank Zone between 2010 and 2011 with species accounts for the DBA and DBB array areas.
Dogger Bank A & B intertidal wintering bird baseline data	2011/12	Wintering waterbird peak counts for the coast between Ulrome and Barmston.
Band Collision Modelling Tool (Band, 2012)	2012	Collision risk modelling tool.
SOSS-05: Assessing the risk of offshore wind farm development to migratory birds designated as features of UK Special Protection Areas (SPA) (and other Annex 1 species) – BTO SOSS-MAT (Wright *et al.* 2012)	2012	Migration front, population and collision risk modelling tool and accompanying literature review, data and maps.
Dogger Bank Teesside A and B baseline survey data	2012	Boat-based and aerial survey data from the offshore Study Area for Dogger Bank Teesside A and B projects which in part overlie the DBD survey area.
Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas (Thaxter *et al.* 2012)	2012	Synthesis and summarising statistics of seabird breeding season foraging ranges (across tracking or tagging studies).
Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland (Balmer *et al.* 2013)	2013	Distributions of occurrence, breeding evidence, and spatial variation in population trend, for British bird species.
Waterbird disturbance mitigation toolkit. Informing estuarine planning and construction projects. Version 3.2. (Cutts *et al.* 2013)	2013	Waterbird disturbance thresholds (noise levels, distances) with respect to noise from construction and aircraft, and to approach by workers and plant.
Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines' (Johnston *et al.* 2014a; Johnston *et al.* 2014b)	2014	Bird flight height distributions of seabirds, estimating frequencies of birds flying in 1m height bands 0 to 300m.
Non-breeding season populations of seabirds in UK waters: Population sizes for BDMPS (Furness, 2015)	2015	Bird population estimates; seasonality of each seabird species in UK waters (breeding, non-breeding / winter / migration seasons); apportioning estimates of SPA breeding adults to North Sea non-breeding populations.
BTO Non-Estuarine Waterbird Survey (NEWS)	1985, 1997/98, 2006/07, 2015/16	Non-estuarine waterbird peak winter counts for the coast from Hilderthorpe to Skipsea.
Avian stochastic collision risk model (MacGregor *et al.*, 2018)	2018	Collision risk modelling tool incorporating stochasticity in model parameters.
Flamborough and Filey Coast seabird tracking data	2018 (ongoing)	Site-specific tracking data from kittiwake and other seabirds of Flamborough and Filey Coast SPA.
Desk-based revision of seabird foraging ranges used for HRA screening (Woodward *et al.* 2019)	2019	Synthesis and summarising statistics of seabird breeding season foraging ranges (across tracking or tagging studies).
A ship traffic disturbance vulnerability index for North-west European seabirds as a tool for marine spatial planning (Fliessbach *et al.* 2019)	2019	Scored sensitivity or vulnerability of seabird species to disturbance and displacement in offshore environment.
Seabird Mapping & Sensitivity Tool (SeaMaST)	2019	Mapped use of English territorial waters by seabirds and waterbirds based on distance sampling modelling analysis of boat-based and aerial survey data 1979 to 2012.
Marine Ecosystem Research Programme	2018	Top predator maps.
BTO Wetland Bird Survey (WeBS) report online and data (Woodward *et al.* 2024)	2022/23	Waterfowl, wader gull and tern count data from the BTO WeBS national survey. Data providing annual and peak population estimates for countries and regions and for specific SPAs, Sites of Special Scientific Interest (SSSI), estuaries, etc. WeBS Alerts highlight short, medium and long term significant changes in population and include summaries of likely drivers of change.

Data Source	Date	Data Contents
SPA citations / departmental briefs / conservation objectives / further conservation advice on marine sites (seasonality, advice on operations, supplementary conservation objectives) from websites of SNCB (Natural England Designated Sites View, NatureScot Sitelink) and Ramsar Sites Information Service (rsis.ramsar.org)	2022	SPA and Ramsar qualifying interests, bird population estimates at citation and at update, conservation objectives and supplementary information.
Seabird Tracking Database	2023	Open seabird tracking data from UK colonies including within SPAs.
Seabird Monitoring Programme Database (JNCC, BTO)	2024	Seabird population estimates (regional, national, SPA, colonies).
eBird (Cornell Lab of Ornithology, Ithaca NY USA)	2024	Open and global bird observation data including abundance, maps of observations and reporting rate as an indicator of species' frequency and abundance.
Trektellen	2024	Open European bird migration passage data including species, abundance and direction data for specific sites and dates plus aggregate datasets and statistics.
Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping (Cleasby *et al.* 2018; Cleasby *et al.* 2020)	2018 and 2020	Modelled seabird utilisation distributions in UK waters during the breeding season.
Natural England Phase I Best Practice for Baseline Characterisation Surveys	2022	Recommendations for baseline survey design and standardisation.
Natural England Phase III Best Practice for Data Analysis and Presentation at Examination, Version 1, March 2022	2022	Recommendations of bird biometrics and behaviour data (nocturnal activity, micro / meso-avoidance rates) for use in collision risk modelling. (Phase III covers data and evidence expectations at examination).
Annex C of Natural England Note 'Highly Pathogenic Avian Influenza (HPAI) outbreak in seabirds and Natural England	2022	Advice on impact assessment and HPAI (specifically relating to offshore wind).
Seabirds Count (Burnell *et al.* 2023)	2015-2021	Seabird population estimates (regional, biogeographic region) following the Seabirds Count (2016-2021) national UK seabird census, and a comparative dataset for Seabird 2000 and Seabirds Count (revised 13 December 2023).
Dogger Bank D – digital aerial survey data	2021-23	Digital aerial surveys conducted by APEM Ltd on a monthly basis between October 2021 and September 2023 inclusive.
Relevant documents from previous applications and assessments for offshore wind farms in the North Sea and Channel	n/a	Baseline data, modelling results, EIA and HRA assessments and species studies from other offshore wind developments.
Relevant ecological studies for species included in EIA and HRA, including peer-reviewed scientific papers, academic theses and 'grey' literature	n/a	Field and other observational / experimental data or synthesised ecological information on species relevant to assessment.

651. Information from other surveys carried out in the vicinity of the Offshore Scoping Area will be utilised during the assessment, such as those undertaken for other proposed or operational wind farms in the Dogger Bank and Greater Wash areas. Validity of past survey data will partly be based on how recently it was collected, and aerial digital surveys are considered less likely to have had confounding influence on the at-sea distribution or presence of birds than boat-based surveys in the same area.

652. The project specific baseline surveys have been or will be undertaken to inform the assessment. Surveys will be undertaken in accordance with Overarching NPS EN-1 and NPS EN-3 and agreed in advance with Natural England where required. **Table 7-21** outlines the proposed baseline surveys to be carried out.

Table 7-21 Proposed Baseline Surveys for Intertidal and Offshore Ornithology

Survey	Timing	Spatial Coverage
Digital aerial surveys for offshore ornithology baseline, following line transect methodology	24 months including two full breeding seasons (carried out between 2021 and 2023).	Array Area plus 4km surrounding buffer areas.
Land-based surveys of intertidal ornithology baseline, following adapted BTO Wetland Bird Survey (WeBS) methodology	One full overwintering and passage period comprising one high tide and one low tide visit per month from August 2024 to mid-May 2025, inclusive (on combined single visits or separate visits dependent on available daylight versus tidal cycle). Duration up to 4 hours per high or low tide survey. Full survey programme will include coverage of both spring and neap tides.	Intertidal and immediate inshore marine habitat of the Project Area.

7.7.6 Approach to Assessment

653. The impact assessment methodology will be based on that described in NPS EN-1 and EN-3 and aligned with the key guidance documents on best practice such as Natural England Phase III Best Practice for Data Analysis and Presentation at Examination (UK SNCBs, 2014; Natural England, 2022). The assessment approach will use a 'source-pathway-receptor' model. Further liaison with key stakeholders, Natural England and the Royal Society for the Protection of Birds (RSPB), will be undertaken to agree the specific assessment methodology.

654. Detailed data analysis for the assessment will include the calculation of design-based abundance and density estimates (with associated confidence intervals and levels of precision) and will consider seasonal differences in site use by each species, as well as importance of the Project area for the life stages of each species (breeding and non-breeding, adult and immature). Reference populations for each species during different biologically relevant seasons (Furness, 2015) for the assessment will be based on the best available information at the time of undertaking the assessment and will be agreed with stakeholders. Consideration of connectivity with SPAs and Ramsar sites will be provided in the assessment and will also be subject to consultation with stakeholders.

655. With respect to the assessment that will be undertaken for the Project, the generic flight height data (Cook *et al.* 2012, Johnston *et al.* 2014a; Johnston *et al.* 2014b) will be used in the standard collision risk model, likely using the stochastic collision risk model tool (McGregor *et al.* 2018) specifying Option 2 outputs (subject to discussion with stakeholders).

656. The sensitivity of each species will be determined based on the size of its population, its conservation status and its known sensitivity to offshore wind farms. Species identified as sensitive receptors will be subject to impact assessment in line with the potential impacts listed in **Table 7-19.**

657. A wide range of other relevant literature will be consulted during the assessment, for example studies assessing foraging ranges across tracking studies (Thaxter *et al.* 2012; Woodward, 2019), flight speeds and behaviour at offshore wind farms, effects of noise and visually obtrusive objects on birds and their prey, and studies on the impacts of specifically offshore wind development on seabirds.

658. Intertidal and offshore ornithology will be included within the EPP (as set out in **Chapter 6 Consultation**) and further liaison with key stakeholders will take place to agree the approach to data collection, and the specific assessment methods to be employed as part of the EIA process.

7.7.7 Scoping Questions to Consultees

659. The following questions are posed to consultees to help them frame and focus their response to the intertidal and offshore ornithology scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the methodology by which the existing and baseline environment is characterised?
- Have all the intertidal and offshore ornithology impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the intertidal and offshore ornithology impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.8 Commercial Fisheries

660. This chapter of the Scoping Report considers the potential likely effects of the Project associated with commercial fisheries, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

661. The commercial fisheries assessment covers fishing activity that is legally undertaken in which the catch is sold for taxable profit.

662. The commercial fisheries assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

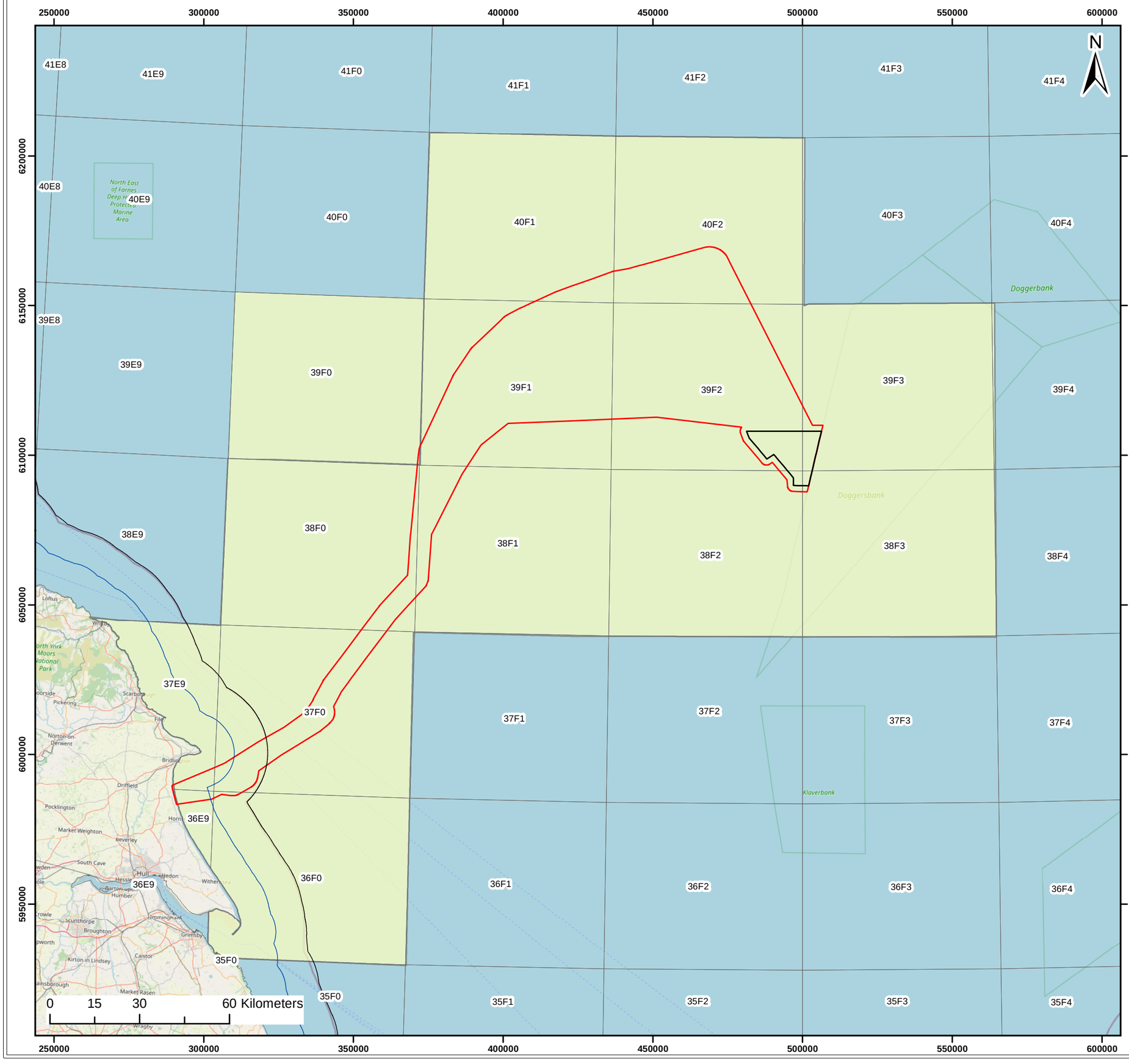
- **Chapter 7.5 Fish and Shellfish Ecology;**
- **Chapter 7.9 Shipping and Navigation;** and
- **Chapter 7.13 Other Marine Users.**

7.8.1 Study Area

663. The Offshore Scoping Area is located within the western portion of the International Council for the Exploration of the Sea (ICES) Division 4b (Central North Sea) statistical area[9], within UK EEZ waters, with the Array Area and large portion of the offshore ECC located outside of the 12nm limit. For the purpose of recording fisheries landings, ICES Division 4b is divided into statistical rectangles which are consistent across the UK and European Member States operating in the North Sea.

664. The Array Area is located primarily in ICES rectangles 39F2, with relatively smaller areas of overlap with ICES rectangles 39F3, 38F2 and 38F3. The offshore ECC is located within portions of several ICES rectangles. Based on this spatial overlap of the Project's boundaries with ICES rectangles, the Commercial Fisheries Study Area (hereafter referred to as 'the Study Area') has been defined as the following fourteen ICES rectangles 36E9, 36F0, 37E9, 37F0, 38F0, 38F1, 38F2, 38F3, 39F0, 39F1, 39F2, 39F3, 40F1 and 40F2. The Study Area is shown on **Figure 7-20**.

[9] ICES standardise the division of sea areas to enable statistical analysis of data. Each ICES statistical rectangle is '30 min latitude by 1-degree longitude' in size (approximately 30 x 30nm). A number of rectangles are amalgamated to create ICES statistical areas.



Legend:

- DBD Array
- Offshore Scoping Boundary
- Commercial Fisheries Study
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Commercial fisheries study area

Figure:	Drawing No:				
7-20	Rev 1.0				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.8.2 Existing Environment

7.8.2.1 Baseline Data

665. An initial desk-based review of literature and data sources was undertaken to support this scoping exercise, as presented in **Table 7-22**.

Table 7-22 Commercial Fisheries Scoping Exercise Data Sources

Data Source	Summary	Spatial Coverage in Relation to the Project
Landings statistics for the period 2018 to 2022. Sourced from the Marine Management Organisation (MMO) and the European Union Data Collection Framework (EU DCF). Note EU DCF data is only available up to 2016 by ICES rectangle. More recent landings statistics will be analysed within the PEIR and ES as they become available.	Fisheries landings data for registered fishing vessels landing to their home nation ports.	UK national and European-wide datasets providing full coverage of the Study Area.
Vessel Monitoring System (VMS) data, for the period 2016 to 2020. Sourced from ICES (2016 to 2020 data) and the MMO (2019 data). Note that the most recent data has been presented in this Scoping Report and is considered representative, but that longer term datasets will be analysed within the PEIR and ES.	VMS data for fishing vessels greater than 12m or 15m in length. Note that UK vessels ≥12m in length have VMS on board, however, to date, the MMO provide amalgamated VMS datasets for ≥15 m vessels only. VMS data sourced from MMO displays the first sales value (£) of catches. VMS data sourced from ICES displays the surface Swept Area Ratio (SAR) of catches by different gear types and covers EU (including UK) registered vessels 12m and over in length. Surface SAR indicates the number of times in an annual period that a demersal fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity.	UK national and European-wide datasets providing full coverage of the Study Area.
Fishing vessel route density data, for 2022. Sourced from the European Maritime Safety Agency (EMSA). Note that the most recent data has been presented in this Scoping Report and is considered representative, but that longer term datasets will be analysed within the PEIR and ES.	Fishing vessel route density, based on vessel Automatic Information System (AIS) positional data. AIS is required to be fitted on fishing vessels ≥15m length.	European-wide dataset providing full coverage of the Study Area.

666. It should be noted that the quantitative datasets identified in **Table 7-22** do not all capture all commercial fisheries activity in the Study Area. For instance, the VMS datasets only covers vessels ≥12m (ICES data) or ≥15m (MMO data) in length. However, in addition to VMS data, other published data can be expected to provide a useful insight into commercial fisheries activity undertaken in inshore areas (e.g. including a number of Inshore Fisheries and Conservation Authority (IFCA) publications and surveillance data). Consultation with fisheries stakeholders and industry is expected to further inform assessment in the PEIR / ES. Consultation will be undertaken to seek to corroborate the findings of desk-based baseline data analysis and to provide insight into specific fishing grounds and activity of any vessels active in the area. Consultation will also be important to inform gear specifications for vessels active in the area, which will allow a full understanding of how different vessels and different gear configurations may be affected.

667. Variations and trends in commercial fisheries activity are an important aspect of the baseline assessment and is the principal reason for considering up to five years of key baseline data. Given the time periods considered in this scoping exercise (i.e. 2018 to 2022), existing baseline data is expected to capture potential changes in commercial fisheries activity resulting from the coronavirus pandemic (COVID-19), which is understood to have temporarily affected market demand and supply chains. However, ongoing changes in fishing patterns resulting from the withdrawal of the UK from the EU and the introduction of new fisheries byelaws and associated fishing restrictions would also be expected in future data sets, which include data for 2022 onwards. Long term environmental and climatic changes may be expected to be detectable within the five-year time series but may benefit from longer-term analysis dependant on the target species. Inclusion of such longer-term analysis will be informed by stakeholder consultation.

668. Following withdrawal of the UK from the EU, a Trade and Cooperation Agreement (TCA) has been agreed between parties, applicable on a provisional basis from 1st January 2021. The TCA sets out fisheries rights and confirms that from 1st January 2021 and during a transition period until 30th June 2026, UK and EU vessels will continue to access respective EEZs (12 to 200nm) to fish. In this period, EU vessels will also be able to fish in allocated parts of UK waters, typically between 6nm to 12nm, where historic rights allow access by the fishing fleets of authorised EU Members States.

669. Access rights of foreign vessels to UK EEZ waters will remain until at least the end of 2026 with reducing quotas, after which rights will be subject to the conclusion of negotiated agreements. In addition to access rights, the TCA requires that 25% of the EU's fisheries quota in UK waters will be transferred to the UK over the five-year transition period. Overall, the biggest gains for UK fleets targeting the North Sea are for pelagic and demersal stocks, including mackerel, sole and herring. The PEIR / ES will further consider likely changes to the future baseline, primarily associated with withdrawal from the EU, taking into account planned changes in quota allocation.

670. The implications of recently enacted fisheries byelaws on commercial fisheries activity in the Study Area are considered in **Section 7.8.2.2.3** and **Section 7.8.2.3**.

7.8.2.2 Baseline Environment

7.8.2.2.1 Landings Data

7.8.2.2.1.1. UK Fishing Activity

671. Landings from the Study Area by UK-registered vessels had an average value of £31.2 million across the period 2018 to 2022 (MMO, 2023a). **Plate 7-2** and **Plate 7-3** show landings values and volumes across this time period for each ICES rectangle within the Study Area, highlighting relatively high landings values in rectangles 36F0, 37E9 and 37F0, within which the western portion of the offshore ECC is located. Landings from ICES rectangle 36F0 accounts for 39% of the total value of UK landings from the Study Area, and landings from rectangles 37E9 and 37F0 account for 23% and 18% of the total value, respectively. Across the 2018 to 2022 period, UK landings showed relative consistency, with a slight decline in 2020 likely to reflect the effects of the COVID-19 pandemic, increasing in 2021 before returning to approximately 2018 / 19 levels in 2022.

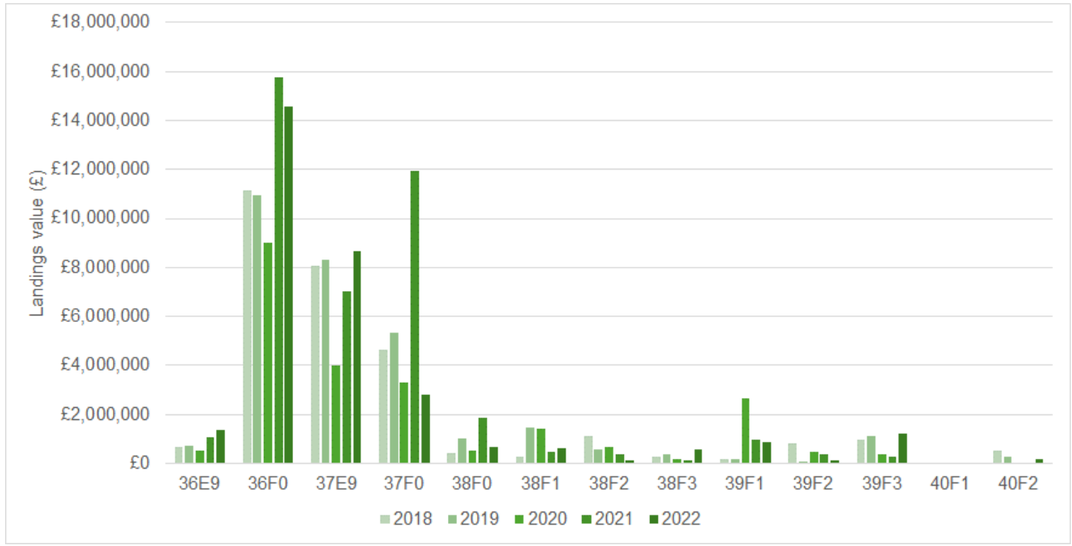


Plate 7-2 Annual Landings Value (£) by UK-Registered Vessels from the Commercial Fisheries Study Area, by ICES Rectangle, between 2018 and 2022 (MMO, 2023)

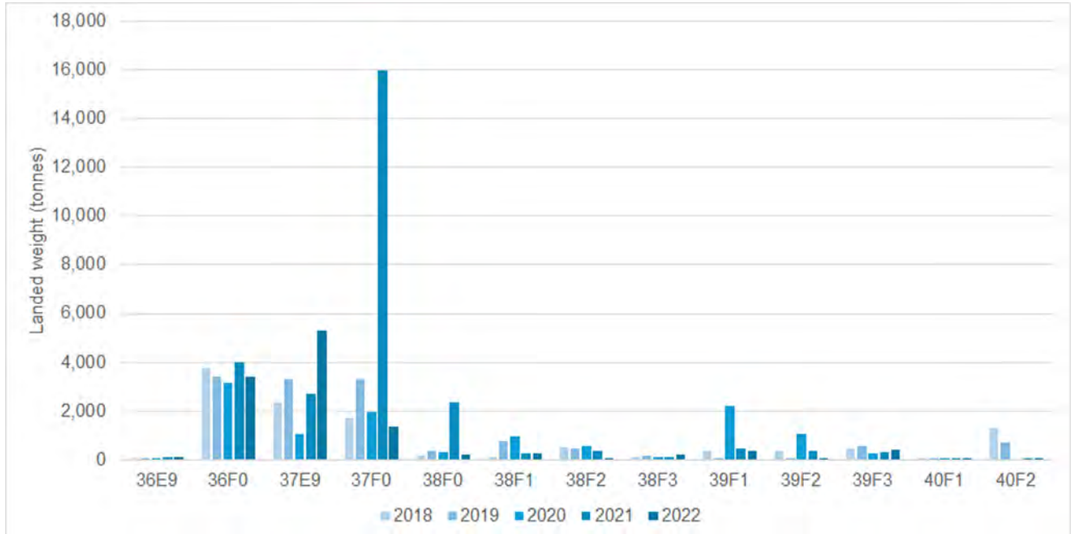


Plate 7-3 Annual Landings Weight (Tonnes) by UK-Registered Vessels from the Commercial Fisheries Study Area, by ICES Rectangle, between 2018 and 2022 (MMO, 2023)

672. **Plate 7-4** shows the key species landed from the Study Area. Shellfish species, most notably lobster *Homarus gammarus* and brown crab *Cancer pagurus* but also scallops *Pecten maximus*, Norway lobster *Nephrops norvegicus* and whelks *Buccinum undatum*, account for approximately 80% of total landings from the Study Area by value. Between 2018 and 2022, annual landings of shellfish were relatively consistent, with a dip in landings observed in 2020 likely to reflect effects of the COVID-19 pandemic.

673. Landings of demersal fish species, including plaice *Pleuronectes platessa* and turbot *Scophthalmus maximus* account for approximately 9% of total landings from the Study Area by value and have shown a continuous decline across the five-year study period. Landings of pelagic species from the Study Area by UK-registered vessels have historically been very low but showed a substantial spike in 2021 which landings data indicate is associated with herring *Clupea harengus* catches in the month of September in 2021.

674. **Plate 7-5** shows the key fishing gear types utilised across the Study Area. The largest proportion of landings are attributed to potting gear. Use of demersal otter trawls and beam trawls by UK-registered vessels in the Study Area has declined over the 2018 to 2022 period, correlating with the observed decline in landings of demersal species over the same period. Dredge gear targeting scallops has remained relatively consistent over the same period. Use of pelagic gear is only identified in the landings data in 2021 and 2022, and not in previous years within the study period. This is likely a reflection of the transient and highly mobile nature of pelagic shoaling fish, whereby landings are not associated with highly specific or consistent grounds.

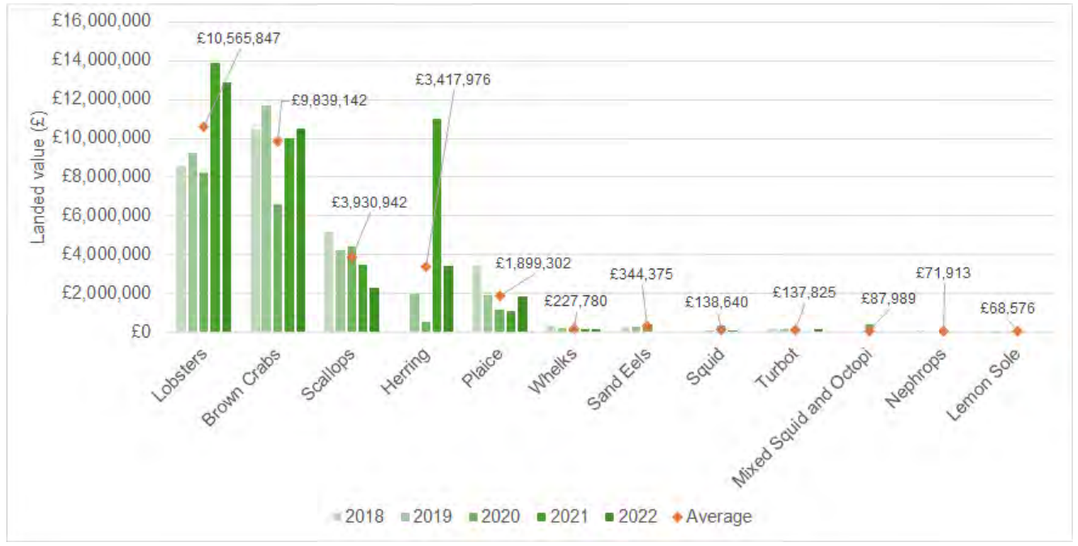


Plate 7-4 Annual Landings Value (£) by UK-Registered Vessels from the Commercial Fisheries Study Area, by Key Species, between 2018 and 2022 (MMO, 2023)

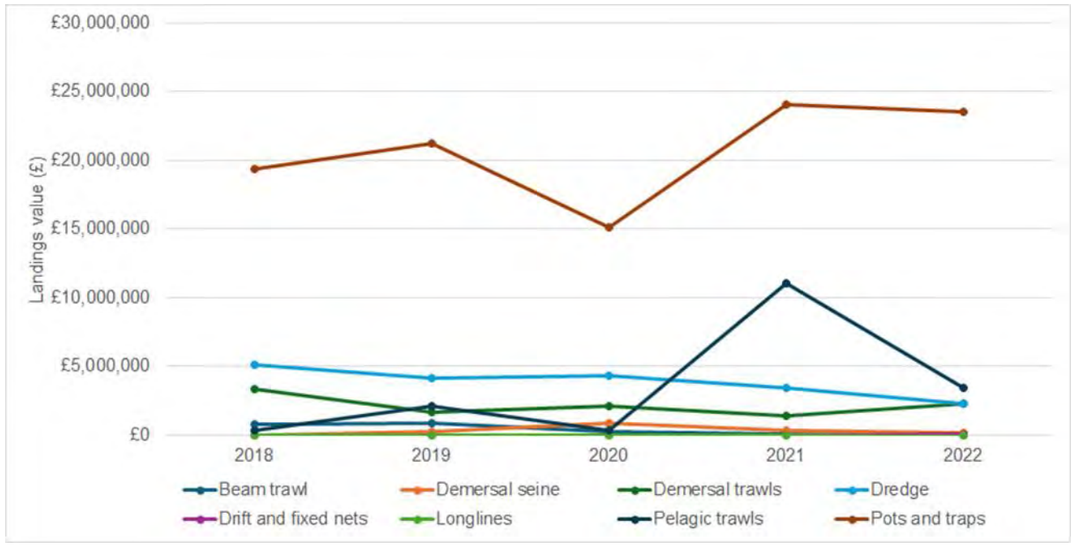


Plate 7-5 Annual Landings Value (£) by UK-Registered Vessels from the Commercial Fisheries Study Area, by Key Fishing Gear, between 2018 and 2022 (MMO, 2023)

675. Landings data indicates that across the 2018 to 2022 period, and across the Study Area, English-registered fishing vessels accounted for approximately 74% of total landings, with Scottish-registered vessels accounting for 24%. Vessels accounting for the majority of landings by both weight and were within the following vessel length categories: over 40m, 24m to 40m, and 12m to 15m. Key UK ports receiving landings from the Study Area include Bridlington, Scarborough, Grimsby, Hartlepool and Whitby. Non-UK ports including Floro (Norway), Scheveningen and Harlingen (Netherlands) also receive landings from the Study Area.

7.8.2.2.1.2. EU Fishing Activity

676. Landings from the commercial fisheries Study Area by EU-registered vessels have been analysed using data sourced from the EU DCF database covering two different time periods. The first source covers the period 2012 to 2016 and is usefully disaggregated at the level of individual ICES rectangle. The second source provides landings data up to 2021 but is available only at ICES division level (i.e. the central North Sea) and so whilst more recent, is less helpful in terms of understanding EU fishing activity across the Study Area.

677. **Plate 7-6** presents landings by both UK and non-UK fishing vessels from the Study Area between 2012 and 2016. The data indicates limited EU vessel activity in the inshore ICES rectangles, with relatively high levels of activity in those rectangles beyond the 12nm limit. Historically, a Danish sandeel *Ammodytes marinus* fishery was active in the Study Area, which has declined substantially since the 2000's, and it is noted that as of March 2024 the UK government has prohibited the fishing of sandeels within the English waters of ICES Area 4 (North Sea) by vessels of any nationality.

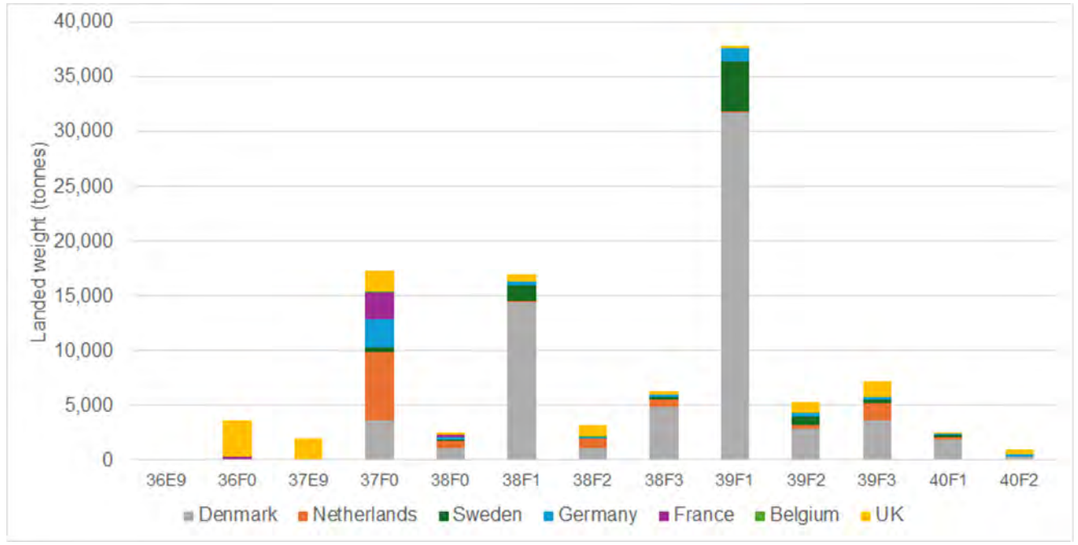


Plate 7-6 Average Annual Landed Weight (Tonnes) by UK and EU Vessels from the Commercial Fisheries Study Area, by ICES Rectangle, between 2012 and 2016 (EU DCF, 2023)

678. **Plate 7-7** presents landings by EU fishing vessels from ICES division 4b, operating in the UK EEZ (i.e. a large area of the central North Sea of significantly greater extent than the Study Area) In 2021. The data indicates the presence of fishing vessels from the Netherlands, Denmark, Germany, France, Belgium and Sweden, with vessels using demersal trawls, beam trawls and flyseine methods to primarily target demersal fish.

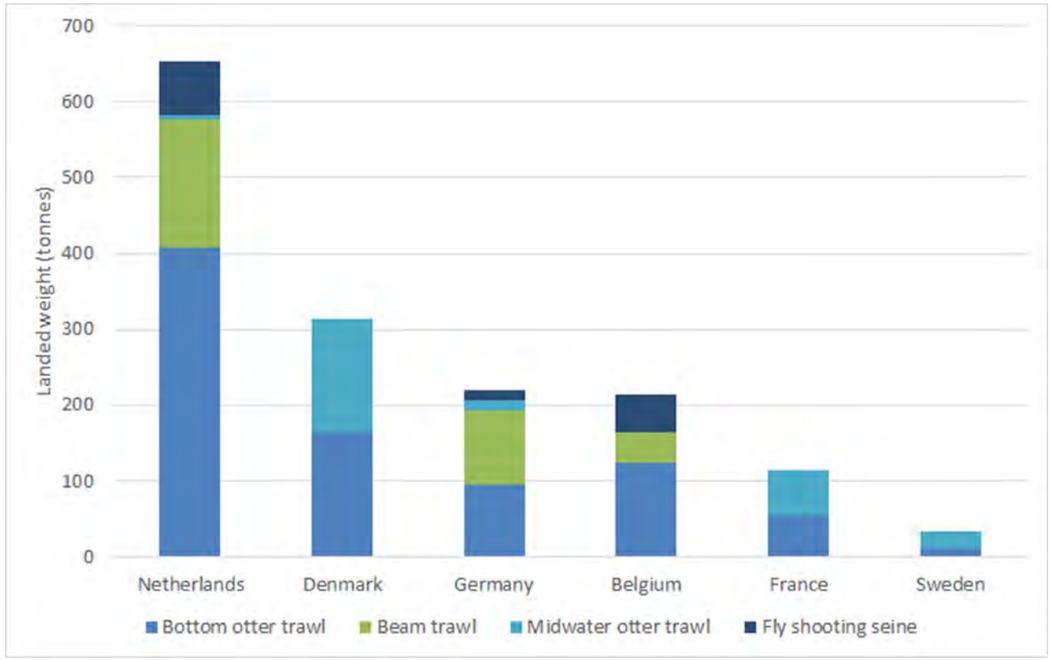


Plate 7-7 Landed Weight (Tonnes) by EU Vessels in ICES Division 4b, by Country and Gear Type between 2012 and 2016 (EU DCF, 2023)

7.8.2.2.2 Spatial Data

679. In addition to landings data, VMS data have been mapped for EU vessels (including the UK) within the Study Area.

680. **Figure 7-21** which presents the 2019 VMS dataset for UK potting activity does not include vessels less than 15m in length, which form a significant portion of the UK fleet. **Figure 7-21** is therefore highly likely to significantly under-represent the potting activity in the region – particularly in inshore waters – and additional data (e.g. surveillance and landings data), together with stakeholder consultation will inform the assessment of impacts on this fleet for the PEIR and ES stages. The VMS data indicates that the western portion of the offshore ECC is located within regional potting grounds and that potting activity can be expected to take place within parts of the offshore ECC (in particular in ICES rectangles 37F0 and 38F0). The data indicates limited potting activity in the eastern portion of the offshore ECC (i.e. ICES rectangles 39F0, 39F1, 39F2) and in the Array Area.

681. **Figure 7-22** indicates the potential presence of EU (including UK, but primarily expected to be EU vessels) demersal otter trawlers throughout the Study Area and outside of it. Within the Offshore Scoping Area, data indicate relatively higher levels of activity in the eastern portion of the offshore ECC and in the Array Area, with data also indicating that key demersal trawl grounds are located to the south and east of the Project.

682. **Figure 7-23** indicates the potential presence of EU (including UK, but primarily expected to be EU vessels) beam trawlers throughout the Study Area and outside of it. Within the Project's boundaries, data indicate relatively higher levels of activity in the eastern portion of the offshore ECC and in the Array Area, with data also indicating that key beam trawl grounds are located to the south and east of the Project, with the Project located on the fringes of these grounds.

683. **Figure 7-24** indicates the potential presence of flyseine vessels (including EU and UK) throughout the Study Area and outside of it, with activity overlapping sections of the offshore ECC and Array Area.

684. **Figure 7-25** indicates discrete areas of scallop dredge activity (associated with the UK fleet) with the portion of the offshore ECC that coincides with the 12nm limit overlapping with a scallop ground. Data indicates scallop dredge activity within a spatially distinct area of the offshore ECC (in ICES rectangle 39F1) and limited activity across the remainder of the offshore ECC and Array Area.

685. **Figure 7-26** presents AIS fishing vessel route density data. AIS is required to be fitted on fishing vessels ≥15m length. The data is specific to fishing vessels and indicates the route density per square kilometre per year. This data does not distinguish between transiting vessels and active fishing but does provide a useful source to corroborate fishing grounds. Data indicates sustained fishing vessel presence in the inshore portion of the offshore ECC, with discrete areas of activity in the offshore ECC and limited activity in the Array Area. Some of the patterns in activity seen in the data can be explained by the presence of fishing restrictions (see **Section 7.8.2.3**).

7.8.2.2.3 Summary

686. In summary, based on the data gathered to inform this scoping exercise, the key fleets operating across the Study Area include (in no particular order):

- UK (English) potters targeting lobster and crab, and to a lesser extent whelk;
- UK (English and Scottish) demersal otter and beam trawlers targeting plaice, turbot, other mixed demersal fish species and *Nephrops*;
- UK (English and Scottish) scallop dredgers;
- UK (English and Scottish) flyseine vessels targeting squid *Loligo spp*. and whiting *Merlangius merlangus*;
- EU demersal otter and beam trawlers from various nations, including the Netherlands, Denmark, Belgium, Germany, France and Sweden, targeting mixed demersal species including plaice and turbot, and pelagic species including herring and mackerel *Scomber scombrus*; and
- EU flyseine vessels from various nations, including the Netherlands and Belgium, targeting a variety of species including mackerel and whiting.

687. It is highlighted that the fishing activity described in **Section 7.8.2.3** can be expected to have been modified to some degree by the introduction of fishing restrictions subsequent to the baseline study period. The introduction in 2022 of a byelaw prohibiting the use of bottom towed gear across the Dogger Bank SAC will have resulted in removal of any dredge, trawl or seine net fishing activity across the Array Area and eastern extent of the offshore ECC in ICES rectangles 39F1, 39F2, 39F3, 38F1 and 38F2 (see **Section 7.8.2.3**).

7.8.2.3 Fishing Restrictions

688. Limits on catch volumes are in place for many commercially fished species, taking the form of Total Allowable Catches (TAC) and quotas. Species targeted in the Study Area for which TAC are set include plaice, turbot, herring and *Nephrops*. Key shellfish species targeted in the Study Area, including lobster and brown crab, are not subject to TAC, but are subject to national and local fisheries management measures.

689. In addition to limits on catch volumes, a number of restrictions are in place based primarily on fisheries byelaws, intended to protect fish stocks and their habitats. These restrictions include limits on minimum landings sizes, technical measures relating to fishing gear design and use, limits on fishing effort, and temporary and permanent fishery closures.

690. Within the Study Area several spatial restrictions are in place that are relevant to the Project. These include (**Figure 7-27**):

- UK Government prohibition of the fishing of sandeels within English waters of ICES Area 4 (North Sea), with this measure applying to all vessels of any nationality, effective from 26 March 2024.
- MMO Byelaw Dogger Bank SAC 2022 – A person must not use bottom towed fishing gear in the specified area. A vessel transiting through the specified area must have all bottom towed fishing gear (including dredges, trawls and seine nets) inboard, lashed and stowed. The presence of the byelaw, which covers the entirety of the SAC and a large portion of the Project, can be expected to result in a significant reduction in mobile gear fishing activity within the Project's scoping boundaries.
- North Eastern IFCA (NEIFCA) byelaw – Trawling within IFCA waters (i.e. within the 6nm limit) is not permitted unless a permit with conditions (e.g. the vessel must not exceed 18.3m length or 400kW engine power) has been granted.
- NEIFCA byelaw – No fishing with any seine net or draw net is permitted within IFCA boundaries.
- NEIFCA byelaw – Scallop dredging is prohibited outside of the specified area, which is located between 3 and 6nm and runs from just north of Sunderland to the north, to Filey in the south, and is subject to a permit with conditions (e.g. the vessel must not exceed 12m length of 221kW engine power).

691. To the west of the Study Area and shown on **Figure 7-27**, fishing restrictions are also in place to manage use of bottom towed fishing gear (i.e. trawls, seines and dredges) in marine protected areas, including at Farne Deeps and Farnes East Marine Conservation Zone (MMO, 2023b).

7.8.3 Potential Impacts

692. A range of potential impacts on commercial fisheries has been identified which may occur during the construction, operation, and decommissioning phases of the Project. These impacts include those issues identified as requiring consideration in the NPS EN-3 (DECC, 2011b; DESNZ, 2023b) and in the guidance documents identified below in **Section 7.8.8**.

7.8.3.1 Potential Impacts during Construction

7.8.3.1.1 Reduction in Access to, or Exclusion from Established Fishing Grounds

693. Installation activities and the physical presence of constructed infrastructure may lead to a reduction in access to, or exclusion from established fishing grounds. There is potential for some loss of fishing opportunities over the construction period, though any effect is expected to be localised, and the operational range of relevant fleets will not typically be limited to the Project footprint. This potential impact has been scoped out of the EIA for mobile gear fleets in the Dogger Bank byelaw area (see **Figure 7-27**), given these fleets can no longer operate there. For fishing fleets across the remainder of the Study Area, they have been scoped into the EIA for further consideration.

7.8.3.1.2 Displacement Leading to Gear Conflict and Increased Fishing Pressure on Adjacent Grounds

694. Fishing activity may be displaced from the Project footprint, leading to gear conflict and increased fishing pressure on adjacent grounds. There is potential for displacement of fishing activity, though any effect is expected to be localised, and the operational range of relevant fleets will not typically be limited to within the Offshore Scoping Area boundaries. This potential impact has been scoped into the EIA for further consideration.

7.8.3.1.3 Displacement or Disruption of Commercially Important Fish and Shellfish Resources

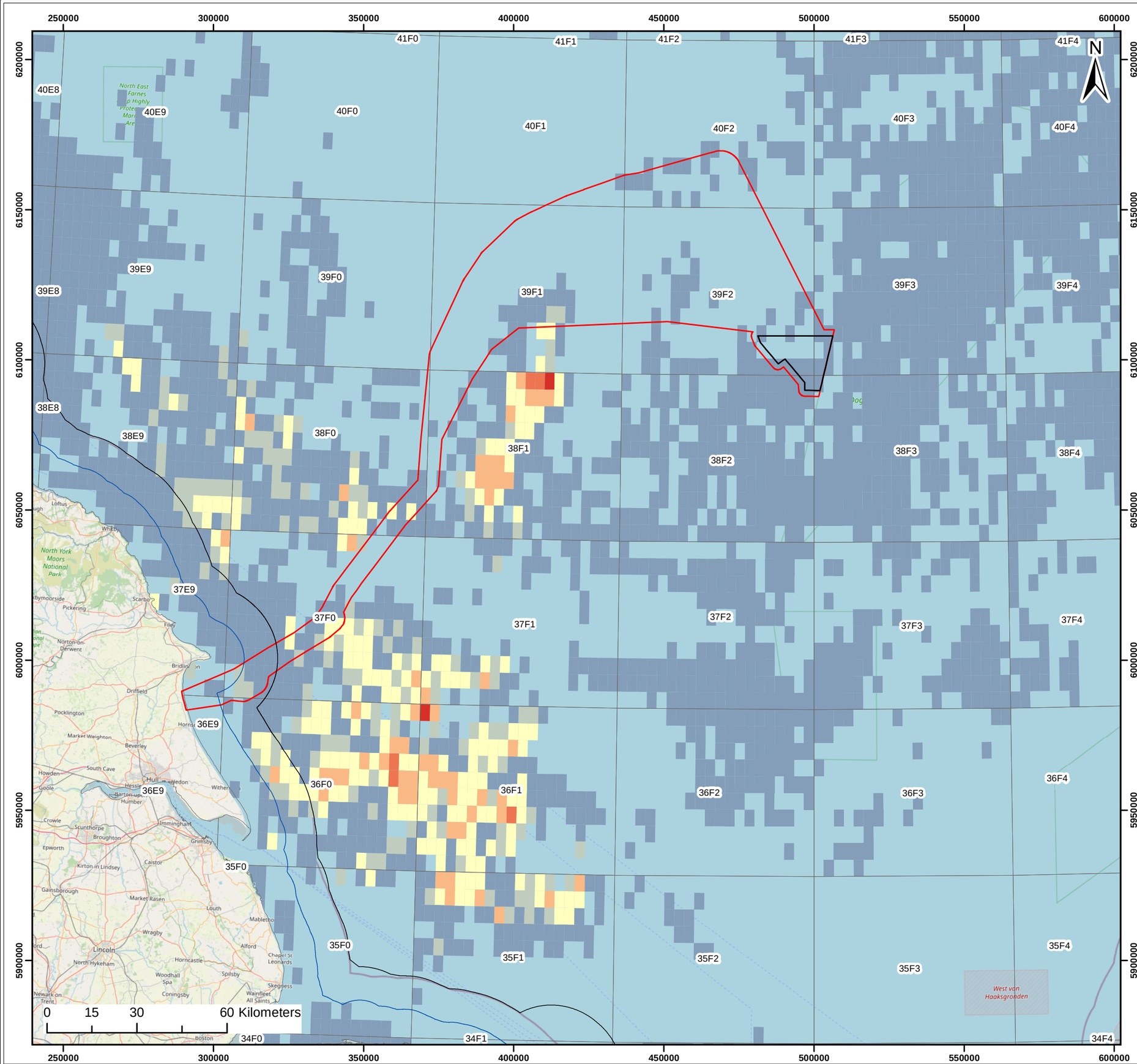
695. Construction activities may lead to the displacement or disruption of commercially important fish and shellfish resources. Assessment will be informed by the outcomes of the fish and shellfish ecology assessment (see **Chapter 7.5 Fish and Shellfish Ecology**), and it will be assumed that commercial fisheries will be affected as a result of any loss of resources. The conclusions presented in the fish and shellfish ecology assessment regarding impact significance will be taken into account in determining the magnitude of impact on commercial fisheries. This potential impact has been scoped into the EIA for further consideration.

7.8.3.1.4 Increased Vessel Traffic Associated with the Project within Fishing Grounds Leading to Interference with Fishing Activity

696. The movement of vessels associated with the Project may add to the existing volume of marine traffic in the area, leading to interference with fishing activity. The assessment will be informed by the outcomes of the shipping and navigation assessment (see **Chapter 7.9 Shipping and Navigation**).) and the conclusions presented in the shipping and navigation assessment will be considered in determining the magnitude of impact on commercial fisheries. This potential impact has been scoped into the EIA for further consideration.

697. Additional Steaming to Alternative Fishing Grounds for Vessels that would Otherwise Fish within the Offshore Development Area

698. This effect will be localised to safety zones and construction activities and therefore limited deviations to steaming routes are expected. Assessment will be informed by consultation with the local fishing industry as to the nature and extent of alternative grounds and associated additional steaming requirements and by the outcomes of the shipping and navigation assessment (see **Chapter 7.9 Shipping and Navigation**). This potential impact has been scoped out of the EIA for mobile gear fleets in the Dogger Bank byelaw area (see **Figure 7-27**), given these fleets can no longer operate there. For fishing fleets across the remainder of the Study Area, it has been scoped into the EIA for further consideration.



Legend:

- DBD Array
- Offshore Scoping Boundary
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

UK potting, 2019

- £0.00 - £5,000.00
- £5,000.01 - £10,000.00
- £10,000.01 - £25,000.00
- £25,000.01 - £50,000.00
- £50,000.01 - £75,000.00
- £75,000.01 - £145,000.00

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Potting vessels VMS data indicating frst sales value
Annual data (for 2019) for UK fishing vessels
Vessel length 15m and over

Figure:	Drawing No:
7-21	Rev 1.0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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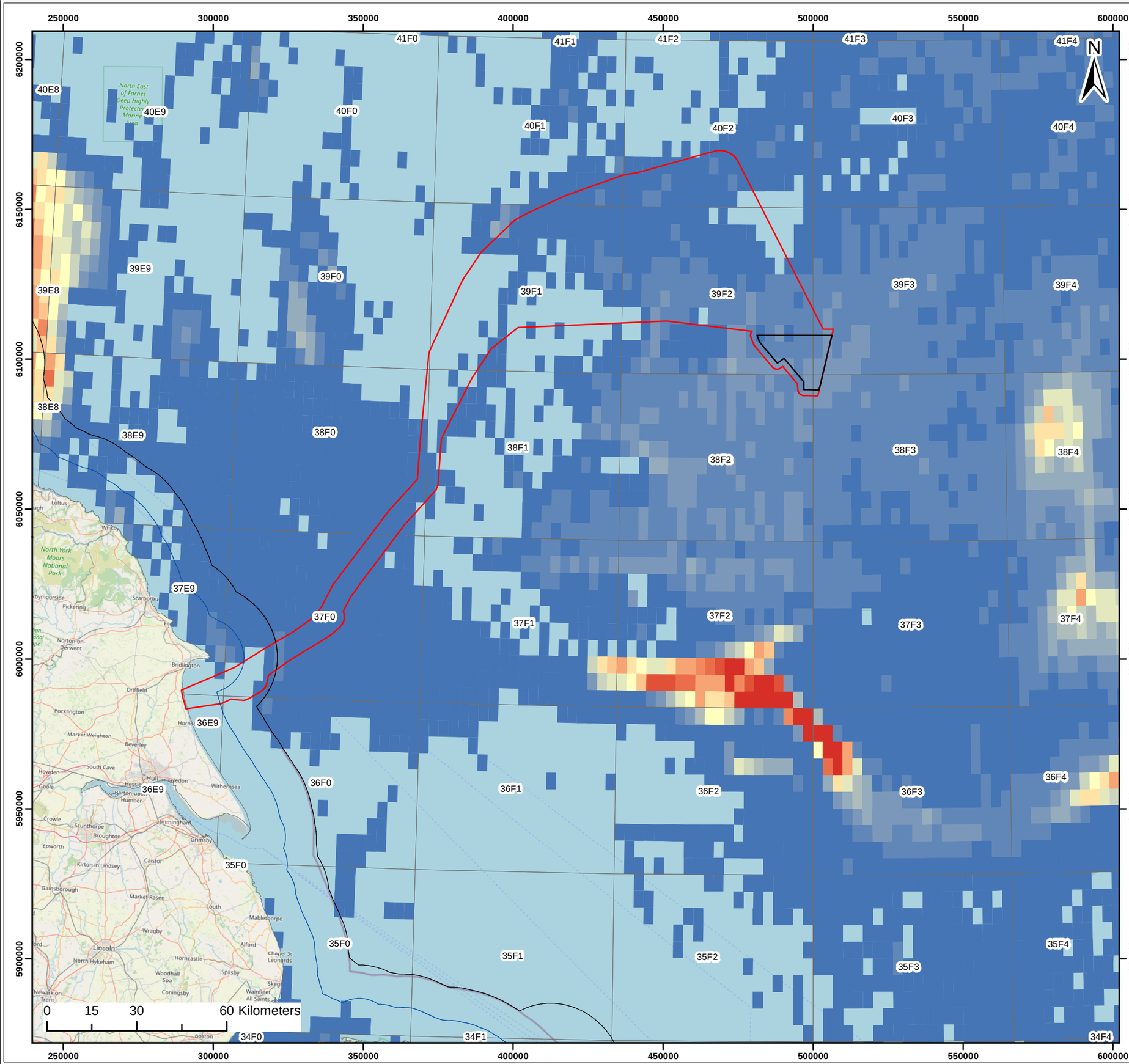

Legend:

- DBD Array
- Offshore Scoping Boundary
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

Otter trawl SAR_mean

0.0 - 0.6	4.0 - 4.5	8.5 - 9.0
0.7 - 1.3	4.6 - 5.1	9.1 - 23.2
1.4 - 1.9	5.2 - 5.8	
2.0 - 2.6	5.9 - 6.4	
2.7 - 3.2	6.5 - 7.1	
3.3 - 3.9	7.2 - 7.7	
	7.8 - 8.4	

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Demersal Otter Trawl Surface Swept Area Ratio
5-year average (2016-2020)
EU (including UK) fishing vessels 12m and over

Figure: 7-22

Drawing No: Rev 1.0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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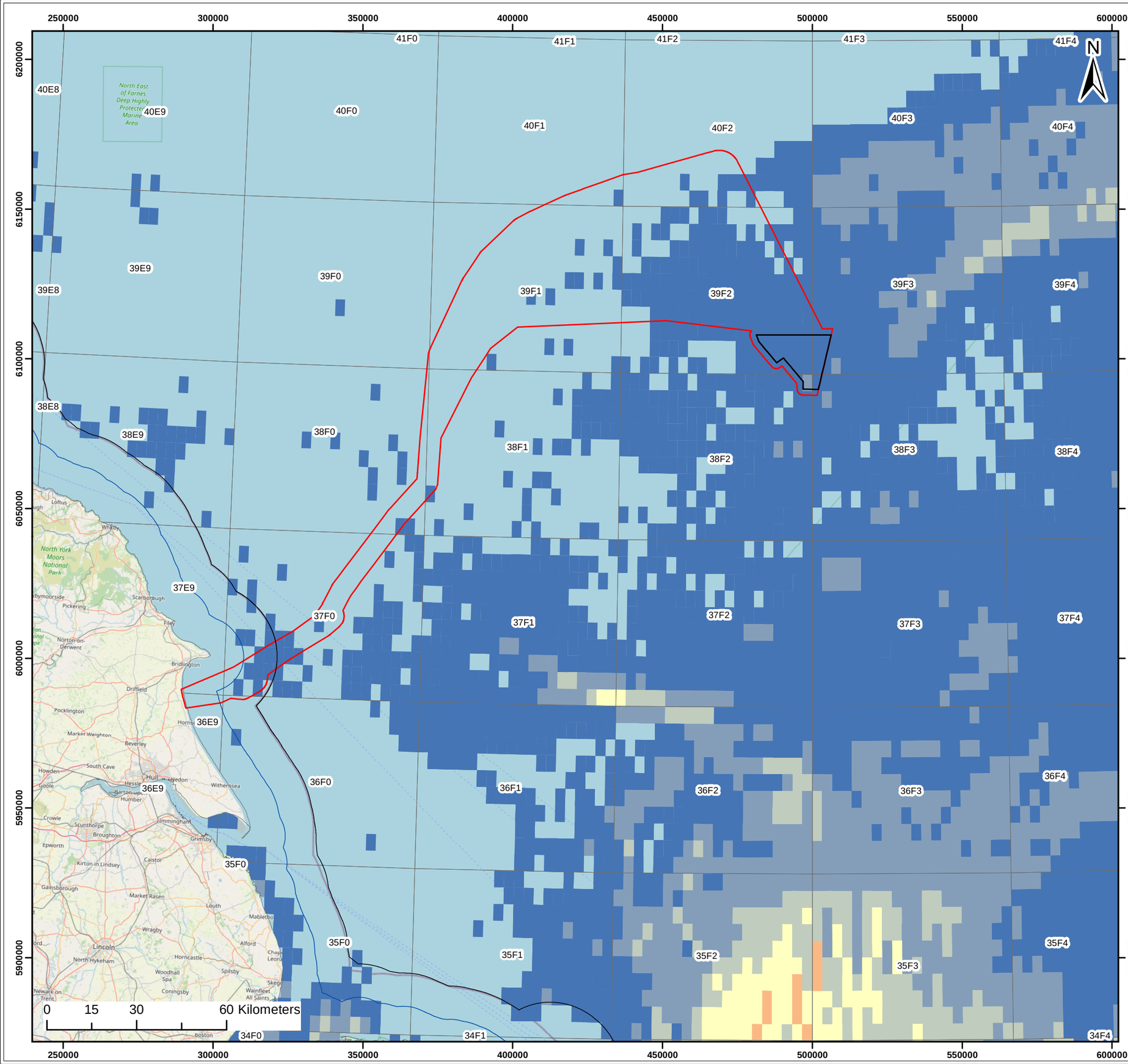

Legend:

- DBD Array
- Offshore Scoping Boundary
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

Beam2016-2020 average

Beam trawl SAR_mean

- 0.0 - 0.4
- 0.5 - 1.0
- 1.1 - 1.7
- 1.8 - 3.0
- 3.1 - 5.0
- 5.1 - 9.0
- 9.1 - 24.0

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Beam Trawl Surface Swept Area Ratio
5-year average (2016-2020)
EU (including UK) fishing vessels 12m and over

Figure:	Drawing No:
7-23	Rev 1.0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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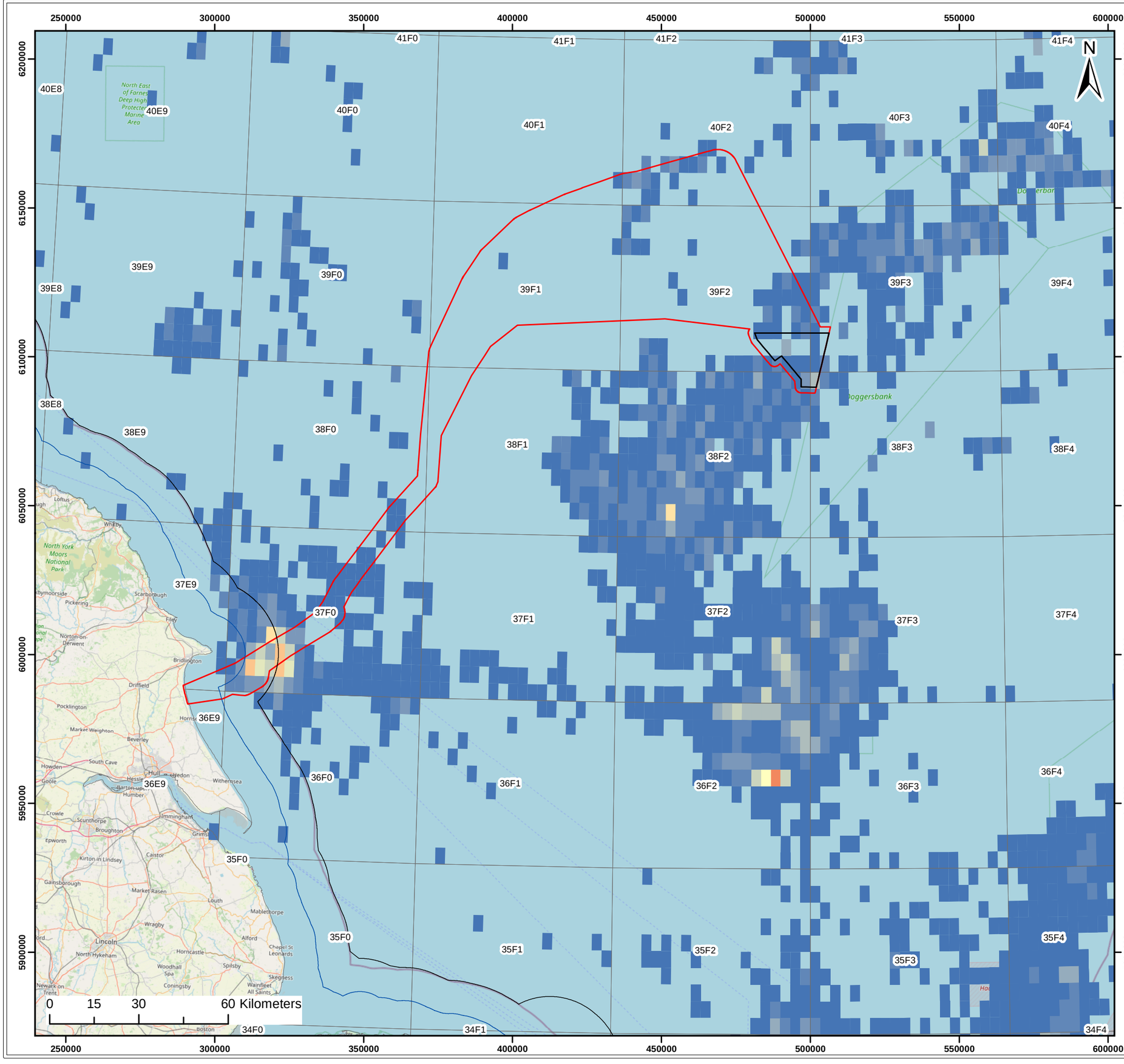


Legend:

- DBD Array
- Offshore Scoping Boundary
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

Demersal seine SAR_mean

0.0 - 0.6	4.6 - 5.1
0.7 - 1.3	5.2 - 5.8
1.4 - 1.9	5.9 - 6.4
2.0 - 2.6	6.5 - 7.1
2.7 - 3.2	7.2 - 7.7
3.3 - 3.9	7.8 - 8.4
4.0 - 4.5	8.5 - 9.0
	9.1 - 46.8

Project:
Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Demersal Seine Surface Swept Area Ratio
5-year average (2016-2020)
EU (including UK) fishing vessels 12m and over

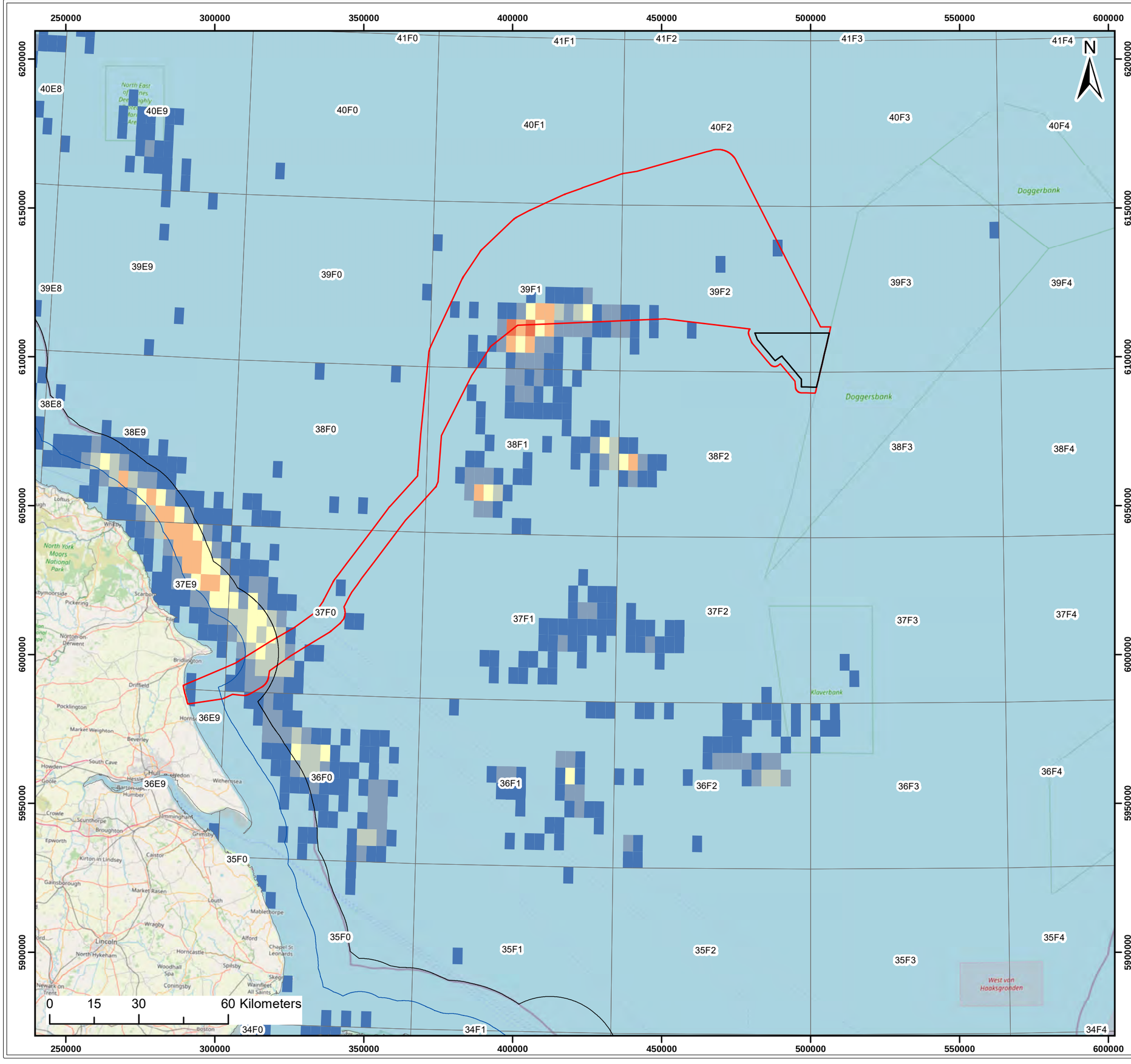
Figure: 7-24

Drawing No: Rev 1.0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor



Legend:

- DBD Array
- Offshore Scoping Boundary
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

Dredge SAR_mean

- 0.0 - 0.1
- 0.2 - 0.5
- 0.6 - 0.8
- 0.8 - 1.0
- 1.1 - 2.0
- 2.1 - 2.5
- 2.6 - 3.8

Project:
Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Dredge Surface Swept Area Ratio
5-year average (2016-2020)
EU (including UK) fishing vessels 12m and over

Figure: 7-25

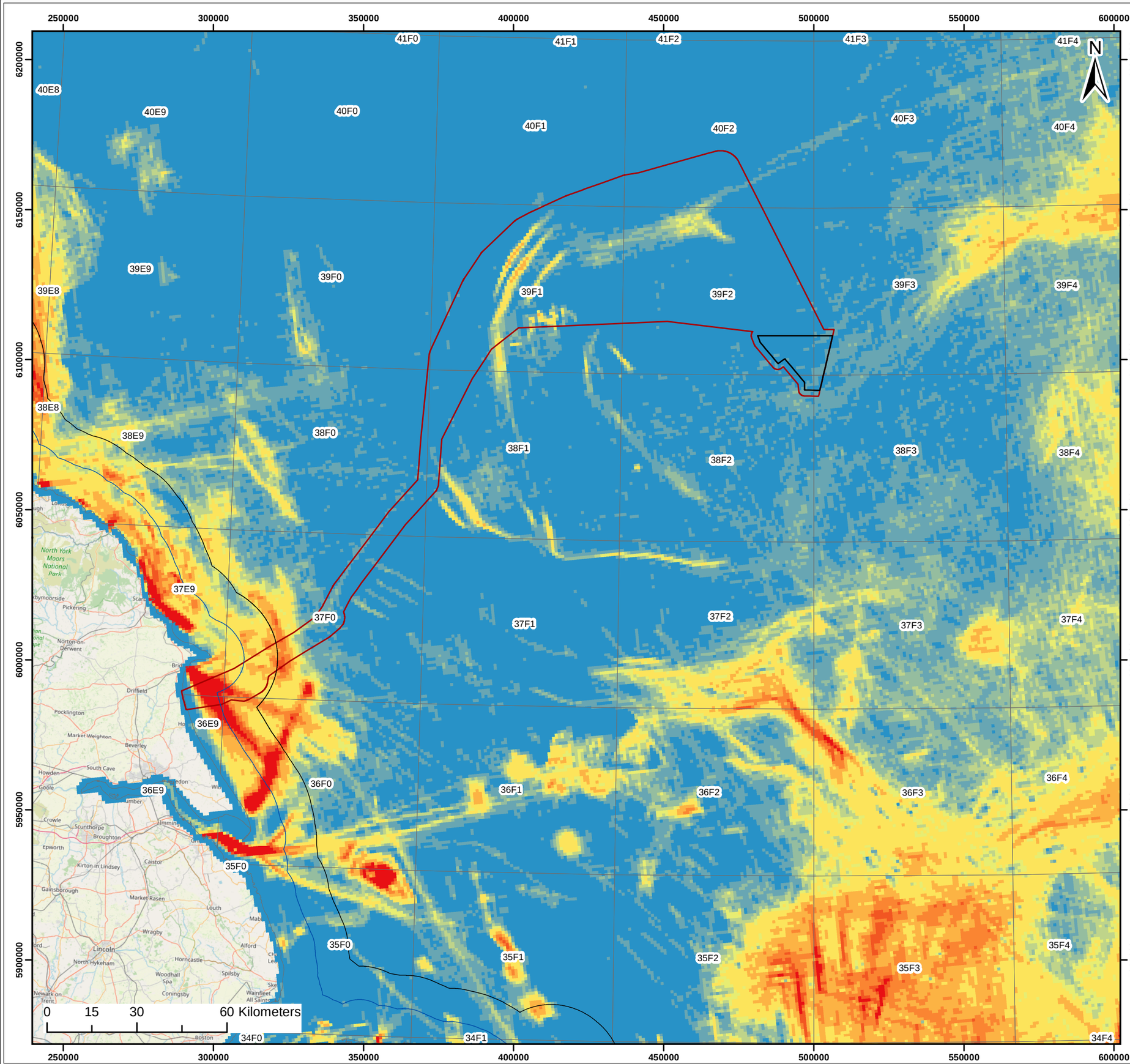
Drawing No: Rev 1.0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables

equinor



Legend:

- DBD Array
- Offshore Scoping Boundary
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

Fishing Vessel Route Density (2022)

(Routes per Square km per year)

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- 201 - 250
- 251 - 16,363

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Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

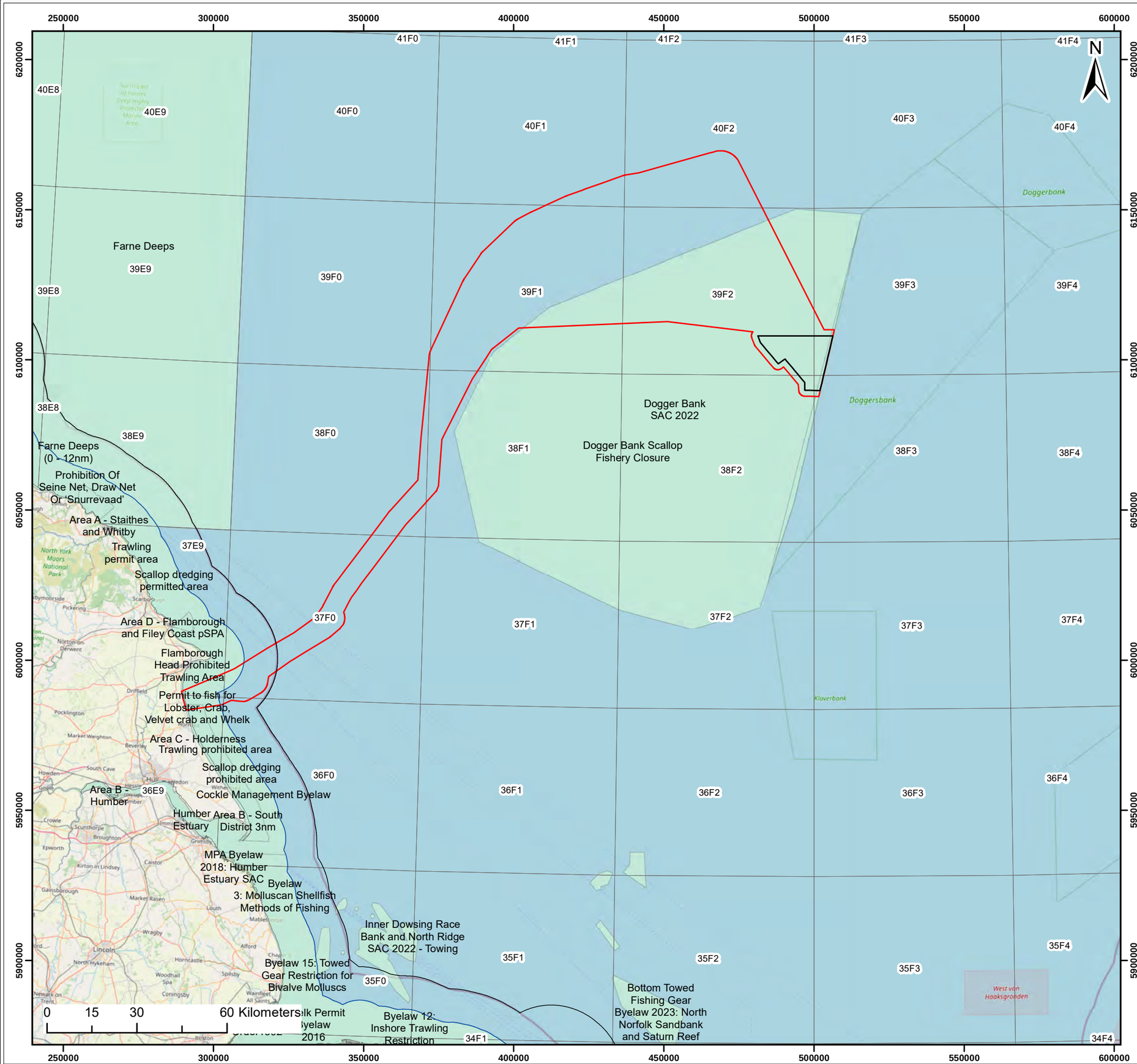
Fishing Vessel Route Density (2022)
(Routes per Square km per year) (Source: EMSA)

Figure:	Drawing No:
7-26	Rev 1.0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor



Legend:

- DBD Array
- Offshore Scoping Boundary
- Fishing Restrictions
- ICES statistical rectangles
- 12 NM limit
- 6 NM limit

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Fishing restrictions informed by Kingfisher Mapping

Figure:	Drawing No:
7-27	Rev 1.0

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
R01	03/06/2024	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor

7.8.3.2 Potential Impacts during Operation

7.8.3.2.1 Reduction in Access to, or Exclusion from Established Fishing Grounds

699. O&M activities and the physical presence of constructed infrastructure may lead to a reduction in access to, or exclusion from established fishing grounds. It is assumed that fishing will resume where possible within the Array Area and Offshore ECC when the Project is operational. The effect will be long term but localised, and the operational range of relevant fleets will not typically be limited to the Project footprint. This potential impact has been scoped out of the EIA for mobile gear fleets in the Dogger Bank byelaw area (see **Figure 7-27**), given these fleets can no longer operate there. For fishing fleets across the remainder of the Study Area, it has been scoped into the EIA for further consideration.

7.8.3.2.2 Displacement Leading to Gear Conflict and Increased Fishing Pressure on Adjacent Grounds

700. Fishing activity may be displaced from the Project footprint, leading to gear conflict and increased fishing pressure on adjacent grounds, during the operation phase. It is assumed that fishing will resume where possible within the Array Area and Offshore ECC when the Project is operational. The effect will be long term but localised, and the operational range of relevant fleets will not typically be limited to the Project footprint. This potential impact has been scoped into the EIA for further consideration.

7.8.3.2.3 Displacement or Disruption of Commercially Important Fish and Shellfish Resources

701. O&M activities may lead to the displacement or disruption of commercially important fish and shellfish resources. Assessment will be informed by the outcomes of the fish and shellfish ecology assessment (see **Chapter 7.5 Fish and Shellfish Ecology**), and it will be assumed that commercial fisheries will be affected as a result of any loss of resources. The conclusions presented in the fish and shellfish ecology assessment regarding impact significance will be taken into account in determining the magnitude of impact on commercial fisheries. This potential impact has been scoped into the EIA for further consideration.

7.8.3.2.4 Increased Vessel Traffic Associated with the Project within Fishing Grounds Leading to Interference with Fishing Activity

702. The movement of vessels associated with the O&M phase of the Project may add to the existing volume of marine traffic in the area, leading to interference with fishing activity. The assessment will be informed by the outcomes of the Shipping and Navigation impact assessment; the conclusions presented in the shipping and navigation assessment (see **Chapter 7.9 Shipping and Navigation**) will be considered in determining the magnitude of impact on commercial fisheries. This potential impact has been scoped into the EIA for further consideration.

7.8.3.2.5 Additional Steaming to Alternative Fishing Grounds for Vessels that Would Otherwise Fish within the Offshore Development Area

703. This effect will be localised to safety zones and construction activities and therefore limited deviations to steaming routes are expected. Assessment will be informed by consultation with the local fishing industry as to the nature and extent of alternative grounds and associated additional steaming requirements and by the outcomes of shipping and navigation assessment (see **Chapter 7.9 Shipping and Navigation)**. This potential impact has been scoped out of the EIA for mobile gear fleets in the Dogger Bank byelaw area (see **Figure 7-27**), given these fleets can no longer operate there. For fishing fleets across the remainder of the Study Area, it has been scoped into the EIA for further consideration.

7.8.3.2.6 Physical Presence of Infrastructure Leading to Gear Snagging

704. Standard industry practice and protocol (e.g. seabed infrastructure will be buried where practicable and / or marked on nautical charts) will minimise the risk of gear snagging, but it remains likely to be an area of industry concern. This assessment will consider the loss or damage to fishing gear leading to reduced economic performance during the operation phase. Safety aspects associated with this impact, including the potential loss of life as a result of snagging risk, will be assessed within the shipping and navigation assessment (see **Chapter 7.9 Shipping and Navigation**). This potential impact has been scoped out of the EIA for mobile gear fleets in the Dogger Bank byelaw area (see **Figure 7-27**), given these fleets can no longer operate there. For fishing fleets across the remainder of the Study Area, it has been scoped into the EIA for further consideration.

7.8.3.3 Potential Impacts during Decommissioning

705. The potential impacts identified as relevant to the decommissioning phase of the Project are as per or similar to those identified for the construction phase, with the addition of the potential for gear snagging any infrastructure left in situ.

706. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-23**).

7.8.4 Potential Cumulative Effects

707. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect commercial fisheries receptors. Therefore, cumulative effects related to commercial fisheries are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

708. Offshore wind projects and other activities relevant to the assessment of cumulative impacts on commercial fisheries will be identified through a screening exercise. The potential impacts considered in the CEA will be in line with those described for the project-alone assessment, though it is possible that some will be screened out on the basis that the impacts are highly localised (i.e. they occur only within Offshore Scoping Area boundaries) or where management measures in place for the Project and other projects will reduce the risk of impacts occurring.

709. For the purposes of the CEA, it will be assumed that already operational offshore wind farms and active licensed activities constitute part of the existing baseline environment, as commercial fisheries would already be adapted to them, and any effect they might have had will be reflected in the baseline characterisation undertaken to inform impact assessment. The CEA will also be cognisant of the fact that the Array Area lies within the footprint of the consented DBC Array Area, and therefore will not result in additional loss or restricted access to additional seabed.

710. The likely scope of other offshore wind projects and other activities to be included in the CEA is set out immediately below, though this will be confirmed by the aforementioned screening exercise:

- Offshore wind: Given the presence of wider offshore wind development within the North Sea, there is the potential for minor impacts associated with the Project to be part of a more significant cumulative effect from multiple offshore wind farm developments in the region. The CEA will consider other offshore wind farm projects across the region and the key cumulative impacts are expected to result from a loss or restricted access to established fishing grounds and displacement of fishing activity.
- Other activities: There is the potential for other activities occurring in the region surrounding the Project to create cumulative impacts. These include the presence of designated sites, oil and gas activity and infrastructure, and sub-sea cabling. Similar to offshore wind projects, the key cumulative impacts are expected to result from a loss or restricted access to established fishing grounds and displacement of fishing activity.

7.8.5 Potential Transboundary Effects

711. Baseline data indicates the presence of foreign fishing fleet activity. Consultation with stakeholders in other relevant EEA Member States, and data gathered from other relevant EEA Member States, will inform the scope of any future transboundary effect assessment within the EIA. Transboundary effects associated with commercial fisheries have been scoped into the EIA for further consideration.

7.8.6 Summary of Scoping Proposals

712. **Table 7-23** outlines the commercial fisheries impacts which are proposed to be scoped in or out of the EIA. These may be refined through consultation activities and as additional project information and site-specific data become available.

Table 7-23 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Commercial Fisheries

Potential Impact	Fishing Fleets	Construction	Operation	Decommissioning
Reduction in access to, or exclusion from established fishing grounds	Mobile gear fleets in the Dogger Bank byelaw area	X	X	X
	All other fleets	✓	✓	✓
Displacement leading to gear conflict and increased fishing pressure on adjacent grounds	All fleets	✓	✓	✓
Displacement or disruption of commercially important fish and shellfish resources	All fleets	✓	✓	✓
Increased vessel traffic associated with the Project within fishing grounds leading to interference with fishing activity	All fleets	✓	✓	✓
Additional steaming to alternative fishing grounds	Mobile gear fleets in the Dogger Bank byelaw area	X	X	X
	All other fleets	✓	✓	✓
Physical presence infrastructure leading to gear snagging	Mobile gear fleets in the Dogger Bank byelaw area	X	X	X
	All other fleets	X	✓	✓
Cumulative impacts	All fleets	✓	✓	✓
Transboundary impacts	All fleets	✓	✓	✓

713. On the basis that use of bottom-towed gear in the Dogger Bank byelaw area is prohibited, it is proposed that certain potential impacts on mobile gear fleets in this area are scoped out of EIA. This proposed scoping out is shown in **Table 7-23** .

7.8.7 Approach to Data Gathering

714. It is intended that during the EIA, full acquisition and analysis of the baseline data sources listed in **Table 7-24** (in addition to those identified in **Table 7-22)** is completed in order to develop a robust understanding of the baseline environment. Any limitations in the datasets underpinning the project assessments will also be detailed fully within the ES.

Table 7-24 Desk-Based Data Sources for Commercial Fisheries

Data Source	Date	Data Contents
Sources include the MMO and the local IFCA.	Various – most recent data will be sought.	IFCA and MMO fisheries surveillance data, showing records of fishing vessel observations from patrol vessels / aircraft.
The Applicant.	Various.	Marine traffic survey (AIS and radar) data identifying fishing vessel activity. Fisheries scouting surveys (fishing gear and vessel observations) and / or data and records held by the Company Fisheries Liaison Officer (FLO).
EU Market Observatory for Fisheries and Aquaculture (EUMOFA) database.	Landings sales values for the baseline study period.	First sale value of fisheries landings.
Sources include ICES and the local IFCA.	Various – most recent data will be sought.	Key species stock assessments.
Various sources.	Various.	Regional offshore wind farm PEIR and ES commercial fisheries assessments.
Various sources (e.g. Wageningen Marine Research for Dutch fisheries data).	Various.	Where relevant, landings and VMS data sourced directly from EEA Member States

715. Data analysis will then be corroborated and expanded upon by consultation with the fishing industry and other relevant stakeholders, including the following:

- MMO;
- Holderness Fishing Industry Group (HFIG);
- National Federation of Fishermen's Organisations (NFFO);
- Scottish Fishermen's Federation (SFF);
- NEIFCA;
- Scallop Industry Consultation Group (SICG);
- Local Fishermen's Associations and Producer Organisations, including inshore fishery groups;
- Any EU Member State representative organisations as identified during baseline data analysis; and
- Individual fishermen as identified by the Company FLO / other means.

716. Consultation will continue throughout the application process, and will not only seek to validate the baseline, but to identify key stakeholder concerns to inform the impact assessment.

7.8.8 Approach to Assessment

717. Detailed analysis of baseline datasets will be undertaken in the EIA to characterise long term (i.e. over several years, typically a five-year period) patterns in commercial fisheries activity across the Study Area and predict potential impacts upon future activity. Consultation with the commercial fishing industry will be undertaken in order to ground-truth available baseline data and gain further understanding of commercial fisheries activity by smaller vessels across the inshore portion of the Study Area. Analysis of data and the results of consultation will provide an extended baseline characterisation of the Study Area, which will underpin and inform the impact assessment.

718. The commercial fisheries impact assessment will follow the methodology set out in **Chapter 5 EIA Methodology**. Specific to commercial fisheries, the following guidance documents will also be considered:

- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (United Kingdom Fisheries Economic Network (UKFEN) and Seafish, 2012);
- Fisheries Liaison with Offshore Wind and Wet Renewables group (FLOWW) Recommendations for Fisheries Liaison: Best Practice guidance for offshore renewable developers (FLOWW, 2014 and Business, Enterprise and Regulatory Reform (BERR), 2008);
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015);
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010a);
- Developing guidance on fisheries Cumulative Impact Assessment for wind farm developers (Blyth-Skyrme, 2010b);
- Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore wind farms (RenewableUK, 2013);

- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403 (Cefas, 2012);
- Good Practice Guidance for assessing fisheries displacement by other licensed marine activities (Scottish Government, 2022);
- Fisheries Liaison Guidelines – Issue 6 (UK Oil and Gas, 2015);
- Fishing and Submarine Cables – Working Together (International Cable Protection Committee, 2009); and
- Offshore Wind Farms – Guidance Note for Environmental Impact Assessment in respect of Food and Environment Protection Act (FEPA) and CPA requirements (Cefas), Marine Consents and Environment Unit (MCEU), Defra and Department of Trade and Industry (DTI), 2004).

719. Where relevant, impact assessment will be informed by the outcomes of the fish and shellfish ecology assessment and the shipping and navigation assessment.

720. Impacts will be assessed for each relevant fleet / fishery scoped into the EIA, and where relevant, impacts associated with the Array Area and the offshore ECC will be separately assessed. Assessment will be cognisant of the presence of the Dogger Bank SAC byelaw and associated fishing restrictions.

7.8.9 Scoping Questions to Consultees

721. The following questions are posed to consultees to help them frame and focus their response to the commercial fisheries scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the commercial fisheries impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the commercial fisheries impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.9 Shipping and Navigation

723. This chapter of the Scoping Report considers the potential likely effects of the Project associated with shipping and navigation, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the selected landfall.

724. The shipping and navigation assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.8 Commercial Fisheries;** and
- **Chapter 7.13 Other Marine Users**.

7.9.1 Study Area

725. The main Shipping and Navigation Study Area (hereafter referred to as 'the Study Area') is defined as the Array Area plus a buffer of up to 10nm as shown on **Figure 7-28.** A buffer of a minimum of 10nm will be utilised in the Navigational Risk Assessment (NRA) as it is standard for shipping and navigation assessments and it is large enough to encompass any vessel routeing which may be impacted, while remaining site-specific to the area being studied. A separate 2nm buffer Study Area of the offshore ECC will be assessed in the NRA as a part of the PEIR / ES.

7.9.2 Existing Environment

7.9.2.1 Navigational Features

726. An overview of the relevant navigational features in proximity to the Offshore Scoping Area is presented on **Figure 7-29.**

727. Offshore wind farms (OWF) that are operational and are in proximity to the Offshore Scoping Area include Westermost Rough OWF which is situated approximately 9nm south of the offshore ECC near landfall and Humber Gateway OWF situated approximately 20nm south of the offshore ECC.

728. Other OWFs that are currently under construction (offshore) and are within proximity to the Offshore Scoping Area include Sofia, DBA and DBB, which at the time of writing are under construction. These OWFs are the closest to the Array Area, with Sofia situated roughly 10nm west of the Array Area, DBA located approximately 24nm south-west of the Array Area, and DBB approximately 30nm to the west. DBA construction began in spring of 2022 and is encompassed by 17 lit demarcation buoys outlining the construction area of the site. DBB had its 20 construction boundary demarcation buoys placed by early February 2023. Construction activities at Sofia began in September 2023, and is marked by 20 construction boundary demarcation buoys. Construction buoyage is reflected on **Figure 7-29** and will remain in place until the respective wind farm construction activities have been completed.

729. Additionally, it is noted that DBC has been consented and has secured a CfD. DBC is situated between the Project and Sofia, sharing its eastern boundary with the western boundary of the Project.

730. The closest Aid to Navigation (AtoN) to the offshore ECC is a yellow-lit buoy located near the landfall, roughly 0.4nm south, marking the end of an outfall pipe at the Hornsea coast. Other notable AtoNs include a west cardinal mark highlighting an area of shallow water in Bridlington Bay, 0.6nm north-west of the Offshore Scoping Area. The closest AtoN to the Array Area are an east cardinal mark approximately 6nm south-east of the offshore ECC which marks a wreck and a special mark approximately 1.6nm south-east of the offshore ECC identifying a shallow well in the Munro gas field.

731. Oil and gas infrastructure is present in proximity to the south of the offshore ECC, close to the coast. There are no platforms located within the Offshore Scoping Area with the closest platform to the offshore ECC, at approximately 6nm south, is Tolmount. The closest platform to the Array Area is in Dutch waters in proximity to the Elbow Spit.

732. Several offshore pipelines and sub-sea cables are present within the vicinity of the Offshore Scoping Area with nine sub-sea cables and two pipelines intersecting the offshore ECC. The sub-sea cables which intersect include the export cables for DBA, DBB, DBC and Sofia, a cable connecting the Cygnus Alpha platform to the Munro Gas Field, a disused cable, several cables to the north, and the VSLN Northern Europe interconnector telecommunications cable between Hunmanby Bay (UK) and Eemshaven (the Netherlands). The pipelines that intersect the offshore ECC the Shearwater Elgin Area Line pipeline and the Langeled pipeline which transports Norwegian natural gas to the Easington Gas Terminal in the UK

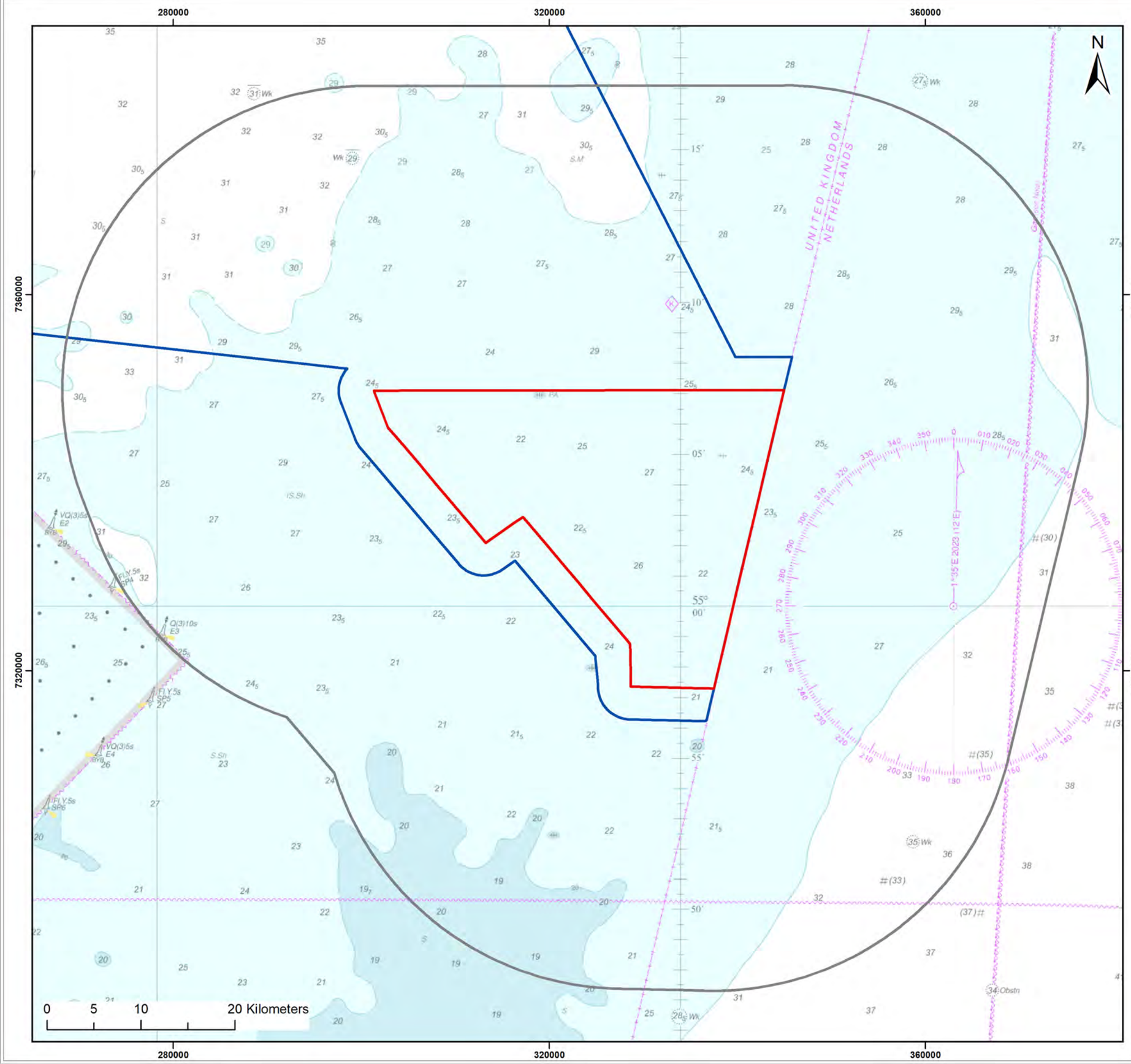
733. Sharing the eastern border of the Array Area is the maritime border between the UK and the Netherlands. This border separates the North Sea into UK and Dutch international waters and delineates the edge of the UK EEZ / Renewable Energy Zone (REZ).

734. An area of foul ground covering approximately 10nm^2 exists between the shore points of Mappleton and Aldbrough on the Yorkshire coast and is situated roughly 6nm south-east of the offshore ECC landfall.

735. There are multiple marine aggregate dredging areas to the south of the offshore ECC with the closest being the cluster of Humber dredge areas 1-4 situated immediately south of the Humber Gateway OWF, approximately 29nm south-east of the offshore ECC.

736. The closest charted anchorage area is the Humber Deep Water Anchorage, north of the Humber entrance, which is located approximately 29nm south-east of the offshore ECC.

737. There is also a cluster of pilot boarding stations at the entrance to the Humber with the deep-draught vessel pilotage station being the closest to the offshore ECC at approximately 28nm south.



Legend:

- Dogger Bank D Array Area
- Shipping And Navigation Study Area
- Offshore Scoping Area

Project:

Dogger Bank D
Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Shipping and Navigation Study Area

Figure:	Drawing No:				
7-28	A4968-13-01				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
05	18/06/2024	RR	JM	A3	1:400,000

Co-ordinate system: WGS 1984 World Mercator

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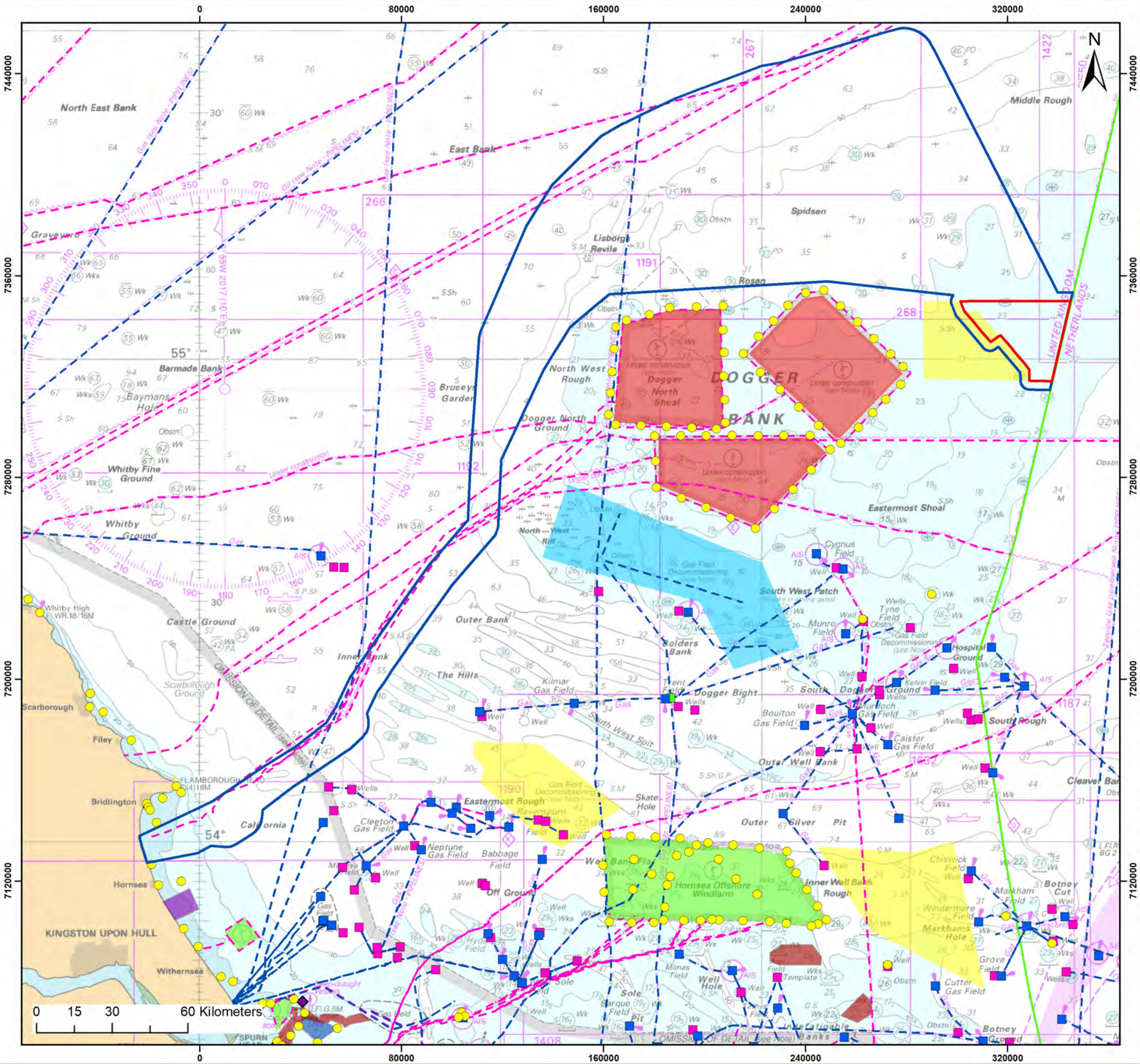

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area

Navigational Features

- Aid to Navigation
- Pilot Boarding Station
- Platform
- Well
- Manifold
- Pipeline
- Subsea Cable
- GBR-NL Border
- Dredging Area
- Foul Ground
- Anchorage

Other Offshore Wind Farms

- Consented
- Operational
- Scoped
- Under Construction

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Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Navigational Features Relevant to Shipping and Navigation

Figure:	7-29	Drawing No:	A4968-13-02		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	18/06/2024	RR	JM	A3	1:1,500,000

Co-ordinate system: WGS 1984 World Mercator

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7.9.2.2 Vessel Traffic

738. The vessel traffic derived from 28-day of Automatic Identification System (AIS) data for two 14-day seasonal data periods in summer and winter of 2022 (see **Section 7.9.4**) is presented on **Figure 7-30 28**. It is noted that a site-specific vessel traffic survey was undertaken in summer 2023; the findings are not presented in this scoping exercise but will be incorporated into the PEIR. Further details on approach to data gathering are provided in **Section 7.9.4.**

739. Vessels deemed as representing temporary traffic (i.e. non-routine), have been removed from the analysis to ensure that the focus of the assessment is on permanent traffic within the surrounding area. The only vessel removed was a survey vessel undertaking a geophysical survey at DBD in August 2022. It is noted that as construction began at DBA in March 2022, the construction buoyage surrounding DBA was present during both data periods and is therefore reflected in the vessel traffic movements.

740. During the summer data period, an average of five to six unique vessels were recorded within the Study Area per day with an average of two unique vessels intersecting the Array Area per day.

741. During the winter data period, an average of one to two unique vessels were recorded within the Study Area per day with an average of zero to one unique vessel intersecting the Array Area per day.

742. Vessel traffic in the Study Area primarily consisted of cargo vessels (41%), tankers (23%), and commercial fishing vessels (23%).

743. There are no clearly defined commercial routes identified from the 28-days of data within the Study Area. Cargo vessels, tankers, and passenger vessels (all cruise liners) are seen to be transiting in multiple directions throughout the Study Area which is a result of the unrestricted sea room available. The most common direction of transit was north-east south-west which was mainly utilised by cargo vessels.

744. Several military vessels were recorded transiting north-west south-east through the Array Area during the summer data period. These vessels consisted of a German military vessel (frigate) as well as two United States (US) military replenishment vessels.

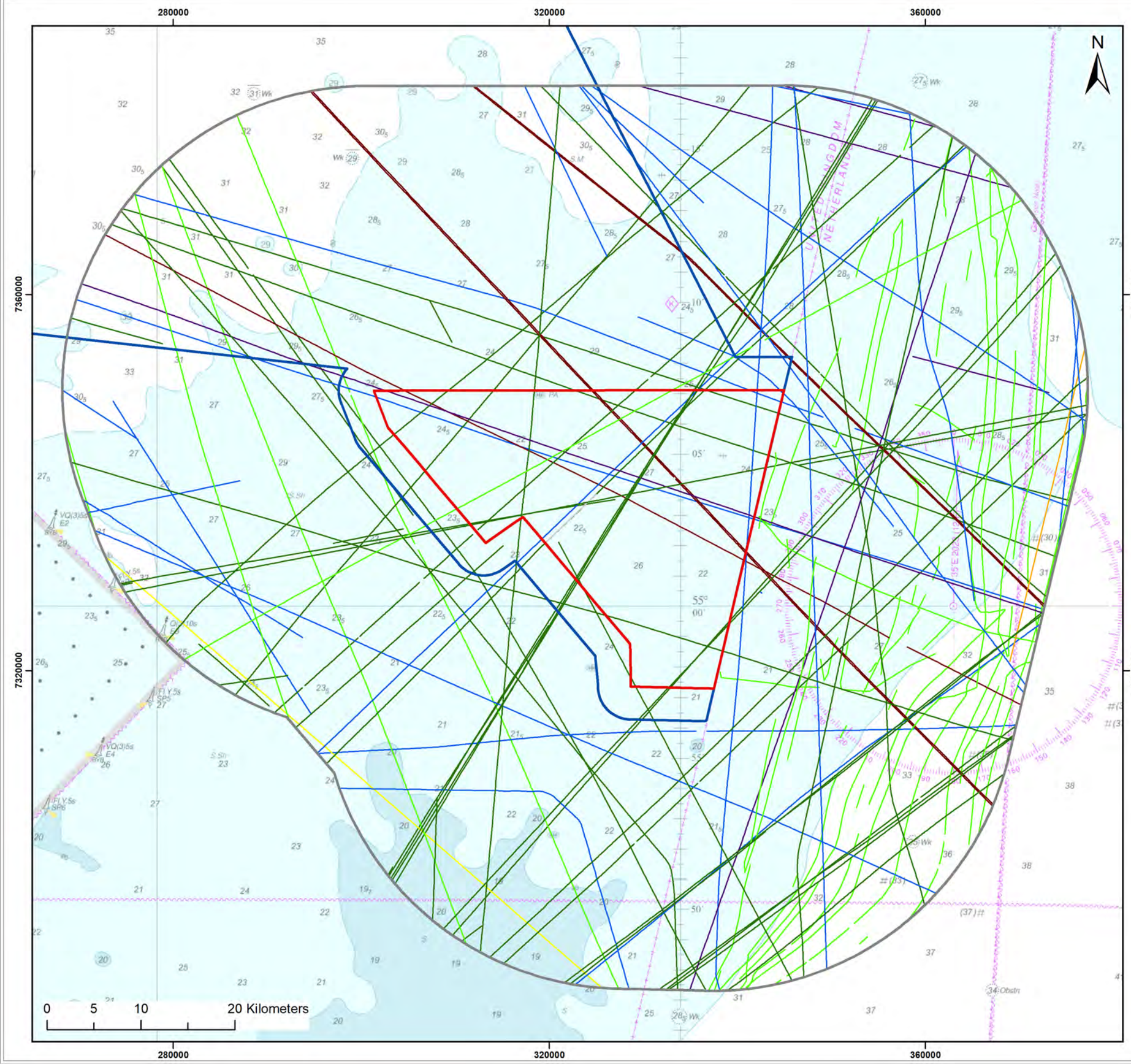
745. Commercial fishing vessels were recorded primarily to the eastern extent of the Study Area. All fishing vessels recorded during the 28-day data period were on transit as opposed to being engaged in fishing activities with all but one fishing vessels transiting north-south. The presence of fishing vessels was highly seasonal with only two unique fishing vessels being recorded during the entire winter period. Fishing vessels less than 15m in length are not obliged to broadcast via AIS and as such the vessel traffic data presented likely do not represent the total fishing vessel activity (see **Section 7.9.7**).

746. It is noted that no recreational vessels were recorded during the data period, but this is expected with the distance (approximately 180nm) the Project is located offshore. Recreational vessel activity may also be underrepresented given AIS carriage requirements, as noted in as noted in **Section 7.9.7**, however again due to distance offshore there is not likely to be significant activity.

7.9.3 Potential Impacts

7.9.3.1 Embedded Mitigation Measures

747. A number of embedded mitigation measures are proposed to reduce the potential for impacts on shipping and navigation. These will evolve over the development process as the EIA progresses and in response to consultation and thus will be fed iteratively into the assessment process. These measures typically include those that have been identified as good or standard practice and include actions that should be undertaken to meet existing legislation requirements. Where appropriate, these mitigation measures will be detailed in a Commitments Register and secured in the draft DCO or DML.



Legend:

- Dogger Bank D Array Area
- Shipping And Navigation Study Area
- Offshore Scoping Area

Vessel Type

- Unspecified
- Fishing
- Military
- Passenger
- Cargo
- Tanker
- Other
- Oil and Gas

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
28-Day Vessel Traffic Data by Vessel Type (Summer and Winter, 2022)

Figure:	Drawing No:
7-30	A4968-13-03

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
05	18/06/2024	RR	JM	A3	1:400,000

Co-ordinate system: WGS 1984 World Mercator

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748. The following are considered relevant embedded mitigation measures for shipping and navigation for the Project and will be detailed in the Commitment Register:

- Where possible, cable burial will be the preferred option for cable protection with the cable burial depth to be informed by a cable burial risk assessment and detailed within the Cable Specification Plan. Any damage, destruction or decay of cables must be notified to Maritime and Coastguard Agency (MCA), Trinity House, Kingfisher and UKHO no later than 24 hours after discovered.
- Advance warning and accurate location details of construction, maintenance and decommissioning operations (including details of vessel routes, timings and locations) associated Safety zones and advisory passing distances will be given via Kingfisher Bulletins at least 14 days prior to works commencing.
- Ongoing liaison with fishing fleets will be maintained during construction, maintenance and decommissioning operations via a Project-appointed Fisheries Liaison Officer (FLO).
- Monitoring of vessel traffic will be undertaken for the duration of the construction period and during the first three years of the operation phase.
- Marine Pollution Contingency Plans for the Project will be developed outlining procedures to protect personnel working and to safeguard the marine environment.
- Safety zones of up to 500m will be applied for where a vessel is Restricted in Her Ability to Manoeuvre (RAM) during construction, major maintenance and decommissioning activities.
- Where appropriate, guard vessels will be used to monitor compliance with Safety zones or advisory passing distances.
- Where scour protection is required, Marine Guidance Note (MGN) 654 will be adhered to with respect to changes greater than 5% to the under-keel clearance in consultation with the MCA and Trinity House.
- Lights, marks, sounds, signals and other AtoNs will be exhibited as required by Trinity House, MCA and the Civil Aviation Authority (CAA) including a buoyed construction area around the array.
- The Project will ensure that local Notifications to Mariners are updated and reissued at weekly intervals during construction activities and at least five days before any planned operations and maintenance works and supplemented with Very High Frequency (VHF) radio broadcasts agreed with the MCA in accordance with the construction and monitoring programme approved under the relevant DML condition.
- Layout Plans (including cables) for the Project will be agreed with the MMO following appropriate consultation with Trinity House and the MCA setting out proposed details of the development areas.
- AtoNs Management Plans for the Project will be agreed with Trinity House.
- The Project will ensure compliance with MGN 654 and its annexes, where applicable, including completion of a Search and Rescue (S&R) checklist.
- Marine coordination will be implemented to manage project vessels throughout construction and maintenance periods.
- Project vessels will ensure compliance with Flag State regulations including the International Regulation for Prevention of Collision at Sea (COLREG) (International Maritime Organisation (IMO), 1972/77) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).
- There will be a minimum blade tip clearance (air draft height) of at least 22m above MHWS.
- There will be appropriate marking on UKHO admiralty charts.

7.9.3.2 Potential Impacts during Construction

7.9.3.2.1 Vessel Displacement Due to Construction Activities

749. All vessels may be displaced from their existing routes or routines due to construction activities associated with the Project and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.2.2 Increased Vessel to Vessel Collision Risk Between Third-Party Vessels Due to Vessel Displacement

750. Displaced or deviated vessels may lead to increased traffic densities and therefore result in a subsequent increase in encounters and / or collision risk between third-party vessels and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.2.3 Vessel to Vessel Collision Between a Third-Party Vessel and a Project Vessel

751. The presence of project vessels during construction may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3 Potential Impacts during Operation

7.9.3.3.1 Vessel Displacement Due to the Presence of the Project

752. Vessels may be displaced or deviated from their existing routes or routines due to the presence of the Project and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3.2 Increased Vessel to Vessel Collision Risk Between Third-Party Vessels (Route-Based) Due to the Displacement

753. Displaced or deviated vessels may lead to increased traffic densities and therefore a subsequent increase in collision risk between third-party vessels and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3.3 Vessel to Vessel Collision Risk Between a Third-Party Vessel and a Project Vessel

754. The presence of project vessels during maintenance may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3.4 Vessel to Structure Allision Risk for Third-Party Vessels Due to the Presence of Project Structures

755. Surface structures within the Array Area or offshore ECC may pose an allision risk (powered or drifting) to third-party vessels and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3.5 Reduction in Under Keel Clearance Due to the Presence of Cable Protection or Cable Crossings

756. The implementation of cable protection and cable crossings may reduce existing water depths and available under keel clearance for third-party vessels creating an underwater allision risk and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3.6 Vessel Interaction with Sub-Sea Cables Associated with the Project

757. The presence of sub-sea cables associated with the Project may increase the likelihood of anchor interaction for third-party vessels and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3.7 Interference with Vessel Navigation and Communication Equipment Due to the Project

758. Vessel based marine navigation and communication equipment may be affected by the presence of structures or cables within the Array Area or offshore ECC and therefore this impact has been scoped into the EIA for further consideration.

7.9.3.3.8 Reduction of Emergency Response Capability Due to Increased Incident Rates and / or Reduced Access for S&R Responders

759. The presence of the Project may result in an increased number of incidents requiring emergency response associated with project vessels or third-party vessels. Also, the presence of the structures may reduce access for Search and Rescue (S&R) responders, such as helicopters (considered in **Chapter 7.10 Aviation, Radar and Military**). Therefore, this impact has been scoped into the EIA for further consideration.

7.9.3.4 Potential Impacts during Decommissioning

760. It is anticipated that the decommissioning impacts would be similar in nature to those of construction.

761. The same potential impacts identified for construction are therefore expected to be scoped in for decommissioning (as per **Table 7-25**).

7.9.3.5 Potential Cumulative Effects

762. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect shipping and navigation receptors. Therefore, cumulative effects related to shipping and navigation are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

763. Cumulative effects on shipping and navigation resulting from the effects of the Project and other developments will also be assessed in accordance with the guidance and methodologies set out in **Section 7.9.7**, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required.

764. The developments included in the CEA will be determined by a screening process where developments are tiered based on numerous criteria including (but not limited to) development status, distance from the Project and data confidence. Given that, at the time of writing, offshore construction for DBA, DBB and Sofia has commenced (based on the presence of the respective buoyed construction areas), these developments will be considered as part of the baseline assessment. The same may also apply to DBC depending on when offshore construction commences relative to the collection of vessel traffic survey data (see **Section 7.9.7**).

7.9.3.6 Potential Transboundary Effects

765. Given the location of the Project in the southern North Sea, there is the potential for transboundary effects upon shipping routes which transit to / from EEA States. These impacts, due to the international nature of shipping are considered within the impact assessment as set out in **Section 7.9.3**. Therefore, transboundary effects related to shipping and navigation have been scoped into the EIA for further consideration, noting that consultation is undertaken by the Planning Inspectorate.

7.9.3.7 Summary of Scoping Proposals

766. **Table 7-25** outlines the shipping and navigation impacts which are proposed to be scoped in or out of the EIA. These may be refined through consultation activities and as additional project information and site-specific data become available.

Table 7-25 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Shipping and Navigation

Potential Impact	Construction	Operation	Decommissioning
Vessel displacement due to construction activities or the presence of the Project.	✓	✓	✓
Increased vessel to vessel collision risk between third-party vessels due to vessel displacement.	✓	✓	✓
Vessel to vessel collision between a third-party vessel and a project vessel.	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Vessel to structure allision risk for third party vessels due to the presence of project structures.	X	✓	X
Reduction in under keel clearance due to the presence of cable protection or cable crossings.	X	✓	X
Vessel interaction with sub-sea cables associated with the Project.	X	✓	X
Interference with vessel navigation and communication equipment due to the Project.	X	✓	X
Reduction of emergency response capability due to increased incident rates and / or reduced access for S&R responders.	X	✓	X
Cumulative impacts.	✓	✓	✓
Transboundary impacts.	✓	✓	✓

7.9.4 Approach to Data Gathering

767. **Table 7-26** identifies the desk-based sources that have been accessed to inform the shipping and navigation scoping exercise. These data sources will be taken forward and used to inform the characterisation of the existing environment alongside any additional site-specific data that is collected for the Project.

Table 7-26 Desk-Based Data Sources for Shipping and Navigation

Data Source	Date	Data Contents
AIS vessel traffic	9 to 15 and 19 to 23 August 2022	14-day of AIS data collected from satellite receivers (summer data period).
	6 to 19 November 2022	14-day of AIS data collected from satellite receivers (winter data period).
UKHO Admiralty charts 156, 2567, 266, 267, 277, 268, 1187, 1190, 1191 1192 and 2182A	2023 to 2024	Admiralty charts and historic mapping relevant to the defined Shipping and Navigation Study Area.
UKHO Admiralty Sailing Directions – NP54 (UKHO, 2021)	2021	Pilot book with information on navigational features in the surrounding area.

768. It is noted that AIS carriage and broadcast is not compulsory for fishing vessels less than 15m length, or vessels of less than 300 Gross Tonnage (GT). It should therefore be considered that such traffic is likely to be underrepresented within the characterisation of the baseline. However, it is noted that smaller vessels are increasingly observed to utilise AIS voluntarily given the associated safety benefits, particularly at the distance offshore of the Array Area. On this basis and noting that AIS is accepted as being comprehensive for other larger vessel types, the available data are considered fit for the purposes of providing the high-level baseline assessment presented in this Scoping Report.

769. MGN 654 (MCA, 2021) requires a minimum of 28 days of data consisting of AIS, visual observations and radar data collected across two 14-day periods. A site-specific 14-day vessel traffic survey collecting AIS, visual observations and radar data was undertaken in summer 2023 and a further similar survey will be undertaken in summer 2025.

770. Radar tracks were recorded and reviewed for the summer 2023 vessel traffic survey, and all such instances were also tracked via AIS and over a greater range, i.e. no non-AIS targets were identified. Therefore, radar data were not required to characterise vessel traffic movements during the summer 2023 vessel traffic survey. This is indicative of the distance offshore, the challenges associated with navigation for small craft on the Dogger Bank and the presence of several under construction OWF developments.

771. Therefore, the collection of site-specific vessel traffic survey data for the winter period (2024/25) will incorporate only AIS data and will be undertaken through the installation of AIS kit on a survey vessel associated with the Project or the nearby DBC. This will be combined with the summer 2025 vessel traffic survey data to form the primary 28-day dataset for characterising vessel traffic movements in the NRA, with the summer 2023 vessel traffic survey data used as validation. This approach to data collection has been agreed with the MCA and Trinity House in pre-scoping consultation.

772. Full details of the vessel traffic data collection proposed is outlined in **Table 7-27**.

Table 7-27 Proposed Baseline Surveys for Shipping and Navigation

Survey	Data Collection	Timing	Spatial Coverage	Status
14-day summer vessel traffic survey 2023	AIS, radar and visual observations from dedicated survey vessel	18th July to 1st August 2023	Shipping and Navigation Study Area	Collected
14-day summer vessel traffic survey 2025	AIS, radar and visual observations from dedicated survey vessel	Between June and August 2025	Shipping and Navigation Study Area	Planned
14-day winter vessel traffic survey 2024/25	AIS from survey vessel associated with the Project or the nearby DBC	Between October 2024 and March 2025 (subject to agreement with MCA)	Shipping and Navigation Study Area	Planned

7.9.5 Approach to Assessment

773. The approach to the impact assessment for shipping and navigation aligns with regulator and stakeholder requirements, including the use of the IMO's Formal Safety Assessment (FSA) process and compliance with MGN 654 (MCA, 2021). This section sets out the proposed methodology which will be applied and how it will address the specific needs for the shipping and navigation assessment. Any feedback received during this scoping exercise will be fed into the methodology taken forward and used to inform the NRA and EIA assessment.

774. The key guidance document that will be considered within the shipping and navigation aspect of the EIA is MGN 654 (MCA, 2021) including the MCA's methodology for the NRA (Annex 1 to MGN 654). Other key guidance is as follows:

- Revised Guidelines for FSA for Use in the Rule-Making Process (IMO, 2018);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 on the Marking of Man-Made Offshore Structures (IALA, 2021a);
- IALA Guideline G1162 The Marking of Offshore Man-Made Structures (IALA, 2021b); and
- The Royal Yachting Association's (RYA) Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2019).

775. As per the MCA methodology, the NRA will assess the hazards to shipping and navigation users in line with the IMO FSA methodology (IMO, 2018) for both the base case and future case environments with and without the development.

776. The IMO FSA methodology is the internationally recognised approach for assessing risks to shipping and navigation users, and is the approach required under the MCA methodology. This methodology is centred on risk control and assesses each hazard in terms of its frequency and consequence in order that the significance of risk can be determined as 'broadly acceptable', 'tolerable', or 'unacceptable'. Should a hazard be assessed as 'unacceptable' then additional mitigation measures implemented beyond those considered embedded will be required to bring the significance of risk within 'tolerable' or 'broadly acceptable' parameters – the As Low As Reasonably Practicable (ALARP) approach.

777. Significance of risk in the PEIR and ES will be determined via a risk ranking matrix assessing frequency and consequence. The frequency and consequence, as part of the NRA process, will be related to the parameters required by the IMO FSA. The risk ranking matrix is illustrated in **Table 7-28**.

Table 7-28 Risk Ranking Matrix for the Shipping and Navigation Assessment

		Frequency				
		Negligible	**Extremely Unlikely**	**Remote**	**Reasonably Probable**	**Frequent**
Consequence	Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable

778. The frequency and consequence rankings per hazard will be determined using a number of inputs, notably:

- Quantitative modelling undertaken in the NRA (Anatec's COLLRISK software);
- Outputs of the characterisation of the baseline including vessel traffic surveys;
- Consideration of embedded mitigation measures;
- Lessons learnt from other offshore wind farm developments;
- Level of stakeholder concern determined though the hazard log;
- Consultation output; and
- Expert opinion.

779. The following statutory and non-statutory organisations deemed relevant to shipping and navigation will be included in further consultation (see **Chapter 6 Consultation**), noting that additional organisations may be included if identified during the NRA process:

- MCA;
- Trinity House;
- UK Chamber of Shipping;
- RYA;
- Cruising Association;
- National Federation of Fishermen's Organisations;
- Regular commercial operators (identified from the vessel traffic survey data); and
- Local fishing representatives.

7.9.6 Scoping Questions to Consultees

780. The following questions are posed to consultees to help them frame and focus their response to the shipping and navigation scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the shipping and navigation impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the shipping and navigation impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.10 Aviation, Radar and Military

781. This chapter of the Scoping Report considers the potential likely effects of the Project associated with aviation, radar and military, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the proposed landfall.

782. The aviation, radar and military assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.7 Intertidal and Offshore Ornithology;**
- **Chapter 7.9 Shipping and Navigation;**
- **Chapter 7.12 Seascape, Landscape and Visual Impact;** and
- **Chapter 7.13 Other Marine Users.**

7.10.1 Study Area

783. In considering the spatial coverage of the Aviation, Radar and Military Study Area (hereafter referred to as 'the Study Area'), the overriding factor is the potential for wind turbines within the DBD Array Area to have an impact on civil and military radars, taking into account required radar operational ranges.

784. In general, Primary Surveillance Radars (PSR) installed on civil and military airfields have an operational range of between 40 nautical miles (nm) and 60nm. There are no radar-equipped airfields within 60nm of the DBD Array Area.

785. The closest radar-equipped airfield is Humberside Airport which is more than 24km (13nm) south-south-east of the Onshore Scoping Area.

786. En route radars operated by NATS (formerly National Air Traffic Services) and Ministry of Defence (MoD) Air Defence (AD) radars are required to provide coverage at ranges in excess of 60nm. Such radars with potential Radar Line of Sight (RLoS) of wind turbines within the DBD Array Area include the NATS facilities at Claxby, Cromer and Great Dun Fell and the MoD AD facilities at Brizlee Wood, Staxton Wold, and Trimingham. RLoS modelling undertaken for the Project indicates that wind turbines and other tall obstacles within the DBD Array Area would not be visible to these or any other radar facilities.

787. The closest NATS radar is Claxby which is approximately 39km (21nm) south-south-east of the Onshore Scoping Area, while the closest AD radar is Staxton Wold, approximately 24km (13nm) north-north-west of the Onshore Scoping Area.

788. The International Civil Aviation Organisation (ICAO) document EUR Doc 015 European Guidance Material on Managing Building Restricted Areas (ICAO, 2015) details safeguarding criteria to protect the radio signals of Communication, Navigation and Surveillance facilities from interference caused by buildings or other large objects. For surveillance facilities such as PSRs the safeguarded zone extends from the facility to a radius of 15km (**Figure 7-32**). The Onshore Scoping Area is more than 15km from any PSRs and therefore impacts on PSRs are not considered further.

789. A NATS en route radio navigation aid facility known as Ottringham VOR / DME (VHF Omni Directional Range / Distance Measuring Equipment) is sited approximately 22km south-east of the Onshore Scoping Area. NATS apply a 10km safeguarded zone around VOR / DME facilities, which is in line with the recommendation in EUR Doc 015 for protection from wind turbine interference. However, the safeguarded zone is reduced to 3km for other obstacles, which is more appropriate for any infrastructure within the Onshore Scoping Area (**Figure 7-31**).

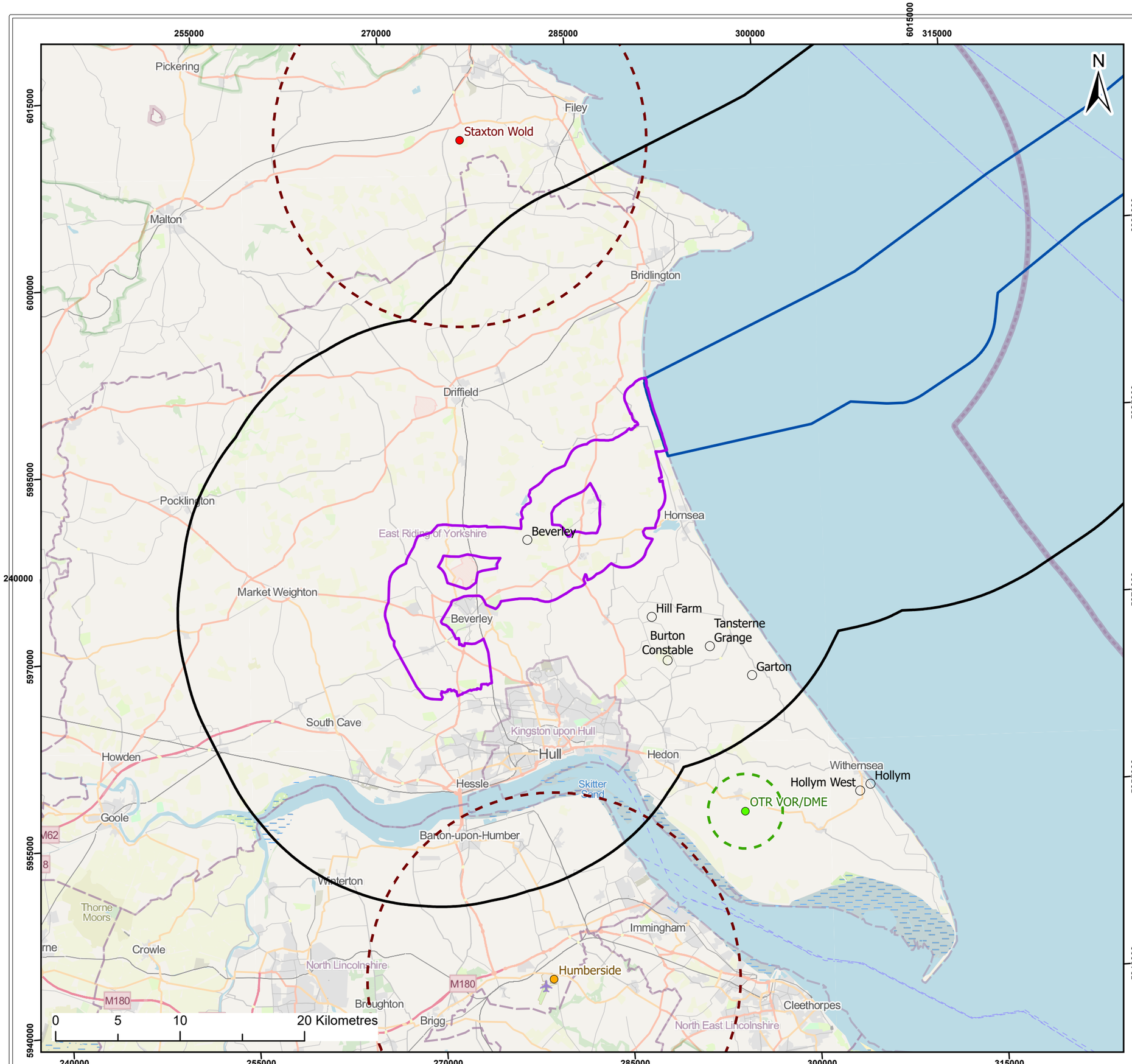
790. The study area is defined as the airspace and aviation receptors within an area extending 9nm (17km) around the Offshore and Onshore Scoping Areas (**Figure 7-32**). The 9nm buffer accounts for potential obstacle impacts on the safe operation of helicopter low visibility approaches in poor weather conditions to offshore helidecks and is discussed further in **Section 7.10.2.4**. The buffer is also considered to be a conservative range for encompassing other aviation receptors that could be impacted by the various phases of the Project.

7.10.2 Existing Environment

7.10.2.1 Civil Aviation

791. There are no licenced civil or military airfields or radars within the Study Area.

792. There are several unlicensed airfields in the vicinity of the Onshore Scoping Area, as shown on **Figure 7-31**. Guidance in the Civil Aviation Authority (CAA) publication Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines (CAA, 2016) states that wind turbine developments within 3km of non-radar equipped unlicensed aerodromes with a runway of less than 800m might have an impact on operations. This guidance can also be applied for other tall buildings and / or stacks that may be constructed within the Onshore Scoping Area. Beverley Airfield is within the Onshore Scoping Area. There are no other airfields within 3km of the Onshore Scoping Area.



Legend:

- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- PSR 15km Safeguarded Zone
- VOR/DME 3km Safeguarded Zone
- Civil Airport
- NATS En Route Radio Navigation Aids
- Unlicensed Airfields
- Air Defence Radars

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Aviation Receptors within the Onshore Scoping Area

Figure: 7-31 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0068

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02	18/04/2024	JH	AB	A3	1:300,000
01	11/04/2023	JR	CM	A3	1:300,000

Co-ordinate system: British National Grid

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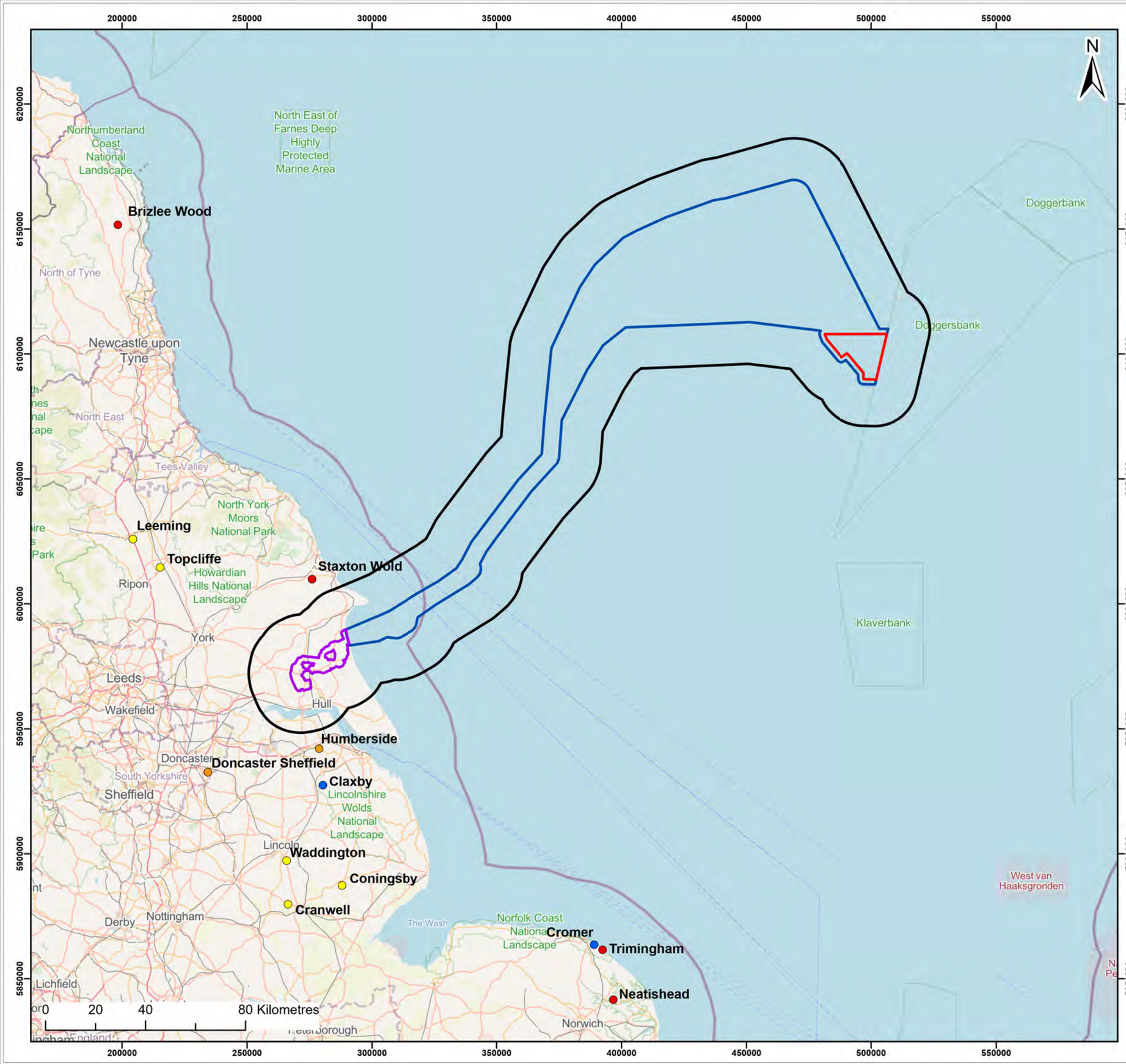

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- NATS Radar
- Military Airfield
- Civil Airport
- Air Defence Radar

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Aviation, Radar and Military Study Area

Figure: 7-32
Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0065

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02	18/04/2024	JH	AB	A3	1:1,500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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793. The airspace above the study area is used by civil and military aircraft and lies within the London and Scottish Flight Information Regions (FIR) which together form the UK FIR. This airspace is regulated by the UK CAA. The northern three quarters of the DBD Array Area is within the Scottish FIR while the southern quarter is within the London FIR (**Figure 7-33**). From sea level to Flight Level (FL) 195, approximately 19,500ft Above Mean Sea Level (AMSL), the airspace is Class G uncontrolled airspace. Above FL195 is Class C controlled airspace.

794. The boundary of the Scottish FIR with the Copenhagen FIR (regulated by the Danish Civil Aviation and Railway Authority) lies 122km east of the DBD Array Area at its nearest point. The boundary of the London FIR with the Amsterdam FIR (regulated by the Netherlands Inspectie Leefomgeving en Transport) lies 109km to the south-east of the DBD Array Area at its nearest point. A portion of UK FIR airspace known as North Sea Area V is delegated to the Netherlands. The eastern boundary of the DBD Array Area lies along the western boundary of North Sea Area V. Within this airspace the Netherlands provides an Air Traffic Service (ATS) to all aircraft between sea level and FL55, approximately 5,500ft AMSL (**Figure 7-33**).

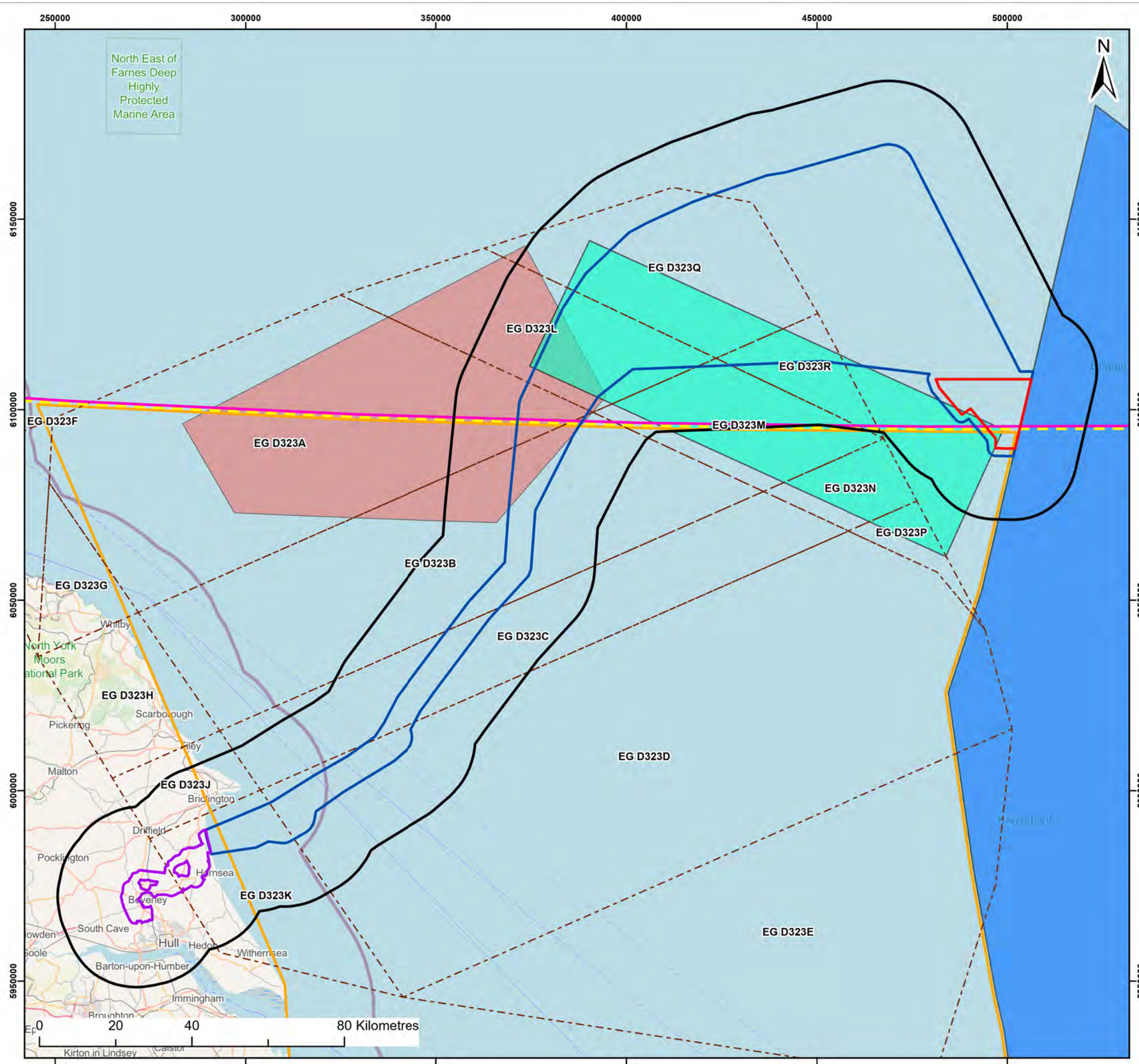
795. NATS (En Route) plc (NERL) provides en route civil ATS within the UK FIR, except in areas such as Area V, where responsibility for ATS has been formally delegated to the Netherlands. NERL services are supported by a network of radar facilities which provide en route information for both civil and military aircraft.

796. To enhance flight safety and expedite S&R operations over the southern North Sea, various Flight Information Services are provided by NATS Anglia Radar based at Aberdeen Airport. These services are available to helicopters operating in support of the offshore oil and gas and renewables industries and other civil and military aircraft transiting the airspace. The Anglia Radar Area of Responsibility, in which these services are available, extends from sea level to FL65 (approximately 6,500ft AMSL) and is shown on **Figure 7-33**. The southern quarter of the DBD Array Area is within the Anglia Radar Area of Responsibility.

7.10.2.2 Military Aviation

797. Staxton Danger Area EGD412 lies more than 86km west of the DBD Array Area but is infringed by some of the offshore ECC, as shown in **Figure 7-33**. This airspace extends from the surface to 10,000ft AMSL. Activities within Staxton Danger Area include ordnance, munitions and explosives.

798. Most of the offshore ECC lies beneath the Southern Complex Danger Area EGD323, one of four such complexes in UK airspace that provide segregated airspace for military flying training. Specifically, **Figure 7-33** shows that the offshore ECC lies beneath danger areas EGD323A, B, C, D, K, L, M, Q and R which have vertical limits of no less than FL50 (approximately 5,000ft AMSL) up to FL660 (approximately 66,000ft AMSL). Activities within the Southern Complex include high energy manoeuvres, ordnance, munitions and explosives, electrical / optical hazards and unmanned aircraft systems operating beyond visual line of sight.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- Air to Air Refuelling Area (AARA) Area 07
- London Flight Information Region Boundary
- North Sea Area V
- Anglia Radar Area of Responsibility
- Southern Managed Danger Area
- Scottish Flight Information Region Boundary
- Staxton Danger Area

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Existing Airspace Environment

Figure: 7-33 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0066

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	07/06/2024	JH	AB	A3	1:1,000,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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799. Danger Area airspace is not permanently active, but rather is activated on request and notified by appropriate agencies such as the MoD or CAA through the issue of a NOTAM (Notice to Airmen).

800. **Figure 7-33** also shows that the study area partially lies beneath airspace designated as Area 07, an Air-to-Air Refuelling Area (AARA) with vertical limits of FL100 (approximately 10,000ft AMSL) to FL290 (approximately 29,000ft AMSL). Within AARA airspace, fuel is transferred from tanker aircraft to receiver aircraft under a Radar Control Service provided by military controllers based at Swanwick.

7.10.2.3 Helicopter Operations

801. A network of offshore routes over the North Sea are flown by civilian helicopters in support of oil and gas installations and defined as Helicopter Main Routeing Indicators (HMRI). These routes, shown on **Figure 7-34**, have no lateral dimensions; however, CAP 764 states that planned obstacles within 2nm of the route centreline should be consulted upon with helicopter operators and the Air Navigation Service Provider. The 2nm distance is based upon operational experience, the accuracy of navigation systems, and practicality. Such a distance provides time and space for helicopter pilots to descend safely to an operating altitude below the icing level. There are no existing HMRIs which overlap with or pass within 2nm of the DBD Array Area or offshore ECC.

7.10.2.4 Offshore Helidecks

802. To help achieve a safe operating environment, and in compliance with CAA guidance CAP 764: Policy and Guidelines on Wind Turbines, a 9nm consultation zone for planned obstacles exists around offshore helicopter destinations. There is one offshore oil and gas helideck within 9nm of the offshore ECC, Tolmount, as shown on **Figure 7-34**.

803. As stated in CAP 764, the 9nm zone does not prohibit development, but is a trigger for consultation with offshore helicopter operators, the operators of existing installations and exploration and development locations to determine a solution that maintains safe offshore helicopter operations alongside proposed developments.

7.10.2.5 Search and Rescue

804. There are ten helicopter S&R bases, incorporating 22 aircraft, around the UK with Bristow Helicopters providing helicopters and aircrew. The nearest S&R base is at Humberside Airport, approximately 43km south-south-west of the Offshore Scoping Area. Its helicopters can provide rescue services up to approximately 460km away from base.

7.10.3 Potential Impacts

7.10.3.1 Potential Impacts during Construction

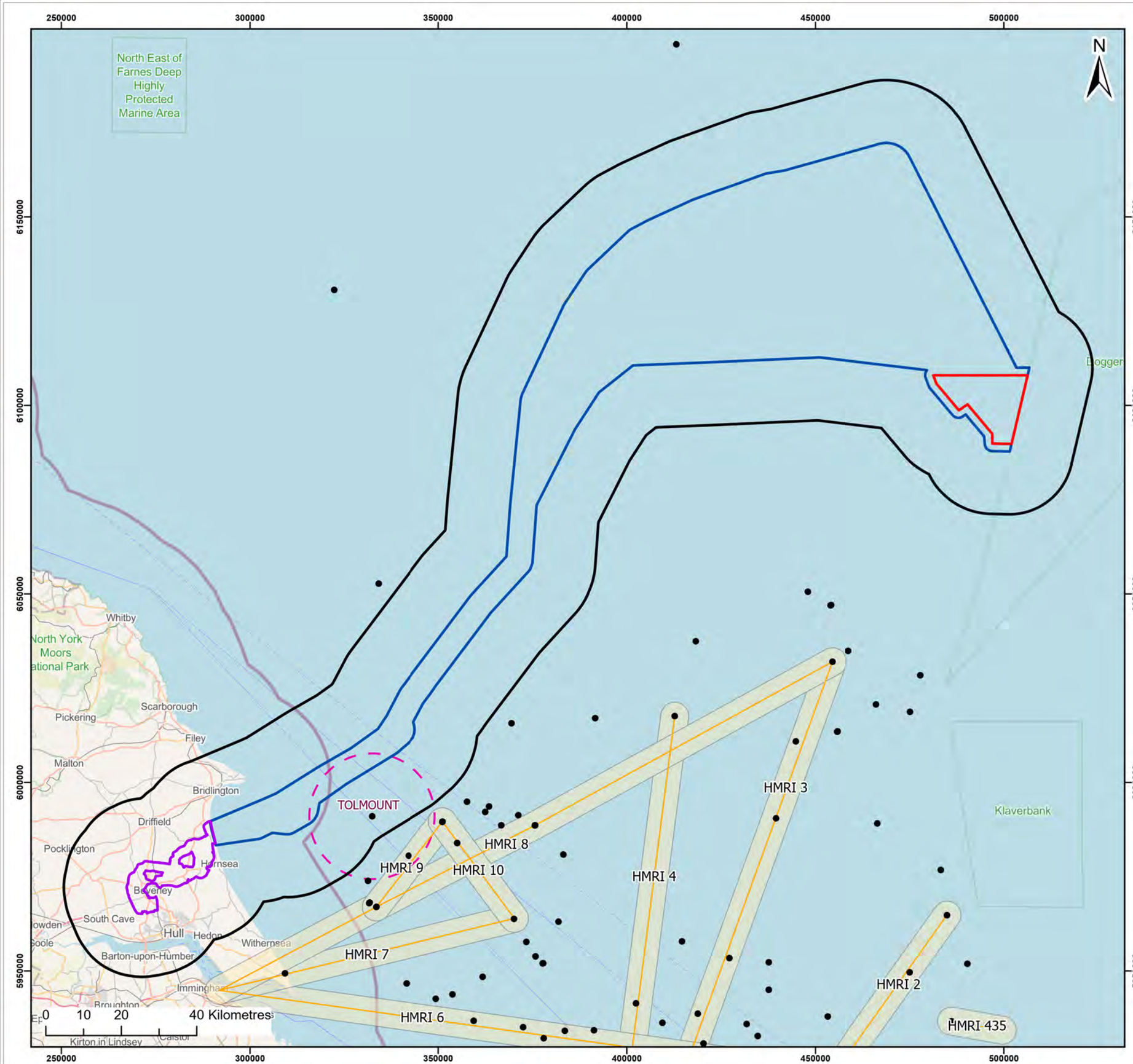
7.10.3.1.1 Impacts on Military and Civil Radar

805. The presence of tall crane vessels and partially completed wind turbines during the construction phase have the potential to cause interference to both military and civil radars. The construction of infrastructure within the Onshore Scoping Area also has the potential to cause interference to PSRs.

806. RLoS modelling indicates that wind turbines and other tall obstacles within the DBD Array Area will not be visible to any radar facilities due to the array being 210km from shore at its closest point. The Onshore Scoping Area is outside the EUR Doc 015 recommended safeguarded zones for the closest PSRs. Impacts on military and civil radars during construction are therefore proposed to be scoped out of the EIA following consultation with the MoD.

7.10.3.1.2 Impacts on Radio Navigation Aids

807. The construction of infrastructure has the potential to cause interference to the NATS Ottringham VOR / DME; however, the Onshore Scoping Area is outside the EUR Doc 015 recommended safeguarded zone for VOR / DME facilities. Impacts on radio navigation aids during construction are therefore proposed to be scoped out of the EIA.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- Existing Oil and Gas Offshore Infrastructure
- Helicopter Main Routing Indicator (HMRI)
- HMRI 2nm Consultation Buffer
- Offshore Helidecks within 9nm

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Helicopter Main Routing Indicators and Oil and Gas Helidecks

Figure: 7-34

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0067

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	14/06/2024	JH	AB	A3	1:1,000,000
01	11/04/2023	JR	CM	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.10.3.1.3 Creation of an Aviation Obstacle Environment

808. The construction phase will involve tall crane vessels and the installation of infrastructure above sea level which could pose a physical obstruction to low flying aircraft, increasing the risk of collision and requiring aircraft to fly extended routes to avoid obstacles.

809. Specifically, tall crane vessels and above sea level infrastructure will have a potential impact on S&R operations, helicopter traffic in support of offshore oil and gas and renewables, and military low flying activities. Therefore, creation of an aviation obstacle environment during the construction phase has been scoped into the EIA for further consideration.

7.10.3.1.4 Increased Air Traffic in the Area Related to Wind Farm Activities

810. Helicopter traffic associated with the construction phase could impact on existing air traffic in the vicinity, increasing the risk of aircraft collision.

811. Existing air traffic may include S&R helicopters, helicopter traffic in support of the oil and gas and renewables industries, and military low flying activities. Therefore, increased air traffic in the area related to wind farm activities during the construction phase has been scoped into the EIA for further consideration.

7.10.3.1.5 Impact of the Offshore Export Cable Route on Staxton Danger Area Activities

812. The proposed route for the offshore export cable could potentially infringe the Staxton Danger Area. Vessels and personnel engaged in cable installation could interfere with military training activities, therefore impact on Staxton Danger Area activities during the construction phase has been scoped into the EIA for further consideration.

7.10.3.1.6 Impact of Onshore Infrastructure on Airfield Operations

813. Construction of infrastructure within the Onshore Scoping Area could have an impact on activities at Beverley Airfield. Construction activities and new infrastructure could potentially impede aircraft from safely landing or taking off from the airfield. Therefore, impact of onshore infrastructure on airfield operations during the construction phase has been scoped into the EIA for further consideration.

7.10.3.2 Potential Impacts during Operation

7.10.3.2.1 Impacts on Military and Civil Radar

814. The presence of completed wind turbines during the operation phase has the potential to cause interference to both military and civil radars. Infrastructure within the Onshore Scoping Area also has the potential to cause interference to PSRs.

815. RLoS modelling indicates that completed wind turbines within the DBD Array Area will not be visible to any radar facilities due to the array being 210km from shore at its closest point. The Onshore Scoping Area is outside the EUR Doc 015 recommended safeguarded zones for the closest PSRs. Impacts on military and civil radars during operation are therefore proposed to be scoped out of the EIA following consultation with the MoD.

7.10.3.2.2 Impacts on Radio Navigation Aids

816. Infrastructure has the potential to cause interference to the NATS Ottringham VOR / DME; however, the Onshore Scoping Area is outside the EUR Doc 015 recommended safeguarded zone for VOR / DME facilities. Impacts on radio navigation aids during operation are therefore proposed to be scoped out of the EIA.

7.10.3.2.3 Creation of an Aviation Obstacle Environment

817. The presence of completed wind turbines and other associated infrastructure above sea level could pose a physical obstruction to low flying aircraft, increasing the risk of collision and requiring aircraft to fly extended routes to avoid obstacles.

818. Specifically, wind turbines and other above sea level infrastructure will have a potential impact on S&R operations, helicopter traffic in support of offshore oil and gas and renewables, and military low flying activities. Therefore, creation of an aviation obstacle environment during the operation phase has been scoped into the EIA for further consideration.

7.10.3.2.4 Increased Air Traffic in the Area Related to Wind Farm Activities

819. Helicopter traffic associated with maintenance activities could impact on existing air traffic in the vicinity, increasing the risk of aircraft collision.

820. Existing air traffic may include S&R helicopters, helicopter traffic in support of the oil and gas and renewables industries, and military low flying activities. Therefore, increased air traffic in the area related to wind farm activities during the operation phase has been scoped into the EIA for further consideration.

7.10.3.2.5 Impact of the Offshore Export Cable Route on Staxton Danger Area Activities

821. The proposed route for the offshore export cable could potentially infringe the Staxton Danger Area; however, the cable would be below sea level and would have no impact on aviation activities. Impact of the offshore export cable route on Staxton Danger Area activities during the operation phase is therefore proposed to be scoped out of the EIA.

7.10.3.2.6 Impact of Onshore Infrastructure on Airfield Operations

822. Infrastructure, specifically tall buildings and / or stacks, within the Onshore Scoping Area could have an impact on activities at Beverley Airfield. Therefore, impact of onshore infrastructure on airfield operations during the operation phase has been scoped into the EIA for further consideration.

7.10.3.3 Potential Impacts during Decommissioning

823. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower.

824. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-29**).

7.10.4 Potential Cumulative Effects

825. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect aviation, radar and military receptors (noting that there is unlikely to be any cumulative impacts for radar given the distance offshore). Therefore, cumulative effects related to aviation, radar and military are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

826. The CEA will consider the impacts in combination with other offshore wind farms and associated aviation activities, including increased collision risk between aircraft and other aircraft and between aircraft and offshore infrastructure.

7.10.5 Potential Transboundary Effects

827. There is potential for transboundary effects upon aviation receptors due to the Project's construction, O&M and decommissioning activities.

828. The airspace around the study area is used by international civil aviation and the DBD Array Area is immediately adjacent to airspace delegated to the Netherlands. The potential transboundary impacts on international use of the airspace have therefore been scoped into the EIA for further consideration.

7.10.6 Summary of Scoping Proposals

829. **Table 7-29** outlines the aviation, radar and military impacts which are proposed to be scoped in or out of the EIA. These may be refined through consultation activities and as additional project information and site-specific data become available.

Table 7-29 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Aviation, Radar and Military

Potential Impact	Construction	Operation	Decommissioning
Impacts on military and civil radar	X	X	X
Impacts on radio navigation aids	X	X	X
Creation of an aviation obstacle environment	✓	✓	✓
Increased air traffic in the area related to wind farm activities	✓	✓	✓
Impact of the offshore export cable route on Staxton Danger Area activities	✓	X	✓
Impact of onshore infrastructure on airfield operations	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.10.7 Approach to Data Gathering

830. The primary source of aviation related data to be used during desk-based studies in support of the EIA is the UK Aeronautical Information Publication (AIP). The AIP contains details on airspace and en route procedures as well as charts and other air navigation information. A summary of relevant data sources providing information and guidance that will be considered as part of the EIA process is provided in **Table 7-30**.

Table 7-30 Desk-Based Data Sources for Aviation, Radar and Military

Data Source	Date	Data Contents
CAP 032: UK AIP (CAA)	2024	Contains information on facilities, services, rules, regulations and restrictions in UK airspace.
CAP 168: Licensing of Aerodromes (CAA)	2022	Sets out the standards required at UK licensed aerodromes relating to management systems, operational procedures, physical characteristics, assessment and treatment of obstacles, and visual aids.
CAP 437: Standards for Offshore Helicopter Landing Areas (CAA)	2023	Provides the criteria applied by the CAA in assessing offshore helicopter landing areas for worldwide use by helicopters registered in the UK.
CAP 670: Air Traffic Services Safety Requirements (CAA)	2019	Highlights the requirements to be met by providers of civil air traffic services and other services in the UK in order to ensure that those services are safe for use by aircraft.
CAP 764: Policy and Guidelines on Wind Turbines (CAA)	2016	Details the CAA policy and guidelines associated with wind turbine impacts on aviation that aviation stakeholders and wind energy developers need to consider when assessing a development's viability.
CAP 1616: Airspace Change Process (CAA)	2023	Explains the CAA's regulatory process for changes to airspace.
Air Navigation Order 2016/765 (CAA)	2022	Sets out the Rules of the Air and includes the application of lighting to wind turbines in UK territorial waters (articles 222 and 223).
UK Military AIP (MoD)	2024	Is the main resource for information and flight procedures at all military aerodromes.

Data Source	Date	Data Contents
MoD Obstruction Lighting Guidance (Low Flying Operations Flight)	2020	Includes requirements for the lighting of offshore developments.
Maritime Coastguard Agency (MCA) Marine Guidance Note (MGN) 654: Safety of Navigation: Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA)	2021	Highlights issues to consider when assessing navigational safety and emergency response, caused by OREI developments.

7.10.8 Approach to Assessment

831. The EIA process will be supported by further desk-based studies that will identify and examine in greater detail sensitive aviation receptors. The assessment will determine receptor sensitivity and magnitude of impact in order to predict the significance of effects, as described in **Chapter 5 EIA Methodology**. Studies will be undertaken in parallel with consultation with relevant stakeholders to provide a detailed understanding of potential impacts. It is expected that consultation will be an iterative process (see **Chapter 6 Consultation**), allowing for any concerns that are raised to be considered in the wind farm design optimisation process.

832. Stakeholders to be consulted include NATS, the MoD, together with potentially impacted offshore platform and helicopter operators, and small airfield operators.

7.10.9 Scoping Questions to Consultees

833. The following questions are posed to consultees to help them frame and focus their response to the aviation, radar and military scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the aviation, radar and military impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the aviation, radar and military impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.11 Offshore Archaeology and Cultural Heritage

834. This chapter of the Scoping Report considers the potential likely effects of the Project associated with offshore archaeology and cultural heritage, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to MHWS at the landfall.

835. The Offshore Archaeology and Cultural Heritage assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.2 Marine Physical Processes;** and
- **Chapter 8.7 Onshore Archaeology and Cultural Heritage**.

7.11.1 Study Area

836. The Offshore Archaeology and Cultural Heritage Study Area (hereafter referred to as 'the Study Area') is defined as the Offshore Scoping Area (**Figure 1-1**) which encompasses the Array Area and the offshore ECC and covers all receptors seawards of MHWS. All receptors landwards of MHWS are included within **Chapter 8.7 Onshore Archaeology and Cultural Heritage**. The Study Area corresponds to the footprint within which development activities could occur and, consequently, the area of potential impacts to the Offshore Archaeology and Cultural Heritage existing environment.

7.11.2 Existing Environment

7.11.2.1 Data Sources

837. For the purposes of this scoping exercise, the existing environment within the Study Area is defined as the known archaeological and cultural heritage resource and the potential for previously unrecorded heritage assets and finds to be present within the Offshore Scoping Area with respect to:

- Seabed prehistory (i.e. archaeological remains on the seabed corresponding to the activities of prehistoric populations that may have inhabited what is now the seabed when sea levels were lower);
- Maritime archaeology (i.e. the remains of boats and ships and archaeological material associated with prehistoric and historic maritime activities);
- Aviation archaeology (i.e. the remains of crashed aircraft and archaeological material associated with historic aviation activities); and
- Buried archaeology (including palaeoenvironmental deposits) within the intertidal zone below MHWS.

838. This scoping exercise is supported by an initial desk-based review of existing literature and data sources as well as preliminary results following the archaeological assessment of marine geophysical data acquired for the Project within the Array Area in 2022 (**Figure 7-35**). As the Offshore Scoping Area has changed since the acquisition of the data in 2022 and 2023, only seabed features which fall within the current Study Area are discussed below. The results of the assessment of the 2022 and 2023 data will be reported on in full in the PEIR. Further geophysical surveys are planned during 2024 and the subsequent archaeological assessment of this data will inform the ES.

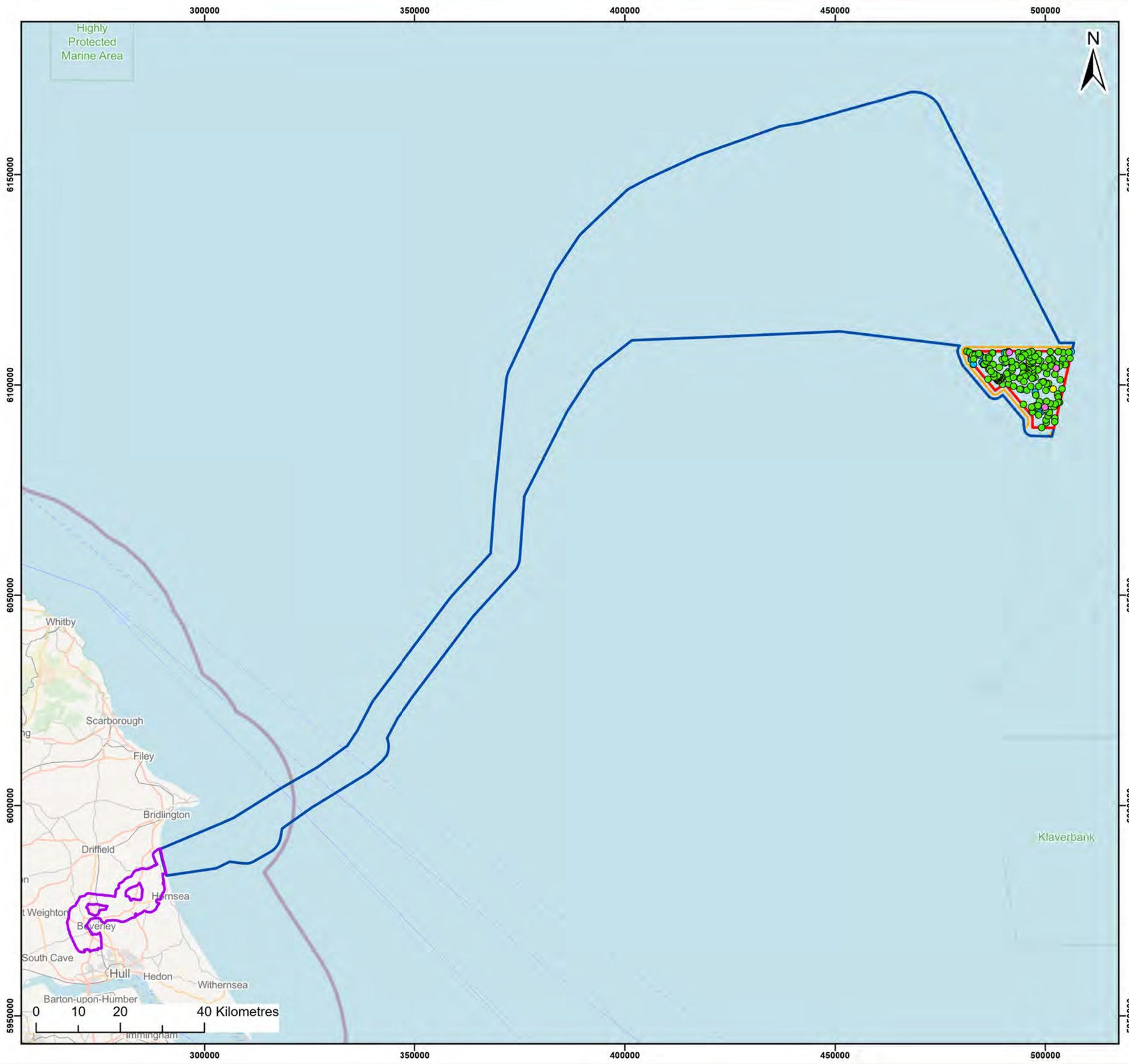
7.11.2.2 Submerged Prehistoric Archaeology

839. The Offshore Scoping Area stretches from the Holderness coastline of the East Riding of Yorkshire to the proposed Array Area, approximately 210km offshore. The Array Area is located within the eastern extent of Dogger Bank, an area of high prehistoric archaeological significance where archaeological and palaeoenvironmental evidence related to human occupation of the UK may be preserved. Dogger Bank is believed to have been formed during the time between the most recent (Devensian) glaciation between 30,000 and 15,000 Before Present (BP). The Offshore Scoping Area is part of a wider prehistoric landscape of the North Sea which, at several times in the past, was exposed as dry land. This is due to sea level falls driven by climate change. Buried sediments related to this are likely to contain, not only direct archaeological evidence of the human occupation of the area, but also evidence relating to the palaeoenvironment.

840. Terrestrial sediments deposited at this time on top of the bank are associated with high potential for prehistoric archaeological remains. Following the last glacial maximum (LGM), gradual but continuous sea level rise eventually inundated all of Doggerland with the topographic high of Dogger Bank being one of the last areas to be fully submerged at circa 7,000 to 6,000 BP. Prior to final inundation, this area would have presented an attractive environment for occupation by prehistoric populations, particularly during the Mesolithic when Dogger Bank would have formed a large upland area.

841. The Dogger Bank region has long been known to preserve prehistoric landscapes and deposits (Reid, 1913; Coles, 1998). From as early as 1883, maps showing the distribution of 'moorlog' (peat / submerged forest) across Dogger Bank were produced (see Wessex Archaeology, 2014). Recent geophysical and geoarchaeological investigations undertaken for the DBA, DBB, DBC and Sofia Offshore Wind Farms have also demonstrated the presence of palaeolandscape features and sub-seabed deposits of palaeoenvironmental interest within those project boundaries (Wessex Archaeology, 2022).

842. Although there are no known prehistoric sites within the Offshore Scoping Area, a wider study of the palaeolandscapes of the Dogger Bank projects is currently ongoing, and the Project has the potential to both inform, and be informed by, this wider study. An archaeological assessment of marine geophysical data (sub-bottom profiler and multibeam bathymetry) acquired for the Project in 2022 and 2023 is ongoing and will inform the assessment of submerged prehistoric landscapes at PEIR stage (see **Section 7.11.7**).



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Wessex Archaeology Study Area (2022-2023 Geophysical Survey)

Wessex Archaeology Seabed Features

- Anthropogenic origin of archaeological interest
- Anomaly of likely anthropogenic origin but of unknown date; may be of archaeological interest or a modern feature
- Anomaly of possible anthropogenic origin but interpretation is uncertain; may be anthropogenic or a natural feature
- Historic record of possible archaeological interest with no corresponding geophysical anomaly

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Seabed Features within the Study Area

Figure: 7-35

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0031

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	14/06/2024	JH	AB	A3	1:900,000
02	15/04/2024	AB	MJ	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.11.2.3 Maritime and Aviation Archaeology

843. Within the Offshore Scoping Area, there are no nationally important wrecks protected under the Protection of Wrecks Act 1973. There is, however, a single wreck designated as a protected place under the Protection of Military Remains Act 1986 (**Figure 7-36**).

844. HMS Falmouth was a First World War 'Town Class' light cruiser, which sank off Skipsea in 1916 whilst being towed to safety after being torpedoed by German U-boats, with the loss of 12 men, eight of whom were never found. Research on the wreck was conducted by Fjordr Ltd (2016) commissioned by Historic England to mark the centenary of HMS Falmouth's loss. Historic England and Fjordr worked with the Maritime and Coastguard Agency to survey the wreck in detail and a statement of significance was produced by Fjordr. Following this study, the Ministry of Defence (MoD) designated the wreck under the Protection of Military Remains Act 1986 and the wreck of HMS Falmouth became a 'Protected Place' on 3rd March 2017. Whilst diving on the site is permitted, it an offence to interfere with a protected place, to disturb or to remove anything from the site.

845. There is also high potential for other non-designated wrecks, aircraft and associated debris to be present within the Study Area. There is a total of 156 UK Hydrographic Office (UKHO) records within the Study Area. Most of these records are likely wreck related, but others are possibly related to aviation losses (**Figure 7-36**).

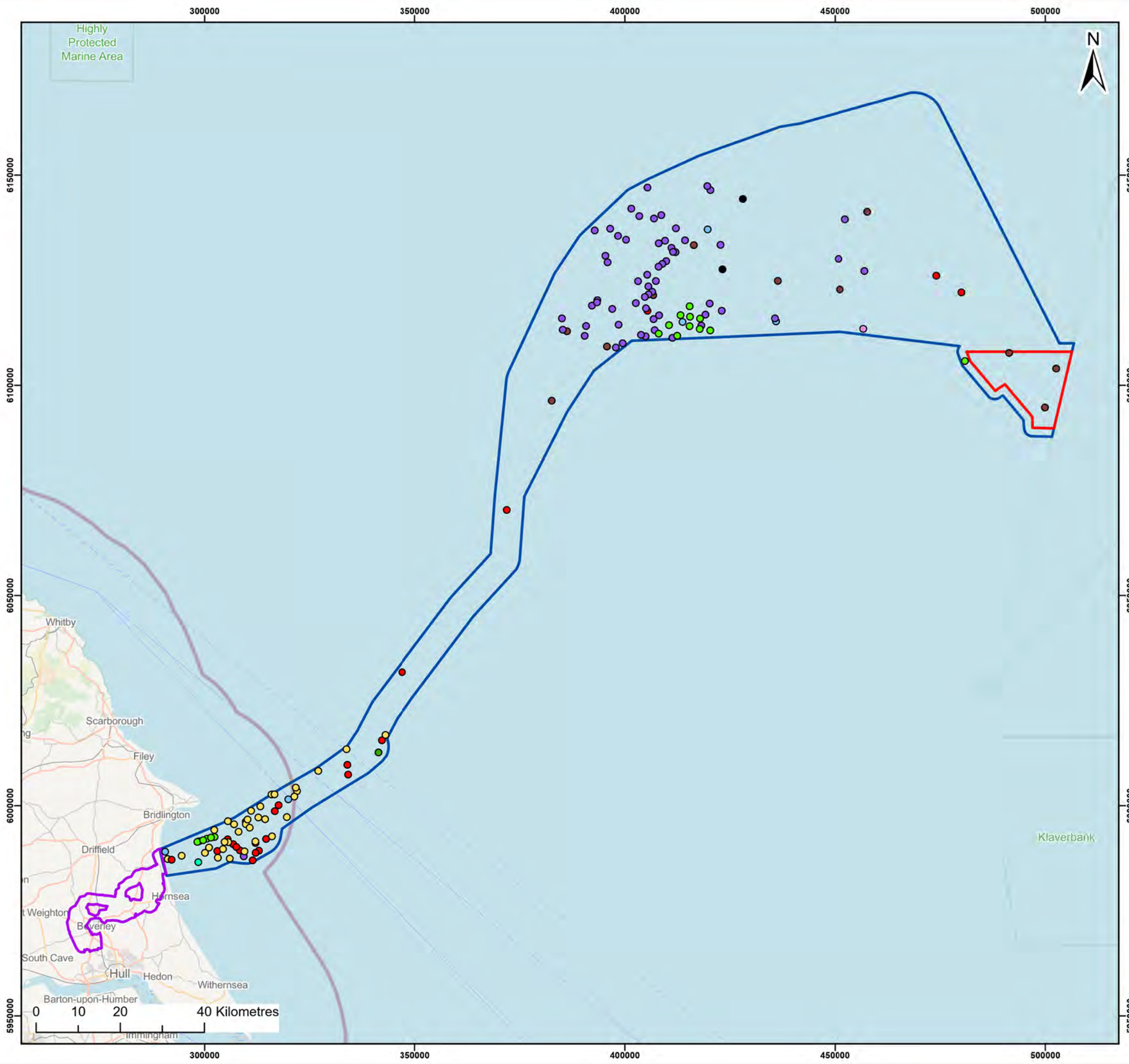
846. Within the Array Area, there are four UKHO records comprising, two named wrecks (SS Membland 'Dead' and St Luke trawler 'Unknown'), one unnamed wreck and one obstruction. The three wrecks are recorded as 'reported sinking' only and have not been seen in the geophysical data assessed at the recorded locations. The fourth record corresponds to a previously deployed wave, current and tidal measurement device and is not of archaeological interest.

847. The preliminary results following the archaeological assessment of marine geophysical data (sidescan sonar, multibeam bathymetry and magnetometer) indicate the presence of 221 further seabed features of possible archaeological interest within the Array Area comprising:

- Two unidentified wrecks (70587 and 70590) both of which were originally identified in data assessed in 2012 as part of the DBC consents process (formerly known as Dogger Bank Teesside A) and five debris features associated with wreck 70587;
- A debris field and two large magnetic anomalies interpreted as being of anthropogenic origin of archaeological interest; and
- 211 further anomalies of possible archaeological interest.

848. There are 152 further UKHO records within the Study Area and outside the Array Area:

- One corresponds to the wreck of HMS Falmouth, a protected place under the Protection of Military Remains Act 1986, as described above;
- One is the reported loss of a Tornado aircraft in 1998 which is not of archaeological interest but as a military aircraft, if found, would also be automatically protected under the Protection of Military Remains Act 1986;
- 22 are live wrecks, 11 of which are unidentified and, therefore, of unknown archaeological importance. Of the 11 which are known and identified wrecks:
  - Two are fishing vessels lost in 1975 (Our Lorraine) and 1980 (Storm Drift) which indicates they are modern vessels and not of archaeological interest;
  - One is possibly the remains of a fishing vessel sunk by mines during the First World War (Casoria, lost 1920);
  - Two are steam ships lost in the late 19th century (Tees, lost in 1883, and Forest Queen, lost in 1892); and
  - Six are steam ships lost during the First World War (Knuthenborg, lost in 1916, Brema, Feltre, Ville De Valenciennes and Tredegar Hall lost in 1917 and Diana lost in 1918).
- Eight of the records correspond to the reported sinking of vessels which have not subsequently been located but which may survive within the Study Area;
- 61 are recorded as fisherman's fasteners (an unidentified feature on the seabed recorded by fishermen as an obstruction to trawling), or are wrecks / obstructions recorded from fishing charts which have not subsequently been located, which may indicate the presence of previously unrecorded archaeological material;
- 36 are recorded as 'dead' (a wreck or obstruction which has not been detected by repeated surveys, and is therefore considered not to exist) but are locations at which archaeological material may still remain, possibly buried or dispersed and no longer causing an obstruction to navigation;
- Six records are described as foul ground and five as unidentified obstructions which may also represent previously undiscovered archaeological material;
- One wreck recorded as 'lifted' (salvaged) and, as a modern fishing vessel built in 1984, is not of archaeological interest;
- Six correspond to the recorded locations of rock berms installed as cable protection and are not of archaeological interest; and
- Ten correspond to the locations of boulders placed on the seabed by Greenpeace as part of an underwater blockade in 2020 and are not of archaeological interest.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area

UKHO

- Aircraft
- Fisherman's Fastener
- Foul ground
- Live wreck
- Modern debris (not of archaeological interest)
- Obstruction
- Protected place (HMS Falmouth)
- Record recorded as 'dead'
- Record recorded as 'lifted'
- Reported sinking

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

UKHO Records within the Study Area

Figure: 7-36

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0022

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	14/06/2024	JH	AB	A3	1:900,000
01	15/04/2024	AB	VC	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.11.2.4 Intertidal Archaeology

849. Evidence for human occupation of the Holderness coast can be traced back to the Palaeolithic and Mesolithic with activity centred around the meres and wetlands which characterised the area. Neolithic and Bronze Age settlers also made use of these environments, and traces of occupation survive in a number of places along the coast (Humber Field Archaeology, 2008).

850. The Holderness coastline and adjacent offshore area have changed significantly since the prehistoric period, with studies suggesting that the coastline has receded by around 6km since the Bronze Age (Humber Field Archaeology, 2008). Due to coastal erosion, in situ prehistoric sites within the intertidal zone are unlikely to survive, although isolated finds may be encountered. Earlier Prehistoric activity is demonstrated through the presence of findspots of faunal remains, flint and bone implements and features and buried deposits observed in the eroding cliff faces along this stretch of coastline. To the south of the Study Area, at Owthorne cliffs, a submerged Mesolithic forest has been recorded along with Mesolithic Axes and a Bronze Age dugout canoe.

851. The high rate of erosion along the coastline has also resulted in numerous lost villages including Wilsthorpe, Auburn Hartburn, Hyde, Withow and Cleeton in the area north of Hornsea (Sheppard, 1912). The potential for medieval and post-medieval finds within the intertidal and nearshore area should, therefore, be considered high, although in situ sites within the intertidal zone are unlikely to survive.

852. There are also a large number of records along the Holderness coast for the presence of First and Second World War coastal defences. The potential for remains should be considered high although due to the action of coastal erosion these would be fragmentary and most likely to comprise the remains of structures such as pillboxes which once would have stood on the cliff top. In situ remains such as beach scaffold poles and anti-tank cubes may survive, potentially buried, although these may now be located further offshore.

853. Overall, within the intertidal zone there is high potential for the fragmentary remains of occupation related to all periods of human activity, although in situ buried deposits are less likely to be encountered due to coastal erosion.

7.11.3 Potential Impacts

854. A range of potential impacts on offshore archaeology and cultural heritage have been identified which may occur during the construction, operation and decommissioning phases of the Project. These impacts include those issues identified as requiring consideration in the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011) and in the guidance documents listed in **Section 7.11.8**.

855. Heritage assets may be affected by direct physical changes or by indirect changes to their setting (Historic England, 2017).

856. Direct impacts to heritage assets present on the seafloor or buried under the seabed may result in damage to, or the destruction of, any archaeological material or the relationship between that material and the wider environment (stratigraphic context or setting). Relationships between archaeological material and the wider environment are crucial to developing a full understanding of such material. These impacts may occur if heritage assets or material are present within the footprint of the Project (i.e. foundations or cables) and from construction related activities (i.e. seabed clearance and anchoring). These impacts will be reviewed as the Project develops, through the EIA process.

857. There is also the potential for the Project to directly and indirectly change the local and regional hydrodynamic and sedimentary process regimes. Changes in coastal processes can lead to the re-distribution of erosion and accretion patterns. Similarly, changes in tidal currents may affect the stability of nearby morphological and archaeological features. Indirect impacts to heritage assets may occur if buried heritage assets become exposed to increased wave / tidal action, as these will deteriorate farther than assets protected by sediment. Conversely, if increased sedimentation results in an exposed site becoming buried, it may add some protection and be considered a beneficial impact. This will be considered based on the assessment undertaken for marine physical processes (see **Chapter 7.2 Marine Physical Processes**).

858. Impacts to the significance of a heritage asset may also occur if a development changes the setting of the asset (the surrounding in which the heritage assets is located, experienced and appreciated).

859. Similarly, historic character may also be affected if the Project results in a change to the prevailing character of the area and / or alters perceptions of the seascape.

7.11.3.1 Potential Impacts during Construction

860. Direct impacts may occur if archaeological material is present within the footprint of the Project (e.g. cabling, foundations, footprint of jack-up vessels). Direct impacts within both the Array Area and offshore ECC are scoped into the EIA.

861. Indirect impacts to heritage assets may occur if the physical presence of construction vessels and offshore infrastructure impact the hydrodynamic regime. Similarly, if seabed preparation associated with foundation and cable installation leads to localised effects upon sedimentary processes, this could lead to indirect impacts to heritage assets. This impact is directly related to the assessment of marine physical processes for which construction impacts have been scoped into the EIA (see **Chapter 7.2 Marine Physical Processes**). Indirect impacts to heritage assets associated with potential changes to marine physical processes are, therefore, also scoped into the EIA for further consideration.

862. During construction, there would also be potential for temporary impacts to the setting of heritage assets and to the historic seascape character from the presence of vessels associated with the installation of offshore infrastructure and activities at the landfall. However, these specific impacts are scoped out of the EIA on the basis that the assessments undertaken for the Teesside A & B ES (Wessex Archaeology, 2014a, 2014b) concluded that any changes in setting due to construction activities would be temporary and of sufficiently short duration such that they would not give rise to material harm. Similarly, changes to the historic seascape character during construction of the Project (i.e. associated with the presence of installation vessels) would be short term and temporary and would not result into a material change to the character of the historic seascape.

7.11.3.2 Potential Impacts during Operation

863. Direct impacts may occur if archaeological material is present where routine and non-routine maintenance activities which disturb the seabed (e.g. seabed contact by legs of jack-up vessels and / or anchors). Similarly, this can occur in exceptional circumstances such as the replacement of cabling. Direct impacts during operation are, therefore, scoped into the EIA.

864. Indirect impacts to heritage assets may occur if the physical presence of the installed infrastructure impacts the hydrodynamic or sedimentary regime. This includes the potential for increased scour around foundations. Operational impacts for marine physical processes are scoped into the EIA (see **Chapter 7.2 Marine Physical Processes**). Therefore, indirect impacts to heritage assets associated with potential changes to marine physical processes are also scoped into the EIA for further consideration.

865. There would also be potential for impacts to the setting of heritage assets and changes to the historic seascape character from the presence of the installed infrastructure and ongoing maintenance activities. The baseline, as presented in the Teesside A & B ES, will need to be updated to take account of the construction of the DBA, DBB, DBC and Sofia Offshore Wind Farms. Changes associated with the installed infrastructure will also be longer term in duration compared to the temporary changes associated with the construction phase. Impacts to the setting of heritage assets and changes to the historic seascape character during operation are, therefore, scoped into EIA.

7.11.3.3 Potential Impacts during Decommissioning

866. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower.

867. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-31**).

7.11.4 Potential Cumulative Effects

868. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect offshore archaeology and cultural heritage receptors. For example, the DBA, DBB and DBC Offshore Wind Farms, DBS and Sofia Offshore Wind Farm (RWE). There are also potential benefits of regional accumulation of data which the Project can feed into. Therefore, cumulative effects related to offshore archaeology and cultural heritage are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

869. Individual heritage assets would not be subject to cumulative direct impacts from other known plans or projects as they are discrete, and there would be no physical overlap of different infrastructure. However, although individual assets are discrete, taken together they could have collective heritage significance. Therefore, multiple impacts upon similar assets could occur cumulatively.

870. In addition, there is potential for multiple developments to affect the larger scale archaeological features such as palaeolandscapes. The setting of heritage assets and the historic seascape character of the North Sea may also be affected.

871. There is also the potential for cumulative indirect impacts associated with changes to marine physical processes. As such, cumulative impacts are scoped into the EIA for construction, operation and decommissioning.

7.11.5 Potential Transboundary Effects

872. Direct transboundary impacts may occur during construction if wrecks or aircraft of non-British nationality are subject to impact from development. Such wrecks may fall within the jurisdiction of another country, and may include, for example, foreign warships lost in UK waters. Similarly, where palaeolandscapes within the North Sea cross international boundaries, direct transboundary impacts may occur.

873. As such, direct transboundary impacts at construction, operation and decommissioning are all scoped into the EIA.

874. Indirect transboundary impacts are associated with changes to marine physical processes, where those changes cross an international boundary. The eastern boundary of the Array Area is located at the UK Economic Exclusion Zone boundary (EEZ). Therefore, there is potential for transboundary impacts upon marine physical processes receptors due to the Project's construction, O&M and decommissioning activities. An assessment of transboundary effects will be based on the 'zone of influence' identified at the PEIR / ES stages

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7.11.6 Summary of Scoping Proposals

875. **Table 7-31** outlines the offshore archaeology and cultural heritage impacts which are proposed to be scoped in or out of the EIA. These may be refined through the EPP and other consultation activities and as additional project information and site-specific data become available.

876. In the case of UXO, a separate Marine License application(s) will be made prior to construction for UXO investigation and clearance works. This will be informed by a detailed UXO survey and further archaeological assessment as part of post-consent investigation and mitigation. Impacts associated with UXO clearance, therefore, are not considered in the Offshore Archaeology and Cultural Heritage chapter.

Table 7-31 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Offshore Archaeology and Cultural Heritage

Potential Impact	Construction	Operation	Decommissioning
Direct impacts to heritage assets	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes	✓	✓	✓
Change to the setting of heritage assets, which could affect their heritage significance	X	✓	X
Change to character which could affect perceptions of the historic seascape character	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts (direct and indirect)	✓	✓	✓

7.11.7 Approach to Data Gathering

877. The data sources that will be accessed to characterise the existing historic environment with respect to offshore archaeology and cultural heritage are set out in **Table 7-32**.

Table 7-32 Desk-Based Data Sources for Offshore Archaeology and Cultural Heritage

Data Source	Data Contents
Archaeological assessment of 2022 and 2023 marine geophysical data.	All data acquired for the Project to date is being assessed by Wessex Archaeology. The preliminary results of the seabed features assessment have been made available to inform this scoping exercise although assessment of the sub-bottom profiler data and palaeolandscapes assessment remains ongoing.
UKHO records	Records of wrecks and obstructions data including 'dead' and salvaged wrecks that are no longer charted as navigational hazards.
Maritime records maintained by Historic England	Maritime records, including documented losses of vessels, and records of terrestrial monuments and findspots, including the archaeological excavation index.
National Heritage List of England (NHLE)	Records of designated heritage assets within England, maintained by Historic England. Geospatial Information Systems (GIS) data for all Protected Wrecks, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Humber Historic Environment Record (HER)	Primary repository of archaeological information. Includes information from past investigations, local knowledge, find spots, and documentary and cartographic sources.
BGS	Historic borehole logs and the wider geological background for the region.
National Historic Seascape Characterisation (HSC)	GIS data and character texts for the HSC of coastal and marine areas around England, mapped through a series of projects funded by Historic England and consolidated into a single national database.
Existing archaeological studies and published sources	Background information on the archaeology of the North Sea and Dogger Bank, including the results of archaeological assessments carried out for the DBA, DBB, DBC, Sofia and DBS Offshore Wind Farms and recent work undertaken in the wider North Sea. Background information relating to submerged landscapes within the North Sea.

878. In addition to the data presented in **Table 7-32**, the data presented in **Table 7-33** is collected or proposed to be collected for the EIA assessment.

Table 7-33 Existing and Proposed Baseline Surveys for Offshore Archaeology and Cultural Heritage

Survey	Timing	Spatial Coverage
Geophysical Survey (magnetometer, multibeam echosounder, side scan sonar and sub bottom profiler survey	Completed in 2022-2023	Array Area
	To be completed in 2024 or 2025	Offshore ECC
Geotechnical Survey	To be completed in 2024 and 2025	Array Area and offshore ECC

879. In addition to the data from the Array Area for which full assessment is already being progressed, all further data to be acquired from the offshore ECC will be archaeologically assessed by a suitably qualified and experienced contractor. This will be conducted in accordance with industry good practice set out in available guidance such as Marine Geophysics Data Acquisition, Processing, and Interpretation (Historic England, 2013).

880. An audit of the data collected will be undertaken by the archaeological contractor to determine the coverage, quality, and the appropriateness of the data for archaeological assessment to inform the EIA process.

881. Geotechnical investigations are scheduled to take place during 2024 and 2025. Advice is being provided by Royal HaskoningDHV's marine archaeologist in planning the survey and the approach to geoarchaeological assessment will be discussed through the EPP with Historic England. Geophysical data from the Array Area acquired in 2022 has been made available to inform the wider palaeolandscapes study of the Dogger Bank projects, which is currently ongoing. Opportunities to integrate the geoarchaeological assessment of geotechnical data acquired for the Project will also be explored as part of this wider study.

882. Data analysis will be corroborated and expanded upon by consultation with relevant stakeholders. Consultation will not only seek to validate the baseline, but also to identify any other additional data sources and understand stakeholder concerns to inform the impact assessment. Further information regarding consultation is provided in **Chapter 6 Consultation**.

7.11.8 Approach to Assessment

883. The offshore archaeology assessment will be informed by the interpretation of the geophysical survey data (namely the multibeam and sidescan sonar data to identify seabed features, such as wrecks, magnetometer data to identify magnetic anomalies and sub-bottom profiler and multibeam data to identify palaeolandscape features).

884. An offshore Archaeological Desk-Based Assessment (ADBA) will be undertaken to establish the baseline for both known and potential heritage assets within the defined areas based upon the desk-based sources listed in **Table 7-32**. Dependent upon the results, a walkover survey at the landfall may be conducted to ground truth existing records of heritage assets and identify any potential unrecorded heritage assets. This may also be required to inform an assessment of potential setting impacts upon heritage assets below MHWS within the intertidal zone.

885. The desk-based assessment and assessment of geophysical data will be used to identify a strategy for mitigation, including the avoidance of identified heritage assets through the application of Archaeological Exclusion Zones where appropriate. This mitigation strategy will be set out in the Outline Written Scheme of Investigation (WSI) which will be submitted as part of the ES and secured within the draft DCO.

886. The methodology for the assessment will also take account of guidance and documentation including:

- North Sea Prehistory Research and Management Framework (Peeters *et al*., 2009);
- People and the Sea: a maritime archaeological research agenda for England (Ransley *et al.,* 2013);
- Joint Nautical Archaeology Policy Committee (JNAPC) Code of Practice for Seabed Development (JNAPC and The Crown Estate, 2006);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2008);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology, 2008);
- Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessments (2020) and Code of Conduct (2022);
- IEMA, Institute of Historic Building Conservation (IHBC) and CIfA Principles of Cultural Heritage Impact Assessment (2021); and
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021).

887. Technical consultation with Historic England will be included as part of the EPP (see **Chapter 6 Consultation**). This will help to identify and agree the primary methodologies, present initial findings and ensure potential historic environment issues and risk are identified and considered during the EIA.

7.11.9 Scoping Questions to Consultees

888. The following questions are posed to consultees to help them frame and focus their response to the offshore archaeology and cultural heritage scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the offshore archaeology and cultural heritage impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the offshore archaeology and cultural heritage impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.12 Seascape, Landscape and Visual Impact

889. This chapter of the Scoping Report considers the potential likely effects of the Project associated with seascape, landscape and visual impact, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

890. The seascape, landscape and visual impact assessment (SLVIA) will consider all seascape and visual receptors seaward of MHWS where there is the potential for them to be significantly affected by the offshore components of the Project. Impacts on onshore landscape and visual receptors from the onshore components of the Project, including intertidal works associated with the landfall, will be considered within the Landscape and Visual Impact Assessment (LVIA) (See **Chapter 8.10 Landscape and Visual Impact**).

891. The SLVIA is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.11 Offshore Archaeology and Cultural Heritage;**
- **Chapter 7.13 Other Marine Users;** and
- **Chapter 8.10 Landscape and Visual Impact.**

7.12.1 Study Area

892. The Seascape, Landscape and Visual Impact Study Area (hereafter referred to as 'the Study Area') has been defined on the basis of the likely influence of the Project offshore components on seascape character, landscape character and visual amenity.

893. The offshore export cables will be submerged beneath the sea and as such will not give rise to any impacts on seascape character or visual amenity during operation. Construction of the offshore ECC will be short-term in nature and occur over a limited spatial extent. Therefore, the offshore ECC is not considered as part of the study area.

894. The study area is defined in relation to the Array Area only. Published guidance suggests a study area of 45km radius for wind turbines over 150m in overall height (Scottish Natural Heritage (SNH), 2017). A typical radius of 50km has been adopted for offshore developments with turbines around 200m to blade tip. More recently, SLVIA study areas of greater than 50km have been advised by stakeholders (Marine Scotland, 2021) in recognition of the increasing maximum heights of wind turbines. Based on other SLVIA studies for offshore wind farms, it is considered that likely significant effects will not occur at distances greater than 60km from the Array Area. The Study Area is therefore defined as 60km around the Array Area and is shown on **Figure 7-37**.

7.12.2 Existing Environment

895. The Array Area is located off the north-east coast of England and is a minimum of 210km from the closest point on the coast, at Flamborough Head. **Figure 7-37** shows the Array Area in the context of a 60km study area. The entirety of the Study Area is within the North Sea, including UK and Dutch waters.

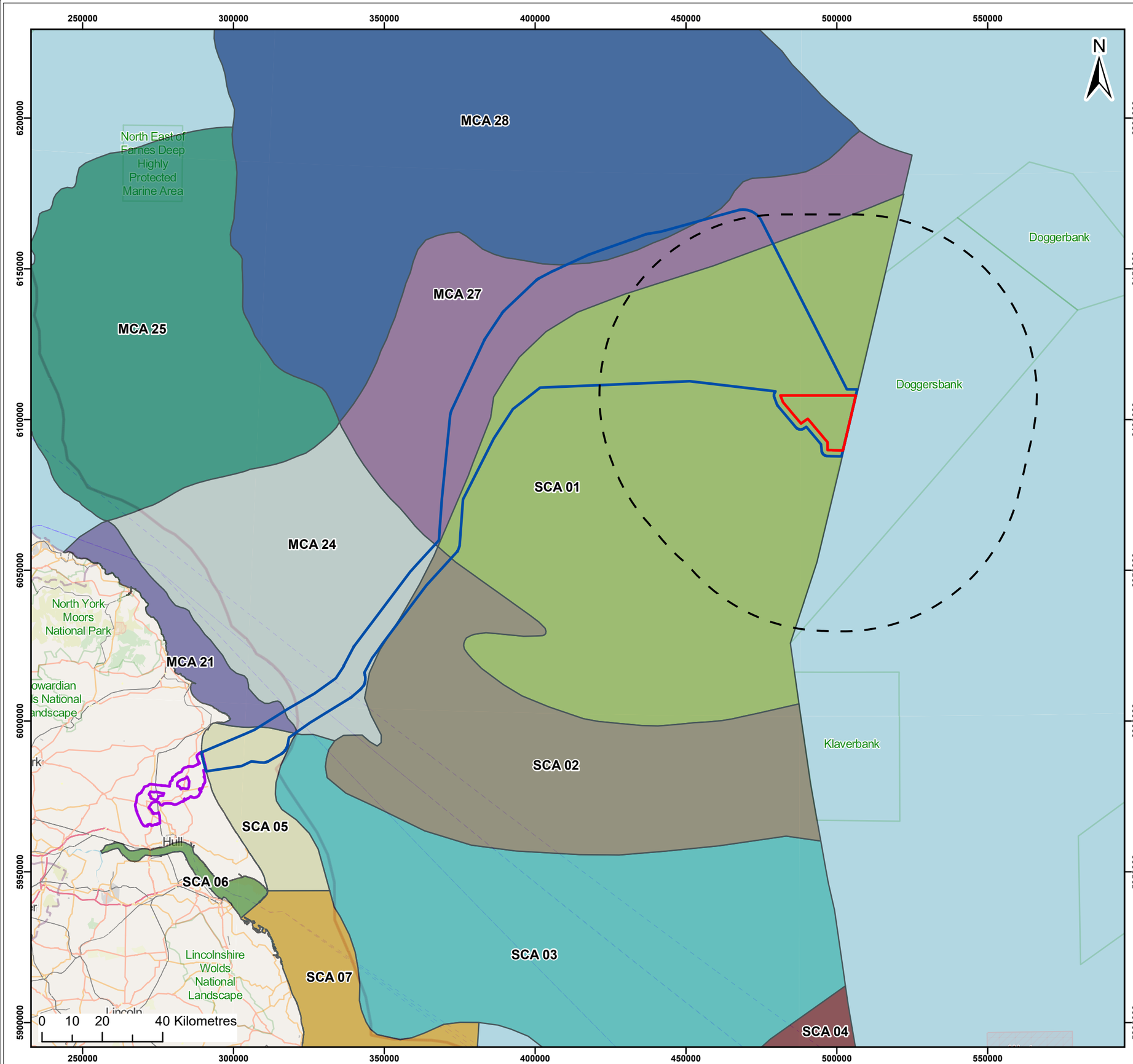
896. The seascape around the Array Area includes evidence of human activity, such as offshore gas platforms and offshore wind farms (see **Chapter 7.13 Other Marine Users**). In addition, transient activity is evident through shipping vessels. The DBD Array Area comprises the eastern half of the consented DBC Array Area. The DBD Array Area is also approximately 20km from the array area for the consented Sofia Offshore Wind Farm, 44km from the array area of the consented DBA Offshore Wind Farm, and 54km from the array area of the consented DBB Offshore Wind Farm. These are each located to the west of the DBD Array Area. The planned DBS Array Areas are located around 60km to the south-west. The operational Hornsea One and Two wind farms, with the planned Hornsea Three and Four projects alongside, are over 100km to the south. Planned wind farms in Dutch waters to the south-east are beyond 100km.

897. In the original Dogger Bank Teesside A & B ES SLVIA (the footprint of which the Project sits within), schemes beyond 100km were not considered in the cumulative assessment and this approach will be adopted for the Project's cumulative effects assessment.

898. The character of the seascape in UK waters is defined at a national scale in the seascape assessments published by the MMO (2012). The DBD Array Area will be entirely within the Dogger Bank Marine Character Area (MRCA) as defined in the East Offshore Marine Plan Area. The key characteristics for this MRCA are as follows:

- *'Extensive and remote areas of relatively shallow waters.*
- *Visually unified and expansive open water character.*
- *Widespread sand bank habitat.*
- *Significant fisheries area because of important fish spawning and nursery habitats.*
- *Expansive seascape with few surface features.*
- *Important archaeological features present.'*

899. There is no known seascape assessment for Dutch waters, though the above characteristics are likely to be similar across the international boundary.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Seascape, Landscape and Visual Impact Study Area (Array Area 60km Buffer)

Marine Characters Areas

- SCA 01: Dogger Bank
- SCA 02: Dogger Deep Water Channel
- SCA 03: East Midlands Offshore Gas Fields
- SCA 04: East Anglian Shipping Waters
- SCA 05: Holderness Coastal Waters
- SCA 06: Humber Waters
- SCA 07: East Midlands Coastal Waters
- MCA 21: North Yorkshire Coastal Waters
- MCA 24: Breagh Oil and Gas Field
- MCA 25: Farne Deeps
- MCA 27: Dogger Bank Edge
- MCA 28: Swallow Hole Plain

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Seascape, Landscape and Visual Impact Study Area

Figure: 7-37

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0059

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	07/06/2024	JH	AB	A3	1:1,250,000
02	23/04/2024	MT	AB	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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900. Due to the curvature of the earth, there would be no visibility of the above water Project infrastructure (maximum turbine height of 365m above Lowest Astronomical Tide (LAT)) from sea level at over 74km from the Array Area. Although there are more elevated areas along the coast, the limits of visual acuity and atmospheric visibility mean that the Project, at a minimum of 210km from landfall, will not be visible from shore. Visual receptors within the Study Area will be limited to people working in the marine environment, people passing through the area on passenger or commercial vessels, and potentially small numbers of recreational vessels.

901. Any offshore platforms within the Array Area would be a minimum of 210km from landfall, and as such would not be visible from the coast.

7.12.3 Potential Impacts

7.12.3.1 Potential Impacts during Construction

902. During construction of the offshore components (wind turbines, offshore platforms, inter-array cables and export cables) the presence of construction activity and partially completed structures within the seascape has the potential to impact seascape character and visual receptors. Due to the distance to shore, construction activity in any part of the Offshore Scoping Area will not be visible in views from land but may be visible from receptors at sea. However, given the temporary nature of construction and its localised nature offshore, impacts on receptors who may be affected by changes to the seascape (e.g. other marine users) will be limited.

903. The limited offshore export cable installation will be of a short duration and will use similar vessels regularly using the local ports. The presence of a cable lay vessel near to the coastal zone for a short period (days) will result in negligible impact on coastal seascape, landscape and visual receptors. Following the installation of the offshore export cables, there will be no residual SLVIA impacts, as the cables will be located beneath the seabed and not observable from any point onshore.

904. Impacts during the temporary construction phase of the offshore components will never be greater than the operational impacts of the completed wind farm. As such, it is proposed that offshore construction impacts are scoped out of the SLVIA.

905. Construction works will be required in the intertidal and inshore areas at the landfall, where the offshore export cables come onshore. It is proposed that the effects of these works on seascape, landscape and visual receptors will be assessed within the onshore LVIA, as set out in **Chapter 8.10 Landscape and Visual Impact**.

906. As such, it is proposed that offshore construction impacts are scoped out of the SLVIA.

7.12.3.2 Potential Impacts during Operation

7.12.3.2.1 Seascape Character

907. The susceptibility of the seascape is likely to be low due to the presence of consented and under-construction offshore wind farms in the area, and there are no indications of value. The baseline seascape of the Study Area is therefore of low sensitivity to the Project. It is considered that operation of the Project is unlikely to significantly impact on the key characteristics of the MRCA in which it is sited or other MRCAs within the Study Area. It is therefore proposed that offshore operational impacts on seascape character are scoped out of the SLVIA.

7.12.3.2.2 Landscape Character and Designated Landscapes

908. Due to the intervening distance of 210km between the Array Area and the coastal and non-coastal landscapes, the presence of the offshore components of the Project (e.g. wind turbines, offshore platforms, inter-array cables and export cables) are unlikely to significantly impact landscape character or the special qualities of any landscape designations. No permanent, above-ground works are proposed at the landfall location, but any residual effects on landscape receptors will be assessed within the onshore LVIA, as set out in **Chapter 8.10 Landscape and Visual Impact**. Therefore, it is proposed that offshore operational impacts on landscape character and designations resulting from the Project are scoped out of the SLVIA.

7.12.3.2.3 Visual Receptors

909. The transient visual receptors within the Study Area will be of low susceptibility to changes in their views of the surrounding sea, and views of low value. Visual receptors will be of low sensitivity to the Project, and significant impacts are not anticipated. There will be no visibility of the offshore components from the coast, due to the minimum intervening distance of approximately 210km. No permanent, above-ground works are proposed at the landfall location, but any residual effects on visual receptors will be assessed within the onshore LVIA, as set out in **Chapter 8.10 Landscape and Visual Impact**. Consequently, it is proposed that visual impacts resulting from offshore operation of the Project are scoped out of the SLVIA.

7.12.3.3 Potential Impacts during Decommissioning

910. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. As such, it is proposed that offshore decommissioning impacts are scoped out of the SLVIA.

7.12.4 Potential Cumulative Effects

911. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect seascape and visual receptors, as the DBD Array Area is situated in close proximity to consented offshore development at DBA, DBB, DBC and Sofia Offshore Wind Farms. However, given the seascape characteristics of the area and the low sensitivity of potential seascape and visual receptors, it is considered that these effects would not be significant. Therefore, given that all impacts arising from the Project are scoped out of the SLVIA, it is proposed that offshore cumulative impacts are also scoped out.

7.12.5 Potential Transboundary Effects

912. There is potential for transboundary effects upon landscape and visual receptors due to the Project's construction, O&M and decommissioning activities.

913. The Array Area is adjacent to the limit of UK waters, and the Study Area extends beyond this into Dutch waters. Seascape and visual transboundary effects could therefore affect receptors in Dutch waters. However, the sensitivity of seascape and visual receptors in this area will be no greater than in UK waters, and the seascape will be similarly affected by the other offshore wind farms currently under construction (DBA, DBB, DBC and Sofia Offshore Wind Farms). It is considered that transboundary effects would not be significant, and therefore all transboundary impacts are proposed to be scoped out of the SLVIA.

7.12.6 Summary of Scoping Proposals

914. **Table 7-34** outlines the seascape, landscape and visual impacts which are proposed to be scoped out of the EIA.

Table 7-34 Summary of Impacts Proposed to be Scoped Out (X) for Seascape, Landscape and Visual Impact (Offshore & Landfall Only)

Potential Impact	Construction	Operation	Decommissioning
Seascape character	X	X	X
Landscape character and designated landscapes	X	X	X
Visual receptors	X	X	X
Cumulative impacts	X	X	X
Transboundary impacts	X	X	X

7.12.7 Scoping Questions to Consultees

915. The following questions are posed to consultees to help them frame and focus their response to the seascape, landscape and visual impact scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the seascape, landscape and visual impacts resulting from the Project been identified in the Scoping Report?
- Do you agree that all seascape, landscape and visual impacts should be scoped out of the EIA?

7.13 Other Marine Users

916. This chapter of the Scoping Report considers the potential likely effects of the Project associated with other marine users, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

917. The Other Marine Users assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 7.8 Commercial Fisheries;**
- **Chapter 7.9 Shipping and Navigation;** and
- **Chapter 7.10 Aviation, Radar and Military**.

7.13.1 Study Area

918. The Other Marine Users Study Area encompasses the Offshore Scoping Area (**Figure 1-1**). This will cover potential effects associated with interactions between other marine users and the Array Area and offshore ECC. The Other Marine Users Study Area also includes a 50km buffer around the Array Area, which was chosen to ensure every receptor which is reasonably likely to be significantly influenced by the Project was captured in this assessment, given the high number of plans, projects and activities (operational or in planning) within the Dogger Bank and Southern North Sea.

7.13.2 Existing Environment

919. This section considers interactions within the Offshore Scoping Area with industries not already covered as EIA topics in their own right, such as **Chapter 7.8 Commercial Fisheries**, **Chapter 7.9 Shipping and Navigation** and **Chapter 7.10 Aviation, Radar and Military**.

7.13.2.1 Offshore Wind Infrastructure

920. Offshore wind developments that have been consented or are known projects in development within a 50km buffer of the Array Area are summarised in **Table 7-35** and shown on **Figure 7-38**.

Table 7-35 Offshore Wind Farm Projects within 50km of the Array Area

Offshore Wind Farm	Distance from the Offshore Scoping Area (km)	Status
DBA	49	Under construction
DBC	Adjacent	Under construction
Sofia	18	Under construction

921. Offshore wind farm ECCs within the Offshore Scoping Area are listed with their status in **Table 7-36** and shown on **Figure 7-38**.

Table 7-36 Offshore Wind Farm Projects Export Cables within the Offshore Scoping Area

Offshore Wind Farm	Wind Farm Status
DBA	Under construction
DBB	Under construction
DBC	Under construction
Sofia	Under construction
Hornsea Project 4	Consent granted, pre-construction
DBS	Application submitted

922. The southern North Sea has significant oil and gas infrastructure. This includes surface (platforms and buoys) and sub-surface (wells, wellheads, manifolds and pipelines) infrastructure.

923. There is no surface infrastructure within the Array Area. The nearest oil and gas infrastructure is associated with the Cavendish, Gordon and Esmond gas fields. The nearest platform (Cavendish), approximately 86km south-west of the Array Area, ceased production in August 2018 and was approved for decommissioning in June 2020 (INEOS UK SNS Limited, 2020). Decommissioning activities for Cavendish are scheduled for five years (Lepic, 2020).

924. There is no active sub-surface infrastructure within the Array Area. The nearest active well lies 60km south-west, which is operated by Neptune E&P UK Ltd and is found within Block Number 12.

925. Within the Offshore Scoping Area, there are two pipelines that cross the offshore ECC, with both pipelines carrying gas. These are listed in **Table 7-37** and displayed on **Figure 7-38**. No pipelines run through the Array Area.

Table 7-37 Pipelines within the Offshore Scoping Area

Pipeline	Material	Status	Number of Crossings
Shearwater to Bacton Seal line	Gas	Active	1
Langeled		Active	1

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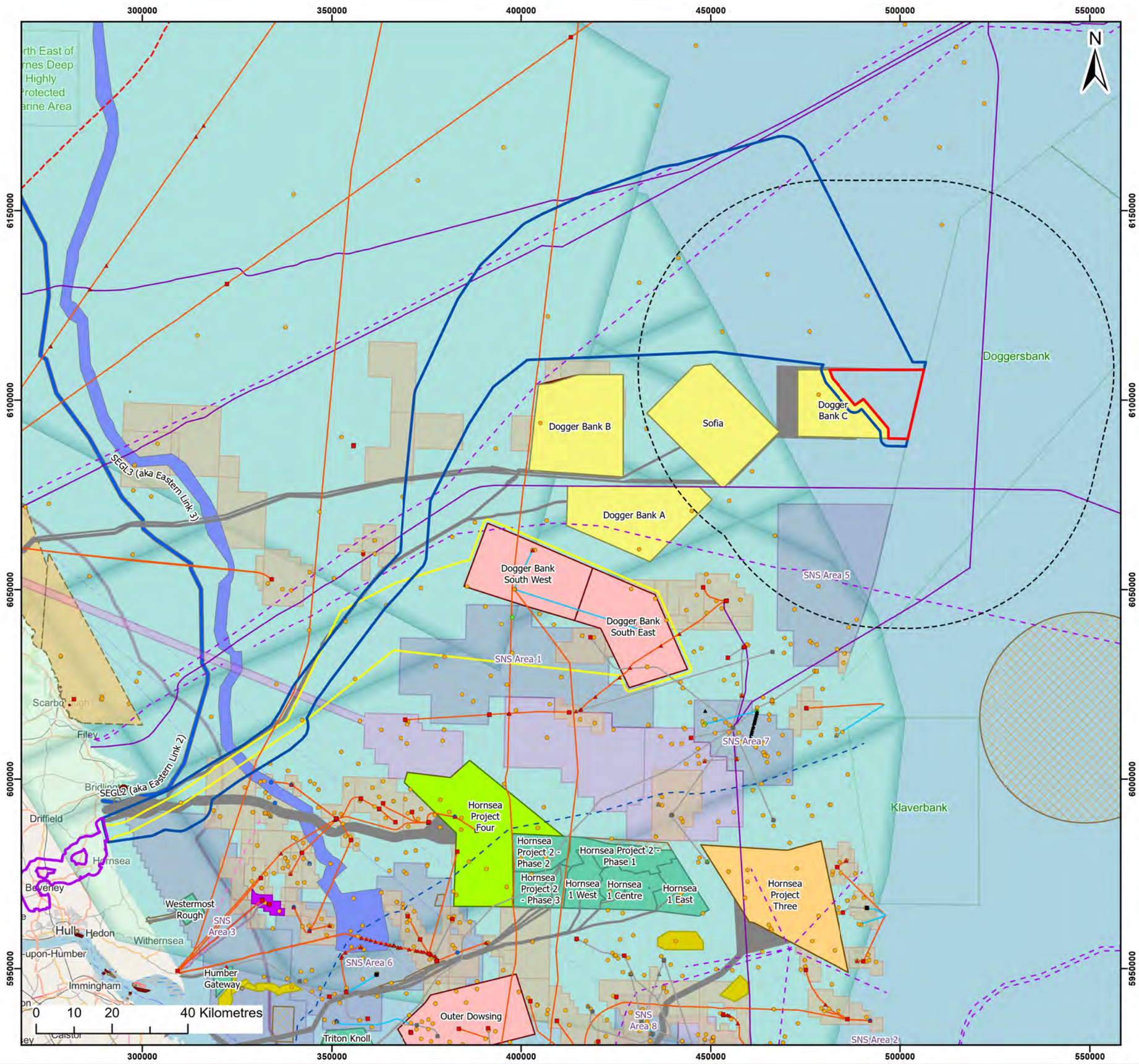

Legend:

- Offshore Scoping Area
- Onshore Scoping Area
- Dogger Bank D Array Area
- Dogger Bank D Array Area 50km Buffer
- Dogger Bank South Offshore Scoping Area
- Carbon Capture Storage Licencing Round
- Carbon Capture Storage Licence Area Out of Round
- PEXA Danger Areas
- Oil & Gas Licence Block

Surface Infrastructure

- Abandoned
- Active
- Not in Use
- Precommissioned

Sub-surface Infrastructure

- Abandoned
- Active
- Not in Use

Wells

- Drilling
- Completed (Operating)
- Plugged
- Abandoned

Cables & Pipelines

- Abandoned Pipeline
- Active Pipeline
- Not in Use
- Precommissioned Pipeline
- Telecommunications Cable
- Out of Use Cable
- Power Cable
- Viking Link Interconnector
- SEGL2 Proposed Cable
- SEGL3 Proposed Cable
- Offshore Wind Export Cable Corridor

Other Offshore Wind Farms

- Active/In Operation
- Consented
- Government Support on Offer
- Pre-planning Application
- Under Construction
- Natural Gas Storage Site
- Marine Aggregate Site
- Offshore Mining Site

Marine Disposal Site

- Open
- Disused
- Closed

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Other Marine Users within the Vicinity of the Scoping Area

Figure: 7-38 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0033

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	14/06/2024	JH	AB	A3	1:1,000,000
02	11/04/2024	JR	CM	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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926. The Offshore Scoping Area also overlaps with the following oil and gas blocks, licenced for exploration and production: 42/22, 42/23, 42/27, 42/19, 42/20b, 43/11, 42/15c, 42/5b, 43/1a, 43/2a, 37/22a, 37/22b, 37/17, 37/18/ 37/23b, 37/23a, 37/28b, 37/24, 37/19, 37/20, 37/25, 38/16, 38/21a and 38/17.

7.13.2.2 Sub-Sea Cables

927. The southern North Sea contains a considerable number of cables, primarily telecommunication connections between the UK and continental Europe. Within the Offshore Scoping Area, three active sub-sea cables and three out of use cables cross the offshore ECC:

- Tata North telecommunications cable;
- Pangea North UK to Denmark telecommunications cable;
- Havhingsten Seaton Sluice telecommunications cable;
- The out of use UK to Denmark telecommunications cable;
- The out of use Faroese telecommunications cable; and
- The out of use Norderney to Scarborough telecommunications cable.

928. There are no existing cables present within the Array Area and this list excludes the offshore wind export cables discussed in **Table 7-36**.

7.13.2.3 Carbon Capture Storage

929. A new leasing round opened by the North Sea Transition Authority (NSTA) in June 2022, includes two CCS areas within the offshore ECC. These two areas are the following:

- Southern North Sea Area 1; and
- Southern North Sea Area 3.

930. Outside of the NSTA leasing round, the pipeline of the proposed Northern Endurance CCS Project crosses the Offshore Scoping Area. It lies 127km south-west of the Array Area and associated pipelines are proposed to run from Redcar and Easington, which would both cross the offshore ECC, with the Easington pipeline entering into the offshore ECC (but not crossing) in two locations.

7.13.2.4 Marine Aggregates and Mining

931. There are no aggregate production or mining areas within the Offshore Scoping Area. The nearest areas are four production areas Area 514/1/2/3/4 licenced to CEMEX UK Marine Ltd located approximately 12km to the south-east of the Offshore Scoping Area boundary, and Area 506 licenced to DEME Building Materials Ltd located around 57km south of the Offshore Scoping Area boundary.

932. Dredging vessels may transit through the Array Area. However, interactions between the Project and vessel traffic are covered in **Chapter 7.9 Shipping and Navigation**.

7.13.2.5 Disposal Sites

933. There are three open disposal sites within 50km of the Offshore Scoping Area, namely:

- Bridlington A;
- DBA; and
- DBB.

934. The closest of these active disposal sites is DBB, which is located approximately 4km from the closest point to the Offshore Scoping Area. There is one closed disposal site within the Offshore Scoping Area, namely, Dogger Bank Teesside A (DG030) disposal site which encompasses the Array Area, as shown on **Figure 1-1**. Furthermore, the closed disposal sites nearby are:

- Dogger Bank Teesside B (DG025), 18km west of the Array Area;
- Bridlington A, 4km at its closest point; and
- Westermost Rough, 18km at its closest point.

7.13.2.6 Ministry of Defence Activities

935. The following Practice and Exercise Areas (PEXA) encompass the Offshore Scoping Area:

- D323B;
- D323C;
- D323F; and
- D412.

936. These sites are designated as Royal Airforce (RAF) Danger Areas for Air Combat Training and High Energy Manoeuvres between 5,000 ft and 66,000 ft.

937. As a result of both World War 1 and World War 2, there is also potential for Unexploded Ordnance (UXO) within the Offshore Scoping Area and the wider southern North Sea region. Locations of any UXO would be determined post-consent during detailed pre-construction surveys, with mitigation agreed in consultation with Natural England, the JNCC and the MMO. Any assessments for UXO clearance in the EIA will be for information only and are not part of the DCO application. A separate Marine Licence application(s) will be made prior to construction for UXO investigation and clearance works, with an accompanying assessment of UXO clearance impacts on other marine users.

7.13.3 Potential Impacts

7.13.3.1 Potential Impacts during Construction

938. Construction works such as the installation of cables or foundations have the potential to impact on other marine users if they are situated or crossing within the construction footprint or adjacent.

939. The presence of increased vessel traffic during construction may also impact on other marine users (see **Chapter 7.9 Shipping and Navigation**).

7.13.3.1.1 Potential Interference with Other Wind Farms

940. The Offshore Scoping Area overlaps with other wind farm infrastructure (**see Section 7.13.2.1**). Therefore, there is a pathway to interfere directly with other offshore wind developments. For example, the proposed Offshore ECC is likely to require crossing the six different offshore wind farm ECCs (**Figure 7-38** and **Table 7-37**). Where cable crossings are required, crossing agreements will be sought with cable owners and operators, and appropriate installation and protection measures developed.

941. The DBD Array Area is situated directly adjacent to the consented DBC array area, as the Project is making use of the eastern section of the DBC array area. The potential effects of this proximity of the Project on DBC and other nearby infrastructure (namely the Sofia Offshore Wind Farm) will be assessed, supported by engagement with the relevant operators. Therefore, the potential interference with other wind farms will be scoped into EIA.

7.13.3.1.2 Potential Interference with Oil and Gas Activities

942. There is limited potential for interactions between the Project and existing and future oil and gas activity. The Applicant has sought to avoid direct conflict with existing oil and gas infrastructure through the site selection process. As mentioned in **Section 7.13.2.2**, within the Offshore Scoping Area, there are no active platforms, no wave buoys, guard buoys or wellhead marker buoys.

943. Any conflicts with oil and gas industry vessel and helicopter operations will be assessed in **Chapter 7.9 Shipping and Navigation** and **Chapter 7.10 Aviation, Radar and Military**, and used to inform the overall assessment of impacts on the oil and gas industry.

944. The licensing of new areas for oil and gas exploration and production, and the associated works, is ongoing and this will be monitored by the Applicant. Therefore, the potential interference with oil and gas operations and decommissioning activities will be scoped into the EIA.

7.13.3.1.3 Physical Impacts on Sub-Sea Cables and Pipelines

945. The Applicant has sought to minimise the number of cable crossings through the site selection process. However, the cable installation, vessel anchoring and debris clearing operations, in proximity to existing cables and at crossings, has the potential to damage existing assets. As mentioned in **Section 7.13.2.2** and **Section 7.13.2.3**, there are potentially 16 cable and pipeline crossings. Therefore, physical impacts on sub-sea cables and pipelines will be scoped into the EIA.

7.13.3.1.4 Impacts on Carbon Capture Storage Sites

946. The Offshore Scoping Area overlaps with the Northern Endurance project pipeline, which is located within the offshore ECC (see **Section 7.13.3.1.4**). There is a potential pathway for interaction between the Project and this CCS site, although any potential effects will be mitigated by engagement with the relevant CCS lease holder / operator and the appropriate crossing agreements. However, as the scale of the potential interaction is unknown at this time, construction impacts on this CCS site will be scoped into the EIA.

7.13.3.1.5 Impacts on Disposal Sites

947. The Offshore Scoping Area does not overlap any active disposal sites (**Figure 7-38**), with the closest active disposal site being DBB, located approximately 7km from the closest point to the Offshore Scoping Area and as such there are no pathways for impacts to occur. Therefore, construction impacts on disposal sites will be scoped out of the EIA.

948. Vessel traffic associated with transits to and from open disposal sites within 50km of the Offshore Scoping Area is covered in **Chapter 7.9 Shipping and Navigation**.

7.13.3.1.6 Impacts on Aggregate Sites

949. As there is no overlap of aggregate licence areas with the Offshore Scoping Area, there are limited pathways for impacts upon aggregate dredging activities, with the closest active sites being Humber 1, 2, 3 and 4 which are located approximately 43km south-east of the closest point to the Offshore Scoping Area. Therefore, construction impacts on aggregate sites will be scoped out of the EIA. Any dredger transit conflicts will be covered in **Chapter 7.9 Shipping and Navigation**.

7.13.3.1.7 Impacts on Ministry of Defence Activities

950. The construction of the Project has the potential to interact with multiple MoD activities, due to overlaps with PEXAs within the Offshore ECC. As the PEXAs are designated as Danger Areas for Air Combat Training, it is assumed the movement of vessels will not interact as the minimum height for the Air Combat Training is 5,000ft. However, as the overlap is only for the Offshore ECC, there would be limited impacts given the distance of the Air Combat Training above. Therefore, it is proposed this will be scoped out of the EIA for this chapter.

7.13.3.2 Potential Impacts during Operation

951. The presence of permanent offshore infrastructure has the potential to impact projects either within or adjacent to the Offshore Scoping Area.

952. Vessel movements during the operation phase may also affect neighbouring activities and will be covered in **Chapter 7.9 Shipping and Navigation**.

7.13.3.2.1 Potential Interference with Other Wind Farms

953. The presence of permanent offshore infrastructure has the potential to impact other wind farm projects that are in close proximity, such as wake loss and vessel activities. Although, any impacts of wind turbines and offshore substations structures on vessel activities, including those related to other offshore wind farms will be covered in **Chapter 7.9 Shipping and Navigation**. Due to the impacts from the offshore infrastructure, potential interference with other wind farms during the operation phase will be scoped into the EIA.

7.13.3.2.2 Potential Interference with Oil and Gas Activities

954. The presence of permanent offshore infrastructure has the potential to impact other marine users either within or adjacent to the Array Area and offshore ECC. Any impacts of wind turbines and offshore substations structures on vessel activities, including those related to the oil and gas industry will be covered in **Chapter 7.9 Shipping and Navigation**.

955. Potential impacts on helicopter operations associated with the oil and gas industry will be covered in **Chapter 7.10 Aviation, Radar and Military.** It is also recognised that the presence of permanent offshore infrastructure may impact on potential future oil and gas exploration, appraisal and development activity.

956. Vessel movements during the operation phase may also affect other marine users. However, impacts from O&M vessel activities are anticipated to be similar to those during the construction phase, although the magnitude of effect is likely to be lower. Due to this impact being assessed in other chapters, potential interference with oil and gas activities during the operation phase will be scoped out of the EIA.

7.13.3.2.3 Physical Impacts on Sub-Sea Cables and Pipelines

957. If cables require maintenance or replacement, standard industry techniques would be followed to ensure that other operators' cables and pipelines are not impacted by maintenance works, including crossing agreements and The Crown Estate licences which will ensure that specific controls and communications are in place with the asset owner when working in close proximity to third-party assets. Therefore, physical impacts on sub-sea cables and pipelines during the operation phase will be scoped out of the EIA.

7.13.3.2.4 Impacts on Carbon Capture Storage Sites

958. The presence of permanent offshore infrastructure has the potential to impact the Northern Endurance CCS project located within the offshore EEC (see **Section 7.13.3.1)**. However, this is likely to be mitigated through engagement with the relevant CCS lease holder / operator during the construction phase. Vessel movements in terms of O&M activities will be covered in **Chapter 7.9 Shipping and Navigation**. Therefore, impacts on CCS sites during the operation phase will be scoped out of the EIA.

7.13.3.2.5 Impacts on Disposal Sites

959. The Offshore Scoping Area does not overlap with any active disposal sites (**Figure 7-38**), with the closest active disposal site being DBB, which is located approximately 4km from the closest point to the Offshore Scoping Area and as such there are no pathways for impacts to occur. Therefore, there are no pathways for impacts to occur, and it is proposed to scope construction impacts on disposal sites out of the EIA.

960. Vessel traffic associated with transits to and from open disposal sites within 50km of the Offshore Scoping Area is covered in **Chapter 7.9 Shipping and Navigation**.

7.13.3.2.6 Impacts on Aggregate Sites

961. As there is no overlap of aggregate licence areas with the Offshore Scoping Area, with the closest active sites being Humber 1, 2, 3 and 4 which are located approximately 43km south-east from the closest point to the Offshore Scoping Area, there are no pathways for impacts upon aggregate dredging activities. Therefore, impacts on aggregate sites during the operation phase will be scoped out of the EIA. Any dredger transit conflicts will be covered in **Chapter 7.9 Shipping and Navigation**.

7.13.3.2.7 Impacts on Ministry of Defence Activities

962. During the operation phase, MoD activities may be affected by the presence of safety zones around surface infrastructure, or temporary safe zones in operation around active O&M vessels when maintenance or repairs are required for the Project. However, as the PEXA is designated as Danger Areas for Air Combat Training, it is assumed the movement of vessels will not interact as the minimum height for the Air Combat Training is 5,000ft. Therefore, impacts on MoD activities during the operation phase will be scoped out of the EIA.

7.13.3.3 Potential Impacts during Decommissioning

963. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower.

964. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for further consideration in the EIA for decommissioning (as per **Table 7-38**).

7.13.4 Potential Cumulative Effects

965. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect other marine users. Potential impacts of the Project on other marine users are expected due to the considerable amount of infrastructure both within, and in close proximity to the Offshore Scoping Area. Should such impacts be identified, in all likelihood they can be fully mitigated after consultation with the relevant parties (i.e. through the development of crossing and proximity agreement with the relevant stakeholders to protect both the existing and new infrastructure and these will be progressed through the development of the Project). All other parties (i.e. wind farm operators) that interact with the same receptor will also need to demonstrate no impact or agree mitigation.

966. Therefore, it is not anticipated that there will be pathways for significant cumulative effects that cannot be appropriately mitigated for, however, cumulative impacts are proposed to be scoped into the EIA.

7.13.5 Potential Transboundary Effects

967. There is potential for transboundary effects upon other marine users due to the Project's construction, O&M and decommissioning activities. However, the closest non-UK offshore wind farm is in German waters approximately 90km away (H2-20), adjacent to Dutch exploration block E01. The international cables or pipelines identified which could come into conflict with the Project are assessed as part of physical impacts on sub-sea cables and pipelines (**Sections 7.13.3.1** and **Section 7.13.3.2**). Should there be any updates to new projects identified through the course of the EIA which could have transboundary impacts, these will also be considered in the EIA. Transboundary impacts have therefore been scoped into the EIA for further assessment.

7.13.6 Summary of Scoping Proposals

968. **Table 7-38** outlines the other marine users impacts which are proposed to be scoped in or out of the EIA. These may be refined through consultation activities and as additional project information and site-specific data become available.

Table 7-38 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Other Marine Users

Potential Impact	Construction	Operation	Decommissioning
Potential interference with other wind farms	✓	✓	✓
Potential interference with oil and gas activities	✓	x	✓
Physical impacts on sub-sea cables and pipelines	✓	x	✓
Impacts on CCS sites	✓	x	✓
Impacts on aggregate dredging activities	x	x	x
Impacts on disposal sites	x	x	x
Impacts of MoD activities	x	x	x
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.13.7 Approach to Data Gathering

969. The following information has been considered during the production of this Scoping Report and will be considered further within the PEIR and ES where relevant matters are 'scoped in' to the EIA process.

970. The other marine users' assessment will be informed by the latest Geographical Information Systems (GIS) datasets including but not limited to the datasets shown in **Table 7-39.**

Table 7-39 Desk-Based Data Sources for Other Marine Users

Data Source	Data Contents
Centre for Environment, Fisheries and Aquaculture Science (Cefas)	Marine disposal sites.
The Crown Estate	• Offshore wind farms and associated offshore export cables; and • Marine aggregate sites.
Marine Themes	Military PEXA.
Oil & Gas Authority, North Sea Transition Authority	Wells, surface infrastructures, sub-surface infrastructures and pipelines.
Kingfisher Information Service – Offshore Renewable & Cable Awareness Project (KIS-ORCA)	Sub-sea cables

971. The datasets within **Table 7-39** are shown on **Figure 7-38**.

972. Where there is potential for interactions with other marine users, the Applicant will liaise with the relevant infrastructure owners / operators.

7.13.8 Approach to Assessment

973. The Applicant will undertake consultation with all relevant developers, operators and marine users within the vicinity of the Project to establish any concerns relating to the Project. Any areas of concern will be identified and considered within the EIA. However, it is likely that any impacts will either be non-significant or able to be fully mitigated after consultation with the relevant parties as discussed above.

974. The EIA will be based on existing data and information gathered through consultation. The assessment will consider the interactions between the Project and other offshore infrastructure and marine users and will cover agreed or best practice mitigation. The approach to assessment will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

7.13.9 Scoping Questions to Consultees

975. The following questions are posed to consultees to help them frame and focus their response to the other marine users scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the other marine users impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the other marine users impacts that have been scoped in for / out from further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?

7.14 Offshore Air Quality

976. This chapter of the Scoping Report considers the potential likely effects of the Project associated with offshore air quality, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area and the offshore ECC up to the landfall.

7.14.1 Study Area

977. The Offshore Air Quality Study Area (hereafter referred to as 'the Study Area') is defined by the Offshore Scoping Area (**Figure 1-1**), which ends at MHWS where the offshore export cables make landfall.

7.14.2 Existing Environment

978. The primary source of offshore atmospheric emissions is likely to be from exhaust emissions associated with vessel activity generated by the Project. Typical pollutants related to vessel emissions include nitrogen oxides (NOx), particulate matter (PM) and sulphur dioxide (SO_2).

979. The International Maritime Organisation (IMO) has enacted regulations to reduce vessel emissions under Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL). IMO international air pollution standards are transposed into UK law via the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008 (as amended).

980. From 1st January 2020, the IMO adopted a global limit on sulphur emissions from vessels known as the 'IMO 2020', which restricts the sulphur content of marine fuel oil to 0.5% mass by mass (m/m), which is a significant reduction from the previous limit of 3.5%. The IMO 2020 would lead to a 77% reduction in overall sulphur oxide (SOx) emissions from vessels, which is equivalent to an annual reduction of around 8.5Mt SOx (IMO, 2019).

981. In addition, the North Sea is also a designated Emission Control Area (ECA) under the MARPOL Convention for SOx and NOx, which have been in effect since November 2007 and January 2021 respectively (IMO, 2023). Designated ECAs are granted higher levels of protection than other areas of the sea. Since 1st January 2015, vessels entering and transiting through the North Sea ECA must comply with a SOx limit of 0.1%. Furthermore, the IMO also adopts a progressive approach to the control of marine diesel engine NOx emissions. Vessels constructed on or after 1st January 2021, must comply with the most stringent Tier III controls on diesel engines when entering and transiting through the North Sea ECA.

982. No air quality management areas (AQMA) have been designated to date in relation to shipping, which indicates that no local authority currently considers air quality exceedances to be driven primarily by local shipping emissions (Air Quality Expert Group (AQEG), 2017). Annual shipping emissions in 2020 expressed relative to annual anthropogenic land-based emissions covering the UK National Atmospheric Emissions Inventory (NAEI) geographical area were estimated at 73%, 14%, 21% and 25% for NOx, SOx, primary PM2.5 and primary PM10 respectively. Projections based on changes in shipping activity and international maritime legislation suggest that NOx emissions will increase from 2020 onwards, while decreases in SO2 and PM emissions are expected (AQEG, 2017).

983. Air pollutant concentrations should only be compared to the relevant air quality Objectives where there is representative exposure. There are no fixed offshore human receptors that are sensitive to air quality within the Study Area, and marine ecological designations are unlikely to be sensitive to air pollution impacts (UK Centre for Ecology and Hydrology (UKCEH), 2024). The only receptors that may be affected by offshore air quality impacts are coastal and nearshore human and ecological receptors, including designated terrestrial sites and transient marine users such as water sports. However, the coastal region of East Riding of Yorkshire is predominantly rural, with isolated locations of beach access points and seaside towns having potential for human exposure (ERYC, 2012).

7.14.3 Potential Impacts

984. Potential impacts during construction, operation and decommissioning will arise from vessel movements associated with all aspects of the Project. Temporary generators may also be required for short discrete activities during commissioning and operation.

7.14.3.1 Potential Impacts during Construction, Operation and Decommissioning

985. Vessel movements and temporary generators used during the Project's construction and operation phase may give rise to air pollutant emissions offshore. However, in the context of existing vessel traffic within the North Sea, vessel movements generated by the Project's construction and O&M activities are considered to be small-scale and infrequent. Therefore, their associated atmospheric emissions (predominantly from exhaust emissions) would be negligible in comparison to the total shipping activity within the region.

986. In addition, construction and O&M activities will be temporary in nature and primarily carried out at a significant distance from shore, mostly within the Array Area. As water depths are shallower nearshore, it is expected that larger, potentially more polluting vessels would not be operating in close proximity to coastal and nearshore receptors. Where smaller vessels are required to carry out works associated with the offshore export cables near the landfall, it is anticipated that these works would be highly localised, infrequent and of a relatively short duration compared to the entire construction programme. Thus, it is highly unlikely that offshore air quality impacts would lead to significant effects on coastal and nearshore human and ecological receptors. Furthermore, given the limited number of receptors further out at sea, it is also highly unlikely that offshore air quality would impact human and ecological receptors offshore.

987. As part of embedded mitigation, the Project would incorporate vessel management strategies and maintenance requirements in its DCO application documents to ensure the most efficient use of vessels as practicable and in compliance with relevant national and international maritime air quality standards and legislation, including the MARPOL Annex VI Regulations.

988. It is anticipated that decommissioning impacts would be similar in nature to those for the construction phase, although the magnitude of impact is likely to be lower. The number and types of decommissioning vessels are not anticipated to be any greater or substantially different to those required for construction, and therefore the magnitude of any offshore air quality impacts would not be greater.

989. Given the likely negligible increases in air pollutant emissions from Project-related vessel movements and temporary generators, the limited number of offshore receptors, the low likelihood for significant effects on coastal and nearshore receptors and stringent regulations on maritime air emissions, it is expected that the effect of offshore air quality impacts on human and ecological receptors would not be significant. As such, it is proposed that all offshore air quality impacts are scoped out of the EIA.

7.14.4 Potential Cumulative Effects

990. It is unlikely that any significant cumulative effects would arise, given that the number of offshore projects or plans considered to be major air pollution sources are limited and the likely negligible magnitude of offshore air quality impacts. It is therefore proposed that all cumulative offshore air quality effects should be scoped out of the EIA.

7.14.5 Potential Transboundary Effects

991. Even though the Array Area is located adjacent to Dutch Territorial Waters, it is unlikely that exhaust emissions from Project-related vessels operating within the North Sea would give rise to any significant transboundary effects to surrounding EEA Member States, given the distance from sensitive receptors. It is therefore proposed that all transboundary offshore air quality effects should be scoped out of the EIA.

7.14.6 Summary of Scoping Proposals

992. **Table 7-40** outlines the offshore air quality impacts which are proposed to be scoped out of the EIA.

993. Construction works within the intertidal area with potential to influence local air quality and thus affect coastal receptors have been considered within the onshore chapter, **Chapter 8.3 Onshore Air Quality and Dust.**

Table 7-40 Summary of Impacts Proposed to be Scoped Out (X) for Offshore Air Quality

Potential Impact	Construction	Operation	Decommissioning
Impacts on human receptors	X	X	X
Impacts on ecological receptors	X	X	X
Cumulative impacts	X	X	X
Transboundary impacts	X	X	X

7.14.7 Scoping Questions to Consultees

994. The following questions are posed to consultees to help them frame and focus their response to the offshore air quality scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the offshore air quality impacts resulting from the Project been identified in the Scoping Report?
- Do you agree that all offshore air quality impacts should be scoped out of the EIA?

7.15 Offshore Airborne Noise

995. This chapter of the Scoping Report considers the potential likely effects of the Project associated with offshore airborne noise, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the DBD Array Area and the offshore ECC up to the landfall.

7.15.1 Study Area

996. The Offshore Airborne Noise Study Area (hereafter referred to as 'the Study Area') is defined by the Offshore Scoping Area (**Figure 1-1**), which ends at MHWS where the offshore export cables make landfall.

7.15.2 Existing Environment

997. Noting that noise is not routinely monitored offshore, the existing offshore background noise is likely to be characterised by a mix of anthropogenic and natural sources. Noise emitted by vessel traffic (mobile sources) and other marine users such as oil and gas infrastructure (fixed sources), other wind farm developments (fixed sources) and marine exploration activities (mobile sources) are expected to be the main sources of anthropogenic noise in the Study Area. Primary sources of natural airborne noise include wind, waves, and precipitation.

998. The existing background noise in nearshore parts of the Study Area that are in proximity to more urbanised locations such as Skipsea, may be expected to be slightly higher due to land-based sources which are likely to be diurnally variable.

999. There are no fixed offshore human receptors that are sensitive to airborne noise within the Study Area, although it is acknowledged that passing vessels such as commercial fishing vessels and commercial shipping traffic may experience limited transient impacts.

1000. Marine ecological receptors are unlikely to be sensitive to airborne noise impacts. Ornithological receptors in the nearshore environment and further offshore may also be affected by airborne noise. However, all airborne noise impacts to ornithological receptors are considered within **Chapter 7.7 Intertidal and Offshore Ornithology**.

1001. Other receptors that may be affected by offshore airborne noise are coastal and nearshore human and ecological receptors, including designated terrestrial sites and transient marine users such as water sports and recreational fishing / sailing. However, the coastal region of East Riding of Yorkshire is predominantly rural, with isolated locations of beach access points and seaside towns having potential for human exposure (ERYC, 2012).

7.15.3 Potential Impacts

1002. Potential impacts during construction, operation and decommissioning will arise from vessel movements associated with all aspects of the Project and from noise associated with operational wind turbines during the operation phase of the Project.

7.15.4 Potential Impacts during Construction

1003. Offshore construction activities have the potential to increase airborne noise within the DBD Array Area and the offshore ECC. The main sources of airborne noise would be from the vessels associated with cable laying, foundation and turbine installation and the construction of other above-sea structures such as the Offshore Substation Platform(s) (OSP). Construction activities associated with the Project would be temporary in nature and primarily conducted at a significant distance from shore, mostly within the DBD Array Area.

1004. Nearshore construction activities that will generate airborne noise will be temporary and limited to the installation of the offshore export cables, which may involve either HDD works or ploughing, trenching or jetting if open cut trenching is used. It is anticipated that construction airborne noise impacts would be localised and of a relatively short duration compared to the entire construction programme.

1005. Vessel movements generated by the Project would be another source of noise emissions during construction. Noise emissions from vessels are considered to be localised and transient in nature, and therefore it is unlikely to result in significantly elevated noise levels beyond the existing offshore background noise. As water depths are shallower nearshore, it is also expected that larger, potentially noisier vessels would not be operating in close proximity to coastal and nearshore receptors. Where smaller vessels are required to operate at the landfall location, it is anticipated that their impacts would be experienced transiently and infrequently.

1006. Given the likely negligible increases in offshore airborne noise levels from construction activities and vessel movements, the limited number of offshore receptors and the low likelihood for significant effects on coastal and nearshore receptors, it is expected that the effect of offshore airborne noise impacts on human and ecological receptors would not be significant. As such, it is proposed that all construction offshore airborne noise impacts are scoped out of the EIA.

7.15.4.1 Potential Impacts during Operation

1007. During operation, increases in offshore airborne noise would be expected to be limited to the movement of turbine blades, as well as O&M vessel movements and any surface maintenance works. However, noise emissions originating from such sources are considered to be low, with other airborne noise assessments undertaken by previous offshore wind farm developments (e.g. Hornsea Project Two and Beatrice) have suggested that operational airborne noise levels are not significant (Beatrice Offshore Wind Farm Ltd., 2012; SMart Wind, 2015), and vessel movements and maintenance works would be temporary and episodic by nature. Considering the existing offshore background noise, it is unlikely that operational impacts would result in significantly elevated noise levels.

1008. Given the likely negligible increases in offshore airborne noise levels from the wind turbines, O&M vessels and activities, the limited number of offshore receptors and the low likelihood for significant effects on coastal and nearshore receptors, it is proposed that all operational offshore airborne noise impacts are scoped out of the EIA.

7.15.4.2 Potential Impacts during Decommissioning

1009. It is anticipated that the decommissioning impacts would be similar in nature to those of construction, although the magnitude of impact is likely to be lower. The number and types of decommissioning vessels and activities are not anticipated to be any greater or substantially to those required for construction, and therefore the magnitude of offshore airborne noise impacts would not be greater.

1010. Therefore, it is proposed that all offshore airborne noise impacts associated with decommissioning are scoped out of the EIA.

7.15.5 Potential Cumulative Effects

1011. It is unlikely that any significant cumulative effects would arise, given the likely negligible magnitude of offshore airborne noise impacts. It is therefore proposed that all cumulative offshore airborne noise impacts are scoped out of the EIA.

7.15.6 Potential Transboundary Effects

1012. It is noted that the DBD Array Area is located adjacent to Dutch Territorial Waters. However, it is considered unlikely that noise emissions from Project-related vessels and offshore construction, O&M and decommissioning works would give rise to any significant transboundary effects to surrounding EEA Member States. It is therefore proposed that all transboundary offshore airborne noise impacts are scoped out of the EIA.

7.15.7 Summary of Scoping Proposals

1013. **Table 7-41** outlines the offshore airborne noise impacts which are proposed to be scoped out of the EIA.

Table 7-41 Summary of Impacts Proposed to be Scoped Out (X) for Offshore Airborne Noise

Potential Impact	Construction	Operation	Decommissioning
Impacts on human receptors	x	x	x
Impacts on marine ecological receptors	x	x	x
Cumulative impacts	x	x	x
Transboundary impacts	x	x	x

1014. The potential for disturbance to intertidal and offshore ornithology receptors from airborne noise will be considered within **Chapter 7.7 Intertidal and Offshore Ornithology**.

1015. Disturbance to marine ecological receptors from underwater noise will be considered separately within the relevant offshore chapters:

- **Chapter 7.4 Benthic and Intertidal Ecology**;
- **Chapter 7.5 Fish and Shellfish Ecology**; and
- **Chapter 7.6 Marine Mammals**.

1016. Construction works landward of MHWS have been considered within **Chapter 8.8 Onshore Noise and Vibration**.

7.15.8 Scoping Questions to Consultees

1017. The following questions are posed to consultees to help them frame and focus their response to the offshore airborne noise scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the offshore airborne noise impacts resulting from the Project been identified in the Scoping Report?
- Do you agree that all offshore airborne noise impacts should be scoped out of the EIA?

8 Onshore Topics

8.1 Introduction

1018. This chapter of the Scoping Report presents the existing environment within the Onshore Scoping Area (**Figure 1-2**) and the potential likely effects of the construction, operation and decommissioning of the Project on the onshore environment. The proposed approach to data collection and assessment are also detailed within the chapter. Each chapter outlines which impacts are proposed to be scoped into or out of the EIA.

1019. It should be noted that topic-specific study areas are defined in the chapters below based on the spatial, temporal and technical considerations of the impacts on relevant receptors and are intended to cover the area within which an effect can reasonably be expected.

1020. A description of the Project's onshore infrastructure is provided in **Chapter 3 Project Description**.

8.2 Geology and Ground Conditions

1021. This chapter of the Scoping Report considers the potential likely effects of the Project associated with geology and ground conditions, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore ECC, landfall area and the OCS zone.

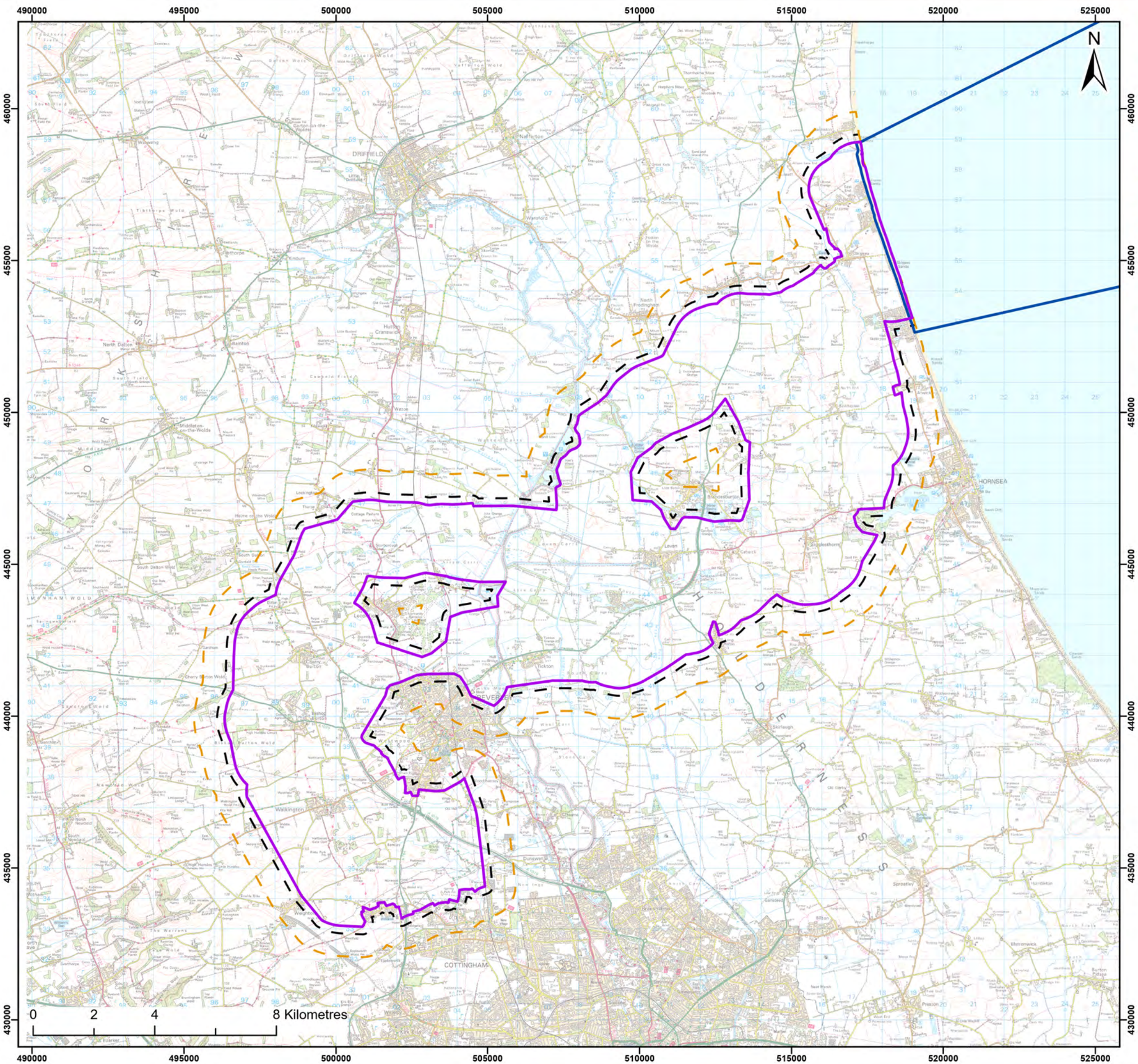
1022. The geology and ground conditions assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

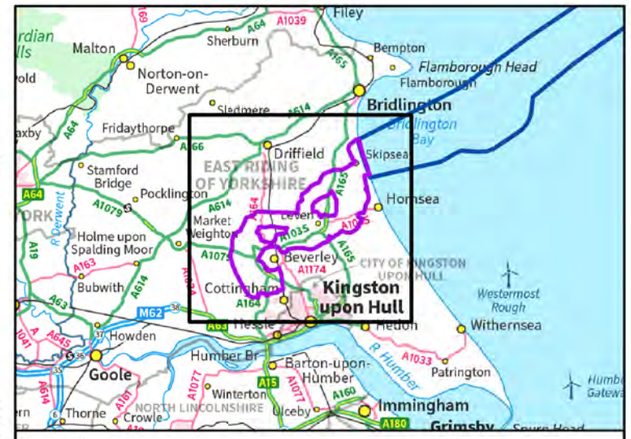
- **Chapter 8.4 Water Resources and Flood Risk;**
- **Chapter 8.5 Soils and Land Use;** and
- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation.**

8.2.1 Study Area

1023. The Geology and Ground Conditions Study Area (hereafter referred to as ‘the Study Area’) will be defined based on the distance over which impacts may occur and by the location of potential receptors that may be affected by those potential impacts. This will be established using professional judgement and will be supported by a Geo-Environmental Desk Study and Preliminary Risk Assessment (PRA). The PRA will form an appendix to the geology and ground conditions chapter of the PEIR and ES.

1024. The Study Area will comprise a 250m buffer around the onshore elements of the Project as illustrated on **Figure 8-1**.The Study Area will be extended to 1km for assessing the presence of groundwater abstraction wells. This is due to the higher sensitivity of groundwater abstraction wells. Industrial installations or activities beyond 250m are unlikely to have an impact on the geology and ground conditions receptors





Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Geology and Ground Conditions Study Area

Figure: 8-1

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0034

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	31/05/2024	JH	DF	A3	1:125,000
02	22/04/2024	AB	DF	A3	1:125,000

Co-ordinate system: British National Grid

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8.2.2 Existing Environment

1025. Information on the existing environment within the Study Area is presented in **Table 8-1** below.

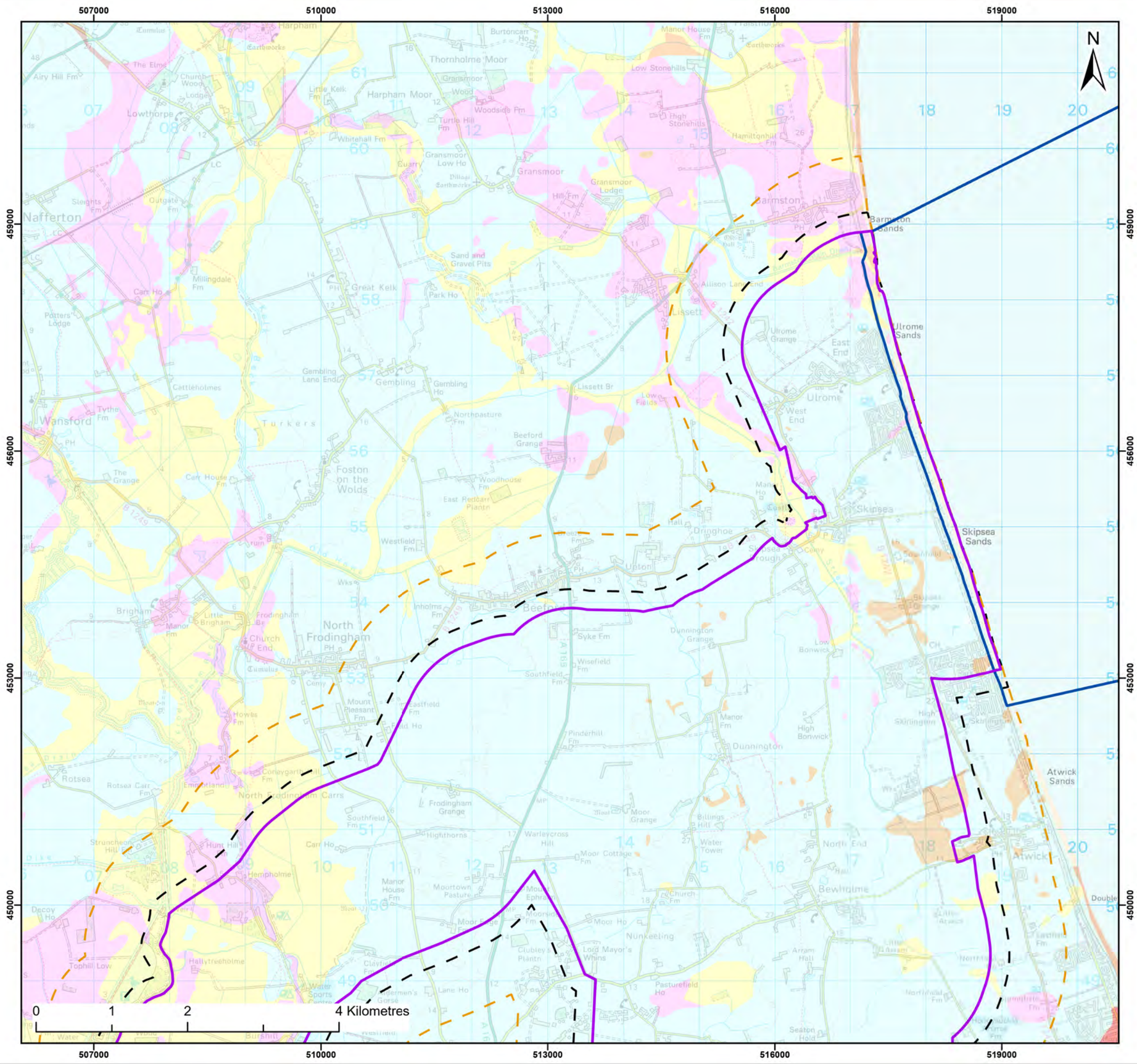
Table 8-1 Geology and Ground Conditions Existing Environment

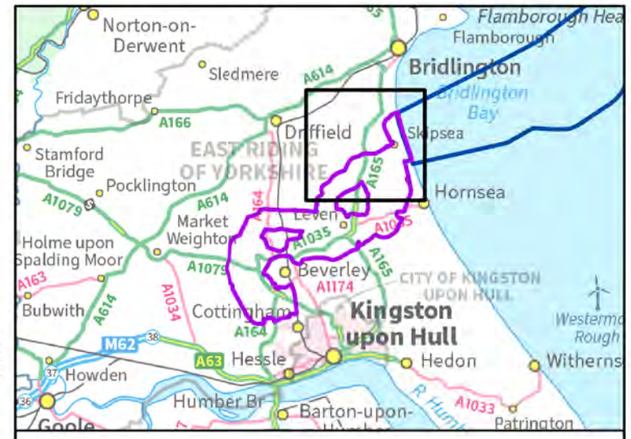
Parameter	Details
Geology and aquifer designations	A review of the published geological mapping available on the BGS Geoindex website (accessed April 2024) and BGS map portal (BGS Geological Maps for Flamborough and Bridlington Solid and Drift, Sheet number 55 and 65, 1985; Great Driffield Solid and Drift, Sheet number 64, 1993; Beverley Solid and Drift, Sheet number 72, 1995 and Hornsea Solid and Drift, Sheet number 73, 1998) indicates that the Study Area is underlain by different superficial and bedrock deposits as summarised below and shown on **Figure 8-2** and **Figure 8-3**. Localised areas of Made Ground associated with previously developed or infilled land may underlie parts of the Study Area.
	Superficial deposits: • Alluvium – clay, silt, sand and gravel (Secondary A Aquifer); • Lacustrine Deposits – sand, silt and clay (Secondary B Aquifer); • Marine Deposits – sand and gravel (Secondary A Aquifer); • Sand and Gravel of uncertain age and origin (Secondary A Aquifer); • Head Deposits – clay, silt, sand and gravel (Secondary Undifferentiated Aquifer); • Glaciofluvial Deposits – sand and gravel (Secondary A Aquifer); and • Glacial Till (Secondary Undifferentiated Aquifer). The majority of the Study Area is underlain by Glacial Till with isolated pockets of the other Superficial Deposits identified, the exception to this is the centre of the Study Area which is predominately underlain by Alluvium and Glaciofluvial deposits with isolated pockets of the other Superficial Deposits identified.
	Bedrock: • Rowe Chalk Formation – chalk (Principal Aquifer); • Flamborough Chalk Formation – chalk (Principal Aquifer); and, • Burnham Chalk Formation – chalk (Principal Aquifer). The Rowe formation subcrops in the north and east of the Study Area and is underlain by the Flamborough Chalk formation which subcrops in the centre of the Study Area. The Burnham Chalk Formation subcrops in the west of the Study Area.
Groundwater vulnerability	The Environment Agency's groundwater vulnerability map (Environment Agency, 2020), as viewed on MAGIC maps (accessed 9 April 2024), indicates that the vulnerability of the groundwater underlying the Study Area ranges from 'medium' to 'medium-high'. A medium groundwater vulnerability classification indicates that the overlying superficial deposits afford limited protection to the underlying groundwater from pollution. A high groundwater vulnerability indicates that the area can easily transmit pollution to groundwater.
Source protection zones (SPZ) and groundwater abstractions	The south-western half of the Study Area is located within SPZs. There are three areas of SPZ 1 present within the Study Area, two in the south-east of the Study Area in the Cottingham area and one in the east near the village of Etton. SPZ 2 and SPZ 3 areas extend beyond the three areas of SPZ 1 across the majority of the south-western half of the Study Area. The location of the SPZs is illustrated on **Figure 8-4**. Although not recorded on the information reviewed, private groundwater abstractions may be present throughout the Study Area. Data relating to these features will be obtained and reviewed as part of the EIA process. If private groundwater abstractions are present, a 50m SPZ 1 would be enforced around the abstraction.
Hydrology	Inland rivers are located either wholly or partially within the Study Area, these include but are not limited to the following: • Skipsea Drain; • Dunnington Sewer; • Towns Drain; • Harrison's Drain; • Old Howe Beck; • Catchwater Drain; • Foredyke Stream; • Holt's Drain; • Roam Drain; • Hall's Drain; • Mickley Dyke; • Leven Canal; • River Hull; • Ushaw's Drain; • Heigholme Drain; • Baswick Steer Drain; • Star Carr Dyke; • Stream Dyke;

Parameter	Details
	• Bowlams Dyke; • Stoneleygoat Dyke; • Monk Dyke; • Cross Drain; • Holderness Drain; • Leven South Carr Drain; • Eske Carrs Drain; • Beverley and Bramston Drain; • Moor Drain; • North Bullock Dyke; • South Bullock Dyke; • Sisterbeck Drain; • Field Drain; • Fleet Drain; • Autherd Drain; and, • Wanlass Beck. Statutory Main Rivers located either wholly or partially within the Study Area, as illustrated on **Figure 8-4**, include the following: • Hull River; and • Approximately six unnamed rivers. Numerous smaller streams, wells and ponds / lakes are also located within the Study Area. Some of the smaller streams may form tributaries of the larger named watercourses listed above. There is also the potential for other surface water features, such as springs and blow wells (associated with the chalk bedrock) to be present within the Study Area. Similar to groundwater abstractions, there are likely to be both licensed and unlicensed surface water abstraction points within the Study Area. Water resources and flood risk is considered in further detail in **Chapter 8.4 Water Resources and Flood Risk.**
Designated sites	Ecologically designated sites located either wholly or partially within the Study Area are outlined in **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation**. In relation to geologically designated sites, the following are present within the Study Area (**Figure 8-5**): • Sites of Special Scientific Interest (SSSI) – Withow Gap. • Local Geological Sites (LGS) – Skipsea Drain, Seaton Routh Quarry, Barmston Mere, Hornsea Mere and Brandesburton Gravel Pits.

Parameter	Details
Coal Authority Mapping	The Coal Authority Interactive Mapper (accessed 9 April 2024) indicates that the Study Area is not located within a Coal Mining Reporting Area. As such, there is not considered to be a risk from onshore historical coal mining activities.
Ground stability	The BGS use their bedrock geology map for the UK to indicate the distribution of soluble rock types which indicates that parts of the Study Area may be located within areas of soluble rock hazard associated with Chalk.
Nitrate Vulnerable Zones (NVZ)	The Study Area is located entirely within NVZ. All NVZ are associated with surface water.
Mineral resources	A review of available mineral resource plans for the Study Area contained within the East Riding of Yorkshire and Kingston upon Hull Joint Minerals Local Plan 2016 – 2033 (ERYC and Hull City Council, 2019) has been undertaken. The review identified multiple areas designated as Mineral Safeguarding Areas (MSA) that are protective of extractable resources. Areas in the north and east of the Study Area are associated with glacofluvial sand and gravel deposits whilst areas in the west of the Study Area are associated with chalk deposits (BGS, 2005) **(Figure 8-6).**
Agricultural land	The Study Area is largely agricultural in nature. A review of Natural England's Agricultural Land Classification (ALC) dataset indicates the presence of provisional ALC Grades 2 – 4 (very good to poor quality agricultural land) within the Study Area. ALC Grade 4 is limited to isolated areas in the north of the Study Area. The majority of land within the north and east of the Study Area is classified as ALC Grade 3 whilst the majority of land in the south and west is classified as ALC Grade 2 (see **Chapter 8.5 Soils and Land Use** for additional details on agricultural land). It should be noted that as the provisional ALC grades do not differentiate between Grade 3a (Best, most versatile (BMV) land) and 3b (non-BMV land), it is assumed all Grade 3 land is Grade 3a as a conservative approach.
Unexploded Ordnance (UXO)	A review of Zetica's online unexploded bombs (UXB) risk map (accessed 11 April 2024) indicates that the majority of the Study Area is at a low risk from UXB or ordnance with the exception of the very south of the Study Area around the village of Cottingham which is considered to be at moderate risk.
Land use and potential sources of contamination	The agricultural nature of the majority of the Study Area represents the potential for both diffuse and point sources of ground contamination to be present in relation to historical and current agricultural activities. Settlements within the Study Area also have the potential to contain historical sources of ground contamination due to past industrial use. Settlements within the Study Area include, but are not limited to, Ulrome, Skipsea, Bewholme, Seaton, Sigglesthorne, Catwick, Leven, Routh, Tickton, Hull Bridge, Etton, Cherry Burton, Bishop Burton and Walkington. Named industrial features within the Study Area that may represent potential sources of contamination include, but not limited to: • Acomb Engineering;

Parameter	Details
	• Catfoss Industrial Estate; • Foss Hill Quarry; • Enviro Aggregates; • Linley Hill (Beverley) Airfield; • BP Beverley West Service Station; • Imerys Minerals Quarry, Beverley; • Creyke Beck Substation; • Dogger Bank Substation A; • Dogger Bank Substation B; • Cottingham Parks Golf & Leisure Club; and, • Swift Group Caravan Factory, Dunswell. There are 37 records of historical landfill sites and four authorised landfill sites located within the Study Area (**Figure 8-7**). Information in relation to the authorised landfills indicates household, commercial and industrial wastes have been accepted at these sites.





Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Superficial Geology

- Alluvium - Clay, Silt, Sand & Gravel
- Beach & Tidal Flat Deposits - Clay, Silt & Sand
- Blown Sand - Sand
- Clay with Flints Formation - Clay, Silt, Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Head - Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels - Clay & Silt
- Kelsey Hill Gravels - Sand & Gravel
- Marine Beach Deposits - Sand & Gravel
- Peat - Peat
- Storm Beach Deposits - Sand, Gravel & Boulders
- Tidal Flat Deposits - Clay & Silt
- Till, Devensian - Diamicton

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Superficial Geology (Sheet 1 of 4)

Figure: 8-2

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0035

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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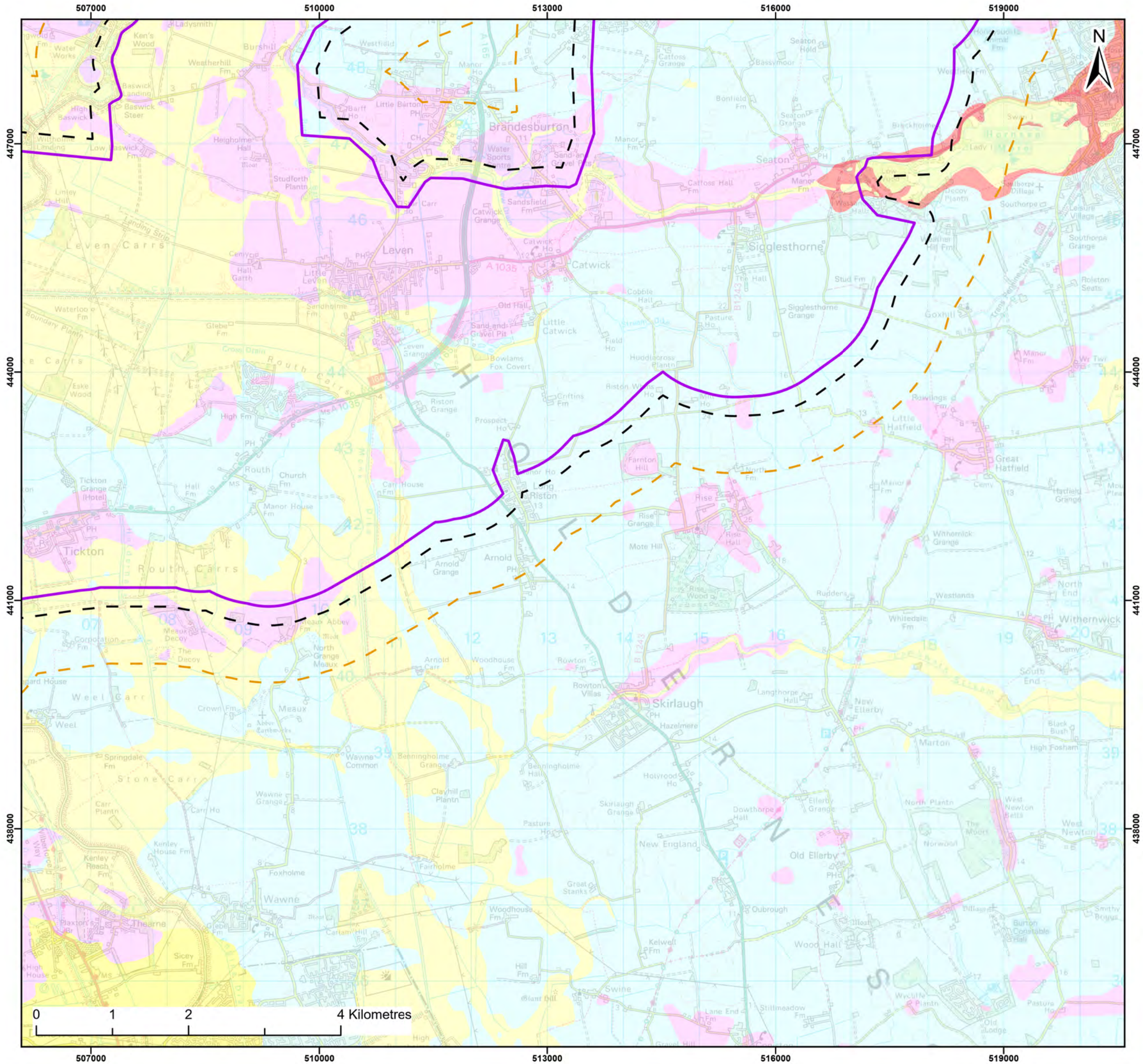

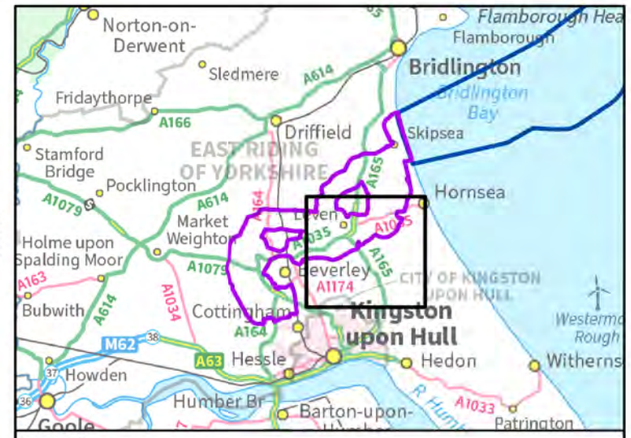

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Superficial Geology

- Alluvium - Clay, Silt, Sand & Gravel
- Beach & Tidal Flat Deposits - Clay, Silt & Sand
- Blown Sand - Sand
- Clay with Flints Formation - Clay, Silt, Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Head - Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels - Clay & Silt
- Kelsey Hill Gravels - Sand & Gravel
- Marine Beach Deposits - Sand & Gravel
- Peat - Peat
- Storm Beach Deposits - Sand, Gravel & Boulders
- Tidal Flat Deposits - Clay & Silt
- Till, Devensian - Diamicton

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Superficial Geology (Sheet 2 of 4)

Figure: 8-2

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0035

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Co-ordinate system: British National Grid

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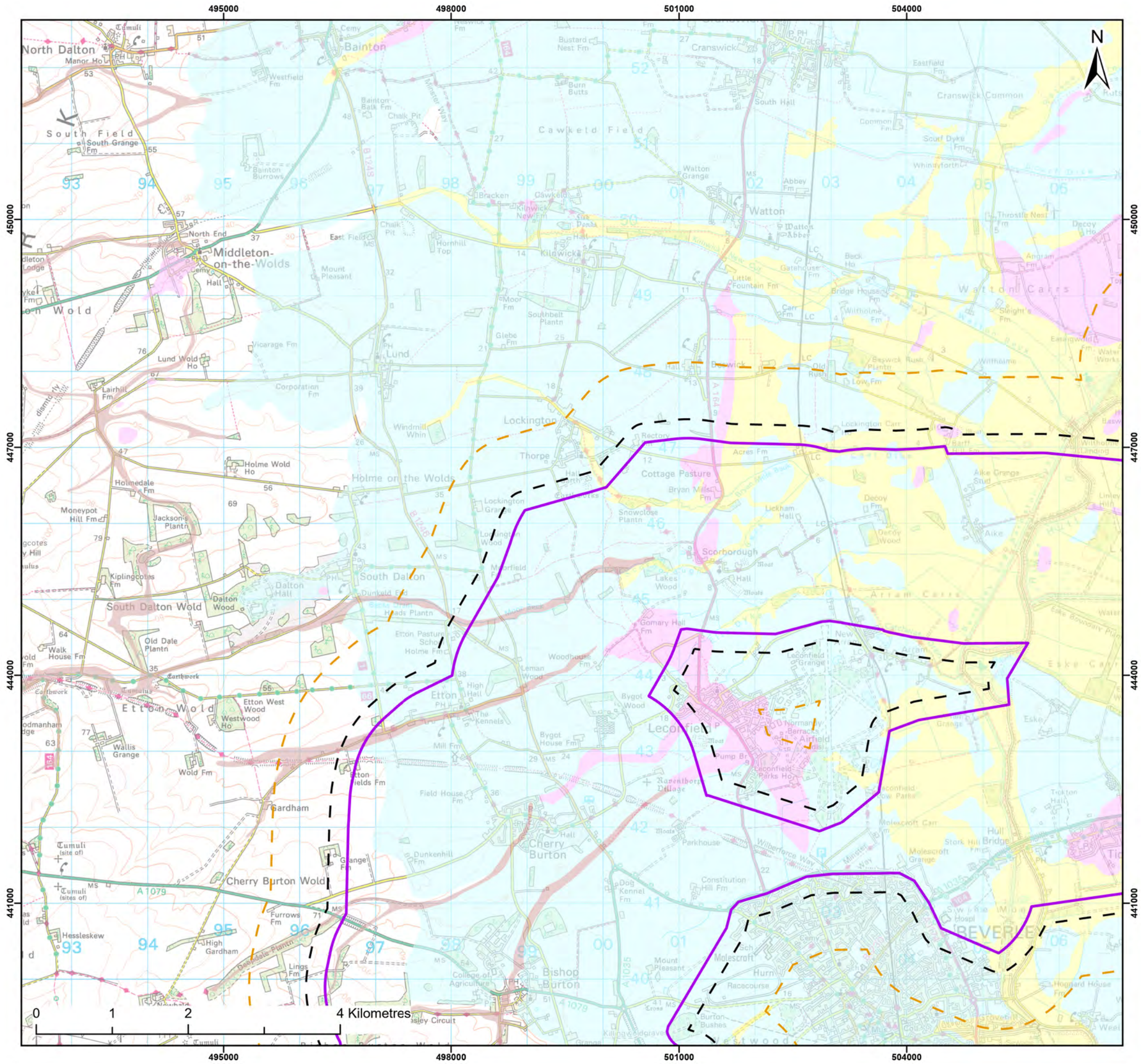

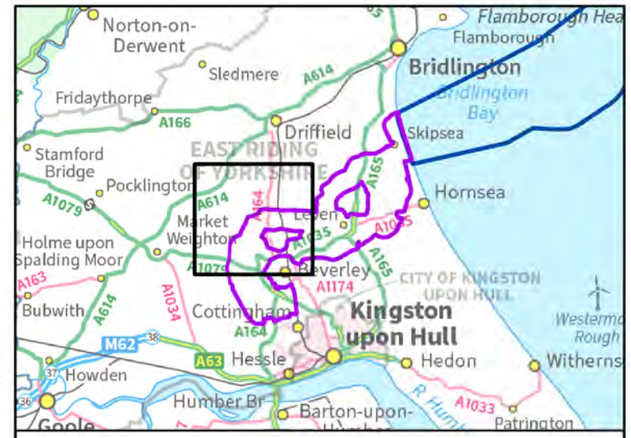

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Superficial Geology

- Alluvium - Clay, Silt, Sand & Gravel
- Beach & Tidal Flat Deposits - Clay, Silt & Sand
- Blown Sand - Sand
- Clay with Flints Formation - Clay, Silt, Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Head - Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels - Clay & Silt
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- Marine Beach Deposits - Sand & Gravel
- Peat - Peat
- Storm Beach Deposits - Sand, Gravel & Boulders
- Tidal Flat Deposits - Clay & Silt
- Till, Devensian - Diamicton

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Superficial Geology (Sheet 3 of 4)

Figure: 8-2

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0035

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Co-ordinate system: British National Grid

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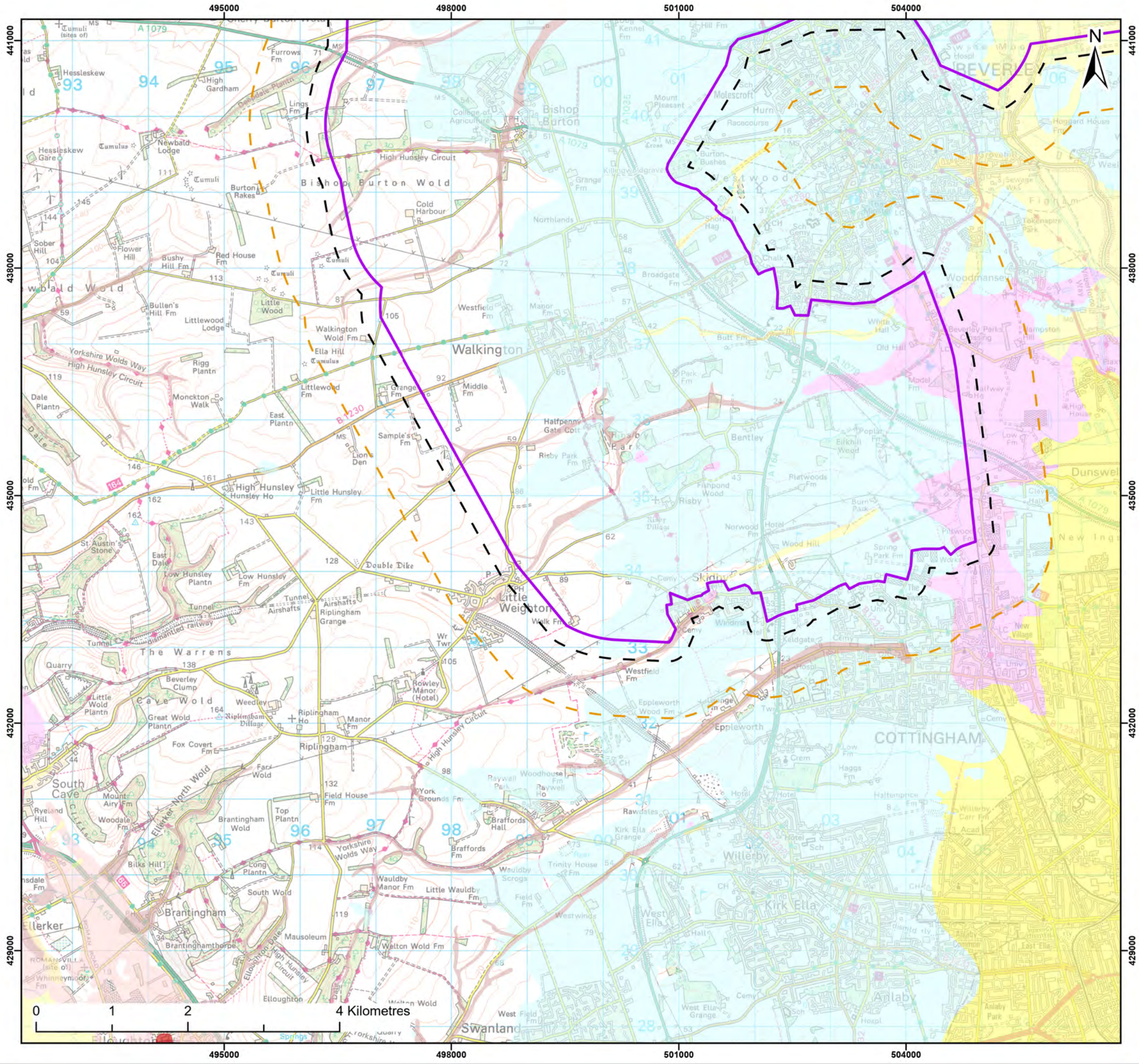

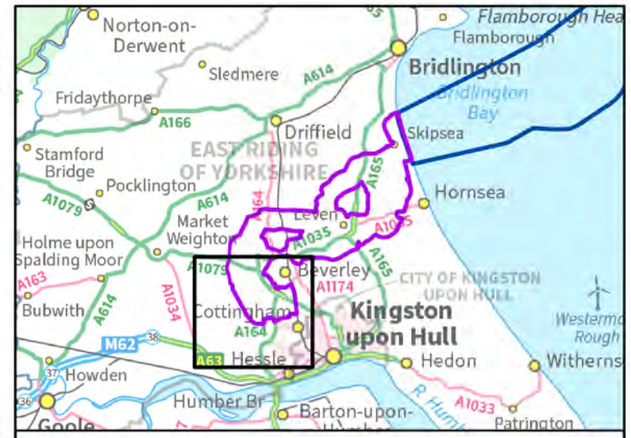

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Superficial Geology

- Alluvium - Clay, Silt, Sand & Gravel
- Beach & Tidal Flat Deposits - Clay, Silt & Sand
- Blown Sand - Sand
- Clay with Flints Formation - Clay, Silt, Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Head - Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels - Clay & Silt
- Kelsey Hill Gravels - Sand & Gravel
- Marine Beach Deposits - Sand & Gravel
- Peat - Peat
- Storm Beach Deposits - Sand, Gravel & Boulders
- Tidal Flat Deposits - Clay & Silt
- Till, Devensian - Diamicton

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Superficial Geology (Sheet 4 of 4)

Figure: 8-2

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0035

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Co-ordinate system: British National Grid

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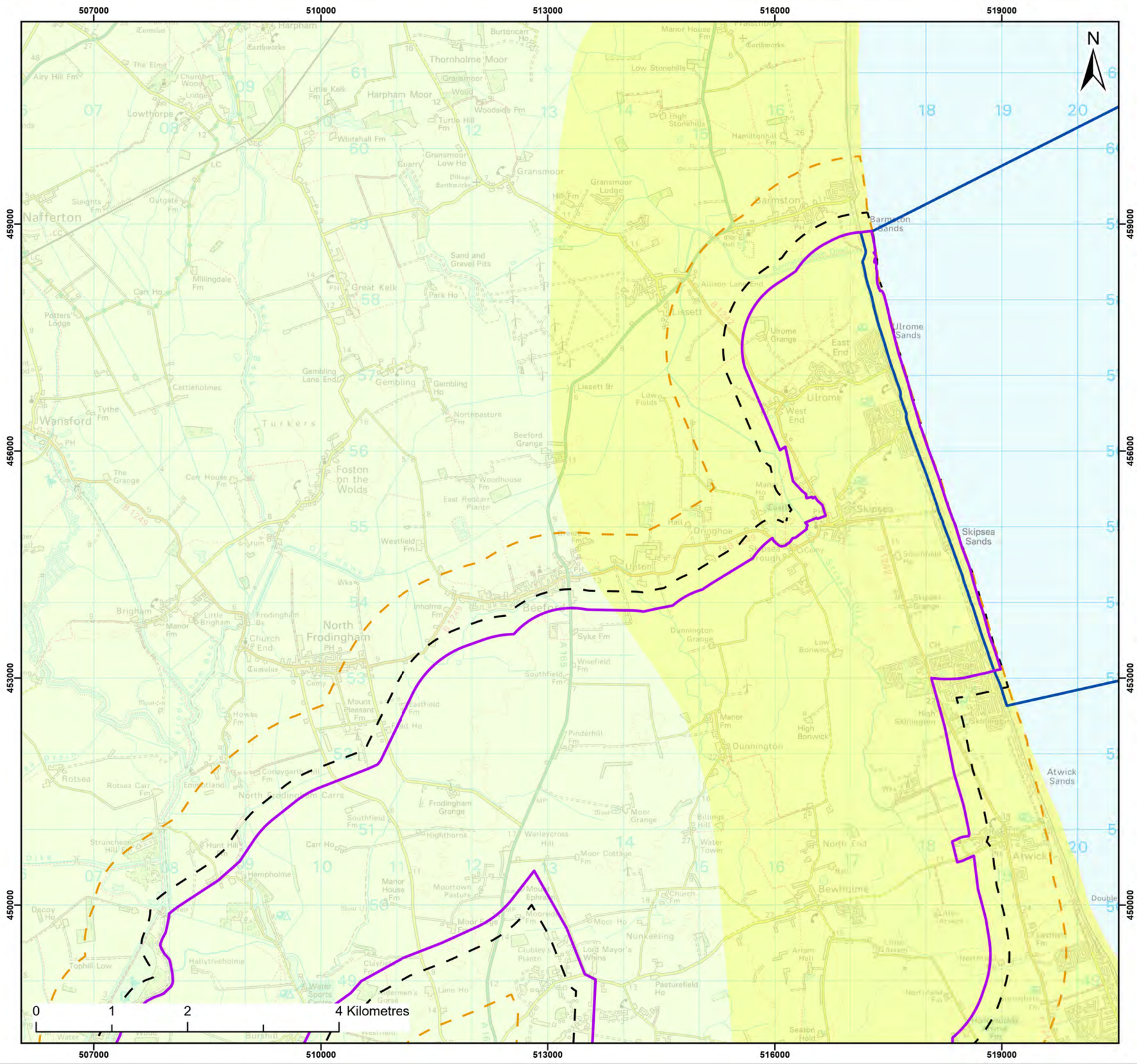

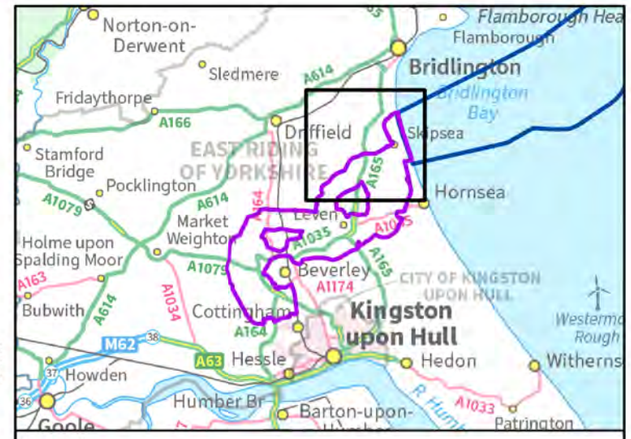

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Bedrock Geology

- Ancholme Group - Mudstone and Siltstone
- Brantingham Member - Sandstone
- Burnham Chalk Formation - Chalk
- Charmouth Mudstone Formation - Mudstone
- Ferriby Chalk Formation - Chalk
- Flamborough Chalk Formation - Chalk
- Hunstanton Formation - Chalk
- Kellaways Sand Member - Sandstone
- Lower Lincolnshire Limestone - Member Limestone
- Marlstone Rock Formation - Ferruginous Limestone and Ferruginous Sandstone
- Pecten Ironstone - Ironstone
- Raventhorpe Beds and Kirton Cementstone beds - Limestone and Argillaceous Rocks, Interbedded
- Rowe Chalk Formation - Chalk
- Thorncroft Sand Member - Sandstone, Siltstone and Mudstone
- Upper Lincolnshire Limestone Member - Limeston, Ooidal
- Welton Chalk Formation - Chalk
- West Walton Formation and Ampthill Clay Formation - Mudstone
- Whitby Mudstone Formation - Mudstone

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Bedrock Geology
(Sheet 1 of 4)

Figure: 8-3

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0036

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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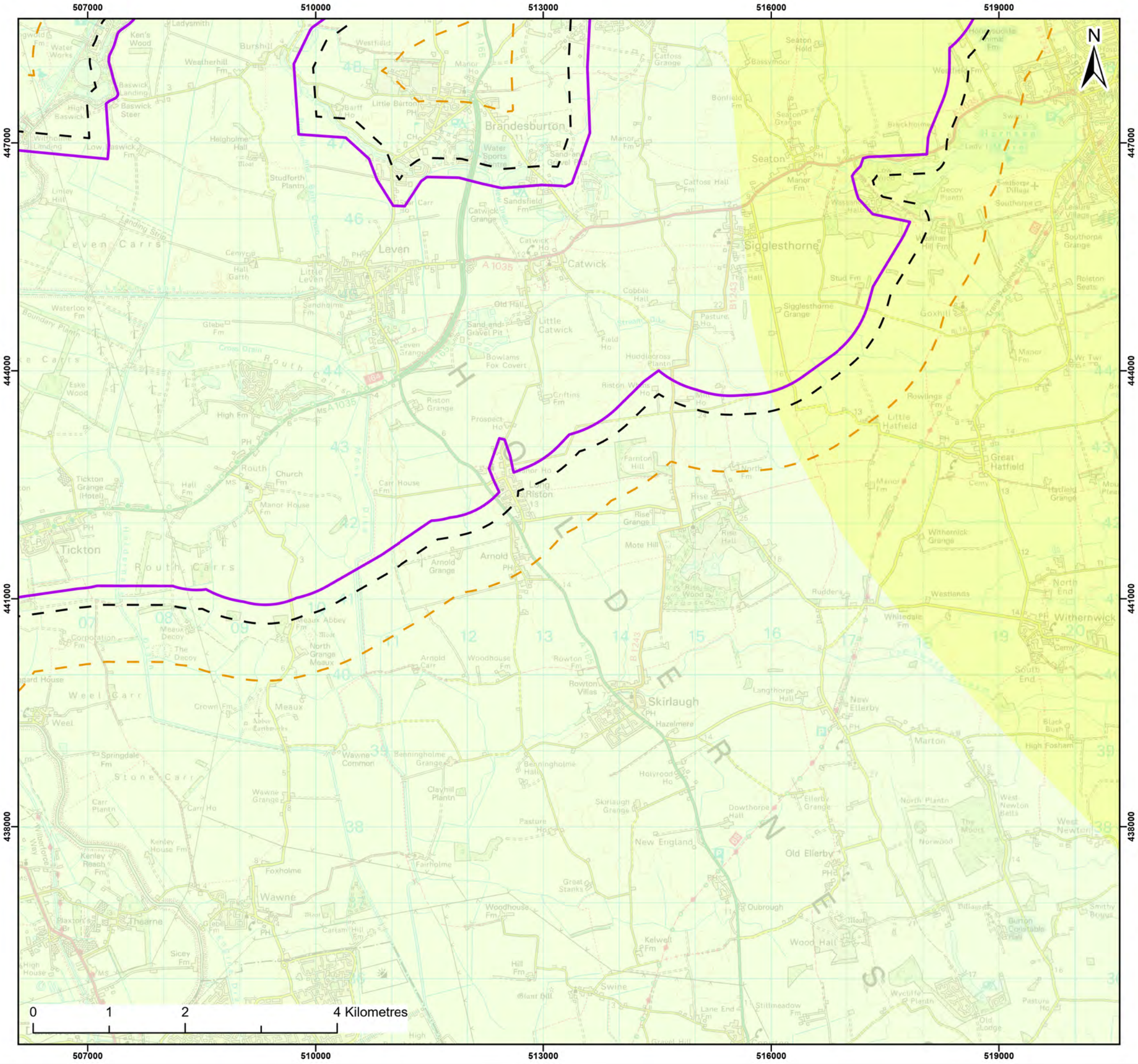

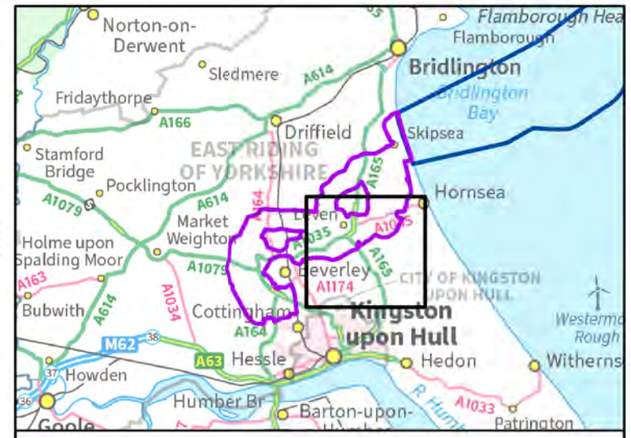

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Bedrock Geology

- Ancholme Group - Mudstone and Siltstone
- Brantingham Member - Sandstone
- Burnham Chalk Formation - Chalk
- Charmouth Mudstone Formation - Mudstone
- Ferriby Chalk Formation - Chalk
- Flamborough Chalk Formation - Chalk
- Hunstanton Formation - Chalk
- Kellaways Sand Member - Sandstone
- Lower Lincolnshire Limestone - Member Limestone
- Marlstone Rock Formation - Ferruginous Limestone and Ferruginous Sandstone
- Pecten Ironstone - Ironstone
- Raventhorpe Beds and Kirton Cementstone beds - Limestone and Argillaceous Rocks, Interbedded
- Rowe Chalk Formation - Chalk
- Thorncroft Sand Member - Sandstone, Siltstone and Mudstone
- Upper Lincolnshire Limestone Member - Limeston, Ooidal
- Welton Chalk Formation - Chalk
- West Walton Formation and Ampthill Clay Formation - Mudstone
- Whitby Mudstone Formation - Mudstone

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Bedrock Geology
(Sheet 2 of 4)

Figure: 8-3

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0036

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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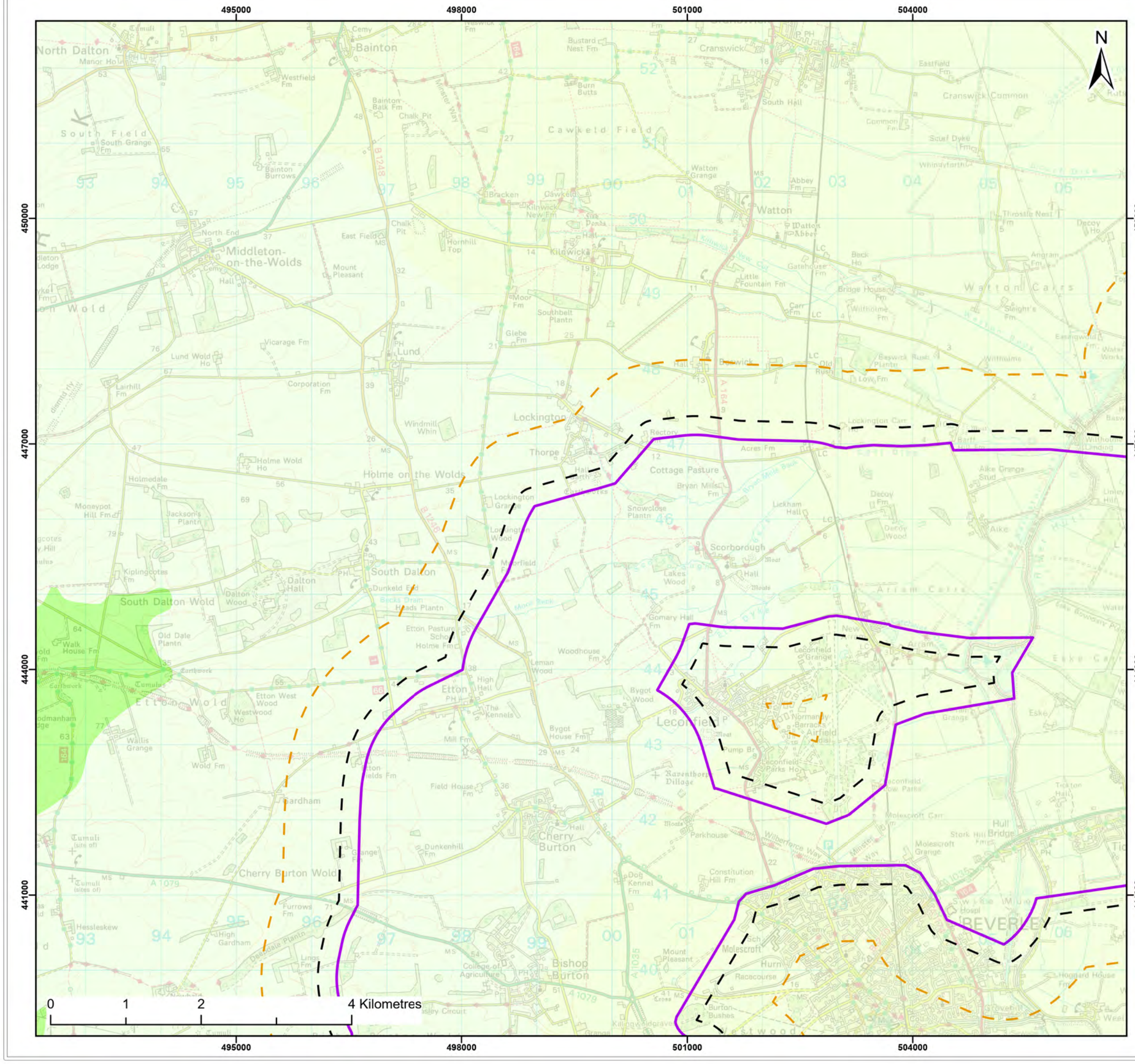

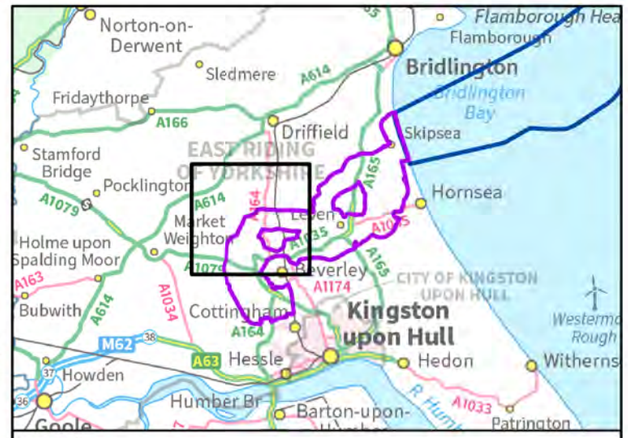

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Bedrock Geology

- Ancholme Group - Mudstone and Siltstone
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- Upper Lincolnshire Limestone Member - Limeston, Ooidal
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- West Walton Formation and Ampthill Clay Formation - Mudstone
- Whitby Mudstone Formation - Mudstone

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Bedrock Geology (Sheet 3 of 4)

Figure: 8-3

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0036

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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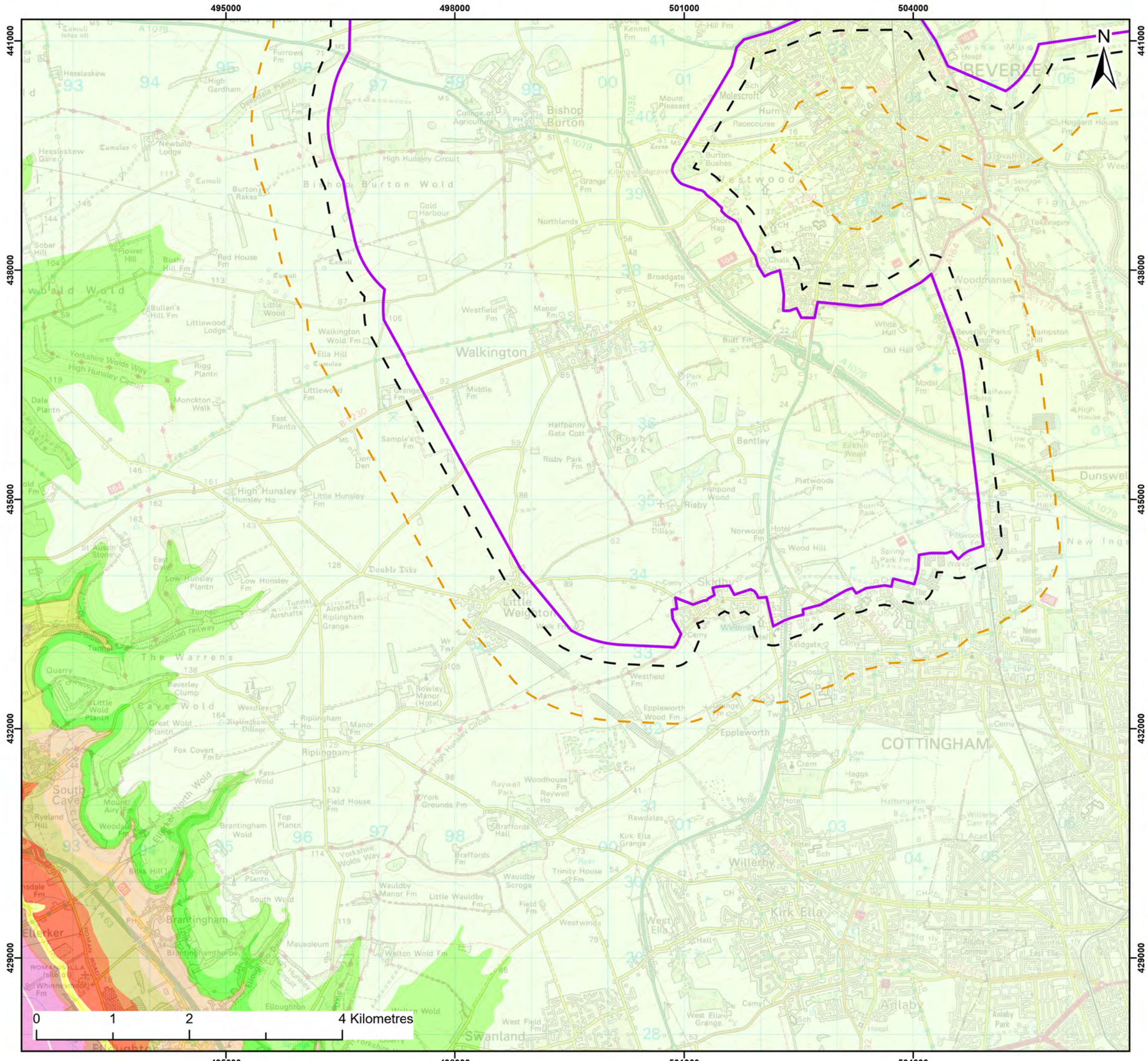

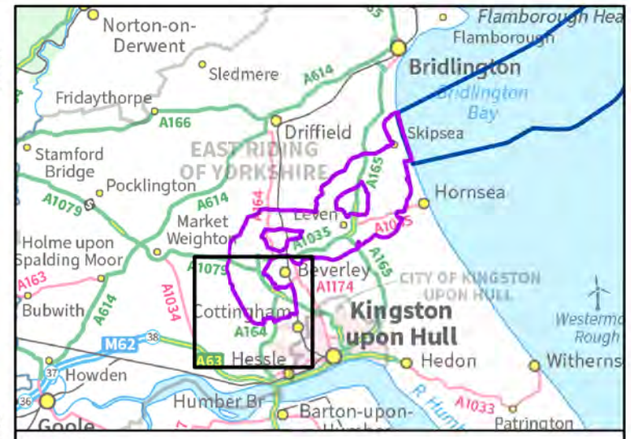

Legend:

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- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)

Bedrock Geology

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- Flamborough Chalk Formation - Chalk
- Hunstanton Formation - Chalk
- Kellaways Sand Member - Sandstone
- Lower Lincolnshire Limestone - Member Limestone
- Marlstone Rock Formation - Ferruginous Limestone and Ferruginous Sandstone
- Pecten Ironstone - Ironstone
- Raventhorpe Beds and Kirton Cementstone beds - Limestone and Argillaceous Rocks, Interbedded
- Rowe Chalk Formation - Chalk
- Thorncroft Sand Member - Sandstone, Siltstone and Mudstone
- Upper Lincolnshire Limestone Member - Limeston, Ooidal
- Welton Chalk Formation - Chalk
- West Walton Formation and Ampthill Clay Formation - Mudstone
- Whitby Mudstone Formation - Mudstone

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Bedrock Geology (Sheet 4 of 4)

Figure: 8-3

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0036

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03	30/05/2024	JH	AB	A3	1:50,000
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Co-ordinate system: British National Grid

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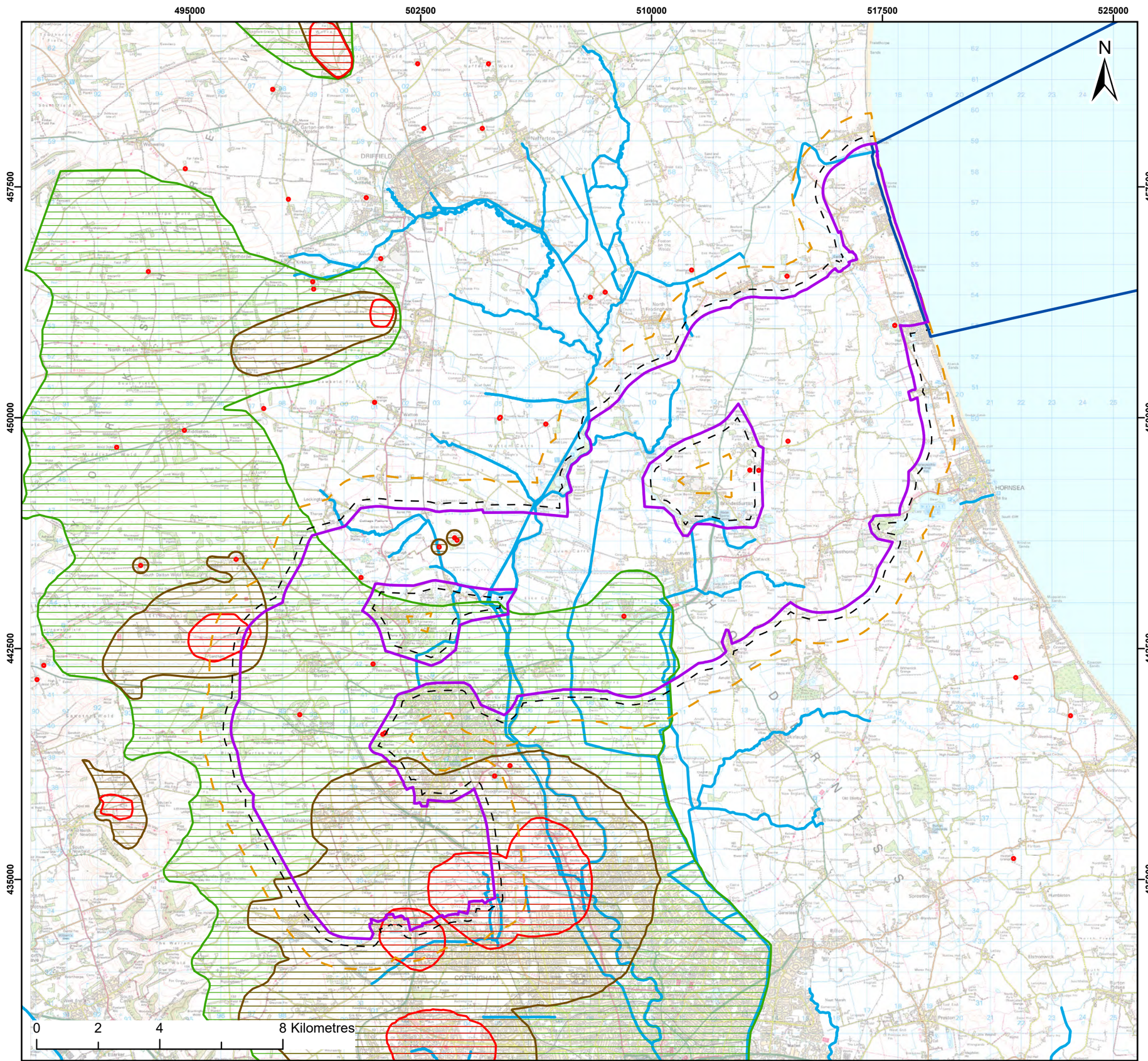

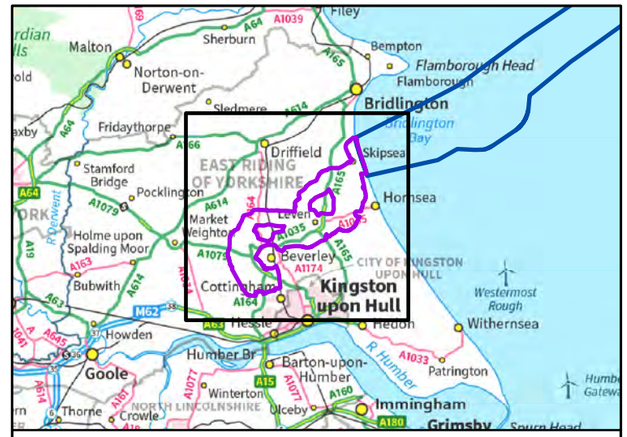

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Statutory Main River

Source Protection Zone

- 1
- 2
- 3

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Source Protection Zones and Statutory Main Rivers

Figure: 8-4

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0037

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03	07/06/2024	JH	AB	A3	1:125,000
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Co-ordinate system: British National Grid

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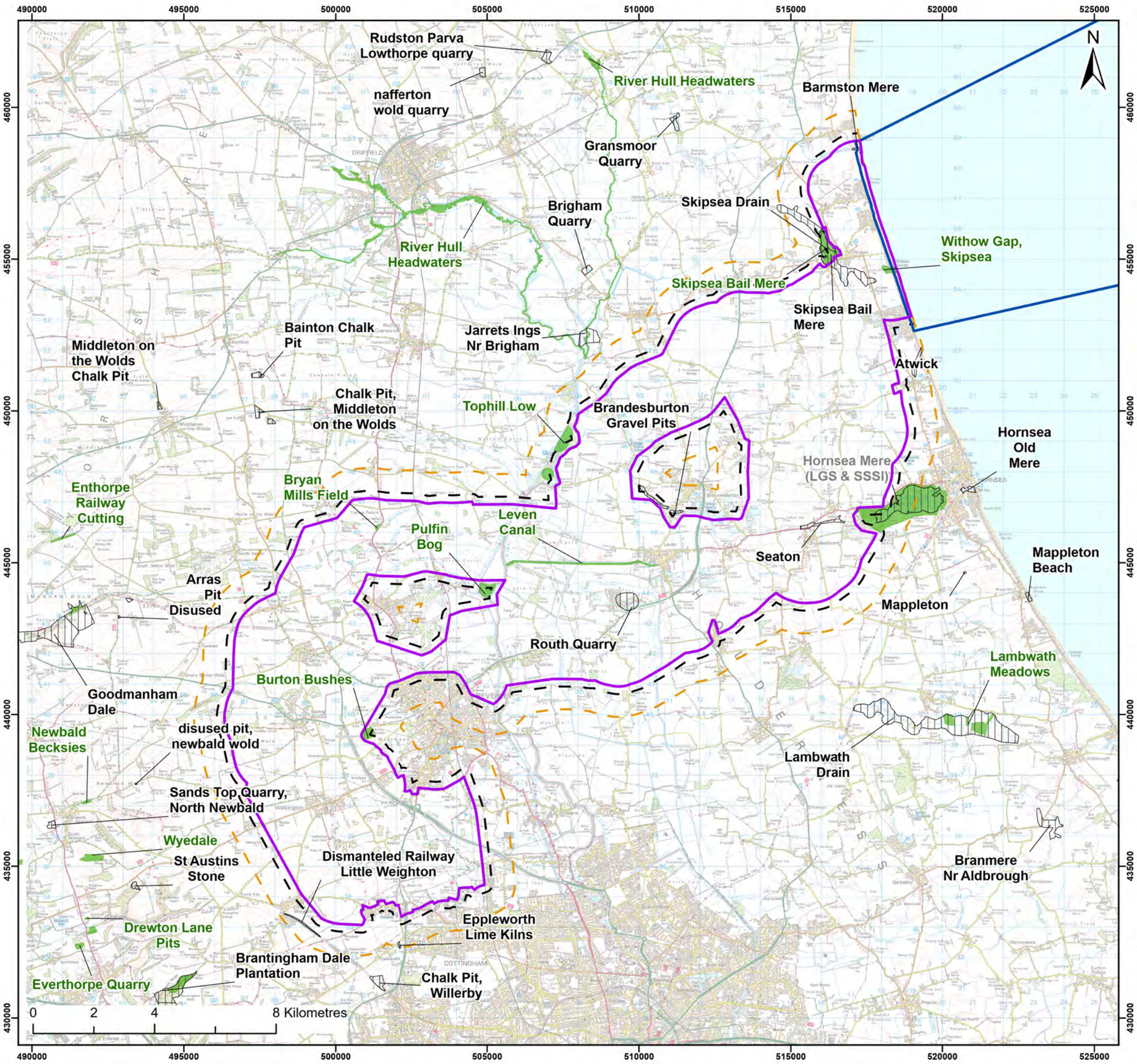

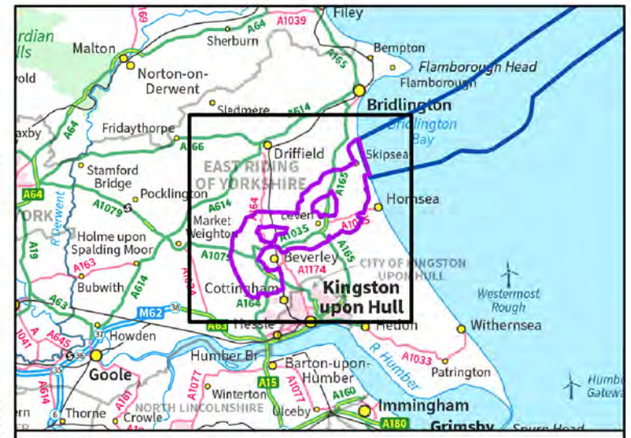

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Local Geological Site (LGS)
- Site of Special Scientific Interest (SSSI)

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Designated Sites (Geology)

Figure: 8-5 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0038

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Co-ordinate system: British National Grid

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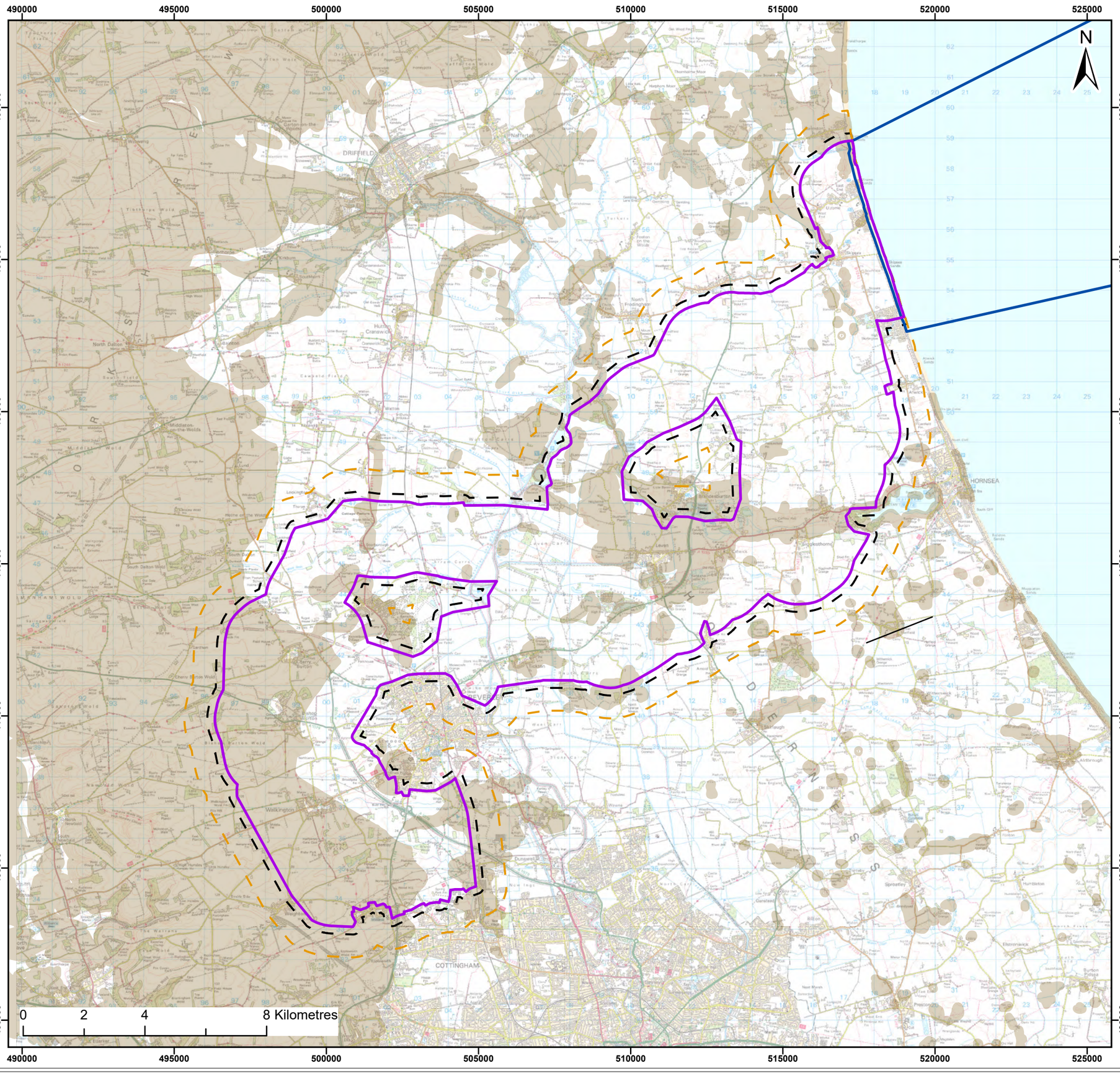

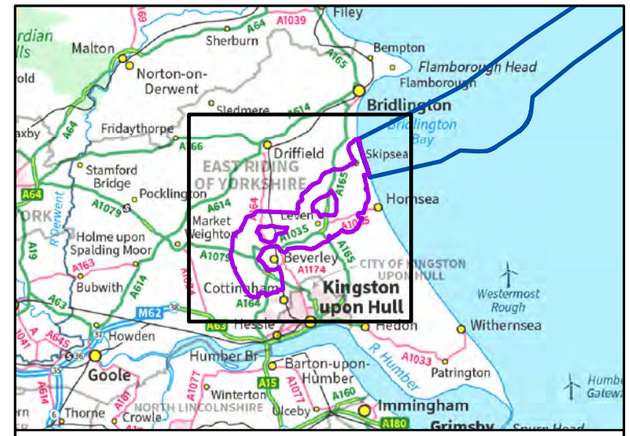

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Mineral Safeguarding Area

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Mineral Safeguarding Areas

Figure: 8-6

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0041

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Co-ordinate system: British National Grid

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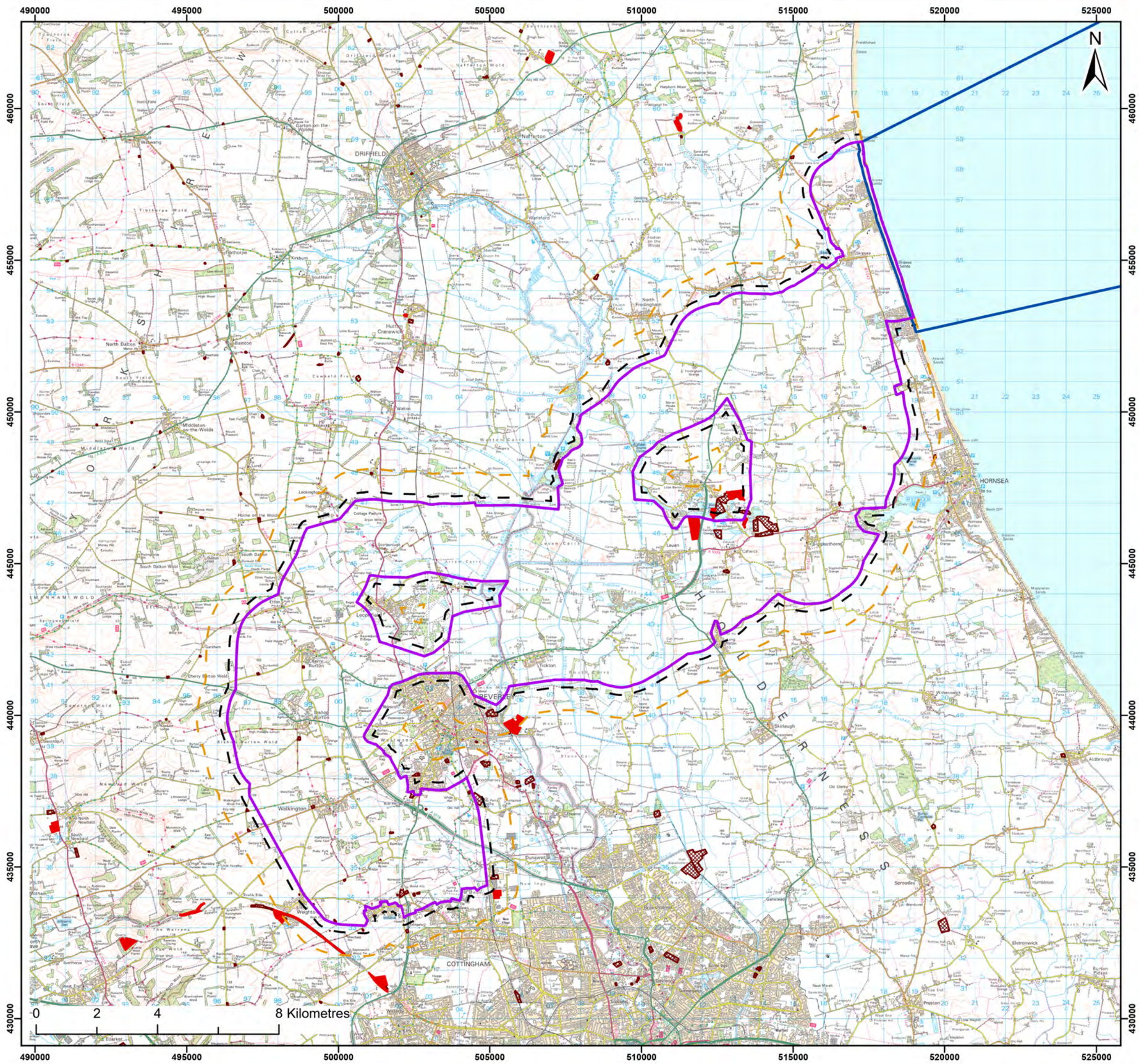

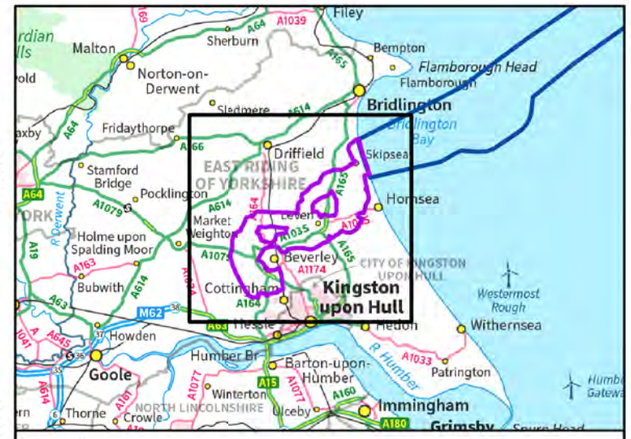

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Authorised Landfill Site
- Historic Landfill Site

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Historical Landfill and Authorised Waste Sites

Figure: 8-7

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0039

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Co-ordinate system: British National Grid

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8.2.3 Potential Impacts

1026. The following sections outline the potential construction and operational impacts scoped into the EIA for Geology and Ground Conditions. No potential impacts have been scoped out of the EIA at this stage.

8.2.3.1 Potential Impacts during Construction

8.2.3.1.1 Impacts to Human Health

1027. The excavation of cable trenches, earthworks and piling (if required for the OCS(s)), as well as the movement and stockpiling of soils has the potential to mobilise pre-existing ground contamination (where present). In addition to mobilising pre-existing contamination, construction works may alter migration pathways or create preferential pathways that did not previously exist between a source and receptor. This could result in impacts to human health through dermal contact, inhalation and ingestion of contaminants. Impacts to human health during construction are therefore scoped into the EIA.

8.2.3.1.2 Impacts to Groundwater

1028. Direct impacts to the Secondary A, B and Undifferentiated Aquifers associated with the superficial deposits, groundwater abstractions (if present) and SPZ may occur due to the intrusive nature of earthworks, trenching and piling (if required). The significance of effect will be dependent on the depth of the aquifer units in relation to the proposed depth of the intrusive works.

1029. During construction, surface layers will be excavated allowing increased infiltration of rainwater and surface run-off to the sub-surface. This could potentially mobilise pre-existing sources of contamination and create new pathways to the superficial aquifers. This could indirectly lead to a deterioration in groundwater quality.

1030. Direct impacts to the Principal Aquifers of the bedrock geology, groundwater abstractions (if present) and SPZ may occur from deep ground workings associated with trenchless crossings and piling (if required). There is the potential for drilling mud to leak along the drill path, or from the immediate area, which could cause contamination of groundwater and a deterioration in groundwater quality. Trenchless techniques also have the potential to create new preferential pathways allowing pre-existing sources of contamination to migrate into the Principal Aquifer.

1031. Direct impacts to the Principal Aquifers, groundwater abstractions (if present) and SPZs may occur because of the adopted piling methodology. Piling may be required to provide foundations for buildings at the OCS(s). Piling has the potential to create new preferential pathways allowing pre-existing sources of contamination to migrate into the underlying superficial and bedrock aquifers leading to a deterioration in groundwater quality.

1032. Indirect impacts to groundwater quality may result from the accidental release of lubricants, fuels and oils via spillages, leakage or storage. These can enter the ground and subsequently into groundwater impacting the quality of the resource and associated abstractions.

1033. Due to the potential impacts to groundwater outlined above, both direct and indirect impacts are therefore scoped into the EIA.

8.2.3.1.3 Impacts to Surface Waters and Ecological Habitats

1034. Installation of the onshore export cables and construction of the OCS(s) will require substantial earthworks, as well as the potential for piling for the OCS(s). These activities have the potential to disturb pre-existing contamination which could migrate via pre-existing pathways or via newly created pathways during the construction phase and be discharged into surface waters. Migration of contamination and discharge into surface water features may also impact on ecological habitats supported by these features.

1035. The construction works could also introduce new sources of contamination, for example, via spillages and leaks of fuels and chemicals. These have the potential to migrate vertically and / or horizontally which may result in indirect impacts to surface waters and the ecological habitats they support.

1036. Due to the potential impacts to surface waters and ecological habitats, an assessment of the potential impacts on these receptors are scoped into the EIA.

8.2.3.1.4 Impacts to Designated Geological Sites

1037. Where overlaps between the construction footprint and designated geological sites exist, construction activities such as trenchless crossings or excavations could directly damage the identified features. Impacts to designated geological sites are therefore scoped into the EIA.

8.2.3.1.5 Impacts to Mineral Resources

1038. Construction activities in areas identified as containing mineral resources have the potential to directly impact the ability for extraction of these resources to be undertaken. This would effectively result in the temporary sterilisation of the resource within the construction footprint. Impacts to mineral resources are therefore scoped into the EIA.

8.2.3.1.6 Impacts to the Built Environment

1039. Activities undertaken during the construction phase of the Project have the potential to impact on the existing built environment. The modification, or creation of new preferential pathways has the potential to allow for contamination or gases to migrate and degrade utilities and concrete. Impacts to the built environment are therefore scoped into the EIA.

8.2.3.1.7 Impacts to Agricultural Land

1040. Construction activities undertaken within the Study Area have the potential to both mobilise pre-existing sources of contamination and introduce new sources. Construction activities also have the potential to modify or create new preferential pathways which may result in the contamination of agricultural land and have an adverse impact on current ALC grades. Impacts to agricultural land are therefore scoped into the EIA.

8.2.3.2 Potential Impacts during Operation

8.2.3.2.1 Impacts to Human Health

1041. During the operation phase of the Project, there is the potential for maintenance workers to come into direct contact with contaminated soils and groundwater should unscheduled excavations be required. There is also the potential for the maintenance workers to be exposed to ground gases and / or vapours when working in confined spaces. Impacts to human health are therefore scoped into the EIA.

8.2.3.2.2 Impacts to Controlled Waters (Groundwater and Surface Waters)

1042. Maintenance activities during the operation of the Project have the potential to mobilise pre-existing contamination or introduce new sources of contamination through the leakage or spillage of fuels, oils or other chemicals from machinery, vehicles or operation equipment. This has the potential to impact on water quality within aquifers underlying the site, surface water features and ecological habitats that they support. Impacts to controlled waters are therefore scoped into the EIA.

8.2.3.2.3 Impacts to Designated Geological Sites

1043. Should unscheduled excavation works be required during the operational phase of the Project, there is the potential for designated geological sites to be impacted should the works be required within the designated area. Impacts to designated geological sites are therefore scoped into the EIA.

8.2.3.2.4 Impacts to Mineral Resources

1044. Future extraction of mineral resources would be prevented within permanent easements, the OCS zones and permanent access roads. This would prevent the extraction of mineral resources in these areas for the duration of the operation phase of the Project. Impacts to mineral resources are therefore scoped into the EIA.

8.2.3.2.5 Impacts to the Built Environment

1045. Materials such as concrete used in the infrastructure associated with the Project have the potential to undergo degradation, such as chemical attack, from aggressive ground conditions due to the presence of acids or sulphates. This has the potential to compromise the integrity of structures associated with the Project. Utilities could also be impacted by the presence of contaminated soils which may result in the corrosion and permeation of pipelines should utilities be installed during the construction phase. Impacts to the built environment are therefore scoped into the EIA.

8.2.3.2.6 Impacts to Agricultural Land

1046. Maintenance activities during the operation phase of the Project have the potential to introduce new sources of contamination through leakage or spills of fuels, oils or other chemicals used during the operation phase. Should unscheduled excavation works be required during the operation phase, there is also the potential to mobilise pre-existing sources of contamination which could have an adverse impact on agricultural land. Impacts to agricultural land are therefore scoped into the EIA.

8.2.3.3 Potential Impacts during Decommissioning

1047. It is anticipated that decommissioning impacts on geology and ground conditions receptors would be similar in nature to those of construction, although the magnitude of impact is likely to be lower.

1048. The same potential impacts identified for construction will therefore be scoped in (and out) of the EIA for the decommissioning phase (as per **Table 8-2**).

8.2.4 Potential Cumulative Effects

1049. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect geology and ground conditions receptors. Therefore, cumulative effects related to geology and ground conditions are scoped into the EIA. The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1050. For geology and ground conditions, the other projects or plans that have the potential to act collectively include the onshore elements of other offshore wind farm projects, construction projects (commercial, residential and transport developments) and remediation projects.

8.2.5 Summary of Scoping Proposals

1051. **Table 8-2** outlines the geology and ground conditions impacts which are proposed to be scoped in or out of the EIA. These may be refined through the EPP and other consultation activities, and as additional project information and site-specific data become available.

Table 8-2 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Geology and Ground Conditions

Potential Impact	Construction	Operation	Decommissioning
Impacts to human health both on and off site from contamination sources	✓	✓	✓
Direct impacts on groundwater quality and groundwater resources from contamination sources and construction methods	✓	✓	✓
Impacts on surface water quality and the ecological habitats they support, from contamination	✓	✓	✓
Physical impacts on geologically designated sites	✓	✓	✓
Loss, damage or sterilisation of mineral resources	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Impacts to the built environment	✓	✓	✓
Impacts to agricultural land	✓	✓	✓
Cumulative impacts	✓	✓	✓

8.2.6 Approach to Data Gathering

1052. The baseline environment for geology and ground conditions will be characterised using the data sources set out in **Table 8-3.**

Table 8-3 Desk-Based Data Sources for Geology and Ground Conditions

Data Source	Data Contents
BGS	Solid geology, superficial geology, borehole records, ground stability issues, faults, geochemistry and mineral extraction sites.
Coal Authority	Coal Mining Reporting Areas.
ERYC	MSAs, private groundwater abstractions, brownfield register and Part 2A sites determined as contaminated land.
Environment Agency	Historical landfill sites, permitted waste sites, authorised landfills, aquifer designations, groundwater abstractions and SPZs.
Environmental Database Geospatial Information System (GIS) data	Historical mapping, site sensitivity data, trade directory and regulatory information.
Google Earth	Aerial images.
Multi Agency Government Information for the Countryside (MAGIC) map application	Ramsar sites, Special Protection Areas, Special Areas of Conservations, Sites of Special Scientific Interest, National and Local Nature Reserves, ALC grades, groundwater vulnerability and aquifer designations.
UK Health Security Agency UK maps of Radon	Radon gas risk.
Zetica	Unexploded bomb risk maps.

1053. Any additional datasets will be identified through ongoing consultation with stakeholders.

8.2.7 Approach to Assessment

1054. As part of the EIA process, the existing environment with respect to geology and ground conditions will be described, including, but not limited to, the following:

- Hydrology;
- Geology and mineral resources;
- Hydrogeology, aquifer designations and groundwater resources;
- Agricultural land;
- Historical land use and potential contamination sources; and
- Sensitive land uses (including designated sites).

1055. The baseline for geology and ground conditions will be established in general accordance with the Environment Agency 'Land Contamination Risk Management Framework' (2023), which advocates a phased risk-based approach. A PRA will be undertaken to develop a Preliminary Conceptual Site Model (PCSM). The PCSM will aid in the identification of potential sources of contamination within the Study Area (inclusive of a 250m and 1km buffer as described in **Section 8.2.1**). The PCSM will also aid in identifying the potential risks posed to sensitive receptors. Sensitive receptors include both those that currently exist and those that could be introduced because of the Project, e.g. construction workers.

1056. The desk-based PRA forms the initial step in the assessment of ground conditions. The PRA will provide valuable information for the design of intrusive investigation works that may be required in the event of potentially unacceptable risks associated with the ground conditions identified. The PRA will be progressed based on the data sources presented in **Table 8-3.**

1057. In addition, a Waste Assessment Report will be appended to the EIA chapter which will assess the types and quantities of wastes likely to be produced during the construction, operation and decommissioning phases of the Project. This assessment will be in accordance with current policy, legislation and guidance.

1058. Geology and ground conditions will be included within the EPP (as set out in **Chapter 6 Consultation**) and further liaison with key stakeholders will take place to agree the approach to data collection, and the specific assessment methods to be employed as part of the EIA as part of this process.

8.2.8 Scoping Questions to Consultees

1059. The following questions are posed to consultees to help them frame and focus their response to the geology and ground conditions scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the geology and ground conditions impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the geology and ground conditions impacts that have been scoped in for further consideration within the EIA?
- Have all the relevant data sources been identified in the Scoping Report?
- Do you agree with the proposed assessment approach?