Environmental Impact Assessment Scoping Report

Dogger Bank D Offshore Wind Farm

Pursuant to Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

21 April 2023

Company:	SSE Renewables and Equinor	Asset:	Development		
Project:	Dogger Bank D Offshore Wind Farm	Sub Project / Package:	Consents		
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Glossary

Term	Definition
Aldbrough – Saltend Scoping Area	One of the two areas that comprise the Onshore Scoping Area, consisting of land located between Aldbrough and Saltend, where the onshore infrastructure may be located.
Areas of Search	Broad geographical areas considered during the site selection process for the project infrastructure.
Array Area	The area within which the wind turbines, inter-array cables and Offshore Substation Platform will be located.
Construction compounds	Areas set aside to facilitate the construction works for the onshore infrastructure, with transport access.
Deemed Marine Licence	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.
Easington Scoping Area	One of the two areas that comprise the Onshore Scoping Area, consisting of land located in the vicinity of Easington, where the onshore infrastructure may be located.
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, which sets out the Environment Impact Assessment (EIA) process for assessing the likely significant effects of a project on the environment.
Evidence Plan Process	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 HRA process.
Green hydrogen	One of the types of low carbon hydrogen production whereby hydrogen is produced using renewable energy to split water into its components of hydrogen and oxygen (known as electrolysis), emitting zero greenhouse gas emissions in the process.
Greenhouse gases	Gases such as carbon dioxide and methane that absorbs infrared radiation and traps heat in the atmosphere, an increase of which due to human activity has led to climate change. Carbon emissions is commonly used as a shorthand for referring to greenhouse gases emissions.

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.
High Voltage Alternating Current (HVAC) / High Voltage Direct Current (HVDC) configuration	The two design configurations considered for the offshore transmission infrastructure associated with the National Grid Option
Horizontal Directional Drilling	A trenchless method of cable installation where a cable is pulled through into a small-bore tunnel used to bring offshore export cables ashore at landfall and to avoid crossing important features.
Hydrogen Option	The hydrogen option and all associated infrastructure from the Array Area to the onshore Hydrogen Production Facility. The Hydrogen Option includes: • The Array Area infrastructure; • The offshore infrastructure relating to electricity transmission; • The onshore infrastructure relating to electricity transmission and hydrogen production; and • The onward connection infrastructure to the hydrogen network or storage.
Hydrogen Production Facility	The area in East Riding of Yorkshire in which all potential components related to hydrogen production will be located. Key components include: • Hydrogen production system; • Water supply and treatment system; • Hydrogen export infrastructure (up to the connection point itself); and • Power infrastructure.

Term	Definition
Impact / Effect	An impact is a change resulting from an activity associated with the Project, defined in terms of magnitude. An effect is the consequence of an impact when considered in combination with the receptor's sensitivity, defined in terms of significance.
Inshore Export Cable Corridor	The section of the offshore export cable corridor from the offshore platform closest to land, namely the Offshore Collector Platform, to any of the possible landfall locations in East Riding of Yorkshire, covering a distance of approximately 140km.
Inter-array cables	Cables which link the wind turbines to the Offshore Substation Platform.
Jointing bay	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	The location where the offshore export cables come ashore on the East Yorkshire coast, which is yet to be selected.
Landfall electrical infrastructure	Landfall electrical infrastructure, including Horizontal Directional Drilling (HDD) for the offshore export cables, construction of the Transition Joint Bay (TJB) and associated construction compound.
Link boxes	Below ground structures housing electrical equipment located along the onshore export cable corridor, alongside each jointing bay.
Mean High Water Springs	The highest level reached by the sea at high tide during mean high water spiring tide, which is determined by averaging throughout the year, the heights of two successive high waters during a 24-hour period in each month when the range of the tide is at its greatest.
National Grid Option	The National Grid option and all associated infrastructure from the Array Area up to and including the Offshore Collector Platform expected to be located in the vicinity of the Dogger Bank South East Offshore Wind Farm. The National Grid Option includes: • the Array Area infrastructure; and • the offshore infrastructure relating to electricity transmission and including the Offshore Collector Platform.
National Site Network	A network of core breeding and resting sites for rare and threatened species and habitats within the UK, adapted from the European Union's Natura 2000 ecological network post-Brexit.
Offshore Booster Station	One of the four possible offshore platforms associated with the National Grid Option (only required for the HVAC configuration) to be located mid-way along the offshore export cable corridor between the Array Area and the Offshore Collector Platform.

Term	Definition
Offshore Collector Platform	One of the four possible offshore platforms associated with the National Grid Option (required for both the HVAC and HVDC configurations) to be located in the vicinity of the Dogger Bank South East Offshore Wind Farm. The Offshore Collector Platform will collect energy from several wind farms in the wider area for further transmission onwards to a yet to be determined landfall location and grid connection point.
Offshore Converter Station	One of the four possible offshore platforms associated with the National Grid Option (only required for the HVAC configuration) to be located in the vicinity of the Dogger Bank South East Offshore Wind Farm.
Offshore Development Area	The area off the East Yorkshire coast comprising all permanent offshore infrastructure area, temporary work areas and mitigation areas, which will be refined through consultation and the engineering review process and defined within the Preliminary Environmental Information Report / Environmental Statement.
Offshore electrical infrastructure	Offshore electrical infrastructure, including Offshore Substation Platform (OSP) foundations, assembly and commissioning and laying of inter-array cables and offshore export cables in the export cable corridor.
Offshore Export Cable Corridor	The area which will contain the offshore export cables.
Offshore export cables	Cables which bring electricity from the Offshore Substation Platform to the Offshore Collector Platform for the National Grid Option and to the Transition Joint Bay at landfall for the Hydrogen Option.
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.
Offshore Substation Platform	One of the four possible offshore platforms associated with the National Grid Option (required for both the HVAC and HVDC configurations) and the only offshore platform associated with the Hydrogen Option to be located within the Array Area. The Offshore Substation Platform will aggregate and convert power from the wind turbines into a more suitable voltage for transmission via the offshore export cables.
Onshore Development Area	The area within the East Riding of Yorkshire comprising all permanent infrastructure area, temporary work areas and mitigation areas, which will be refined following consultation and the engineering review process and defined within the Preliminary Environmental Information Report / Environmental Statement.
Onshore Export Cable Corridor	The area which will contain the onshore export cables.
Onshore export cables	Cables which bring electricity from the Transition Joint Bay at landfall to the Hydrogen Production Facility.

Term	Definition
Onshore Scoping Area	The boundary in which all potential onshore infrastructure associated with the Project will be located, which extends landward of Mean Low Water Springs. The Onshore Scoping Area is comprised of two sub-areas within the East Riding of Yorkshire, the Aldbrough – Saltend Scoping Area and the Easington Scoping Area.
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.
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 Area	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, including both potential design options in the project design envelope – the National Grid Option and the Hydrogen Option.
Transition Joint Bay	An underground structure at landfall that houses the joint between the offshore and onshore export cables.
Trenching	Open cut method for cable or duct installation.
Wind turbines	Power generating devices located within the Array Area that convert kinetic energy from wind into electricity.

1 Introduction

1.1 Project Overview

1. This document 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 'DBD' or '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. 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.

3. 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. Teesside B was renamed as Sofia Offshore Wind Farm and would be progressed separately from the Dogger Bank Wind Farm by RWE[1] (see **Figure 1-1**).

4. 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 approximately 1.8GW 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.

5. 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. The Applicant therefore intends to adopt proportionate approach to EIA (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.

[1] Within the Scoping Report, documents and surveys previously undertaken for offshore wind farms in the Dogger Bank Zone are referred to by their given name at publication (e.g. Teesside A & B Environmental Statement). References to the project areas at present day are referred to by their current name (e.g. Dogger Bank C).

6. The Applicant is currently developing two options for how the electricity from the Project will be used, these options will be referred to as the National Grid Option and Hydrogen Option. Further details on these are presented below:

- **National Grid Option**, this refers to the electrical offtake option and associated infrastructure.
  - The National Grid Option includes the Array Area infrastructure (including the wind turbines) and the offshore infrastructure relating to electricity transmission, including the offshore export cables to an Offshore Collector Platform. Development of the infrastructure landward of the Offshore Collector Platform would be undertaken by National Grid Electricity Transmission (NGET) as described further below.
  - Electrical export through both High Voltage Direct Current (HVDC) and High Voltage Alternating Current (HVAC) are currently being considered for the National Grid Option, and both of these configurations are included within this Scoping Report.
- **Hydrogen Option**, this refers to the hydrogen offtake option and associated infrastructure.
  - The Hydrogen Option includes the Array Area infrastructure (including the wind turbines), the offshore infrastructure relating to electricity transmission, including the offshore export cables, and the onshore infrastructure relating to electricity transmission to a Hydrogen Production Facility (HPF) in the East Riding of Yorkshire, including any hydrogen offtake from the facility to the wider distribution and storage network.
  - The electrical export for the Hydrogen Option is proposed to be HVDC.

7. **Figure 1-1** identifies the proposed scoping boundary which encompasses both options.

8. **Plate 1-1, Plate 1-2** and **Plate 1-3** identify what infrastructure is required for the National Grid Option (HVDC and HVAC configurations) and the Hydrogen Option respectively. Further discussion on the project infrastructure is set out in **Chapter 3 Project Description**.

9. It should be noted that both options include development of the wind turbines within the Array Area (see **Figure 1-1**). The DBD Array Area covers an area of approximately 249km^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).

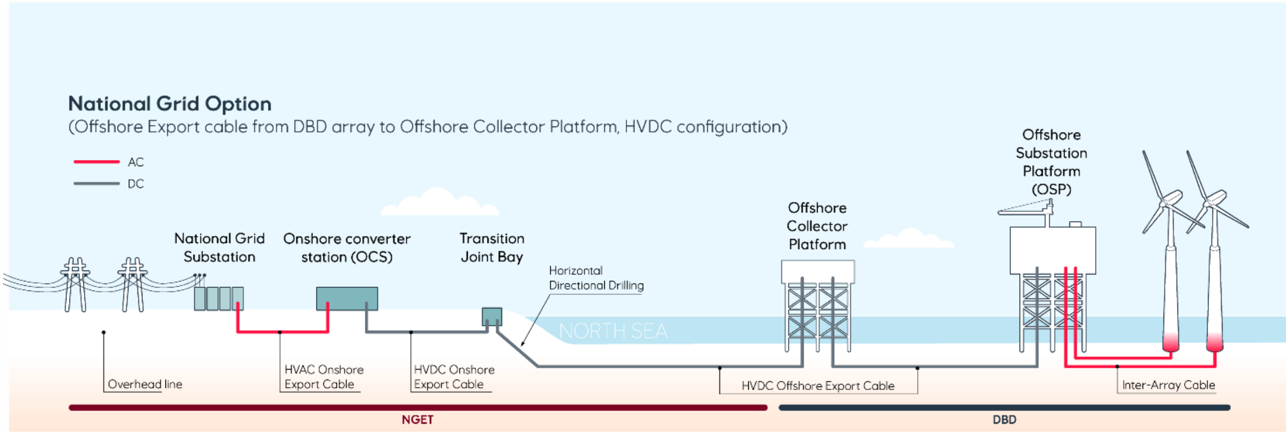

Plate 1-1 Indicative Components of the National Grid Option (HVDC Configuration)

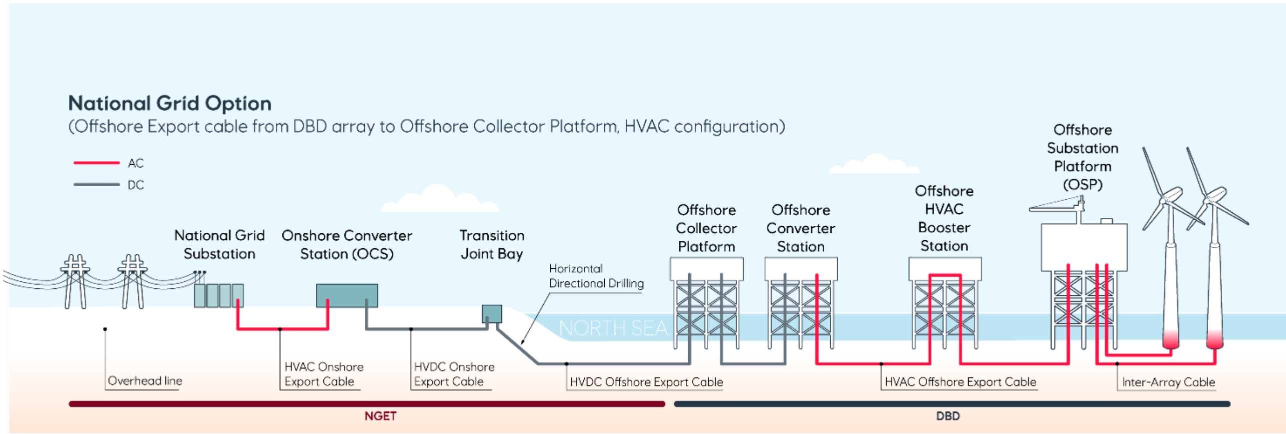

Plate 1-2 Indicative Components of the National Grid Option (HVAC Configuration)

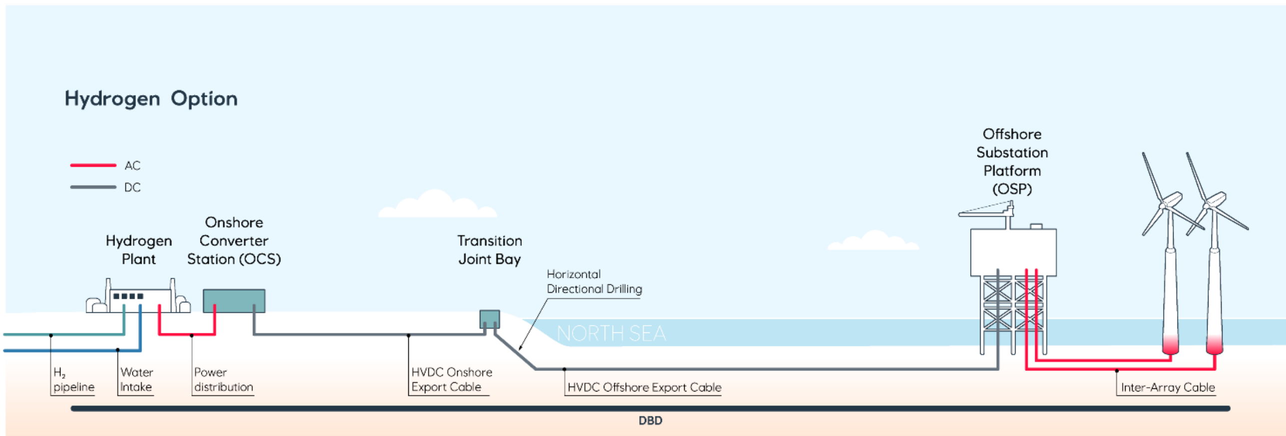

Plate 1-3 Indicative Components of the Hydrogen Option

10. DBD was considered as part of the Office of Gas and Electricity Markets' (OFGEM) Offshore Network Transmission Review (ONTR) for a Holistic Network Design[2]. This review has resulted in the decision that the National Grid Option landward of the Offshore Collector Platform (shown on **Plate 1-1** and **Plate 1-2** would be developed by NGET. This includes the onward offshore export cable corridor (ECC) and all onshore infrastructure relating to electricity transmission and an onward connection to a National Grid connection point within Lincolnshire. Therefore, these elements are not considered within this Scoping Report.

11. Both the National Grid Option and Hydrogen Option are currently being developed in order to avoid prematurely dismissing the possibility of the Hydrogen Option, noting that this technology is not yet proven at such scale, compared to a conventional grid connection. However, despite the lack of similar scale electrolytic hydrogen (hereafter referred to as 'green hydrogen') projects to date, it remains a valid option under consideration at this stage, particularly given significant 2030 government targets for green hydrogen as outlined in **Section 2.3**. As such, it is not yet appropriate to settle on a preferred technology. For the avoidance of doubt, both of the above options are included within this Scoping Report (see **Chapter 3 Project Description** for further information), noting that only one of these options will be taken forward for construction and operation.

12. The scoping exercise for the Project has been undertaken using a worst case scenario. Noting that spatially (**Figure 1-1**), and with respect to much of the infrastructure required to operate each option (**Plate 1-1, Plate 1-2** and **Plate 1-3**), the Hydrogen Option is considered to represent the worst case scenario given its larger spatial extent which includes the whole of the National Grid Option footprint. However, there is the potential requirement for three additional offshore platforms if the National Grid Option (HVAC configuration) were to be progressed (i.e. the Offshore HVAC Booster Station, Offshore Converter Station and Offshore Collector Platform) and the potential use of HVAC export cable configuration resulting in six offshore export cables. Therefore, the worst case scenario defined as the basis for this Scoping Report is the Hydrogen Option plus the additional infrastructure outlined above. However, as noted above only a single option will be taken forward to construction and operation.

13. The exception to scoping on the basis of the worst case scenario as described above is the scoping exercise for the greenhouse gas (GHG) assessment within **Chapter 9.4 Climate Change**. The GHG assessment is not limited to a defined geographical area and requires a tailored approach based on the infrastructure, associated activities and end uses specific to the development option being assessed. Therefore, the scoping exercise for the GHG assessment within **Chapter 9.4 Climate Change** is presented separately for the National Grid Option and the Hydrogen Option.

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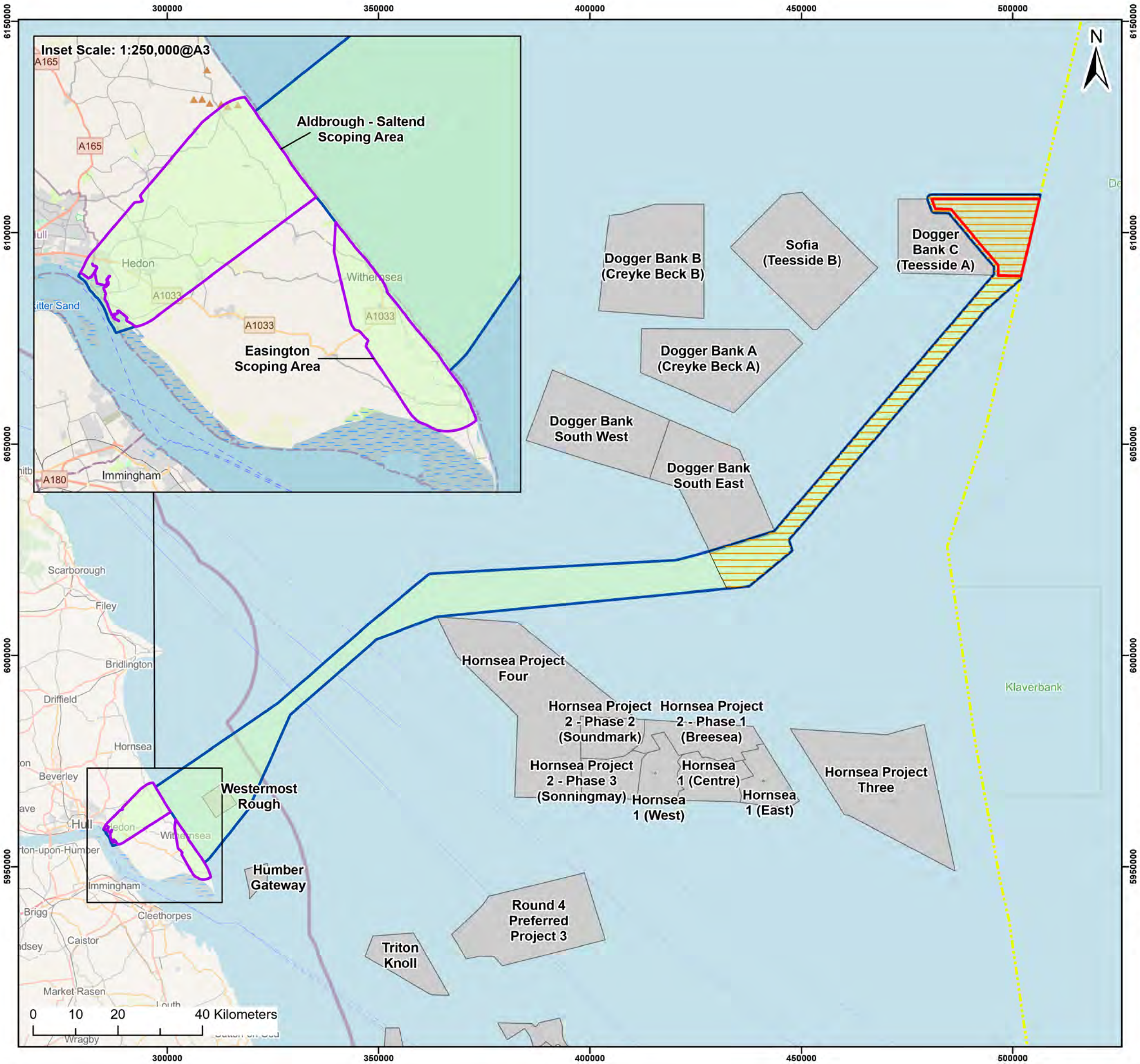
[2] Further information can be found on the OFGEM website: https://www.ofgem.gov.uk/publications/offshore-transmission-network-review-decision-asset-classification.

14. 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 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 Mean High Water Springs (MHWS). The Onshore Scoping Area is comprised of two sub-areas within the East Riding of Yorkshire, the Aldbrough – Saltend Scoping Area and the Easington Scoping Area. These scoping areas, along with the spatial extent of the National Grid Option and Hydrogen Option, are shown in **Figure 1-1**.

15. As DBD contains an offshore generating station with an installed capacity exceeding 100MW, it is classified as a Nationally Significant Infrastructure Project (NSIP). As such a 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).

16. 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 Proposed Development and produce an ES to report the findings of the EIA.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Hydrogen Option
- National Grid Option
- The Crown Estate Lease / Agreement Area
- UK Waters International / Exclusive Economic Zone Boundary

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Onshore and Offshore Scoping Areas

Figure:	1-1	Drawing No:	PC3991-RHD-ZZ-ZZ-DR-Z-0005		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/04/2023	JR	PS	A3	1:900,000
00	21/03/2023	JR	PS	A3	1:900,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor

1.2 The Applicant

17. DBD is being developed by 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, which is currently undergoing construction in three development phases (DBA, DBB and DBC). Once operational, Dogger Bank Wind Farm will be the world's largest offshore wind farm and provide a total of 3.6GW of energy, which is capable of powering six million UK homes and 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. In addition to previous project experience within the Dogger Bank Zone, SSE Renewables and Equinor are also focussed on the integration of innovative solutions and the delivery of local employment benefits. Dogger Bank Wind Farm (DBA, DBB and DBC) will employ the world's most powerful offshore wind turbine in operation today and will be 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 1,250 new jobs in the UK, increasing the country's supply chain capacity and building capabilities within the national offshore wind sector.

19. Equinor and SSE Thermal are also collaborating throughout the Humber region to decarbonise the UK's most carbon-intensive industrial region, bringing together the two companies' expertise in power, natural gas, hydrogen and carbon capture and storage. This portfolio in the Humber region includes at least three strategic projects:

- Aldbrough Hydrogen Storage, located in the East Riding of Yorkshire, which could be one of the world's largest hydrogen storage facilities;
- Keadby 3 Carbon Capture Power Station, which could be the UK's first flexible power station equipped with carbon capture; and
- Keadby Hydrogen Power Station, which could be one of the world's first 100% hydrogen-fuelled power stations.

20. Also in the Humber region, Equinor's flagship H2H Saltend hydrogen production project is expected to significantly contribute to the wider decarbonisation of the region as part of the Zero Carbon Humber initiative, within which Equinor and SSE both play a leading role. The recently acquired Saltend Power Station, owned by Equinor and SSE Thermal, serves as a potential primary off-taker and potential fuel-switcher for the hydrogen produced by H2H Saltend. All of these projects are targeting execution within the next decade (subject to government support) and are aligned with government decarbonisation and net zero ambitions.

21. SSE Renewables has the largest secured offshore wind development pipeline across the UK and Ireland at over 8GW, of which around 2.6GW is either consented or under construction. With a diverse portfolio of renewable technologies, SSE Renewables has an installed renewable energy capacity of around 4GW, consisting of nearly 2GW of onshore wind, 1.5GW of hydropower and pumped storage and 0.5GW of offshore wind from two joint venture sites, Beatrice and Greater Gabbard offshore wind farms. These operational generation assets produce around 10TWh of renewable power per year. SSE Renewables aims to increase its installed renewable energy capacity to 8GW by 2026 and accelerate growth to over 50TWh annually by 2031.

22. Equinor has a long track record of developing offshore wind farms in the UK, having already built and commissioned into operation Sheringham Shoal Offshore Wind Farm, Dudgeon Offshore Wind Farm and Hywind Scotland Pilot Park, the world's first floating offshore wind farm capable of powering 36,000 homes in the UK. 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.

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

1.3 Purpose of this EIA Scoping Report

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

25. This Scoping Report supports a request for a Scoping Opinion from the Planning Inspectorate (on behalf of the Secretary of State) for DBD 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.*'

26. 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 (Institute of Environmental Management and Assessment (IEMA), 2004).

27. Additionally, scoping also allows for early stage engagement with stakeholders and 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 DBD which is discussed further in **Chapter 6 Consultation**.

28. 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 proposed development, including its location and technical capacity;
- An explanation of the likely significant effects of the development on the environment; and
- Such other information or representations as the person making the request may wish to provide or make.

29. The Scoping Report outlines the receptors that will be considered in the EIA, the proposed data sources and data collection approach that will be used to characterise the existing environment, the assessment methodology and potential mitigation measures on a topic-by-topic basis. This will be refined following the receipt of the Scoping Opinion, including 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**).

30. This Scoping Report identifies potential impacts within discrete environmental topics to be scoped in or out of the EIA based on the existing evidence base, expert judgment and lessons learned from past EIA experience with other offshore wind farms, including previous developments within the Dogger Bank Zone. In particular, the DBD Array Area has previously been assessed and reported in the Dogger Bank Teesside A & B ES.

31. 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). The Array Area of DBD (which sits wholly within the area of Teesside A) has previously been subject to a full EIA and was granted development consent. Since then a wide range of additional surveys and data has 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, giving a greater understanding of the engineering constraints and constructability of offshore wind farms in this area and also the impacts associated with these methods. This Scoping Report makes reference 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.

32. Ensuring scoping is effective underpins a proportionate approach to 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 and a separate commercial entity from any other previous phase of the Dogger Bank Wind Farm, thus a new DCO application will be made.

35. Refinement of DBD will continue to take place within the pre-application period however both the Hydrogen Option and the National Grid Option may be retained through the application process. A single option will be taken forward for construction and operation of the Project.

36. A single DCO application will be made, 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 MMO.

37. 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.

2 Policy and Legislative Context

2.1 Need for the Project

38. In 2022, the UK Government published the British Energy Security Strategy (BESS) (UK Government, 2022), setting out how Great Britain will accelerate homegrown power for increased energy independence through methods including renewables (incorporating offshore wind). The strategy states an ambition to deliver an increased target of up to 50GW of offshore wind by 2030, an increase from the previous 40GW target. This strategy also includes targets for low carbon hydrogen with an ambition for hydrogen production of up to 10GW by 2030, with at least half of this from green hydrogen.

39. DBD would have the potential to generate a significant amount of renewable energy to contribute towards this target, at the same time contributing to key national policy aims of:

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

2.1.1 Climate Change and Greenhouse Gas Emissions

40. Climate change is a major contributor to global temperature increases. In the Overarching National Policy Statement for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011) and the draft version of EN-1 (Department for Energy Security and Net Zero (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:

- 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 and coastal change.

41. Renewable and low-carbon development is an adaptive measure to address climate change, with wind power providing a clean and secure source of electricity supply.

42. In 2019, the UK became the first major economy to legislate for a 2050 net zero GHG emissions target through the Climate Change Act 2008 (2050 Target Amendment) Order 2019, followed in 2020 by setting out the UK Nationally Determined Contribution to reduce GHG emissions by at least 68% from 1990 levels by 2030. In April 2021, the Government announced the sixth carbon budget and as a result will legislate to reduce GHG emissions by around 78% by 2035 compared to 1990 levels.

2.1.2 Energy Security

43. The UK Office for National Statistics (ONS) published its latest UK fuel imports and exports data in 2022 (ONS, 2022). The UK imports 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. These vulnerabilities have been highlighted in 2022 as a result of the Russian invasion of Ukraine.

44. The BESS (UK Government, 2022) 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 roll out new renewables’.

45. The Government set out plans to enhance the country’s energy security, seize the economic opportunities of the transition, and delivery net zero commitments in its March 2023 document ‘Powering Up Britain’ (UK Government, 2023). The document sets out the Government’s view that energy security and net zero are ‘*two sides of the same coin*’ and that ‘*rapid deployment of low carbon electricity will enable a systematic transformation across the economy working with technologies across the system to deliver cheaper, more secure energy*’. The plan includes delivering both a hydrogen economy and accelerating the deployment of renewable energy (including offshore wind).

2.1.3 Decarbonisation

46. To reduce GHG emissions in light of climate change and increase the UK's national energy security, the development of renewable sources of energy is key to increasing electricity from a low-carbon source. The UK Energy Trends statistics (BEIS, 2022) states that renewables hold a 38.6% share of electricity generation in 2022, with fossil fuels holding a 41.9% share. Within the Climate Change Committee’s Sixth Carbon Budget, for 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.

47. DBD’s Hydrogen Option would also facilitate the UK’s goal of developing a thriving low carbon hydrogen sector, as set out by the UK Hydrogen Strategy (UK Government, 2021a). Hydrogen serves as a potential versatile replacement for high-carbon fuels and is thus critical to the UK’s net zero transition. Low carbon hydrogen will complement renewable energy by enabling the deep decarbonisation of ‘difficult to electrify’ industrial sectors and building flexibility and stability to low carbon transport, power generation, and municipal heating systems. As part of the Sixth Carbon Budget, analysis by BEIS suggests that 250 to 460TWh of hydrogen may be needed by 2050, which accounts for 20 to 35% of the UK’s final energy consumption (UK Government, 2021a).

48. The Prime Minister’s Ten Point Plan for a Green Industrial Revolution (UK Government, 2020) states that working with industry, the government is aiming for 5GW of low carbon hydrogen production capacity by 2030. With virtually no low carbon hydrogen produced or used currently, particularly to supply energy, this will require rapid and significant scale up from where we are today. If developed, the Hydrogen Production Facility (HPF) would be the UK’s largest green hydrogen project and could contribute a significant proportion of the UK Government’s ambition for 5GW of low carbon hydrogen by 2030.

49. An ‘update to the market’ was released in July 2022, which brought the Hydrogen Strategy in line with the BESS published in April this year, highlighting that the government had doubled the UK’s hydrogen production ambition to up to 10GW, of which at least 5GW will be green hydrogen, by 2030 (UK Government, 2022).

2.1.4 Energy Affordability

50. In order to progress towards a reduction in GHGs, decarbonisation targets and energy security, there is a need for renewable energy to be affordable.

51. 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).

52. The UK Contracts for Difference 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.

2.1.5 Economic Opportunities

53. 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 23% of global offshore wind operating capacity in 2021 (The Crown Estate, 2021). 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.

54. 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).

55. DBD’s Hydrogen Option would also help contribute to the UK Hydrogen Strategy’s aim of establishing a UK hydrogen economy at the forefront of the growing global hydrogen market. Analysis by BEIS indicates that in 2030, the UK hydrogen economy could be worth £900 million and support over 9,000 jobs, with around a quarter of these jobs driven by supply chain exports. These figures are forecasted to grow to up to £13 billion and 100,000 jobs in 2050 under a high hydrogen scenario (UK Government, 2021a).

2.2 Climate Change and Renewable Energy Policy and Legislation

56. 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.

Policy / Legislation	Summary
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.
Ten Point Plan for a Green Industrial Revolution 2022	The policy paper sets out the approach the Government will take to support green jobs and accelerate the path to net zero. Includes aim for 5GW of low carbon hydrogen production capacity by 2030.
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 2-030. The strategy also aims for an ambition for UK hydrogen production of up to 10GW by 2030, including half of this from green hydrogen.

2.3 Hydrogen Policy and Legislation

57. In August 2021, BEIS published the UK Hydrogen Strategy (UK Government, 2021a) together with a series of related consultations, with the strategy stating that: '*Hydrogen is one of a handful of new, low carbon solutions that will be critical for the UK's transition to net zero*' and '*Hydrogen can support the deep decarbonisation of the UK economy, particularly in 'hard to electrify' UK industrial sectors, and can provide greener, flexible energy across power, heat and transport*.'

58. For hydrogen to play a part in the journey to net zero, future production will need to be low carbon, and the Hydrogen Strategy recognises the UK's potential to produce large quantities of green hydrogen.

59. The Hydrogen Strategy recognises the need to introduce a new legal and regulatory framework to support hydrogen's continued development, stating that: '*While early projects can be expected to operate within existing regulatory regimes, new rules and regulations may be required to facilitate the further expansion of the market and maintain competitive pressure over the course of the 2020s and beyond, especially should hydrogen networks connect to the existing gas network in the future, for instance, to enable blending or grid conversion*' (UK Government, 2021a).

60. Given the nascent nature of low carbon hydrogen technologies, further work is required to determine the environmental impact of the future hydrogen economy and therefore whether new, hydrogen-specific environmental regulation may be required. In April 2022, BEIS published two research papers: *'Fugitive Emissions in a Future Hydrogen Economy'* (UK Government, 2022e) and *'Atmospheric Implications of Increased Hydrogen Use'* (UK Government, 2022f). DESNZ are currently consulting on whether the existing environmental regulatory framework is optimal for the future hydrogen economy.

61. Additional considerations relating to hydrogen developments include (inter alia):

- The Control of Major Accident Hazards (COMAH) Regulations (UK Government, 2015) which ensures that businesses take all necessary measures to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any major accidents which occur. Hydrogen is a named dangerous substance under the Regulations; and
- The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (UK Government, 2002) which are concerned with preventing or limiting the harmful effects of fires, explosions and similar energy-releasing events and corrosion to metals.

2.4 Planning Policy and Legislation

2.4.1 The Planning Act 2008

62. The Planning Act 2008 established the first legal framework for applying for, examining and determining applications for Nationally Significant Infrastructure Projects (NSIP). The Act sets thresholds above which certain types of infrastructure development are nationally significant and require a Development Consent Order (DCO) application. DBD 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.

63. Under the Localism Act 2011, the Planning Inspectorate became the agency responsible for administering the planning process for NSIPs. The Planning Inspectorate will examine the DCO application, supporting documents and other applications for relevant permissions, consents and licences such as Deemed Marine Licences (DML) and compulsory acquisition powers and make a recommendation to the relevant Secretary of State. The decision whether to grant the DCO falls ultimately with the Secretary of State.

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

64. The Environmental Impact Assessment (EIA) Regulations require that the Project's impacts that are likely to have a significant effect on the environment are accounted for in the decision-making process for that project. The EIA Regulations indicate the process for environmental information provision to enable the EIA process. As required under the Regulations, the DCO application for DBD will be accompanied by an Environmental Statement (ES).

65. The EIA process for DBD will also take account of non-statutory National Infrastructure Advice Notes published by the Planning Inspectorate. These notes are published to provide advice and information on a range of issues arising throughout the whole life of the DCO application process.

2.4.3 National Policy Statements

66. National Policy Statements (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 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. Three NPS are of relevance to DBD:

- EN-1 for Overarching Energy (DECC, 2011a);
- EN-3 for Renewable Energy Infrastructure (DECC, 2011b); and
- EN-5 for Electricity Networks Infrastructure (DECC, 2011c).

67. The energy NPS are currently being revised following public consultation in 2021, and the draft energy NPS are material considerations. The Energy White Paper, which was published in 2020, announced the government's intentions to update the energy NPS to align with new national policies and the broader strategic approach and ensure that the planning policy framework remain suitable for delivering the infrastructure needed to transition the UK to net zero. The latest draft NPS for EN-1, EN-3 and EN-5 were published for consultation in March 2023 (DESNZ, 2023a; DESNZ, 2023b, and DESNZ, 2023c). Draft EN-1 and EN-3 maintain the acceptability of a flexible approach to project details so long as where such flexibility is sought applicants assess the likely worst case effects of a proposed development.

68. The White Paper states that: 'while the review is undertaken, the current suite of NPS remain relevant government policy and have effect for the purposes of the Planning Act 2008' (UK Government, 2020). Thus, the EIA process for DBD will refer to the existing energy NPS and the draft versions of the updated NPS until the final versions have been adopted by the Government. The latest information from the Department of Levelling Up, Housing and Communities (DLUHC) is that the target dates for designation of the revised NPS (EN-1 to EN-5) would be within Q2 2023 (DLUHC, 2023).

2.4.4 Marine Policy

69. 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.

70. 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.

71. 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).

2.4.5 National Planning Policy Framework

72. 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 planning authorities. The most recent NPPF was published in 2021 and sets out the UK Government’s planning policies for England and how these are expected to be applied (UK Government, 2021).

73. The NPPF does not contain specific policies for NSIPs, 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 DBD will refer to these core principles to ensure that sustainable development is pursued in a positive way.

2.4.6 Regional and Local Planning Policy

74. 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.

75. 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. For the majority of local authorities, these documents are still under development or revision, but where draft versions are available, they will be acknowledged and considered within the EIA process for DBD.

76. The Hydrogen Option Onshore Scoping Area falls under two administrative areas, the jurisdiction of the East Riding of Yorkshire Council and Hull City Council. For avoidance of doubt, the EIA process for DBD will consider regional and local planning policies belonging to these local authorities and their neighbouring authorities as appropriate.

2.5 Environmental Legislation

77. **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.

Level	Policy / Legislation	Summary
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.

Level	Policy / Legislation	Summary
	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% Biodiversity Net Gain (BNG) will become mandatory as part of the planning system (for Town and Country Planning Act (TCPA) developments) in England from November 2023. For NSIP developments it is anticipated that BNG will be a requirement no later than November 2025 (Department for Environment, Food and Rural Affairs (Defra), 2023).
	Marine Coastal and Access Act 2009	Enables the designation of Marine Protected Areas (MPAs) in England, Wales and UK offshore waters, including Marine Conservation Zones (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.
	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.

Level	Policy / Legislation	Summary
	The Protection of Badgers Act 1992	The Protection of Badgers Act 1992 makes it an offence to wilfully 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.

2.5.1 Habitats Regulations Assessment (HRA)

78. 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, SAC), known as HRA.

79. HRA can be described as a three stage process as outlined in Planning Inspectorate Advice Note 10 (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)'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.

80. HRA Screening is being undertaken and will be consulted upon with the relevant stakeholders through the Evidence Plan Process (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 competent authority to carry out an appropriate assessment. A draft RIAA will also be provided for consultation.

81. 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.

2.5.2 Marine Conservation Zone (MCZ) Assessment

82. Noting the presence of the Holderness Offshore and Holderness Inshore MCZs in proximity to the Offshore Scoping Area (see **Figure 7-10** within **Chapter 7.4 Benthic and Intertidal Ecology**), consideration will be made of Section 126 (s.126) of the Marine and Coastal Access Act (MCAA) (2009) which places specific duties on the Marine Management Organisation (MMO) relating to marine conservation zones (MCZs) and marine licence decision making.

83. 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.

84. 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 competent authority to carry out an appropriate assessment. A draft report will also be provided for consultation.

85. 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

86. This chapter provides an indicative description of Dogger Bank D (DBD) for the purpose of informing the Scoping Report and obtaining a Scoping Opinion. The project description will develop throughout the Environmental Impact Assessment (EIA) process and a final description will be provided in the Environmental Statement (ES), which will form part of the Development Consent Order (DCO) application.

3.2 Design Envelope Approach

87. The National Policy Statement (NPS) for Renewable Energy Infrastructure (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.’

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

> ‘In accordance with Section 4.2 of EN-1, the IPC [the Secretary of State] should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until some time after any consent has been granted. Where some details have not been included in the application to the IPC [the Secretary of State], the applicant should explain which elements of the scheme have yet to be finalised, and the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have (as set out in EN-1 paragraph 4.2.8) to ensure that the project as it may be constructed has been properly assessed (the Rochdale Envelope). In this way the maximum adverse case scenario will be assessed (…)’

89. The draft NPS EN-3 also recognises and supports the design envelope approach within paragraphs 3.8.87 (Department for Energy Security and Net Zero (DESNZ, 2023).

90. 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'.

91. 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 general public); and
- Further technical and engineering development along with environmental assessments.

3.3 Indicative Project Infrastructure

92. **Figure 1-1** identifies the Onshore Scoping Area and the Offshore Scoping Area, with **Table 3-1** setting out which infrastructure components are located in which area.

93. **Plate 1-1**, **Plate 1-2** and **Plate 1-3** present indicatively, the general arrangement of the individual components for the National Grid Option – High Voltage Direct Current (HVDC) and High Voltage Alternating Current (HVAC) configuration – and the Hydrogen Option respectively.

94. As stated in **Paragraph 12**, the scoping exercise has been undertaken using a worst case scenario approach, which is defined as the Hydrogen Option plus consideration of:

- three potentially required additional offshore platforms associated with the National Grid Option – HVAC configuration (i.e. the Offshore HVAC Booster Station, Offshore Converter Station and Offshore Collector Platform); and
- up to six offshore export cables being required from the Array Area to the Offshore Collector Platform (as per the National Grid Option – HVAC configuration), with only a maximum of four cables being required from this platform to the landing point.

95. **Table 3-2** 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 with the ES based on the worst case scenarios, which will be fully justified in the ES.

Table 3-1 Infrastructure Requirements for Each Development Option

Development Option	Offshore Scoping Area (seaward of Mean High Water Springs)		Onshore Scoping Area (landward of Mean High Water Springs)			
	Array Area	Offshore Electrical Infrastructure	Landfall Electrical Infrastructure	Onshore Export Cable	Onshore Converter Station	Onshore Hydrogen Infrastructure
National Grid Option	✓	✓ (from the Array Area up to and including the Offshore Collector Platform only)	X Developed by NGET (not included in the Scoping Report)	X Developed by NGET (not included in the Scoping Report)	X Developed by NGET (not included in the Scoping Report)	n/a
Hydrogen Option	✓	✓	✓	✓	✓	✓

Note: See **Section 3.4** for a description of which infrastructure is located in which area and also shown in **Plate 1-1, Plate 1-2** and **Plate 1-3**.

Table 3-2 Key Indicative Parameters for the 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	249km^2
Array Area water depths	21 to 35m at Lowest Astronomical Tide (LAT)
Wind Turbine Parameters	
Maximum number of wind turbines	100
Maximum wind turbine rotor diameter	340m
Minimum blade clearance	22m above Highest Astronomical Tide (HAT)
Wind turbine foundation options under consideration	Potential foundation types include monopiles, mono suction bucket, piled jacket and suction bucket jacket.

Feature	Indicative Parameter
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.
Offshore Platform Parameters	
Maximum number of platforms	Maximum of four offshore platform structures (based on the National Grid Option – HVAC configuration): • One Offshore Substation Platform (OSP); • One Offshore HVAC Booster Station; • One Offshore Converter Station; and • One Offshore Collector Platform.
Platform foundation options under consideration	Potential foundation types include monopiles, mono suction bucket / suction bucket jacket, piled jacket and gravity base.
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.
Inter-Array Cables Parameter	
Maximum total inter-array cable length	Up to approximately 550km
Offshore Export Cable Parameters	
Electrical current	HVDC or HVAC
Maximum number of offshore export cables	Maximum of six cables (including six fibre optic cables) (for the National Grid Option – HVAC configuration) from the Array Area to the Offshore Collector Platform, but with four cables (including two separate fibre optic cables) required for the Hydrogen Option to landfall.
Maximum offshore export cable length	Up to approximately 300km
Landfall Parameters	
Maximum number of Horizontal Directional Drilling (HDD) exit pits	Up to an estimated six HDD exit pits
Maximum number of Transition Joint Bays (TJB)	Estimated one TJB
Approximate transition pit permanent footprint (per pit)	Up to approximately 25 x 25m

Feature	Indicative Parameter
Approximate transition pit construction footprint (per pit)	Up to approximately 30m x 30m
Landfall HDD compound (length x width)	Up to approximately 150m x 150m
Proposed landfall installation method	HDD or open cut trenching
Onshore Export Cables Parameters	
Maximum number of onshore export cables	15 cables and five separate fibre optic cables
Cable installation	Open trenching methods, where trenchless techniques such as HDD are not suitable.
Maximum number of trenches	Five trenches
Maximum onshore export cable length	Up to approximately 18km
Maximum permanent corridor width	50m
Maximum temporary construction corridor width	100m
Onshore Hydrogen Production Facility Parameter	
Estimated (construction and operation area)	46ha (subject to final design)

3.4 Infrastructure Description

3.4.1 Array Area

96. The wind turbines will be located within the 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 Dogger Bank C (DBC) Offshore Wind Farm, covering an area of approximately 249km^2. Water depths in this area range from approximately 21 to 35m below LAT.

3.4.1.1 Wind Turbines

97. 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 decision made post-consent. Based on the likely wind turbines available at the time DBD enters construction (14 to 27+MW), it has been assumed at this scoping stage that up to a maximum of 100 wind turbines would be deployed if wind turbines at the lower end of this range are selected, with fewer required if the more powerful 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. At present, the expected maximum rotor diameter is 340m, and a minimum blade clearance of 22m above HAT.

98. The final layout of the wind turbines will be informed by site investigation works, impact assessment, wind resource modelling and the layout principles to be developed alongside consultation with key stakeholders, with the final layout selected post-consent.

99. Indicative wind turbine parameters are set out in **Table 3-2** with a schematic of a generic turbine provided in **Plate 3-1**.

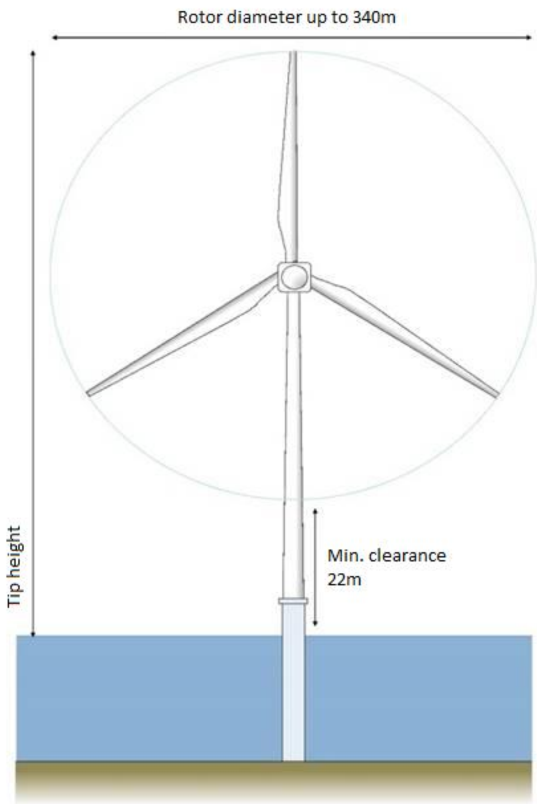


Plate 3-1 Indicative Wind Turbine Schematic

100. The wind turbines will be secured to the seabed using fixed foundations. 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. **Table 3-3** sets out high level details of the foundation types under consideration (noting an additional option for the offshore platforms only at the end of the table) with

101. **Plate 3-2** identifying what each foundation type looks like in general terms.

Table 3-3 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. Monopiles can be used in depths of up to 35 to 40 m.
Mono Suction Bucket / Suction Bucket Jacket	Suction installed foundations penetrate the seabed by self-weight with suction applied after so that pressure difference drives the bucket in to 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.
Piled Jacket	The piled jacket foundation for offshore wind turbines is generally used in water depths over 60m where the monopile has reached its limit. The structure is then initially positioned on the seabed, with piles then driven through ‘skirts’ and fixed in to 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.
Gravity Base	This foundation type is only under consideration for the offshore platforms (i.e. not the wind turbines) as per **Paragraph 111**. 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 platforms. 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.

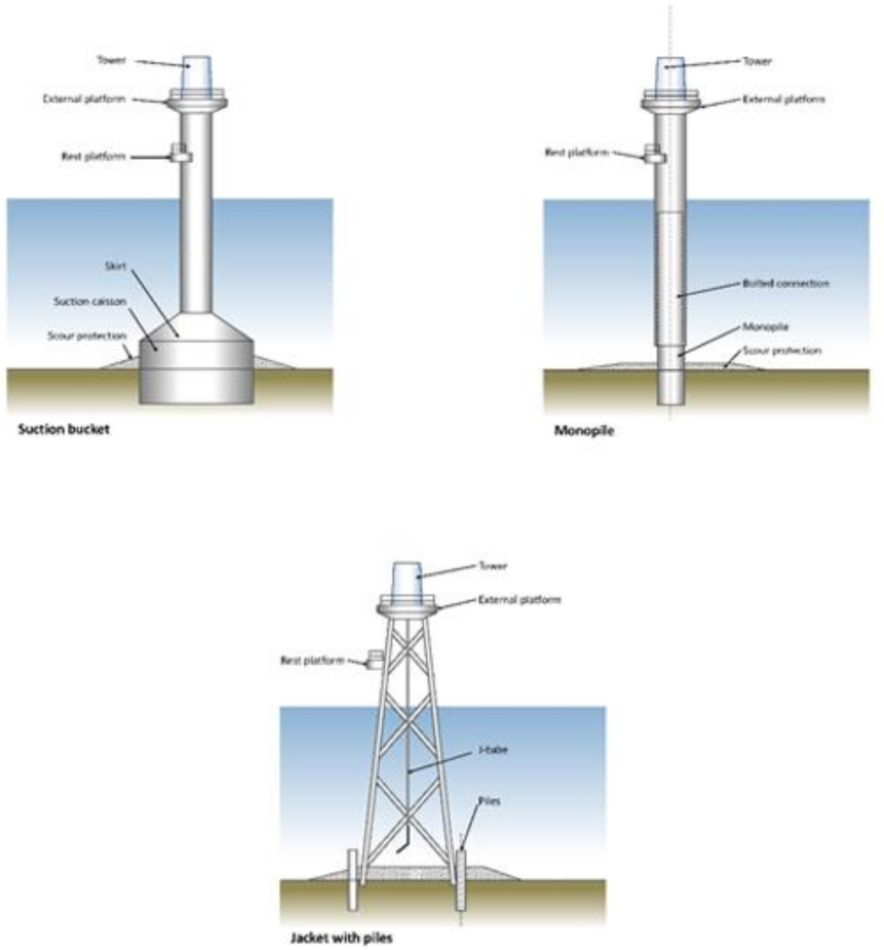


Plate 3-2 Potential Wind Turbine Foundation Types

102. Scour of the seabed may occur around the foundations, and scour protection measures may be required to be provided 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.

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

3.4.1.2 Inter-Array Cables

104. Inter-array cables will connect the wind turbines to the OSP. The length of each inter-array cable will be dependent on the final wind farm layout, however the most realistic maximum length of the inter-array cabling for DBD will be refined for the purposes of the EIA, with the indicative maximum total length being up to approximately 550km. The final location and length of the inter-array cabling will be determined post-consent, subject to the final layout of the wind turbines as set out in **Paragraph 98**.

105. The inter-array cables will be buried in the seabed, typically to a depth of 1m, but burial depth may range from 0.5 to 3m 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 worst case scenarios during the EIA process to allow assessment.

106. 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 resulting in the identification of worst case scenarios during the EIA process to allow assessment.

3.4.2 Offshore Platforms

107. **Table 3-2** identifies the worst case scenario used in the scoping exercise with respect to the number of offshore platforms potentially required for the Project, which is based on the National Grid Option – HVAC configuration (see **Plate 1-2**). The four potential offshore platform considered in this scenario are presented below.

108. Inter-array cables from the wind turbines will be brought to an OSP, located within the Array Area to optimise the inter-array cable and offshore export cable lengths. At the OSP, the generated power will be transformed to a higher voltage for the export cabling. The OSP will typically comprise components including but not limited to transformers, batteries, generators, switchgear, fire systems, and modular facilities for operation and maintenance (O&M) activities.

109. There is a potential requirement for an Offshore Collector Platform, which is likely to be located in the vicinity of the proposed Dogger Bank South (DBS) East Offshore Wind Farm. The Offshore Collector Platform will collect energy from several wind farms in the wider area, whilst assisting with network constraints elsewhere, for further transmission onwards to landfall.

110. Two additional offshore platforms which potentially will be required include:

- The Offshore HVAC Booster Station will house the electrical equipment required to reduce electrical losses on the HVAC transmission system - likely to be located mid-way along the offshore ECC between the Array Area and Offshore Collector Platform; and

- The Offshore Converter Station – likely to be located in the vicinity of DBS East Offshore Wind Farm. This structure would be necessary should a HVDC connection to the Offshore Collector Platform be required. This structure would be similar to that located in the Array Area.

111. The type of foundations being considered for all of these platforms are the same as those being considered for the wind turbines, with the addition of gravity bases (as per **Table 3-3**), which are only being considered for the offshore platforms and not the wind turbines. However, it should be noted that the final design may incorporate different foundations on the offshore platforms compared to the wind turbines.

3.4.3 Offshore Export Cable Corridor

112. It is expected that there could be up to four offshore export cables laid in the offshore ECC for the Hydrogen Option (i.e. from the Array Area to the landfall), with up to six cables for the National Grid Option – HVAC configuration (from the Array Area to the Offshore Collector Platform) (see **Table 3-2**).

113. Each export cable will be installed in a separate trench and protected in line with good industry practice. The export cables will be installed in separate installation campaigns as the installation vessel can only install one cable at a time. The method of installation of offshore cables will depend on the soil conditions along the cable route, however the best methodology for installation, along with appropriate burial depths will be determined by a BAS and a CBRA. The purpose of cable burial is to ensure that the cables are protected from damage by external factors.

114. Cable protection, where required, can take various forms with those under consideration described briefly in **Table 3-4**. The appropriate level of cable protection will be determined based on an assessment of the risks posed to the Project in specific areas.

Table 3-4 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.

Cable Protection Method	Description
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.

115. 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.

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

3.4.4 Landfall Electrical Infrastructure

117. Dependent on the location of the landfall, different cable installation methodologies will be considered. It is assumed that suitable technologies will include trenchless solutions such as HDD. 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.

118. The HDD is 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 HDD will also depend upon factors such as seabed topography, shallow geology / soil conditions, selected cable installation methodology, coastal erosion and environmental constraints.

119. Each offshore and onshore export cable will be jointed in a single onshore TJB. The TJB is an underground structure that houses the joint between the offshore and onshore export cables together with a fibre optic link box.

3.4.5 Onshore Export Cable Corridor

120. The onshore export cables will be installed within the onshore ECC via open cut trenching methods and, where required, using trenchless crossings (e.g. HDD or other trenchless technology). A maximum temporary construction corridor of 100m is assumed for the onshore ECC. This width accounts for the cable trenches, haul road, topsoil storage, drainage, etc.

121. 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.

3.4.6 Hydrogen Production Facility Infrastructure

122. The production output of the HPF is currently unknown, with further design and engineering studies taking place through the pre-DCO application period to confirm the facility's technical capacity. The HPF will be located on a site with an area of up to 46ha (inclusive of the required construction area) and will indicatively comprise the following key parts (see **Plate 3-3**):

- A hydrogen production system including:
    - Water electrolysis stacks (options under consideration include Alkaline Electrolysis (AEL), Proton Exchange Membrane (PEM) and Solid Oxide Electrolyser Cells (SOEC));
    - Gas / liquid separators;
    - Hydrogen drying units;
    - Hydrogen compression, purification and metering system;
    - Cooling system (options under consideration include air cooling fin fans, air cooled condensers, cooling tower, seawater cooling and cooling pond);
    - Hydrogen / oxygen venting as required (option under consideration include oxygen export via pipeline or truck loading and potentially small scale hydrogen export via road).
- Water supply and treatment system including:
    - Water supply / abstraction (options under consideration include wastewater from industry, groundwater and marine waters)
    - Wastewater discharge point(s) (including potential discharge to marine waters);
    - Potential desalinisation plant (if abstraction is from marine waters);

- Hydrogen export infrastructure including:
    - Any connection required to a proposed wider hydrogen distribution network (with any such pipelines included in the Project up to the connection point itself);
    - Connection to any hydrogen storage facility (with any such pipelines included in the Project, up to the connection point itself);
- Power infrastructure potentially comprising of:
    - An Onshore Converter Station / Substation;
    - Auxiliary grid connection(s) for essential site services;
    - Microgrid infrastructure (options under consideration include, but are not limited to; battery storage, supercapacitors, inverter system, on-site photo-voltaic system, a back-up power station or fuel cell);
    - Safety and control systems; and
    - Utility and telecommunication equipment.

123. Design of the HPF will continue through the pre-consent phase, with a worst case scenario derived for each potential environmental impact to enable a robust assessment to be carried out.

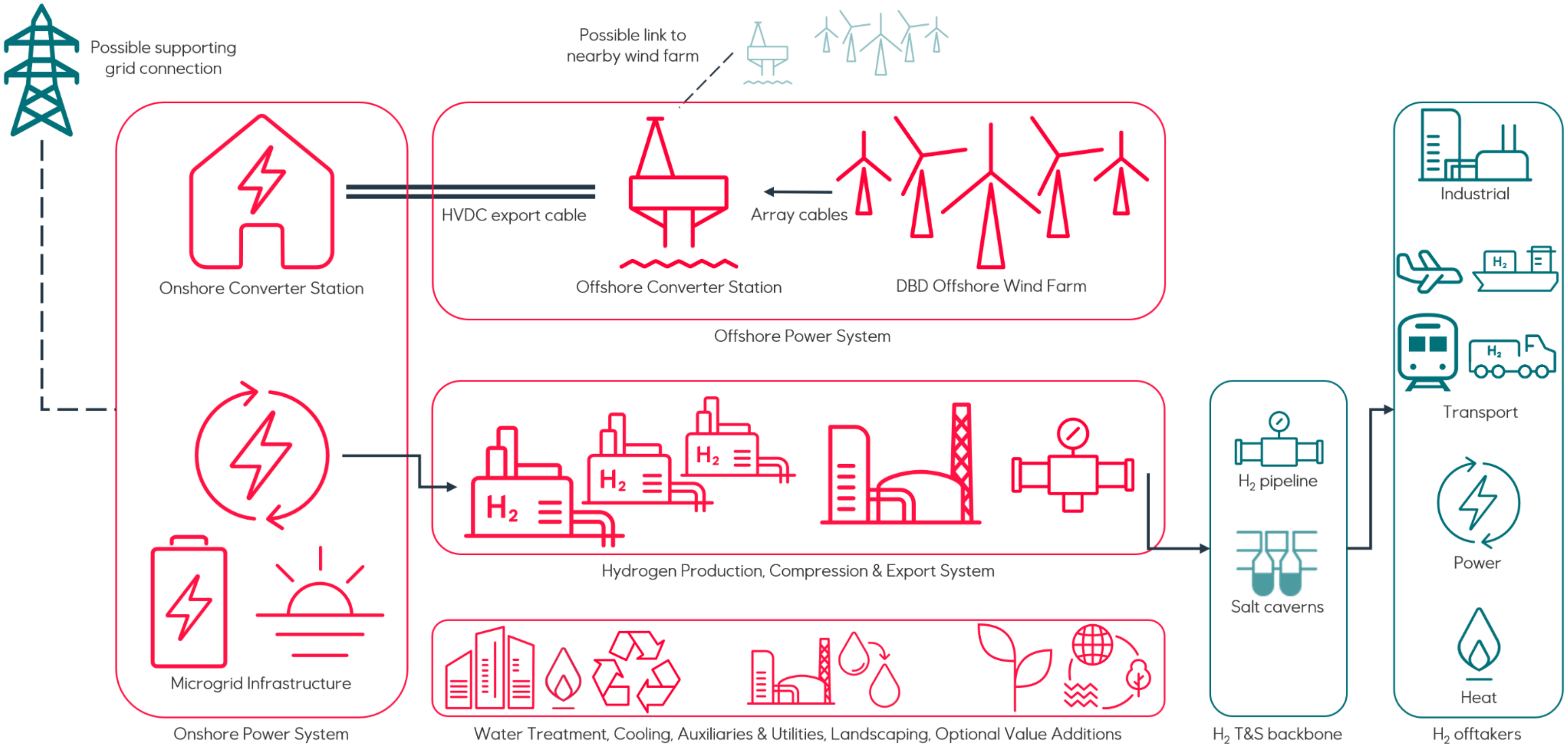


Plate 3-3 Conceptual Diagram Options and Components for the Hydrogen Production Facility[3]

[3] Note: Red outlines core and / or optional components within the scope of this Project, whereas turquoise shows aspects outside of the scope of this Project.

3.5 Construction Programme

124. Construction of the Project is expected to begin no earlier than 2027. Based on a commencement date of 2027, first power is expected to be generated in 2029.

3.6 Operation, Maintenance and Decommissioning

125. Throughout the operational life of DBD, 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.

126. Maintenance will include:

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

127. 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.

128. 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 HPF 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.

129. A Decommissioning Programme and associated schedule will be developed during detailed design prior to construction and updated during the Project's lifespan to take account of changing 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 and Current Status

130. This section sets out an overview of the site selection process adopted for Dogger Bank D (DBD). The aim of the site selection process was to identify potential options for the DBD offshore export cable corridor (ECC), landfall locations, onshore ECC and Hydrogen Production Facility (HPF) through constraints mapping, and to assess environmental and engineering risks associated with the potential options. The site selection process outlined below is currently ongoing and further details will be provided within the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

131. As noted in **Chapter 1 Introduction**, an opportunity was identified by the Applicant to maximise the capacity of the third phase of the Dogger Bank Wind Farm, namely Dogger Bank C (DBC), which established the DBD Array Area. Therefore, this aspect is not covered further within the site selection chapter.

132. The site selection process for the onshore infrastructure of the Hydrogen Option is being undertaken in the vicinity of the following potential location options for the HPF:

- Aldbrough Gas Storage Facility (‘Aldbrough option’);
- Saltend Chemicals Park (‘Saltend option’); and
- Easington Gas Terminal (‘Easington option’).

133. The National Grid Option has been identified through National Grid’s Holistic Network Design process. The most direct route possible has been taken for the offshore ECC to the Offshore Collector Platform adjacent to the Dogger Bank South (DBS) projects, as there are minimal environmental and engineering constraints present. However, the onward site selection from the Offshore Collector Platform to a National Grid connection point within Lincolnshire is the responsibility of National Grid Electricity Transmission (NGET) (see **Paragraph 10**), and this aspect is not included within any site selection work undertaken by the Applicant.

134. The Hydrogen Option has been predicated on the HPF locations, as set out in **Paragraph 151**, within the East Riding of Yorkshire, with options for linking into National Grid Ventures’ proposed Humber Low Carbon Pipeline (the ‘Saltend’ and ‘Easington’ options) and the wider Humber value chain, or to a hydrogen storage facility.

135. Site selection is an iterative process building on constraints mapping and assessment for the identification of the potential options for each element of the proposed infrastructure (i.e. offshore ECC, landfall, onshore ECC and HPF). The main steps of the process are outlined in **Plate 4-1** and detailed within the following sections.

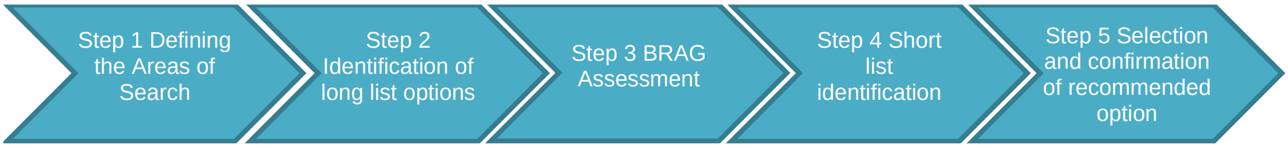


Plate 4-1 Overview of Site Selection Process

136. For Steps 1 and 2, the initial identification of Areas of Search (AoS) and long list options, a series of site selection design principles and engineering assumptions were set out in order to avoid, reduce and minimise adverse impacts resulting from the construction, operation and decommissioning of project infrastructure. The site selection design principles and engineering assumptions have been developed with consideration of industry guidance. Examples of some of the site selection design principles are covered in the sections below and this will be expanded in further detail within the PEIR / ES.

137. Step 3, the 'Black Red Amber Green' (BRAG) Assessment involved identifying the key constraints under a series of environmental topics as outlined below, and then classifying the risk / opportunity posed by each option under each constraint, during construction, operation and decommissioning of the Hydrogen Option. A summary of the option classification system used is provided below:

- **Black** - Potential showstopper in terms of environment, consenting or engineering risk to development;
- **Red** - High environment, consenting or engineering risk to development;
- **Amber** - Medium environment, consenting or engineering risk to development; and
- **Green** - Low environment, consenting or engineering risk to development.

138. A comprehensive and relevant range of environmental and engineering topics were used within the BRAG process reflecting the topics considered in this Scoping Report.

139. Further details of the steps undertaken in the site selection process are outlined in **Sections 4.2** to **163**.

4.2 Step 1: Defining the Areas of Search

140. The first step in the process was to define an AoS for the potential landfalls, offshore and onshore ECCs and the HPF. These AoS are broad geographical areas within which further site selection was undertaken to identify long list routes and locations for the proposed infrastructure.

4.2.1 Landfall Areas of Search

141. The Aldbrough option was assessed initially, on a without preference basis, with the landfall AoS and subsequently the landfall options identified. The landfall AoS was then also utilised as the starting point for the Saltend and Easington options. All three landfall AoS are shown on **Figure 4-1**.

142. The most northerly extent of the Aldbrough landfall AoS was established at Scarborough, as north of this lie two significant constraints: North Riding Forest Park; and North York Moors National Park. If the offshore and onshore ECC routes were located north of here, they would be excessively long when compared to viable alternatives. In addition, it was considered that landfall options south of Scarborough existed that would be less constrained and have fewer risks associated with their development. In order to avoid key constraints, the urban areas at Filey and Scarborough and the Special Area of Conservation (SAC) at Flamborough Head, which includes Annex I Reefs, were not included as part of the AoS.

143. The most southerly extent of the landfall AoS for Aldbrough (and also Saltend and Easington) was the northern bank of the Humber Estuary, as it was considered that the estuary itself would present too many constraints for cabling and subsequently making landfall due to shipping traffic, extensive environmental designations (including the Humber Estuary SAC, Special Protection Area (SPA) and Site of Specific Scientific Interest (SSSI), and The Greater Wash SPA at the mouth of the estuary) and other offshore constraints (for example aggregate extraction and other offshore wind farms). The Project sought to minimise these effects in line with the site selection design principles as part of the site selection assessment methodology.

144. The site selection assessment for Saltend and Easington were undertaken following the assessment for the Aldbrough option. The AoS for these options were refined following the findings of the Aldbrough assessment and the individual characteristics of the Saltend and Easington options.

145. Saltend is located at a similar latitude as Aldbrough but located further inland adjacent to the Humber Estuary. Following the finalisation of the long list of landfall options for Aldbrough, the landfall AoS for Saltend was identified which extended from Barmston in the north, as past this point the landfalls have been scoped out for Aldbrough due to excessively long corridors crossing several constraints. The southern extent of the AoS was the northern bank of Humber Estuary following the same rationale as the Aldbrough option i.e. the presence of significant constraints associated with the estuary which would be a challenge for cabling / landfall.

146. The Easington option is located further south than Aldbrough and Saltend and therefore the most northerly extent of the landfall AoS was identified as Hornsea, as past this point there are a high number of constraints for an onshore ECC which would need to run south to Easington, such as: gas pipelines, local wildlife sites, conservation areas and scheduled monuments. The southern extent of the AoS was the northern bank of the Humber Estuary following the same rationale as the Aldbrough option, i.e. the presence of significant constraints associated with the estuary which would be a challenge for cabling / landfall.

4.2.2 Offshore Export Cable Corridor Area of Search

147. The offshore ECC AoS for Aldbrough is shown on **Figure 4-2**. The northern extent of the offshore ECC AoS was a direct route from the northern extent of the landfall AoS to the western side of the Dogger Bank SAC. The southern extent of the offshore ECC AoS was established following and avoiding the boundary of the Dogger Bank SAC within UK waters and taking a direct route to the southern extent of the landfall AoS.

4.2.3 Onshore Export Cable Corridor Areas of Search

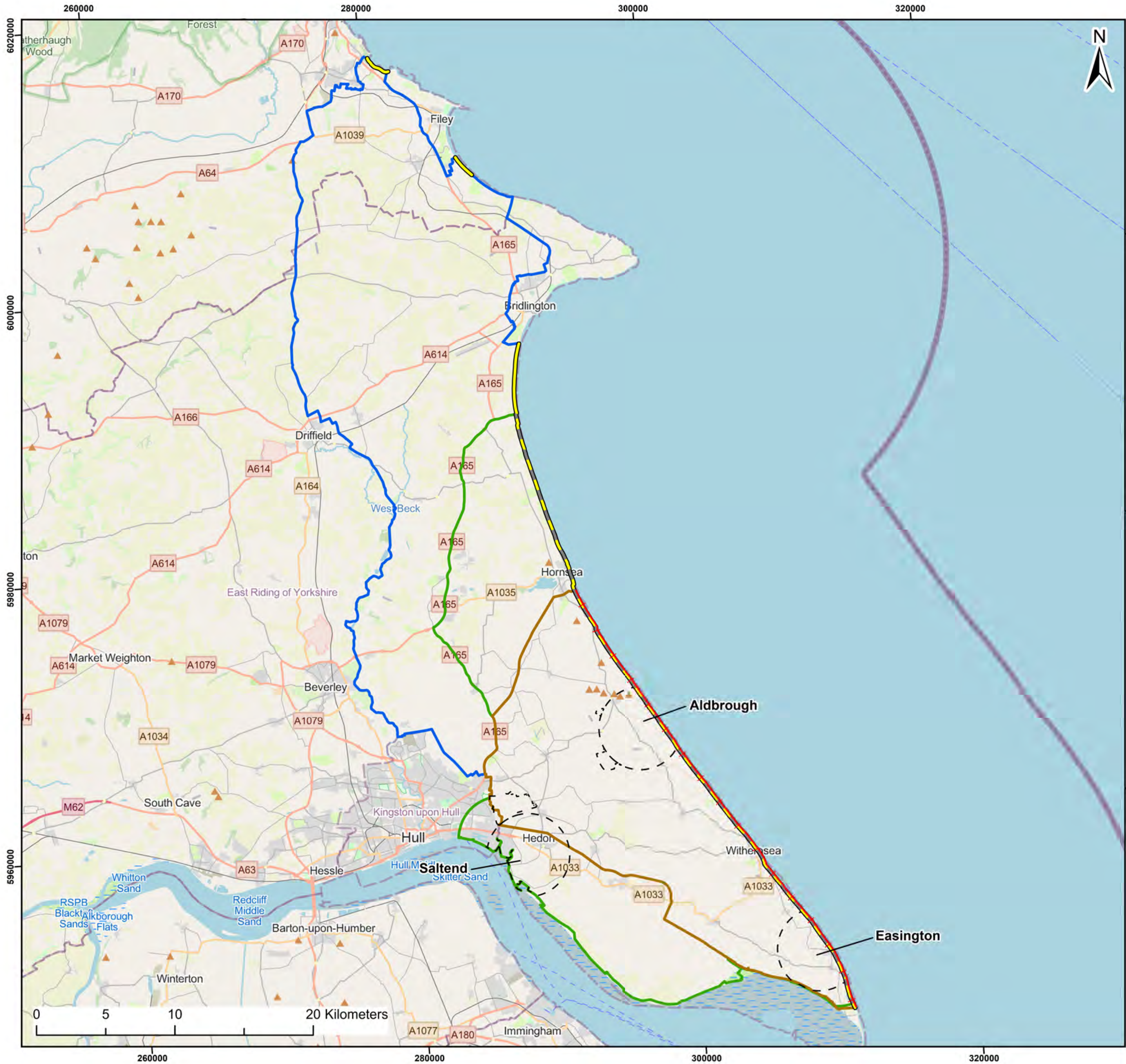
148. The onshore ECC AoS for Aldbrough is shown on **Figure 4-1**. The AoS included the land between the northern and southern extents of the landfall AoS and extended westward to align with identifiable boundaries of constraints such as limits of urban areas (i.e. Hull), cliffs, the Humber Estuary, major roads and main rivers. This was in order to ensure a broad range of onshore ECC options could be identified to connect into the 3km HPF AoS (described in **Section 4.2.4**).

149. The Saltend onshore ECC AoS included the land between the northern and southern extents of the landfall AoS. From the southerly extent of the landfall AoS, the onshore ECC AoS was directed towards the HPF AoS at Saltend by following the line of the Humber Estuary. To reach the northerly extent of the landfall AoS from the Saltend AoS, the onshore ECC AoS was drawn to follow the A165 north.

150. The onshore ECC AoS for Easington included the land between the northern and southern extents of the landfall AoS. From the southerly extent of the landfall AoS, the onshore ECC AoS was directed inland towards Hull avoiding urban areas, and then north to the northern extent of the landfall AoS.

4.2.4 Hydrogen Production Facility Areas of Search

151. The AoS for the HPF was established using a 3km buffer around where the produced hydrogen was intended to be connected into i.e. the hydrogen storage location, or wider distribution pipeline nodes. This was in order to reduce the distance for any subsequent hydrogen pipeline connection from the HPF, and to allow for such related infrastructure to be sited together as far as practicable to minimise environmental and engineering effects. The AoS for the HPF for Aldbrough, Saltend and Easington are shown on **Figure 4-1**.



Legend:

Hydrogen Production Facility Area of Search

Onshore Cable Corridor Areas of Search

- Aldbrough
- Saltend
- Easington

Landfall Areas of Search

- Aldbrough
- Saltend
- Easington

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Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Onshore Areas of Search

Figure:	4-1	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0069		
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Co-ordinate system: British National Grid

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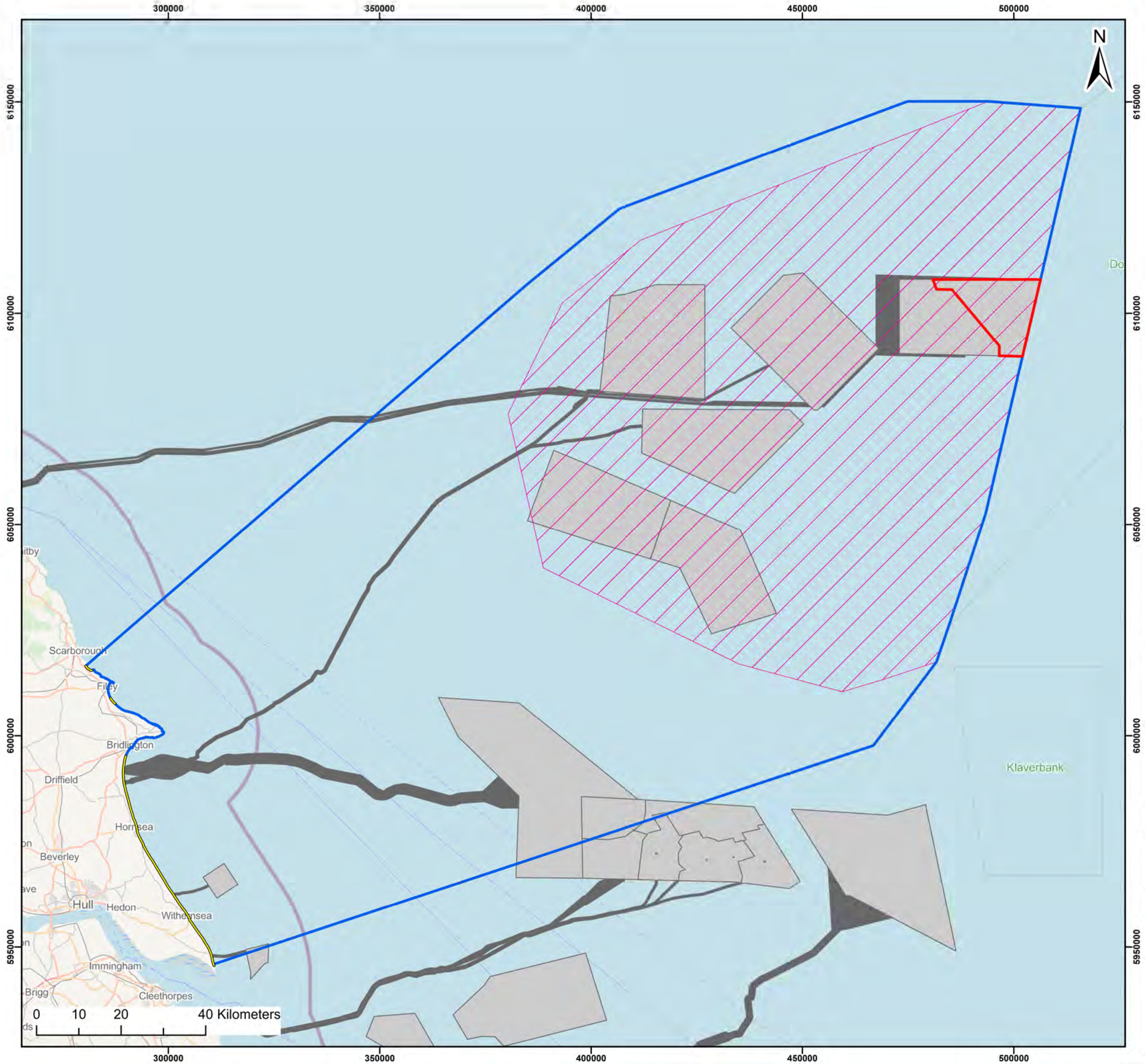

Legend:

- Dogger Bank D Array Area
- Offshore Area of Search
- Aldbrough Landfall Area of Search
- Dogger Bank Special Area of Conservation
- Crown Estate Wind Site Agreement
- Crown Estate Wind Cable Agreement

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Project:	
Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM

Title:

Offshore Area of Search

Figure:	4-2	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0070		
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Co-ordinate system: WGS 1984 UTM Zone 31N

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4.3 Steps 2 and 3: Identification of Long-List Options and BRAG Assessment

4.3.1 Landfall Long List

152. The process for identifying a long list of options began with the landfall, as offshore and onshore ECCs can only connect via viable landfall sites. Environmental constraints were mapped out and broad zones were identified where viable landfall sites could be located in order to minimise as far as possible impacts on environmental receptors. These broad zones were identified initially within the AoS, before being narrowed down to specific landfall location options.

153. The long list of landfall options was identified and developed using high level engineering assumptions and site selection design principles which identified whether the landfall options would be possible, for example: ‘minimise impacts to internationally and nationally designated areas (e.g. SACs, Marine Conservation Zones (MCZ), SPAs and SSSIs, etc.)’; ‘minimise impacts with landscape / seascape and cultural heritage designations’ and ‘avoid areas with substantial infrastructure or urban land use’. Further details of these engineering assumptions and design principles will be outlined within the PEIR and ES.

154. Following the identification and agreement on the long list of landfall options for Aldbrough, Saltend and Easington, a comparative assessment of risks and opportunities of each option was undertaken, consisting of a BRAG Assessment on potential landfall options.

4.3.2 Offshore Export Cable Corridors Long List

155. The identification of potential offshore ECCs adhered to engineering assumptions and site selection design principles, where possible. For example, ‘routeing options need to be able to connect to viable landfall locations’ and ‘minimise impacts to sites designated for nature conservation as far as possible’. Further details of these engineering assumptions and design principles will be outlined within the PEIR and ES.

156. Following the identification of the long list of offshore ECC options, a BRAG Assessment was undertaken on the offshore ECC options for Aldbrough. This exercise was based on main offshore ECC options with several corridor branches to the potential landfall locations.

157. In addition to the BRAG assessment, it was considered that an important factor was minimising effects to the Dogger Bank SAC and the Holderness Inshore and Offshore MCZs. Therefore, minimising the length of the offshore ECC within the Dogger Bank SAC and the MCZs, in addition to minimising pipeline crossings, was considered to minimise as far as practicable seabed take within these designations.

158. Following the process set out above, one main offshore ECC was identified as a preferable option for Aldbrough, Saltend and Easington (with the sub-options to the respective landfalls also included within the nearshore environment).

4.3.3 Onshore Export Cable Corridors Long List

159. The identification of potential onshore ECCs adhered to engineering assumptions and site selection design principles, where possible. Examples of site selection design principles include ‘routeing should be kept as straight and as short as practicable’ and ‘avoid areas with substantial infrastructure or urban land use e.g. areas of housing, recreation (e.g. golf courses, camping sites, allotments, cemeteries and airfields.)’.

160. Following the identification and agreement on the long list of onshore ECC options, a BRAG Assessment was undertaken on the onshore ECC options for Aldbrough, Saltend and Easington.

4.3.4 Hydrogen Production Facility Long List

161. Given the uncertainty surrounding the exact layout and dimensions of a HPF, the decision was taken to identify broad zones within the AoS that could accommodate the construction and operational compound area of an HPF. The identification of the zones adhered to the engineering assumptions and site selection design principles where possible such as ‘avoid residential titles (including whole garden) (using 250m buffer)’ and ‘avoid areas with substantial infrastructure or urban land use e.g. areas of housing, recreation (e.g. golf courses, camping sites, allotments, cemeteries and airfields.)’

162. Following the identification and agreement on the long list of HPF zones, a BRAG Assessment was undertaken on the zone options for Aldbrough, Saltend and Easington.

4.4 Step 4: Identification of Short-List Options

163. The outcome of the BRAG for each project element was reviewed and the findings presented for discussion and review at a short list workshop. The BRAG results for each option and each project element were discussed and reviewed against the design principles, engineering assumptions and project objectives to ensure that the most viable options were taken forward. The outcome of the workshop was a short list of options that will be taken forward for further investigation and development, including stakeholder consultation.

164. The short list options for each project element have helped to define the scoping study areas.

4.5 Step 5: Next Steps and Final Options

165. Work will continue post-scoping to refine the DBD Project in terms of its spatial extent and required infrastructure using a stepwise approach to evolve the options to the finally selected Project (Step 5 of the process), with worst case scenarios identified for all environmental impacts scoped into the EIA. Decisions on the final option(s) to be taken forward to the Development Consent Order (DCO) application will be made based on additional data that will be collected such as, the Scoping Opinion received, stakeholder discussions, and commercial considerations relating to both the Hydrogen Option and the National Grid Option. Further details of the site selection process will be provided within the PEIR and ES.

5 EIA Methodology

5.1 Methodology Overview

166. The Environmental Impact Assessment (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 Environmental Statement (ES) and other related Development Consent Order (DCO) application documents will be informed by the following documents:

- National Policy Statements (as noted in **Chapter 2 Policy and Legislative Context**);
- The Planning Inspectorate Advice Notes (as noted in **Chapter 2 Policy and Legislative Context**);
- National, regional, and local policy and legislation (as noted in **Chapter 2 Policy and Legislative Context**, plus any additional policy and legislation as relevant);
- Topic- and receptor-specific guidance documents; and
- Other relevant guidance issued by governmental and non-governmental organisations.

167. The outputs of the EIA will be a Preliminary Environmental Information Report (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 where data is sufficient in order to maximise 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.

168. As described in **Section 1.4**, DBD will be subject to an EIA process which may include both the Hydrogen Option and the National Grid Option and resulting in a single DCO application. The EIA methodology will be applied consistently to all parts of the proposed development to ensure comparability between effects associated with the two development options where appropriate.

169. As the Project evolves and design refinements occur, including through consultation within the Evidence Plan Process (EPP) (covered in **Chapter 6 Consultation**), the EIA process will take this into consideration and 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

170. The characterisation of the existing environment will be undertaken to determine the baseline conditions in the area subject to potential change by DBD 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.

171. Existing data from research, government and industry will be used, alongside data collected by the Applicant specifically for the Project. Data collected as part of the consenting and post-consent monitoring process for other similar projects which overlap with DBD or are within the local area (e.g. Dogger Bank C and Dogger Bank A / Dogger Bank B respectively) will also be examined to increase efficiency and support proportionate assessment (see **Paragraph 32**). The existing data sources and proposed data collection are outlined in the respective subsections of each technical topic chapter within this Scoping Report.

172. Consideration will also be given to the evolution of the baseline in the absence of DBD (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.

173. 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), 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

174. 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.

175. 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.

176. 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 DBD.

177. The assessment will use the conceptual 'source-receptor-pathway' 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).

178. In general, the impact assessment for each topic will use the 'source-receptor-pathway' 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

179. 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.

180. 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.

181. 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 past 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.

182. 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

183. 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).

184. 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.

185. 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.

5.4 Evaluation of Significance

186. 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 5-1** 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 5-1**, 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.

187. 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.

188. 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.

189. 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 cumulative effects assessment (CEA) and in-combination assessments where appropriate.

Table 5-1 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

190. 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 Institute of Environmental Management and Assessment's (IEMA) guidance (IEMA, 2016):

- Primary (Design) - Modifications to the location or design of DBD 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.

191. 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 and within a project Commitment Register.

192. 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).

193. In addition, where possible enhancement measures to deliver Environmental and / or Biodiversity Net Gain (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 Nationally Significant Infrastructure Projects (NSIP).

194. 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 Residual Effect and Confidence

195. 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.

196. 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.

5.6 Cumulative Effects

197. CEA forms part of the EIA process and is a requirement under the EIA Regulations. The Planning Inspectorate Advice Notes 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.

198. 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.

199. 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. 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. These include:

- Tier 1 (most certain):
    - Projects that are under construction;
    - Consented applications not yet implemented; and
    - Submitted applications not yet determined.
- Tier 2:
    - Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted.
- Tier 3 (least certain):
    - Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted;
    - Developments identified in the relevant Development Plan (and emerging Development Plans, with weight being given as they move closer to adoption), recognising that information on any relevant proposals will likely be limited; and

- Sites identified in other plans, programmes, and / or policy documents as development are reasonably likely to come forward.

200. 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 as-built project parameter information (if available) as opposed to consented parameters to reduce inaccuracies and avoid an overly precautionary CEA approach. This approach is consistent with the Planning Inspectorate Advice Note Seventeen on CEA (Planning Inspectorate, 2019) which states that: '*assessment should be undertaken to an appropriate level of detail, commensurate with the information available at the time of the assessment*'.

201. 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).

202. 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.

203. 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
- Unexploded Ordnance (UXO) clearance.

204. 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.

5.7 In-Combination Effects

205. 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.

206. 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).

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

5.8 Transboundary Effects

208. 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.

209. 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 (The Planning Inspectorate, 2020).

210. 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

211. The Applicant will undertake a programme of stakeholder engagement throughout the Development Consent Order (DCO) process (and beyond) in addition to a formal period of consultation with local communities, land and property interest holders, and statutory bodies.

212. The formal period of consultation, referred to as a 'Statutory Consultation', will comply with regulations set out in the Planning Act 2008 and ensure those defined as prescribed bodies and stakeholders (Section 42 of the Planning Act 2008), local communities (Section 47) and the wider public (Section 48) are adequately identified and made aware of the consultation. The Statutory Consultation will seek feedback on preliminary environmental impact information and consider the views, concerns, constraints and ideas received through consultation responses in order to develop proposals and mitigate the Projects local impacts as reasonably feasible.

213. This chapter briefly demonstrates engagement that has been undertaken to date with stakeholders to inform this Scoping Report and to take forward the proposals for further design development and environmental assessment. It then outlines the methodology and process for consultation and engagement that will take place to refine, modify and improve the proposals that are submitted in the DCO application.

214. This Scoping Report accompanies a formal request for an Environmental Impact Assessment (EIA) Scoping Opinion from the Planning Inspectorate. The Planning Inspectorate will consult statutory consultees such as Natural England, the Environment Agency and local authorities, before issuing their Scoping Opinion. The Project will carefully consider the Scoping Opinion and consultee responses during the EIA process.

6.2 Consultation

215. Ongoing engagement with local communities will be structured around formal periods of consultation, where proposals and questions are put forward and feedback and responses sought within a set timeframe. A Statement of Community Consultation (SoCC) will be prepared setting out how the local community will be consulted. It is at this stage individuals and groups who were not formally invited to comment on this Scoping Report will have the ability to provide comments on environmental information relating to the Project.

216. A Preliminary Environmental Information Report (PEIR) will be presented and consulted on as part of a Statutory Consultation, currently planned for 2024. 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.

217. The final siting and design details will consider all feedback 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 Early Engagement

218. The Applicant is in the introductory stages of engagement with statutory stakeholders, technical environmental groups and communities in the vicinity of the proposals. The primary objectives of engagement to date have been to build awareness of the Project, develop relationships with those from whom input will be sought as the designs develop, and begin to understand the local context surrounding the Project area. Engagement will continue throughout the EIA process to ensure that those interested in the Project are kept informed of progress, participation in consultation and engagement activities are maximised and those with an interest in the proposals have adequate time and opportunity to inform the design development.

219. We have begun communicating with stakeholders and communities and we will develop those dialogues to shape the proposals presented during Statutory Consultation. At this stage, the Project has begun engaging with local planning officers, statutory and technical environmental bodies, statutory undertakers (utilities), and people with property interests within the Scoping Area. The Project has also begun engaging with parish councils and Members of Parliament (MP) in directly affected and neighbouring areas.

220. The Applicant has held introductory meetings with the Planning Inspectorate and a number of Consultation Bodies to introduce the Project and the associated design and site selection work undertaken to date, Natural England, Marine Management Organisation (MMO), East Riding of Yorkshire Council, Hull City Council, Historic England, the Royal Society for the Protection of Birds (RSPB), Yorkshire Wildlife Trust, Trinity House, Maritime and Coastguard Agency (MCA), North Eastern Inshore Fisheries and Conservation Authority (NEIFCA), National Federation of Fishermen's Organisation, Holderness Fishing Industry Group and the Environment Agency. These meetings allowed the Applicant to receive early informal ideas and constraints to consider and established the intention and process for working closely with them to improve and refine our proposals, as described in the following section.

6.4 Technical Consultation

221. Consultation with technical consultees is crucial to the development of impact assessments. Detailed methodologies for gathering baseline data and undertaking the impact assessments have been or will be agreed with the relevant stakeholders.

222. An Evidence Plan Process (EPP) will be established and followed during the EIA 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 process and ensures compliance with the requirements of the EIA Regulations and Habitats Regulations.

223. 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 be discussed with relevant stakeholders and documented through the EPP and set out in agreement logs which will form the basis for the Statement(s) of Common Ground (SoCG).

224. The EPP will include a Steering Group and a number of Expert Topic Groups (ETG). ETG meetings will provide the opportunity to bring technical stakeholders to the table to discuss 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 will be to agree key aspects (such as baseline data, impact assessment methods and mitigation) prior to the DCO application.

225. The topics and member bodies to be included within the EPP will be set out and presented to relevant stakeholders in Q2 2023. Consultation with technical stakeholders may also occur outside of the EPP framework and will occur on a topic-specific and ongoing basis.

226. In addition to the ETGs, specific meetings will be held with a range of stakeholders (e.g. commercial fishing, aviation and radar and shipping and navigation stakeholders) as required.

7 Offshore Topics

7.1 Introduction

227. This part 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 Environmental Impact Assessment (EIA).

228. 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.

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

7.2 Marine Physical Processes

230. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

231. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

232. 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;** and
- **Chapter 7.11 Offshore Archaeology and Cultural Heritage.**

7.2.1 Study Area

233. 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 Preliminary Environmental Information Report (PEIR) / Environmental Statement (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

234. 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 (**Figure 7-1**) (EMODnet, 2020). Water depths along the offshore ECC are between 10 and 25m below LAT on the top of Dogger Bank and become deeper towards the west reaching a maximum depth of 60m 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

235. An understanding of tidal currents in the study area provides insight into the patterns and rates of naturally occurring sediment transport. The tidal regime in the southern North Sea is strongly influenced by predominantly semi-diurnal tides that enter from the Atlantic Ocean. Business, Enterprise and Regulatory Reform (BERR) (2008a) modelled peak flows for mean spring tides within the Offshore Scoping Area of 0.2m/s in the Array Area (**Figure 7-2**), with peak flows gradually increasing across 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

236. Given its open sea location, the Offshore Scoping Area is exposed to relatively high levels of wave energy. The most frequent waves across the Array Area are from the north (Forewind, 2014). BERR (2008a) described annual mean significant wave heights of 1.75 to 2.00m (**Figure 7-3**) which corresponds broadly to the mean significant waves height of 1.70m recorded from a wave buoy deployed between 2010 and 2011 in the northern sector of Dogger Bank (Forewind, 2014). Wave heights decrease gradually across the study area, to less than 1.0m closer to the coast.

7.2.2.4 Oceanic Fronts

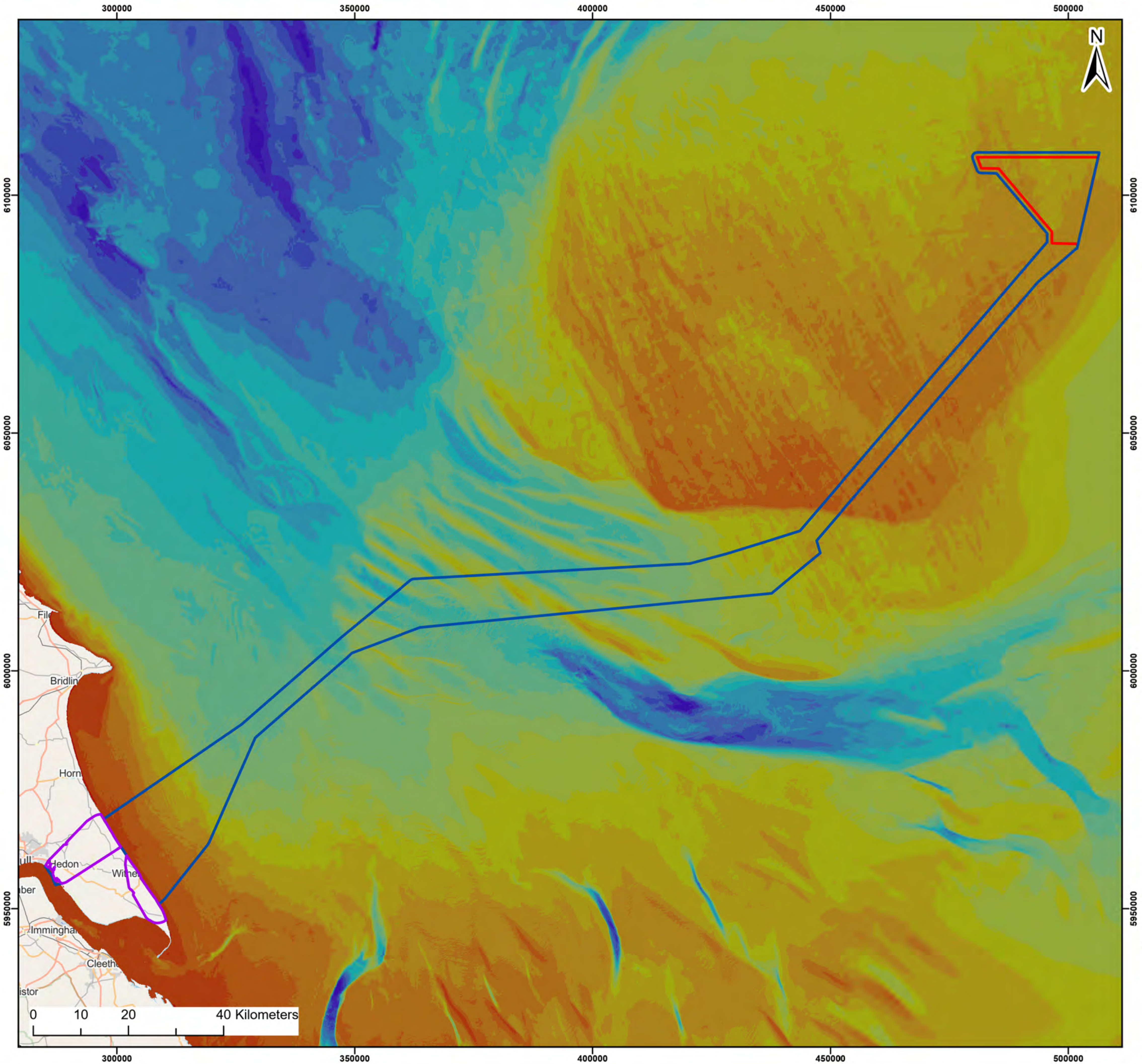
237. The Flamborough front is a tidal mixing front that is persistently present in the southern North Sea off the east coast of England between spring and early Autumn (Miller and Christodoulou, 2014). Tidal mixing fronts form in the water column at the boundary between stratified water and vertically mixed water and 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

238. Mapping of seabed sediments by the British Geological Survey (BGS) shows the seabed within the Array Area comprises sand and slightly gravelly sand with patches of slightly gravelly, muddy sand locally (**Figure 7-4**). The offshore ECC is dominated by gravelly sand offshore that becomes initially sand-dominated and then coarser-grained gravel and sandy gravel towards the coast.

7.2.2.6 Suspended Sediment Concentrations

239. Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015. Values within the Array Area are less than 2mg/l, with values along the offshore ECC increasing to up to 30mg/l in shallower water near the coast (**Figure 7-5**).



Legend:

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

Bathymetry (LAT)

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

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

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:800,000
00	02/02/2023	JR	CM	A3	1:800,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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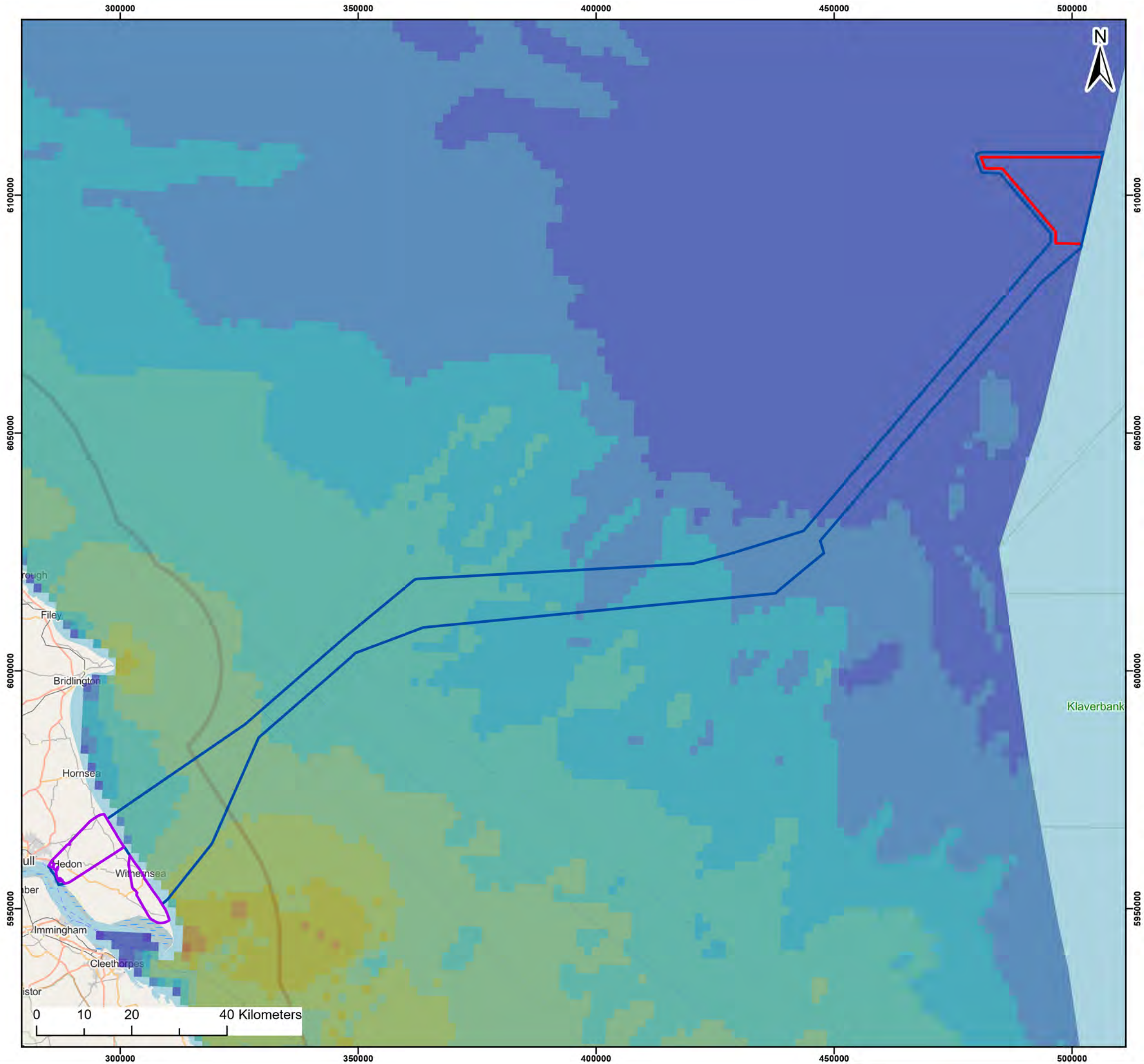

Legend:

- 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

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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

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/04/2023	JR	CM	A3	1:800,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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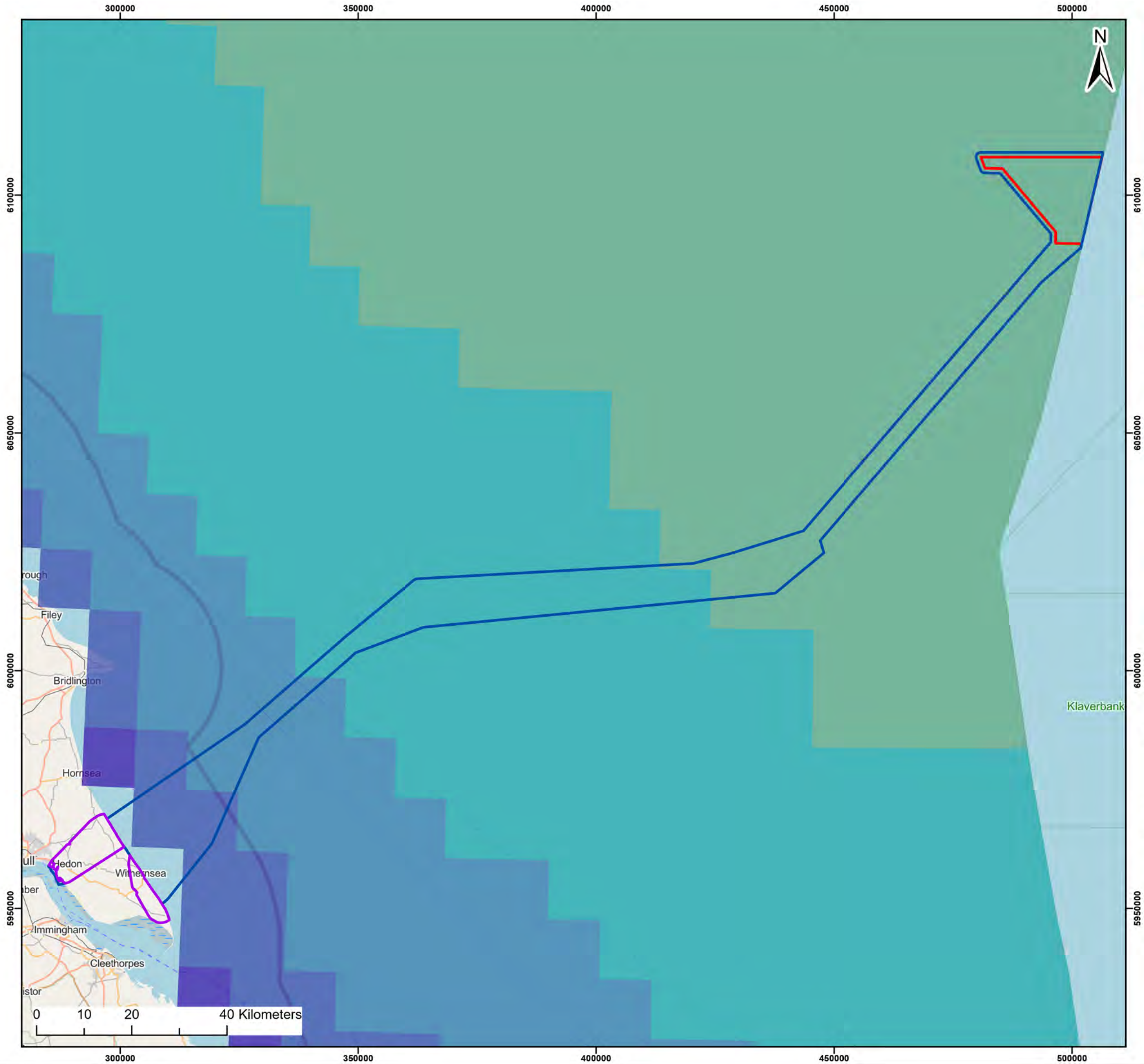

Legend:

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

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: 7-3 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0011

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/04/2023	JR	CM	A3	1:800,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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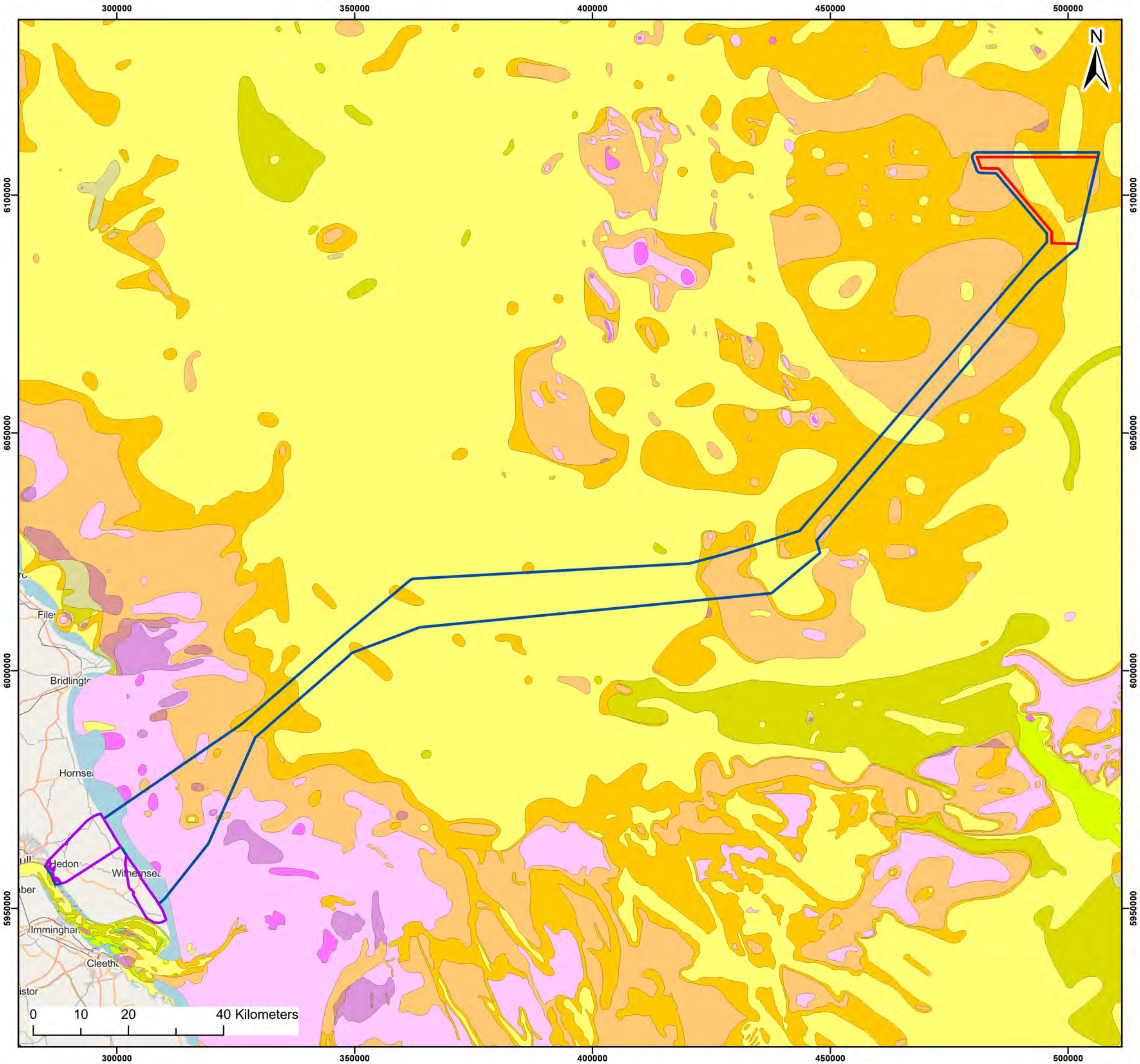

Legend:

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

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

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Seabed Sediments

Figure: 7-4 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0012

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/04/2023	JR	CM	A3	1:800,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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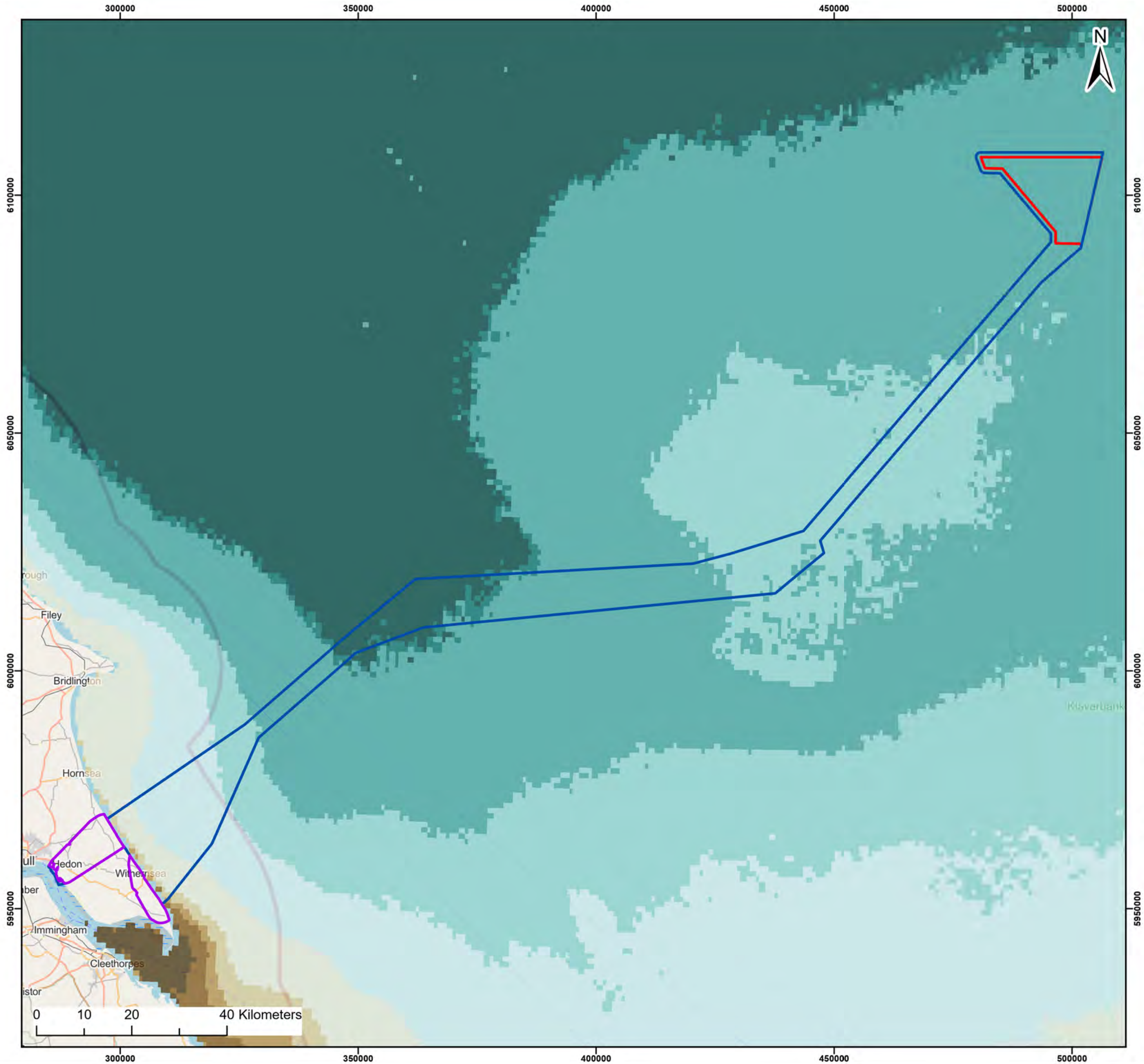

Legend:

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

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

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

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Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Average Suspended Particulate Matter (SPM) 1998 - 2015

Figure:	7-5	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0013		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/04/2023	JR	CM	A3	1:800,000
00	02/02/2023	JR	CM	A3	1:800,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.2.2.7 Coastal Processes

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

7.2.2.8 Coastal Erosion

242. 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 1 to 2m/year. If these rates are linearly extrapolated into the future, it would mean that the Holderness cliffs would retreat landward by approximately 60 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

243. Potential impacts during the construction phase of the Project will arise from disturbance of the seabed during foundations, cable and outfalls / intakes installation activities (including seabed preparation).

7.2.3.1.1 Impacts on Wave and Tidal Currents

244. The physical presence of structures in the water column has the potential to influence wave and tidal currents. During the construction phase, structures will be installed incrementally. Therefore, the impact on wave and tidal regime 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 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 7.2.3.2.1**). Therefore, impacts on wave and tidal currents during the construction phase are scoped out of the EIA.

7.2.3.1.2 Impacts on Bedload Sediment Transport and Seabed Morphological Change

245. During construction, there is potential for changes in bedload sediment transport and seabed morphology due to seabed preparation for foundation (and associated scour protection) and cable installation. Redeposition of suspended sediment resulting from seabed disturbance preparation for foundation and cable installation may change the seabed level, including sand wave clearance which would change the morphology of the seabed. If seabed levelling and sand wave clearance are required to prepare the seabed for foundation and cable installation, there is potential for changes in seabed morphology. These impacts are therefore scoped into the EIA for further consideration.

246. 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 Development Consent Order (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 Physical Processes.

7.2.3.1.3 Impacts on Suspended Sediment Concentrations

247. Potential impacts during construction include temporary disturbance of the seabed due to the installation activities for outfalls / intakes associated with the HPF, cables and foundations (including seabed preparation, ploughing / trenching, cable burial and Horizontal Directional Drilling (HDD)) which release sediment into the water column resulting in increased suspended sediments and changes to seabed levels. Nearshore cable and outfall / intake 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.

7.2.3.1.4 Impacts on Coastal and Nearshore Sediment Transport Due to Marine Outfalls and Intakes for the HPF

248. Potential impacts on coastal and nearshore sediment transport due to the physical presence of marine outfalls and intakes are scoped out of the EIA during the construction phase given the limited nature of their spatial and temporal extent. Any impacts during construction will be related to the physical disturbance of the seabed which is scoped into the EIA and considered above in **Section 7.2.3.1.3**, whilst the impacts of the outfall and intake structures for the HPF on sediment transport are assessed for the operation phase of the Project.

7.2.3.1.5 Indentations on the Seabed Due to Installation Vessels

249. 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, it is expected that these indentations would be temporary, and the seabed would recover to its natural state relatively quickly. Nevertheless, these impacts are scoped into the EIA for further consideration.

7.2.3.2 Potential Impacts during Operation

250. Potential impacts during the operation 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

251. 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 changes could potentially affect the sediment transport regime and / or seabed morphology. In addition, there is potential for the temporary presence of engineering equipment (e.g. jack-up barges or anchored vessels and cofferdams in the coastal zone) to have local effects on the hydrodynamic and sediment regimes during maintenance activities. 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

252. Previous studies have concluded that minimal impacts can be expected on the prevailing bedload sediment transport conditions, both within wind farm sites 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.

253. Where the offshore export cables are buried there would be no impact on bedload sediments and 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

254. 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 operation phase and are therefore scoped into the EIA for further consideration.

7.2.3.2.4 Impacts on Coastal and Nearshore Sediment Transport Due to Marine Outfalls and Intakes for the HPF

255. There is potential for sediment transport in the coastal and nearshore zone to be interrupted due to the presence of outfall and intake structures for the HPF. If surface-laid on the seabed, the structures will protrude potentially creating a blockage effect. Discharge from the outfall may also affect tidal currents locally. These impacts are therefore scoped into the EIA for further consideration.

7.2.3.2.5 Indentations on the Seabed Due to Installation Vessels

256. During operation, repair and maintenance of foundation and cable infrastructure may be required using 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, it is expected that these indentations would be temporary, and the seabed would recover to its natural state relatively quickly. Whist the number of vessels required during operation will be significantly less than during construction, these impacts are scoped into the EIA for further consideration.

7.2.3.3 Potential Impacts during Decommissioning

257. 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.

258. 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

259. 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 Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

260. 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. Recognising that the DBD Array Area is directly adjacent to the Dogger Bank C (DBC) array area and that the offshore ECC is adjacent to the Dogger Bank South (DBS) East array area, 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

261. Cumulative changes to wave and tidal regime during operation of Dogger Bank D Offshore Wind Farm were modelled for the worst case foundation layouts across Dogger Bank A, B and C Offshore Wind Farms (DBA, DBB and DBC respectively) and Sofia Offshore Wind Farm. The effects on tidal currents do cross into Dutch waters, while the effects on waves cross into all adjacent international waters. However, the results show that predicted changes to waves would be of small magnitude in international waters, with limited secondary effects on sediment transport or seabed morphology.

262. 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 wind farm foundations and therefore no effects from scour processes are predicted to cross international boundaries.

263. A conservative worst case scenario foundation layout which covered the entire developable area of DBA, DBB, DBC and Sofia Offshore Wind Farms at a spacing of 700m was modelled. Any effects from the Project will be proportionately lower, therefore transboundary impacts are scoped out of the EIA.

7.2.6 Summary of Scoping Proposals

264. **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 and seabed morphological change	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Impacts on suspended sediment concentrations	✓	✓	✓
Indentations on the seabed due to installation vessels	✓	✓	✓
Impacts on coastal and nearshore sediment transport due to marine outfalls and intakes for the HPF	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts	X	X	X

7.2.7 Approach to Data Gathering

265. 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;
- geology;
- water levels;
- tidal currents;
- waves;
- climate change;
- seabed sediment distribution;
- bedload sediment transport;
- suspended sediment concentration and transport;
- morphological change; and
- anticipated trends in baseline conditions.

266. 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

267. 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 proposed baseline surveys to be carried out.

Table 7-3 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 and partial offshore ECC
	To be completed in Q2 / Q3 2023	Offshore ECC
Grab sampling and particle size analysis	Q2 / Q3 2023	Array Area and offshore ECC

268. 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;
- Class A tide gauges;
- United Kingdom Climate Projections 2018 (UKCP18);
- BGS 1:250,000 seabed sediment, quaternary geology and bedrock geology mapping;
- Admiralty Charts and UKHO bathymetry data;
- National Coastal Erosion Risk Mapping;
- East Riding of Yorkshire Council coastal monitoring data;
- Projects including Futurecoast, Shoreline Management Plans, the Humber Regional Environmental Characterisation and Marine Aggregate Regional Environmental Assessments; 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

269. The assessment of effects on marine physical processes will be based on a Source-Pathway-Receptor (S-P-R) 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 provided 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).

270. 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 Project is located within the previously modelled DBC array in the referenced reports, and the present-day oceanographic and physical characteristics will be the same as when the modelling was undertaken. Therefore, the results of the historical modelling will be used as part of the conceptual evidence-based assessment of potential construction and operational effects of the Project. The physical basis for using the previous modelling results is that the marine physical processes across the Dogger Bank Zone are comparable to those in the Offshore Scoping Area (specifically within the Array Area) and therefore provide suitable evidence (and are suitable analogues) to support the assessment of effects from the Project. There is an extensive and robust evidence base from the previous Dogger Bank Zone wind farms to negate the need for numerical modelling to support the assessment of the Project.

271. 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.

272. 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.

273. 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).

274. Marine physical processes 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.

7.2.9 Scoping Questions to Consultees

275. 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

276. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

277. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

278. 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 Environmental Impact Assessment (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

279. 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, as well as the potential tidal excursion from discharges from the HPF, if incorporated into the final project design. This would also encompass the potential operational and decommissioning impacts that may arise, as these would be lesser in magnitude that construction impacts. The study area would be identified at the Preliminary Environmental Information Report (PEIR) or Environmental Statement (ES) stage once further assessment on the potential extent of any sediment plume is carried out.

7.3.2 Existing Environment

7.3.2.1 Sediment: Physical Properties

280. 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 (Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2001). 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.

281. Seabed habitats within the vicinity of the Array Area are comprised of coarser grained sediments, namely sand and mixed coarse substrates, with the rest of the Offshore Scoping Area and along the Holderness coast is characterised by coarser, gravel dominant sediments (**Figure 7-4**). Within the Humber Estuary, sediment composition is influenced by riverine inputs and as such have a higher mud content (**Figure 7-4**).

282. Site-specific survey work carried out to inform the environmental assessment of Dogger Bank C (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) support the British Geological Survey (BGS) sediment data shown in **Figure 7-4**.

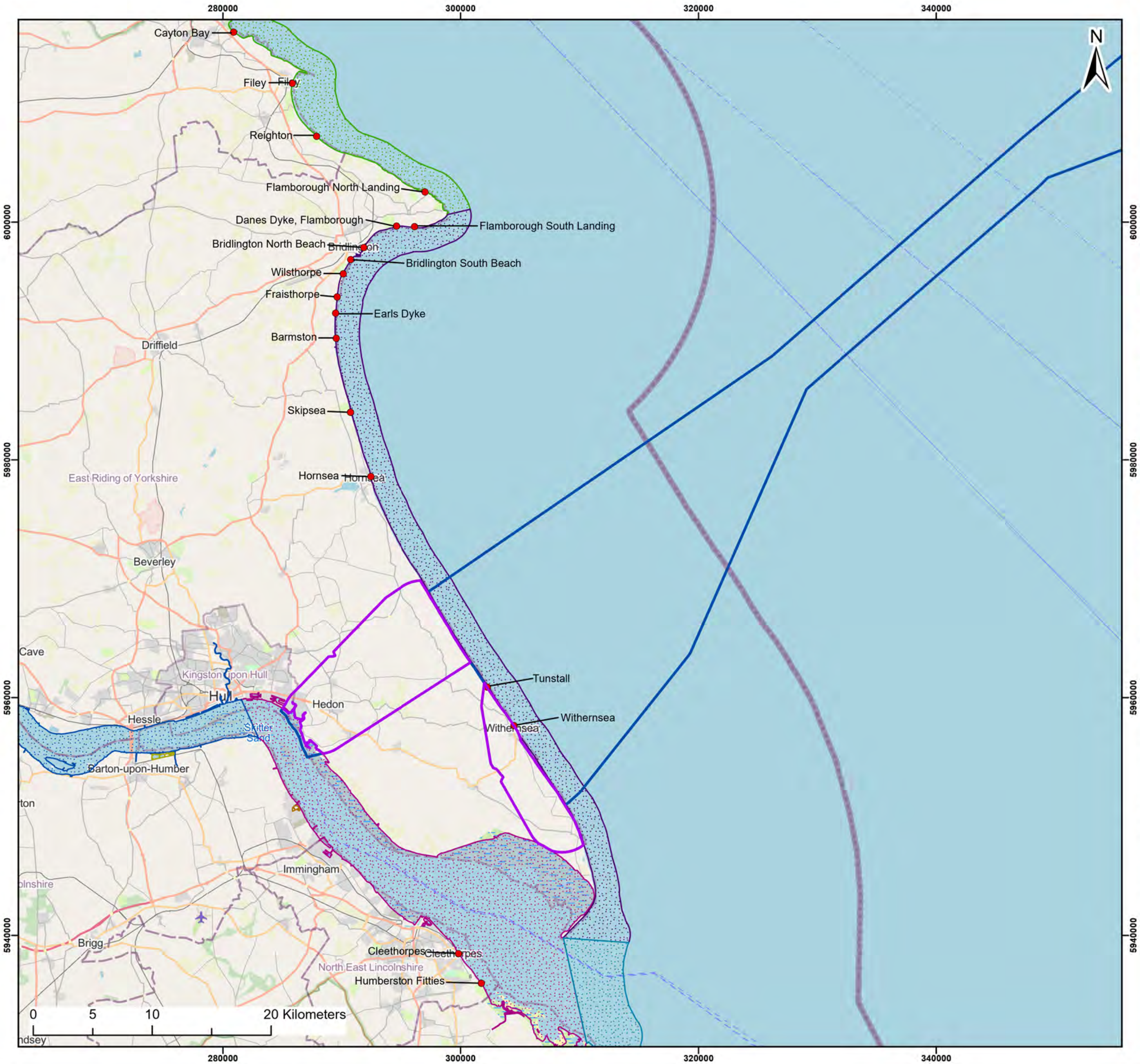
7.3.2.2 Sediment: Chemical Properties

283. Sediment chemical composition within the Offshore Scoping Area can be informed by site-specific studies undertaken for other offshore wind farm projects (particularly DBC and Sofia Offshore Wind Farms) given the proximity and overlap in location of sample sites and similarities in sediment grain size, evidenced in **Figure 7-7**.

284. Sediment contaminant concentration data is compared to the Cefas Action Levels, 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 Water Framework Directive (WFD) Compliance Assessment process (Environment Agency, 2017).

285. Surveys undertaken in 2011 and 2012 for the DBC and Sofia Offshore Wind Farms identified low levels of contamination within the sediments (i.e. sediment concentrations did not exceed the upper sediment quality guideline values used). Analysis of results from the DBC and Sofia Offshore Wind Farms surveys are presented in **Table 7-4** and **Table 7-5** respectively**. Table 7-5** presents analysis results applicable to the inshore portion of the Offshore Scoping Area along the Holderness Coast, compared to Cefas Action Levels. Yellow indicates an exceedance of Action Level 1 and red indicates an exceedance of Action Level 2. Contaminant levels are higher in this inshore area, due to the presence of shore-based chemical inputs and the presence of industry and ports.

286. Whilst this data was collected some years ago, there are no known additional chemical inputs along the Holderness coast or to this offshore area in the intervening years therefore the sediment data can be considered a good indicator of likely contaminant levels in the study area. 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.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Bathing Waters Monitoring Locations

WFD Transitional & Coastal Water Bodies

- Barrow Clay Pits
- Humber Lower
- Humber Middle
- Lincolnshire
- North Killingholme Haven Pits
- 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:	7-6	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0015		
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01	06/04/2023	JR	CM	A3	1:320,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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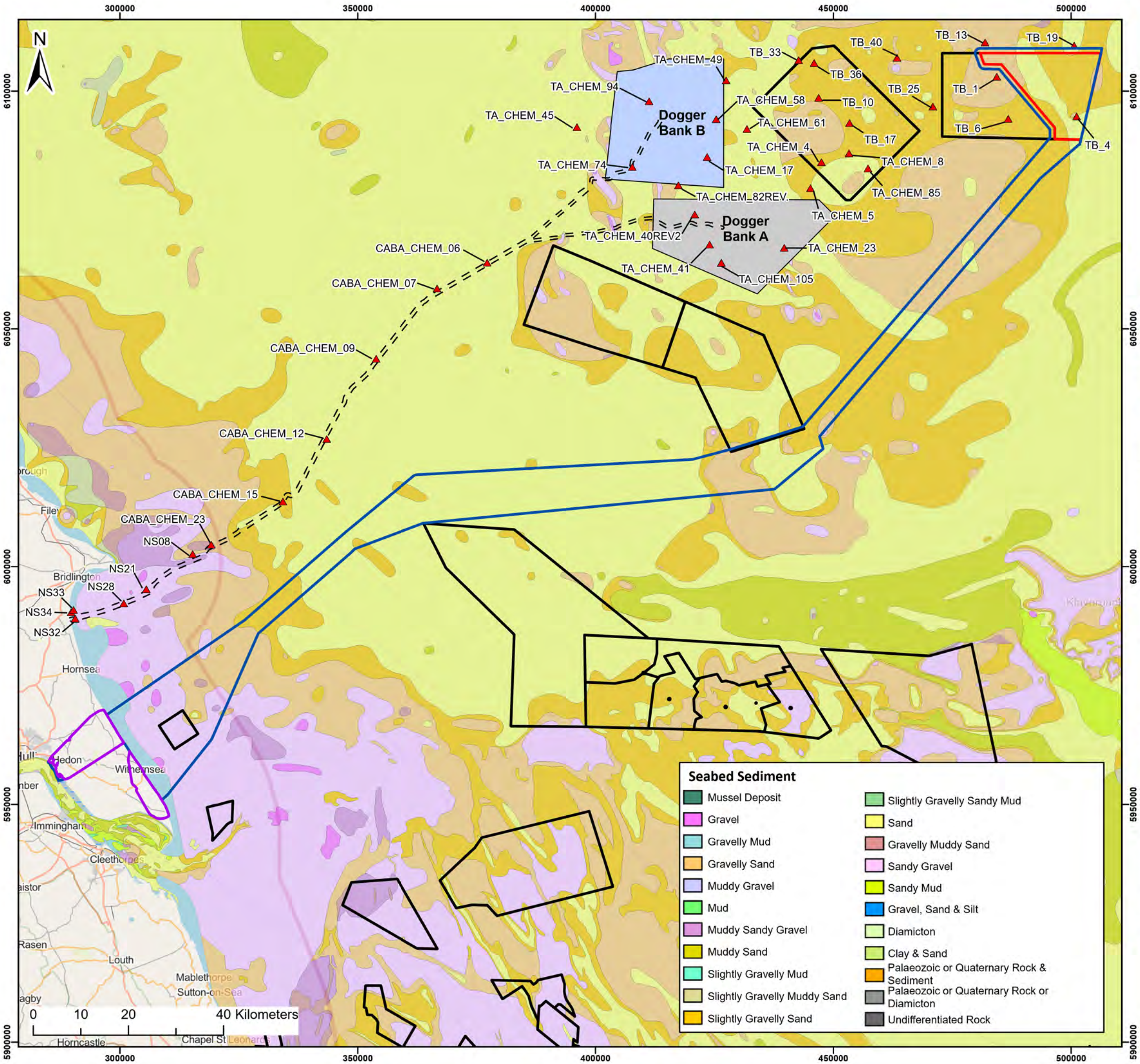
Table 7-4 Sediment Contaminant Sample Analysis Results Compared to the Cefas Action Levels for the DBC and Sofia Offshore Wind Farms – Array Area (Forewind, 2014)

Contaminant (mg/kg)	Site Reference (Offshore)														Cefas Action Levels	
	TB_1	TB_4	TB_6	TB_10	TB_13	TB_17	TB_19	TB_25	TB_33	TB_36	TB_40	TA_85	TA_8	TA_4	Action Level 1	Action Level 2
Arsenic	2.65	2.5	2.59	2.7	2.28	5.31	2.3	2.79	3.04	2.22	2.57	1.64	1.13	2.69	20	100
Cadmium	<0.03	<0.03	<0.03	<0.03	<0.03	0.071	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	0.4	5
Chromium	15.1	22.4	11.2	25	15.1	112	13.5	10	13.9	21.3	11	15.5	14.8	25.4	40	400
Copper	4.24	6.06	3.73	5.18	3.15	160	4.47	4.13	2.64	3.27	2.74	4.12	3.86	3.32	40	400
Mercury	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.017	<0.002	<0.002	<0.002	0.3	3
Lead	6.97	7.28	7.21	7.03	6.57	12.3	8.67	12.6	6.99	9.19	7.05	8.18	6.38	6.6	50	500
Nickel	2.79	7.44	3.21	7.84	2.85	52.4	2.37	4.57	5.82	3.72	3.63	3.7	3.07	2.96	20	200
Zinc	8.07	15.5	11.2	10.1	7.47	46.3	16	11.5	10.6	14.6	7.87	Not analysed			130	800
Polychlorinated biphenyl (PCB) (Sum of International Council for the Exploration of the Sea (ICES) Rectangle 7)	Below level of detection															
Total Polycyclic aromatic Hydrocarbons (PAH) (µg/kg)	0.12	0.25	0.38	0.13	0.22	0.48	0.93	0.5	0.53	0.79	0.1	0.35	0.05	0.12	100	-

Table 7-5 Sediment Contaminant Sample Analysis Results Compared to the Cefas Action Levels for the DBC and Sofia Offshore Wind Farms – Offshore ECC (Forewind, 2014)

Contaminant (mg/kg)	Site Reference (Export Cable Corridor)									Cefas Action Levels	
	61	62	64	75	86	95	102	109	114	Action Level 1	Action Level 2
Arsenic	20	15.3	7.14	25.5	9.87	9.42	9.77	10.1	6.74	20	100
Cadmium	0.152	0.143	0.165	0.136	0.079	0.082	0.076	0.1	0.053	0.4	5
Chromium	126	312	381	221	193	233	164	103	66	40	400
Copper	55.9	121	196	62.7	116	88.8	138	70.3	63.5	40	400
Mercury	0.046	0.009	0.008	0.049	0.003	0.002	0.002	0.016	<0.002	0.3	3
Lead	58	53.5	54.2	104	29.4	25.5	26.5	35.9	14.9	50	500
Nickel	56.8	149	220	118	106	136	90.6	43.5	41.4	20	200
Zinc	113	115	112	118	50.3	41.2	51.9	69	31	130	800
Total hydrocarbons (THC) (µg/kg)	27	35.2	60.2	41	5.43	3.16	4.59	10.3	<3	100	-
Tributyltin (TBT)	Below limit of detection (<0.003mg/kg)										
PCB	Below limit of detection (<0.1µg/kg)										



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

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Sediment Sample Locations

Figure:	7-7	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0055		
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01	09/03/2023	JR	SM	A3	1:800,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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287. The Humber Estuary is one of the busiest waterways in the UK. The major ports of Hull, Goole and Grimsby and Immingham account for the majority of shipping activity on the Humber and necessitate the requirement for maintenance dredging within the estuary approaches and berths (ABP, 2014).

288. Sediment quality data from sediment sampling undertaken to inform dredging activity within the Humber Estuary between 2006 to 2011 indicates that heavy metals are present in the estuary sediments and can exceed Action Level 2 (ABP, 2014). Organotin compounds and PCB compounds are generally present at levels below Cefas Action Levels or may marginally exceed Action Level 1. PAH exceed Action Level 1 for a range of compounds and THC regularly exceed Action Level 1 (there is no Action Level 2 for PAH and THC). Overall contaminant levels in dredged material within the Humber are within acceptable limits and are of no concern with respect to their potential to cause pollution (ABP, 2014).

7.3.2.3 Water Quality: Suspended Sediment Concentrations

289. 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 5mg/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 slightly closer to the Holderness coast to approximately 10mg/l. Suspended sediment concentrations within the Humber Estuary, however, are characterised by values in excess of 30mg/l (**Figure 7-5**).

7.3.2.4 Water Quality: Chemical and Physicochemical Parameters

290. 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.

291. 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 Scoping Area. Within 1 nautical mile (nm) off the coast, the Offshore Scoping Area passes through the Yorkshire South coastal water body (GB640402491000) (**Figure 7-6**). 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.

292. The Humber Lower transitional water body (GB530402609201) is located to the south of the proposed landfall sites and adjacent to the proposed HPF (**Figure 7-6**). This water body is classified as a 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, saltmarsh, invertebrates and levels of dissolved inorganic nitrogen within the water body. It has a chemical status of ‘Fail’ due to levels of benzo[a]pyrene, benzo[b]fluoranthene, benzo[ghi]perylene, mercury and its compounds, perfluorooctane sulphonate (PFOS), PBDE and TBT compounds, cypermethrin and dichlorvos.

293. There are a number of bathing waters within and in close proximity to the Offshore Scoping Area (**Figure 7-6**). 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 2022 (Environment Agency, 2022) were:

- Withernsea – excellent;
- Tunstall – closed (excellent in 2018 but has been closed since as there is no safe access to bathers due to coastal erosion);
- Hornsea – excellent;
- Skipsea – excellent;
- Cleethorpes – good; and
- Humberston Fitties – good.

294. 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’ and 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 be put in place to reduce pollution from nutrients, hazardous substances and the oil and gas sector focussing on problem areas and regional hotspots.

295. 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 harm 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, 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

296. Potential impacts during construction could result from disturbance of seabed sediments during installation activities for cables and foundations (including seabed preparation) and any installation of marine infrastructure associated with the HPF (intake / outfall construction for example). This has the potential to cause:

- Localised temporary increases in suspended sediments; and
- Remobilisation of existing contaminated sediments.

297. It is proposed that these impacts are scoped into the EIA specifically for the potential marine construction components of the HPF (e.g. intakes and outfalls if required) as information on the installation of marine infrastructure and its location is not yet confirmed.

298. Accidental spillages during construction could occur as a result of use of lubricants and chemicals throughout this phase. In addition to the control measures required under the MARPOL Convention Regulations, standard best practice will be secured through a Project Environmental Management Plan (PEMP) or similar, inclusive of a Marine Pollution Contingency Plan, which will include emergency plans and mitigation for a range of potential marine pollution incidents. Also detailing best practice measures for the storage, use and disposal of lubricant and chemicals throughout the construction phase.

299. However, it is proposed that where these impacts would occur during cable and foundation installation, they are scoped out of the EIA for the following reasons:

- Sediments within the Array Area and along the length of the offshore ECC are 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 is 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 has been given in this chapter with regards to marine water and sediment quality.
- Contamination data collected from within the Array Area and in the vicinity of the offshore ECC (**Figure 7-7**) does not indicate significant levels of chemicals within the sediments that could potentially be disturbed. The coarse and sandy nature of the nearshore and offshore sediments further reduces this risk. The assessment for DBC and Sofia Offshore Wind Farms concluded that a deterioration in water quality due to re-suspension of contaminated sediments would have a negligible effect (Forewind,

2014).

- Any chemicals used during construction would be listed on the Offshore Chemical Notification Scheme (OCNS) or a Chemical Risk Assessment (CRA) would be required as part of the PEMP or similar.

- All vessels 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.

7.3.3.2 Potential Impacts during Operation

300. Potential impacts during operation could arise as a result of disturbance to the seabed due to scour and routine maintenance activities. Should any potential discharges to a waterbody be required as part of the hydrogen production process, an impact on marine water quality may occur. These activities have the potential to cause:

- Localised temporary increases in suspended sediments;

- Remobilisation of existing contaminated sediments;

- Accidental pollution; and

- Reduction in marine water quality during operation of the HPF.

301. Impacts associated with maintenance activities within the Array Area and along the offshore ECC would be limited in terms of timeframe and scale and would cease following completion of the works.

302. Accidental spillages during operation could occur as a result of use of lubricants and maintenance chemicals. In addition to the control measures required under the MARPOL Convention Regulations, standard best practice will be applied through a PEMP or similar and completed for the storage, use and disposal of lubricant and maintenance chemicals throughout the operation phase.

303. 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.

304. As for construction, sediments in the vicinity of the Array Area and offshore ECC are coarse in nature and unlikely to harbour significant levels of contaminants due to a lack of chemical inputs. Chemicals to be used and / or discharged would be listed on the OCNS or a CRA would be carried out as required in the PEMP or similar. Additionally, operation and maintenance (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, as this is considered through the construction and decommissioning phases.

305. The operation of the HPF may involve the requirement for a discharge of water used in the hydrogen production process and potentially an intake and outfall system for desalination which may impact the marine water quality in a localised area. The potential impacts of discharging and releasing treated water on marine water quality are expected to be highly localised but require assessment. Changes to parameters such as salinity and temperature will be key to assess, with any additional potential contaminants also identified and assessed (e.g. biocides). As such this impact is scoped into the EIA for the operation phase only.

7.3.3.3 Potential Impacts during Decommissioning

306. 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.

307. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-6**).

7.3.4 Potential Cumulative Effects

308. There is potential for cumulative effects to arise during the construction and operational lifetime of the HPF, whether this is located on the Holderness Coast or within the Humber region, in which other projects or plans could act collectively with the Project to affect marine water quality receptors. Therefore, cumulative effects related to marine water and sediment quality in relation to the HPF are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

309. All other impacts, i.e. those associated with the construction and operation of wind farm infrastructure within the Array Area and offshore ECC, are scoped out of the EIA, therefore there is no pathway for cumulative impacts leading to likely significant effects. Therefore, cumulative effects in relation to the offshore wind farm infrastructure are scoped out of the EIA.

7.3.5 Potential Transboundary Effects

310. The potential impacts on marine water quality which may arise during the construction and operation of the HPF are anticipated to be highly localised such that significant transboundary effects will not occur (the coastline is approximately 185km from the Exclusive Economic Zone (EEZ)).

311. 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 they will be restricted to small scale and temporary impacts. As such, there would be no pathway for significant transboundary effects.

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

7.3.6 Summary of Scoping Proposals

313. **Table 7-6** 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 Evidence Plan Process (EPP) and other consultation activities and as additional project information and site-specific data become available.

Table 7-6 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Marine Water and Sediment Quality

Potential Impact	Construction	Operation	Decommissioning
Localised temporary increases in suspended sediments.	✓ (HPF and inshore ECC only)	X	✓ (HPF and inshore ECC only)
Remobilisation of existing contaminated sediments.	✓ (HPF and inshore ECC only)	X	✓ (HPF and inshore ECC only)
Accidental pollution	X	X	X
Reduction in marine water quality during operation of the HPF	X	✓	X
Cumulative impacts	✓ (HPF and inshore ECC only)	✓ (HPF only)	✓ (HPF and inshore ECC only)
Transboundary impacts	X	X	X

7.3.7 Approach to Data Gathering

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

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

Data Source	Date	Data Contents
Environment Agency's Catchment Data Explorer (https://environment.data.gov.uk/catchment-planning)	2022	Information on the status of coastal and transitional water bodies
Marine Management Organisation (MMO) Public Register - Other plans or projects within the inshore scoping area and Humber Estuary	2022 / 2023	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

315. A site-specific sediment survey to include chemical contaminant analysis is anticipated to be undertaken as part of the wider benthic ecology survey requirement and will be reported as part of benthic ecology assessment (see **Chapter 7.4 Benthic and Intertidal Ecology**). This will provide sediment samples from within the Offshore Scoping Area. Surveys will be undertaken in line with the Marine Management Organisation's (MMO) sediment sampling guidelines relating to disposal to sea and agreed in advance with stakeholders, such as the Environment Agency and Cefas, where required. **Table 7-8** outlines the proposed baseline surveys to be carried out.

Table 7-8 Proposed Baseline Surveys for Marine Water and Sediment Quality

Survey	Timing	Spatial Coverage
Baseline water quality survey	Q2 2023	Discharge location, up- and down-stream
Sediment quality survey	Q2 2023	Throughout the Array Area and offshore ECC, including the footprint of any dredge required for the intake and outfall locations associated with the HPF. Samples to be taken to maximum dredge depth.

7.3.8 Approach to Assessment

316. Impacts arising from the Project on marine water and sediment quality that have been scoped into the EIA (in relation to the HPF only) will be included within the EPP for marine physical processes and benthic and intertidal ecology (as set out in **Chapter 6 Consultation**). 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 this process.

317. The assessment 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**. Any proposed discharge of wastewater assessment will follow the requirements of Environment Agency guidance *'Surface water pollution risk assessment for your environmental permit'* (Environment Agency, 2022). These requirements may identify a requirement for modelling to determine whether the discharge will cause pollution. The requirement for modelling will be confirmed in consultation with the Environment Agency.

7.3.9 Scoping Questions to Consultees

318. 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 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?

7.4 Benthic and Intertidal Ecology

319. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

320. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

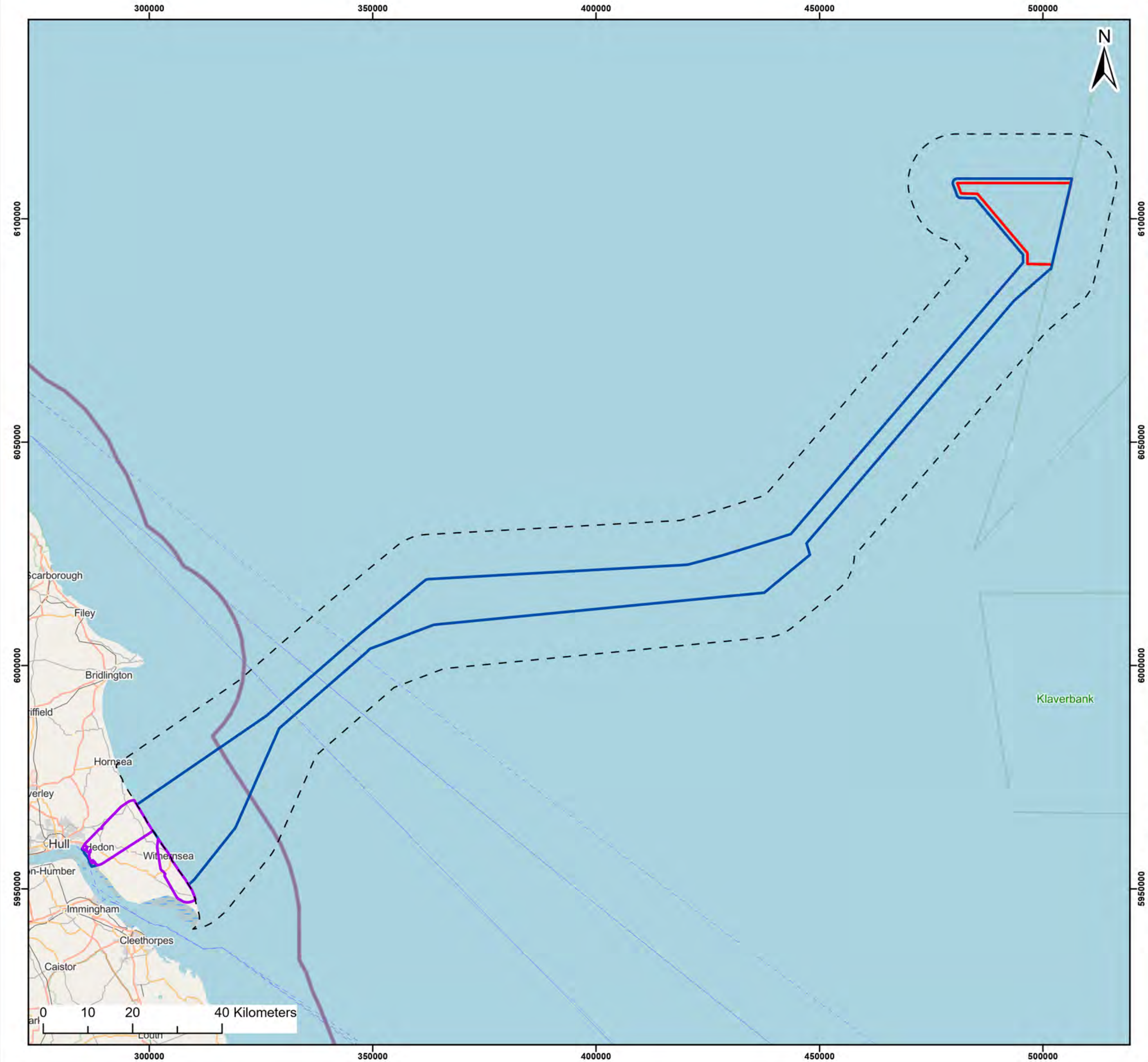
321. The benthic and intertidal ecology assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **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

322. The Benthic and Intertidal Ecology Study Area (hereafter referred to as ‘the study area’) covers a total of 8,025.1km^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**.

323. 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 (**Figure 7-8**).



Legend:

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

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Benthic and Intertidal Ecology Study Area

Figure:	7-8	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0057		
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Co-ordinate system: WGS 1984 UTM Zone 31N

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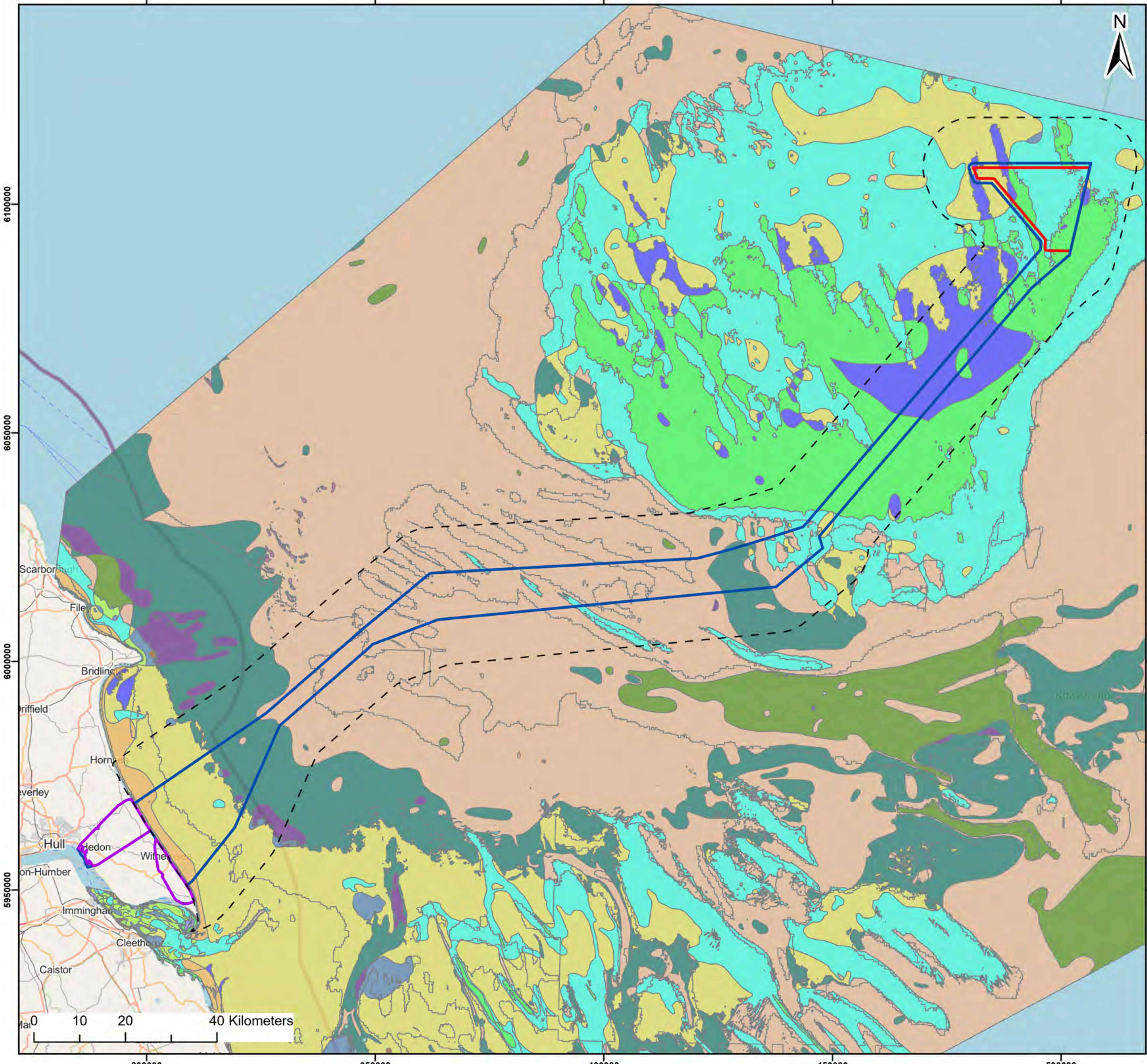

Legend:

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

EUSeaMap 2021 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
- A5.61: Sublittoral polychaete worm reefs on sediment
- A5.6: Sublittoral biogenic reefs
- No EUNIS habitat assigned

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Seabed Habitat

Figure: 7-9

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0018

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/04/2023	JR	CM	A3	1:850,000
00	03/02/2023	JR	LA	A3	1:850,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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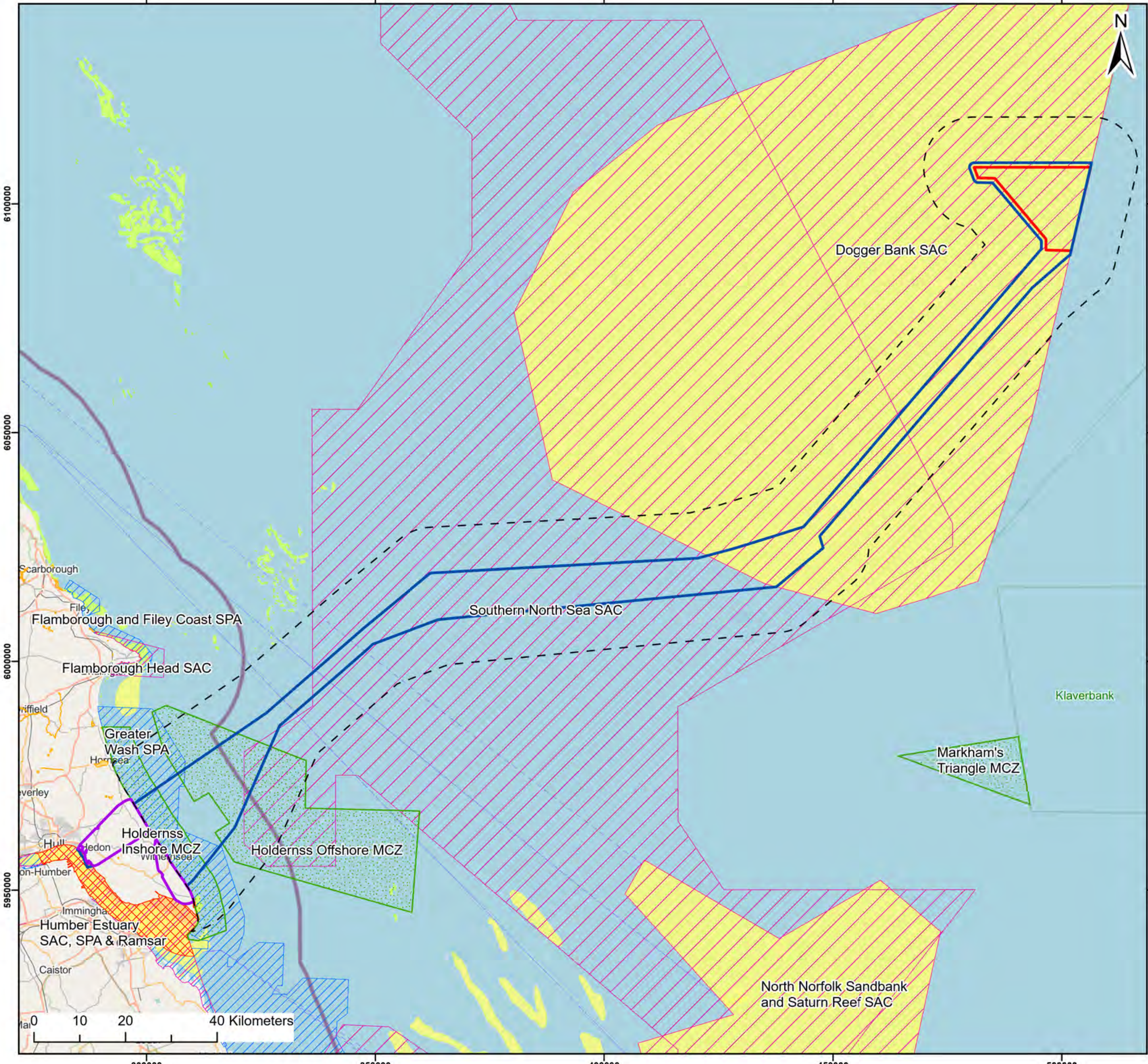

Legend:

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

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Designated Sites and Protected Benthic Habitats

Figure: 7-10

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

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	06/04/2023	JR	CM	A3	1:850,000
00	03/02/2023	JR	LA	A3	1:850,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.4.2 Existing Environment

7.4.2.1 Intertidal Zone

324. The intertidal zones within the study area predominantly comprise of mobile sediments (see **Figure 7-9**) and one area of man-made coastal defence structures at Withernsea. The intertidal zone that encompasses Aldbrough and Easington landfall areas falls within the Holderness Inshore Marine Conservation Zone (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.

325. 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 2023 to record the habitat types present at potential landfall locations and, in turn, to characterise the ecological interest within the intertidal area.

326. Around Saltend, the scoping boundary overlaps the Humber Estuary by 2.69km^2, to take into account the potential installation of an intake / outfall for the HPF, should a desalinisation plant be required as part of the onshore development. The Humber Estuary is designated as a Special Area of Conservation (SAC), Special Protected Area (SPA), Ramsar site and Site of Special Scientific Interest (SSSI). The benthic features protected as part of the SAC and that are found within the scoping boundary are (Joint Nature Conservation Committee (JNCC), 2015):

- Sandbanks which are slightly covered by sea water all the time;
- Estuaries (primary reason for selection of the site);
- Mudflats and sandflats not covered by seawater at low tide (primary reason for selection of the site);
- Salicornia and other annuals colonising mud and sand; and
- Atlantic salt meadows, Glauco-Puccinellietalia martimae.

327. The coastline along Paull and at Paull Holme Sands is predominantly made up of the priority habitat of Mudflats which are not covered by seawater at low tide (H1140). Parts of Paull Holme Sands, Old Fleet and Hedon Haven are identified as Coastal Saltmarsh, which although not a feature of the Humber Estuary protected sites, is still classed as a priority habitat.

7.4.2.2 Offshore Zone

328. Site-specific benthic surveys will be undertaken in 2023 to characterise the benthic ecology within the study area to feed into the Preliminary Environmental Information Report (PEIR). To inform this Scoping Report, the predictive seabed habitats derived from EUSeaMap (European Marine Observation and Data Network (EMODnet), 2023) and Dogger Bank Teesside A & B (now Dogger Bank C and Sofia Offshore Wind Farms respectively) array area survey have been used and will be ground truthed during the proposed benthic surveys.

329. The findings of the 2012 Dogger Bank Teesside A & B array area survey shows that historically 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 (Forewind, 2014). More recent monitoring surveys of the Dogger Bank SAC for both research (carried out by the Senckenberg Research Institute) and pre-construction baseline characterisations, have shown that these sediment types and infaunal communities still dominant this region and therefore these historic data still provide a good characterisation of the site. However, as this is historic data, a site-specific survey will still be undertaken in 2023, and the assessment will be updated to reflect this.

330. 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 in **Figure 7-9**, have been used to determine the anticipated habitat types within the study area in the absence of site-specific information.

331. 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 in **Figure 7-9**, 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).

332. The benthic habitats in the nearshore section of the study area are more heterogeneous, with more coarse and mixed sediments predicted. Such as circalittoral coarse sediments (A5.14), circalittoral mixed sediments (A5.44) and circalittoral fine sand (A5.25) (**Figure 7-9**).

333. 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 fine sand (A5.23) - This habitat is characterised by a range of taxa including polychaetes, bivalve molluscs and amphipod crustacea;

- 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;
- 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; and
- Circalittoral fine sand (A5.25) - This habitat is characterised by a range of taxa including polychaetes, bivalve molluscs and amphipod crustacea.

7.4.2.3 Designations

334. 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 in **Table 7-9** below. **Figure 7-10** 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 Screening.

Table 7-9 Designated Sites for Benthic Features Within the Benthic and Intertidal Ecology Study Area

Site	Designating Features
Dogger Bank Special Area of Conservation (SAC)	Sandbanks which are slightly covered by sea water all the time
The Humber Estuary SAC, Special Protection Area (SPA), Ramsar and Site of Special Scientific Interest (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*;

Site	Designating Features
	• 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*.
Holderness Offshore Marine Conservation Zone (MCZ)	• 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; • Subtidal coarse sediment; • Subtidal sand; • Subtidal mud; and • Subtidal mixed sediments.

7.4.2.4 Protected Habitats and Species

335. 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 in **Figure 7-10**, instances of this feature occur throughout the study area, both within designated sites (**Table 7-9**) and outside of them.

336. 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 in **Figure 7-10**, there are patches of Annex I reef found at the nearshore, with geogenic reefs present within 500m of the coastline. The nearshore area is designated for the Holderness Inshore MCZ, where the rocky interest features of the site are made up of cobble boulder and post glacial deposits. However, there are currently no known areas of biogenic reef within the study area.

337. *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 (NERC) Act 2006. *S. spinulosa* is a common species, however, some aggregations may form biogenic reefs in the right conditions. Annex I *Sabellaria spinulosa* reefs represent a priority habitat (biogenic reefs) under the European Commission (EC) Directive 92/43/EEC, known as the EU Habitats Directive. None of these habitats have been recorded within the study area, but they are quite common in offshore environments and may be shown to be present after the site-specific benthic surveys (for further information, see **Table 7-12**).

338. 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.

339. The benthic survey due to be undertaken in 2023 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.

7.4.3 Potential Impacts

7.4.3.1 Potential Impacts during Construction

340. Potential impacts during the construction phase of the Project will arise from disturbance of the seabed during the installation of foundations, cables and marine outfalls / intakes associated with the HPF (including any seabed preparation).

341. Impacts which span the life of the Project (e.g. long term habitat loss) will be considered as part of the operation 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

342. There is potential for direct physical disturbance of the seabed construction activities such as the installation of foundations, cables and marine outfalls / intakes associated with the HPF, 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 Sediment Concentrations

343. The installation of foundations, cables and marine outfalls / intakes associated with the HPF may cause an increase of suspended sediment concentrations 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 Environmental Statement (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). However, given the potential outfall / intake system, this impact is proposed to be scoped into the EIA for the HPF and inshore ECC only for further consideration.

7.4.3.1.3 Remobilisation of Contaminated Sediments

344. Sediment disturbance could lead to the mobilisation of contaminants (if present) that could be harmful to benthic habitats and species. 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 in to the EIA for the HPF and inshore ECC only.

345. Contamination data collected from within the Array Area and in the vicinity of the offshore ECC (locations shown in **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 offshore sediments further reduces this risk. The Dogger Bank Teesside A & B ES concluded that a deterioration in water quality due to re-suspension of contaminated sediments would have a negligible impact (Forewind, 2014). However, given the uncertainty of the landing site, and the potential for increased sediment contamination concentrations in inshore sediments, this impact has been scoped into the EIA for the HPF and inshore ECC only.

7.4.3.1.4 Pollution Events Resulting from the Accidental Release of Pollutants

346. Impacts could also occur if there is an accidental release of pollutants into the water from construction vessels. The risk of pollutant release will be managed via the production of a Marine Pollution Contingency Plan, which will include emergency plans and mitigation for a range of potential marine pollution incidents. Any chemicals to be used during offshore works will be listed on the Offshore Chemical Notification Scheme (OCNS), or for any chemical not on the list with a potential pathway to the marine environment, a Chemical Risk Assessment (CRA) will be carried out.

347. All vessels must comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78. A Project Environmental Management Plan (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.

348. As a result of these embedded mitigation measures, 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. 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.

7.4.3.1.5 Introduction of Marine Invasive Non-Native Species (INNS) from Vessel Traffic

349. 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.

350. These commitments would be secured in the PEMP via a condition in the deemed Marine License of the Development Consent Order (DCO). The PEMP will be agreed with relevant stakeholders prior to the start of construction.

351. With the appropriate mitigations in place, it is not expected that INNS will be introduced. 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.

7.4.3.1.6 Disturbance from Noise and Vibration

352. 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.

353. 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 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.

354. 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 clearance works, with an accompanying assessment of UXO clearance impacts on benthic and intertidal ecology.

7.4.3.2 Potential Impacts during Operation

355. Potential impacts during operation will mostly result from the physical presence of infrastructure on the seabed (i.e. foundation, any cable protection above the seabed and marine outfalls / intakes associated with the HPF) which will result in long term habitat loss. 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.

356. 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.

357. 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**.

7.4.3.2.1 Temporary Physical Disturbance / Physical Disturbance

358. 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. Therefore, it is proposed that temporary physical disturbance of the seabed due to operation and maintenance (O&M) activities should be scoped out of the EIA.

7.4.3.2.2 Long Term Habitat Loss

359. The presence of foundations on the seabed, cable protection and marine outfalls / intakes associated with the HPF 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 long term habitat loss, and any removals of infrastructure during decommissioning would be confirmed at a later date. Therefore, it is proposed that long term habitat loss during the operation phase is scoped into the EIA for further consideration.

7.4.3.2.3 Increased Suspended Sediment Concentrations

360. As any potential for temporary physical disturbance during operation from O&M activities has been scoped out, any potential impacts related to the suspension of fine sediments during operation have therefore also been scoped out of the EIA. Consideration of potential discharge of effluent from the HPF is detailed in **Section 7.4.3.2.5**.

7.4.3.2.4 Remobilisation of Contaminated Sediments

361. Contamination data collected in the vicinity of the Project (survey locations shown in **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. Dogger Bank Teesside A & B ES concluded that a deterioration in water quality due to re-suspension of contaminated sediments would have a negligible impact (Forewind, 2014).

362. 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.

7.4.3.2.5 Reduction in Marine Water Quality during Operation of the HPF

363. The operation of the HPF may involve the requirement for a discharge of water used in the hydrogen production process and also potentially an intake and offtake system for desalination. The potential effects of discharging and releasing treated effluent into the marine environment are expected to be highly localised but require assessment on impacts on benthic communities.

364. Changes to parameters such as salinity and temperature will be key to assess, along with any additional potential contaminants also identified and assessed (e.g. biocides). Therefore, this potential impact has been scoped into the EIA for further consideration.

7.4.3.2.6 Pollution Events Resulting from the Accidental Release of Pollutants

365. 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. Embedded mitigation measures to reduce spillage risk and establish appropriate management measures described in **Section 7.4.3.1.4** will also cover the Project's operation phase. Therefore, it is proposed that this impact is scoped out of the EIA.

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

366. Potential impacts from EMF from operational cables are not considered to result in significant effects on benthic and intertidal receptors. National Policy Statement (NPS) for Renewable Energy Infrastructure (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.

367. A comparison of EMF field strength across 10 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).

368. 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**.

369. 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. Therefore, this impact has been scoped out of the EIA.

7.4.3.2.8 Introduction of Marine INNS from Vessel Traffic

370. 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 7.4.3.1.5** will also cover the Project's operation phase. Therefore, it is proposed that this impact is scoped out of the EIA.

7.4.3.2.9 Colonisation of Introduced Substrate, including INNS

371. 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 for the operation phase only.

7.4.3.2.10 Disturbance from Noise and Vibration

372. 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.

373. 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.

374. 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 Potential Impacts during Decommissioning

375. 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.

376. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-10**).

7.4.4 Potential Cumulative Effects

377. 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 Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

378. 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.

379. 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

380. 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.

381. The North Sea Programme 2022-2027 (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

382. **Table 7-10** 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 Evidence Plan Process (EPP) and other consultation activities, and as additional project information and site-specific data become available.

Table 7-10 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	✓	X	✓
Long term habitat loss	X	✓	X
Increased suspended sediment concentrations	✓ (HPF and inshore ECC only)	X	✓ (HPF and inshore ECC only)
Remobilisation of contaminated sediments	✓ (HPF and inshore ECC only)	X	✓ (HPF and inshore ECC only)
Reduction in marine water quality during operation of the HPF in the intertidal area	X	✓	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	X
Introduction of marine INNS from vessel traffic	X	X	X
Colonisation of introduced substrate	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.4.7 Approach to Data Gathering

383. 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.

384. 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 7-11**.

Table 7-11 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.

Source	Summary	Coverage of the Benthic and Intertidal Ecology 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, Centre for Environment, Fisheries and Aquaculture Science (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.

385. In addition to the data in **Table 7-11**, the following data (**Table 7-12**) is proposed to be collected for the assessment.

Table 7-12 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 offshore ECC	2023
Grab sampling, epibenthic trawls and drop-down video	Array Area and offshore ECC	2023
Intertidal walkover surveys	Landfall location(s)	2023

7.4.8 Approach to Assessment

386. 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** and **Chapter 7.3 Marine Water and Sediment Quality**. 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.

387. 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.

388. Site-specific surveys as set out in **Table 7-12** will also be carried out.

389. 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.

390. 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

391. 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

392. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

393. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

394. 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 Environmental Impact Assessment (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

395. 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 39F2, 39F3, 38F2, 38F3, 37F0, 37F1, 37F2, 36E9 and 36F0. The study area covers a total of 32,474km^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 12km.

396. 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 7-11**.

7.5.2 Existing Environment

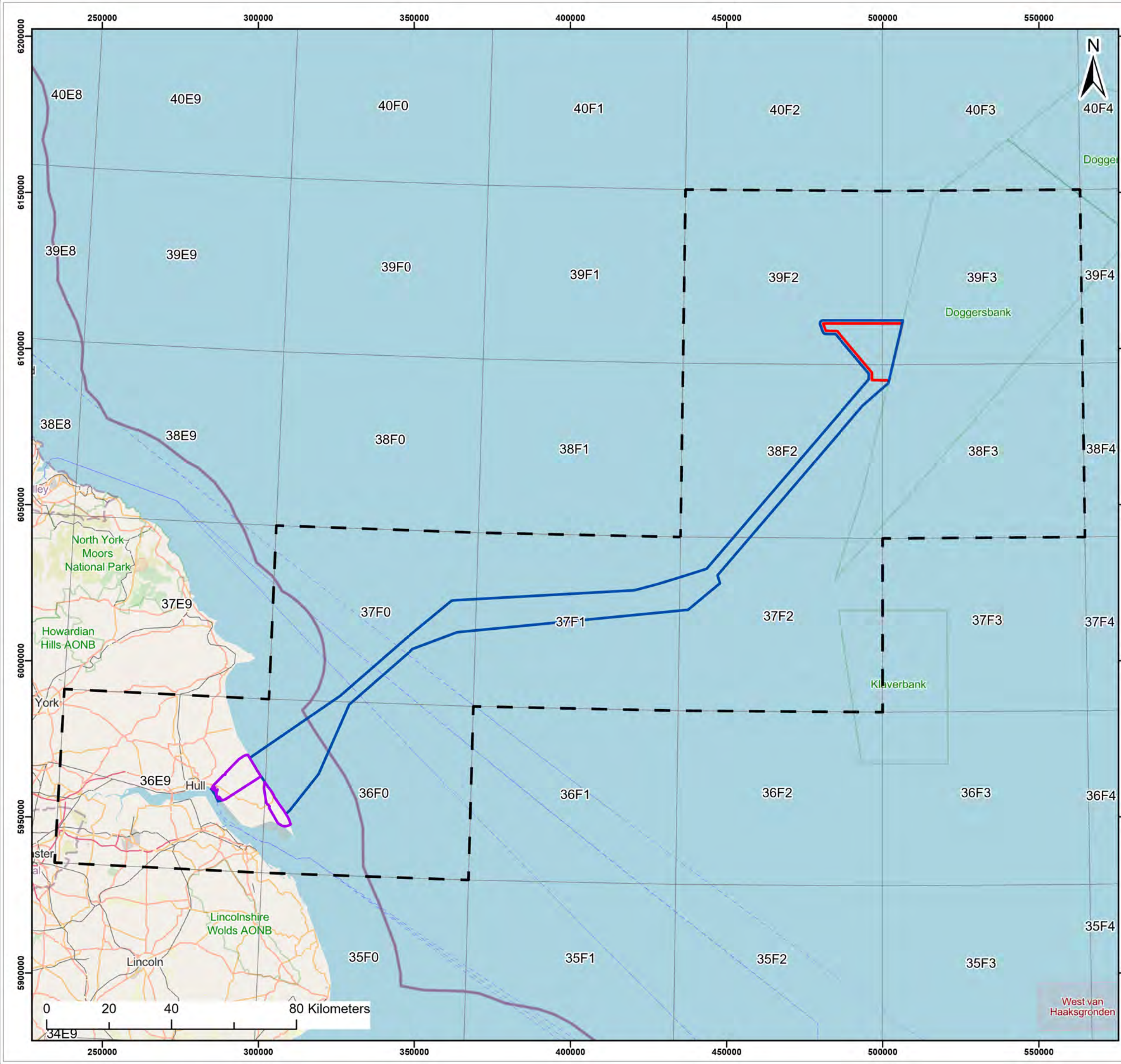
397. An initial desk-based review of existing literature and data sources was undertaken to support this scoping exercise.

7.5.2.1 Fish

398. 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 al*., 1990). In shallow waters (50 - 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 *Pleuronectes plattessa*. The study area is located within ICES Division IVb.

399. 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 *Limanda limanda*, common dragonet *Callionymus lyra*, and sand goby *Pomatoschistus minutus* (Callaway *et al.*, 2002).

400. 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 7-12** and **Figure 7-13**, and listed in **Table 7-13** with their corresponding conservation importance and hearing sensitivities.



Legend:

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

Source: © Haskoning DHV UK Ltd, 2023; Contains OS data © Crown copyright and database rights, 2023; © ICES Spatial Facility, ICES, Copenhagen, 2023; © OpenStreetMap (and) contributors, CC-BY-SA

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Fish and Shellfish Ecology Study Area

Figure:	7-11	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0024		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	06/02/2023	JR	EB	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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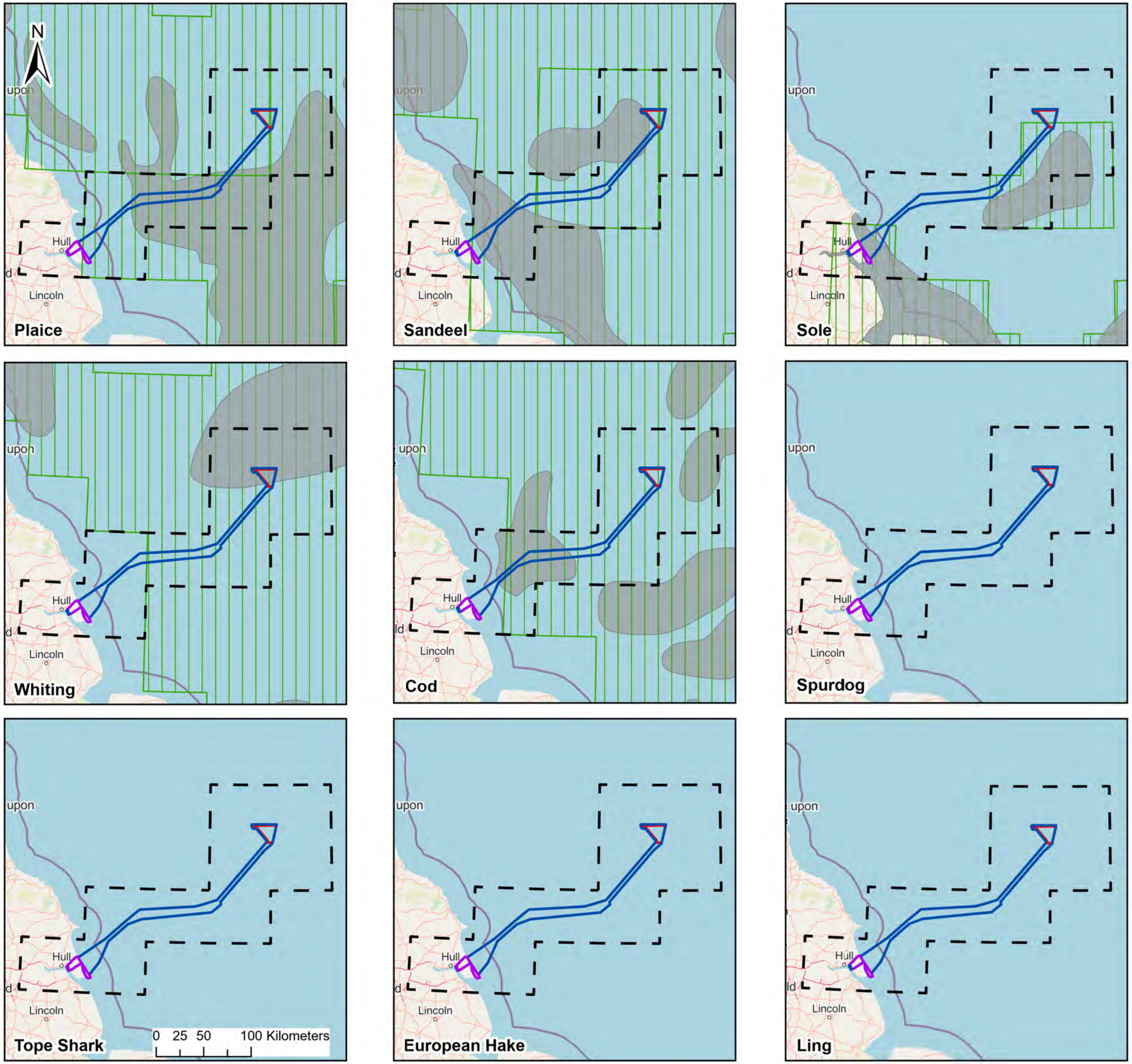

Legend:
- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Spawning Grounds 2010
- Spawning Grounds 1998

Source: © Haskoning DHV UK Ltd, 2023; © Cefas, 2022 [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: 7-12 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0026

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:4,000,000
00	07/02/2023	JR	EB	A3	1:4,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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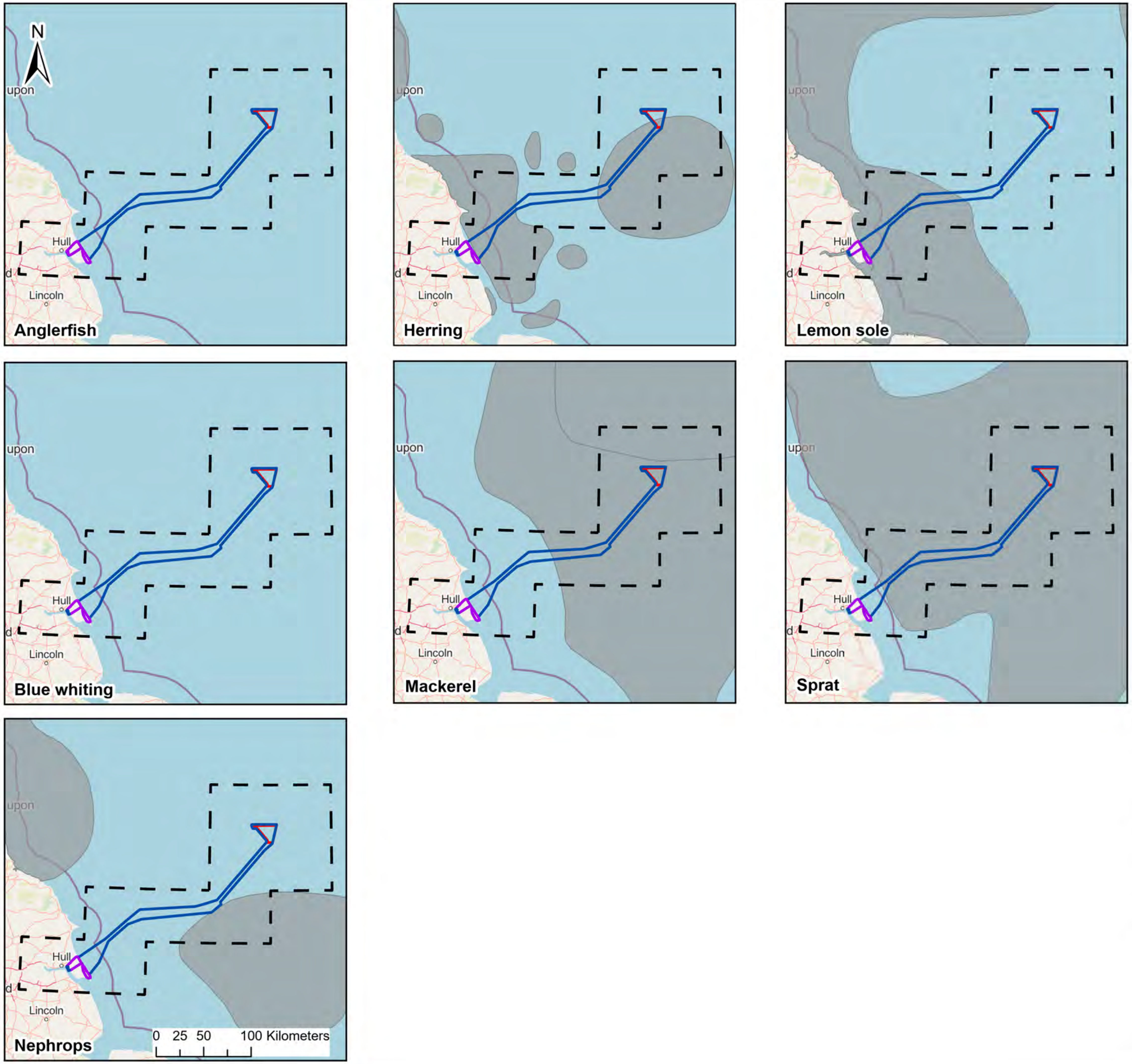

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Spawning Grounds 2010
- Spawning Grounds 1998

Source: © Haskoning DHV UK Ltd, 2023; © Cefas, 2022 [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 2 of 2)

Figure: 7-12 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0026

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:4,000,000
00	07/02/2023	JR	EB	A3	1:4,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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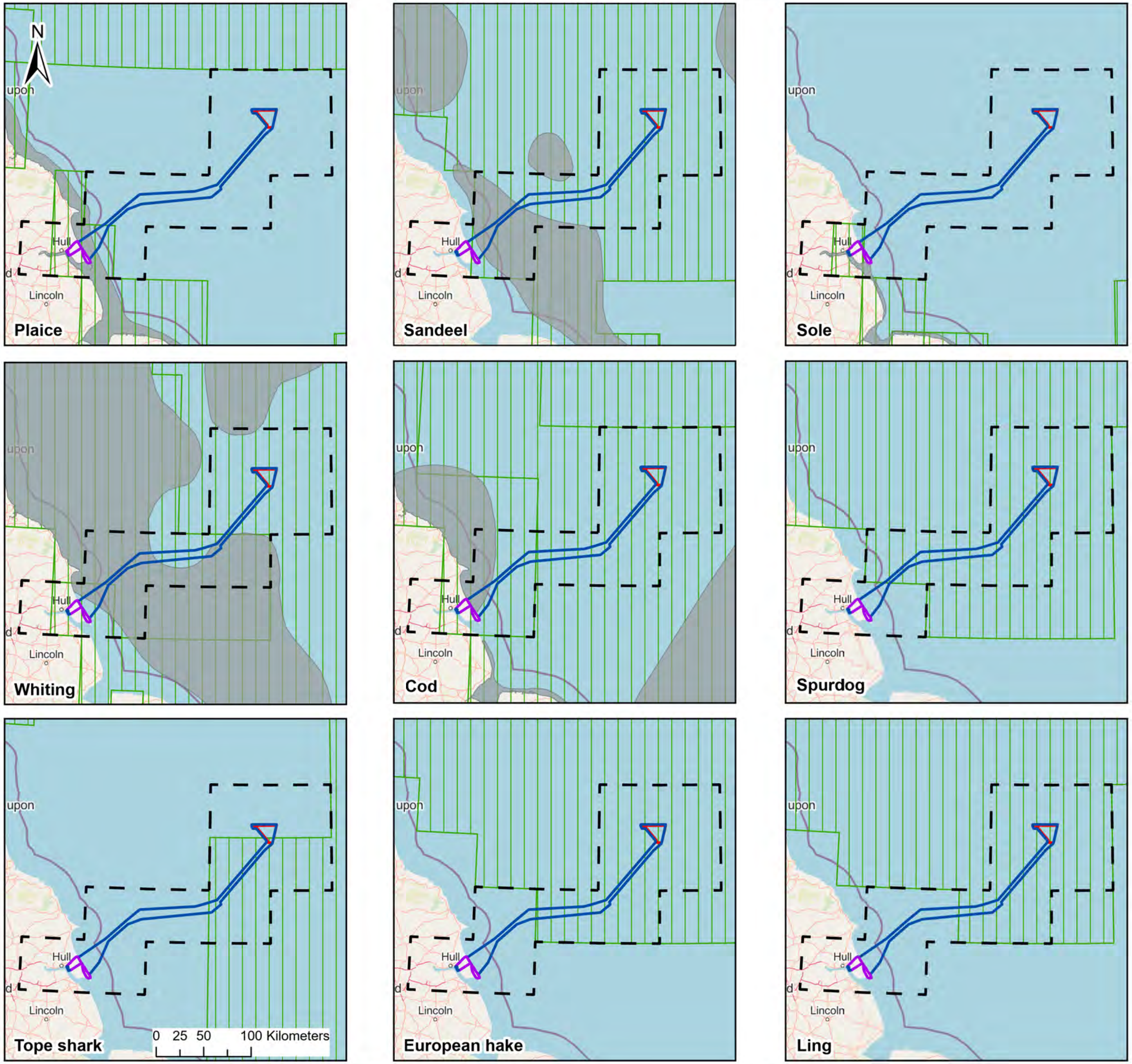

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Nursery Grounds 2010
- Nursery Grounds 1998

Source: © Haskoning DHV UK Ltd, 2023; © Cefas, 2022 [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 Nursery Areas (Sheet 1 of 2)

Figure: 7-13 Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0027

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:4,000,000
00	07/02/2023	JR	EB	A3	1:4,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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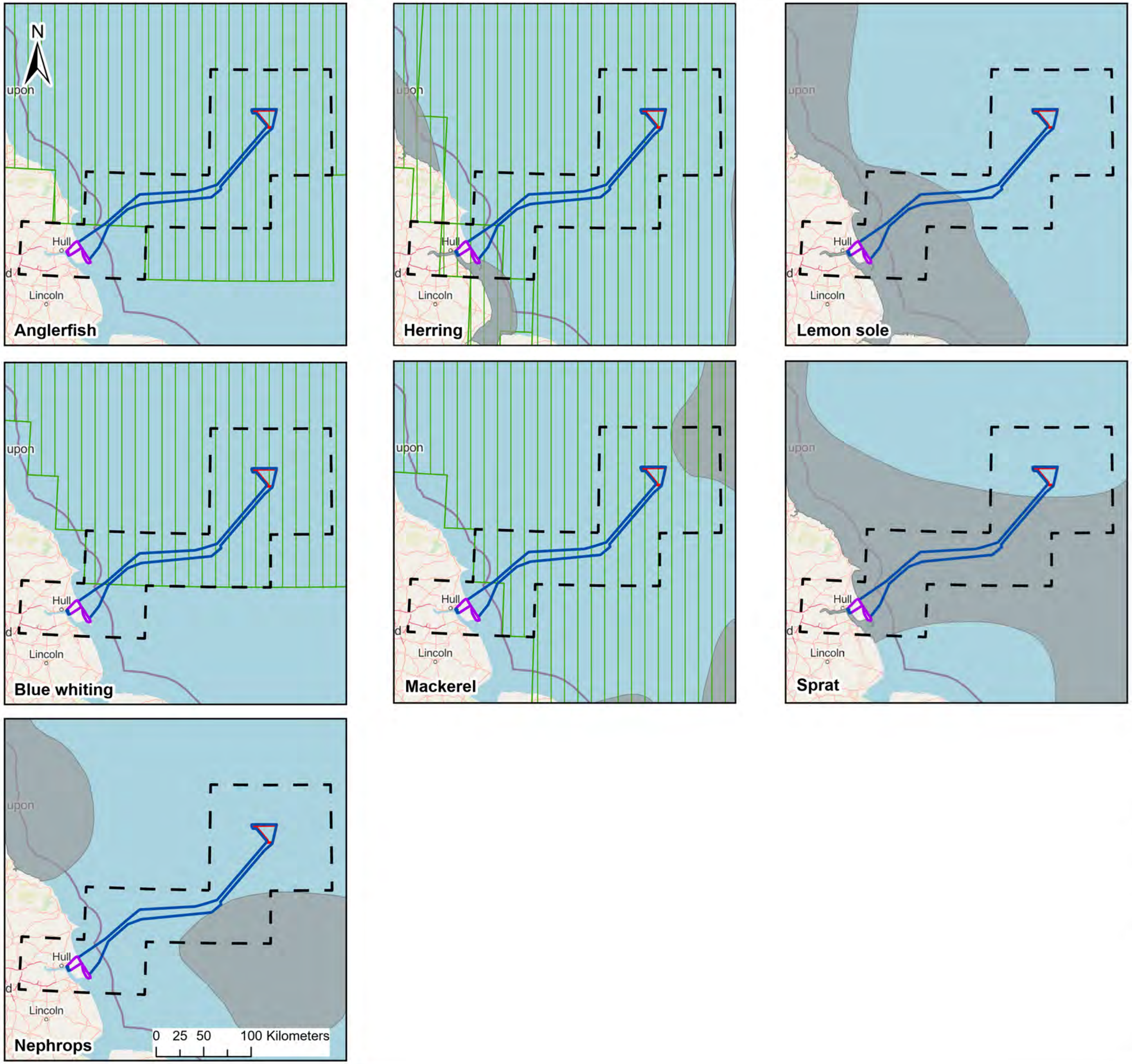

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Fish and Shellfish Ecology Study Area
- Nursery Grounds 2010
- Nursery Grounds 1998

Source: © Haskoning DHV UK Ltd, 2023; © Cefas, 2022 [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 Nursery Areas (Sheet 2 of 2)

Figure: 7-13 Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0027

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:4,000,000
00	07/02/2023	JR	EB	A3	1:4,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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Table 7-13 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 Biodiversity Action Plan (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)

Species	Hearing Group	Areas Overlapping the Study Area		Conservation Designation
		Spawning	Nursery	
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)	-

401. Both mackerel *Scomber scrombus* and cod *Gadus morhua* 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.

402. Both herring and sandeel have been identified as having spawning and nursery grounds within the study area (**Figure 7-12** and **Figure 7-13**). 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.

403. 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 (Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2007). However, a new byelaw for the Dogger Bank Special Area of Conservation (SAC) implemented by the Marine Management Organisation (MMO) prohibits bottom towed fishing gear, and hence the sandeel fishery (MMO, 2022). Specific habitats of importance to these species within the region are poorly understood, with the habitats of these species often present as small, 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).

404. 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* 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 *Raja naevus*, and common skate *Leucoraja batis*, with the latter classed as endangered on the IUCN Red List.

405. 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

406. 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 norvegicus* and brown shrimp *Crangon crangon*. 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

407. 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 National Policy Statement (NPS) for Energy (EN-1), the National Policy Statement for Renewable Energy Infrastructure (EN-3), and the draft revisions of NPS EN-1 and NPS EN-3 (Department for Energy and Climate Change (DECC) 2011a; DECC, 2011b; Department for Energy Security and Net Zero (DESNZ, 2023a; DESNZ, 2023b).

7.5.3.1 Potential Impacts during Construction

408. 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).

409. 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 7.5.3.2.1** and **Section 7.5.3.2.7**) and are therefore not considered in the construction phase assessment to avoid duplication.

7.5.3.1.1 Temporary Habitat Loss / Physical Disturbance

410. Demersal fish and, 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.

411. 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.

7.5.3.1.2 Increased Suspended Sediments and Sediment Re-Deposition

412. 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.

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

7.5.3.1.3 Remobilisation of Contaminated Sediments if Present

414. Previous site-specific surveys of sediment contaminants have been undertaken for nearby Dogger Bank Teesside A & B (now known as Dogger Bank C (DBC) and Sofia respetively) wind farm sites. 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 this inshore portion of the Offshore Scoping Area, 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).

415. It is proposed that the impact of remobilisation of contaminated sediments is scoped in specifically for the potential marine construction components of the HPF (e.g. intakes and outfalls) as information on the installation of marine infrastructure and its location is not yet confirmed.

416. However, it is proposed that where these impacts would occur during cable and foundation installation, they are 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 (and only being scoped in specifically for the marine construction components of the HPF).

417. Should the results of benthic sampling demonstrate higher levels of contamination than expected, the Applicant would revisit the scope for further assessment through the Evidence Plan Process (EPP) (see **Section 7.4.7**).

7.5.3.1.4 Underwater Noise and Vibration

418. 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.

419. 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 Development Consent Order (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 fish and shellfish receptors.

7.5.3.1.5 Changes in Fishing Pressure

420. The construction of offshore infrastructure could result in changes to fishing activity within the wind farm site 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.

421. As highlighted in **Chapter 7.8 Commercial Fisheries**, **Section 7.8.2.3**, the introduction in 2022 of a byelaw prohibiting the use of bottom towed gear across the Dogger Bank Special Area of Conservation (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.

422. 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

423. 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, these would be similar to those during construction but at a lower magnitude.

7.5.3.2.1 Long Term Habitat Loss

424. The presence of foundations and scour protection (see **Chapter 3 Project Description**, **Section 3.4**) 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.

425. 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 decommissioning of the Project would result in long term habitat loss, and any removal of infrastructure during decommissioning would be confirmed at a later date. Therefore, it is proposed that the potential impact of long term habitat loss on fish and shellfish receptors phase is scoped into the EIA.

7.5.3.2.2 Temporary Habitat Loss / Physical Disturbance

426. 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 which 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. Therefore, the potential impact of temporary habitat loss / physical disturbance from maintenance activities on fish and shellfish receptors will be scoped out of the EIA.

7.5.3.2.3 Increased Suspended Sediments and Sediment Re-Deposition

427. Small volumes of sediment could be re-suspended during maintenance activities. This will occur infrequently, with local and temporary effects. Given that the potential for temporary habitat loss / physical disturbance during operation has been scoped out (**Section 7.5.3.2.2**), any potential impacts related to the suspension of fine sediments and their redeposition during operation have also been scoped out of the EIA.

7.5.3.2.4 Remobilisation of Contaminated Sediments If Present

428. As set out in **Section 7.5.3.1.2**, previous site-specific surveys of sediment contaminants have been undertaken for nearby DBC and Sofia wind farm sites. The results of these site-specific surveys indicate that the levels of contaminants in the offshore wind farm areas where sediment re-suspension concentrations are predicted to be the highest due to cable and foundation installation, is relatively low, i.e. the majority of the contaminant levels are below the Cefas Action Level 1 and Canadian Sediment Quality Guidelines threshold effects level (TEL) values. Twenty chemicals were analysed at 15 locations, totalling 300 measurements, and in only cases were contaminants above Cefas Action Level 1 (both cases were also under Cefas Action Level 2) (Forewind, 2013; Forewind, 2014). 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.

429. It is proposed that the impact of remobilisation of contaminated sediments is scoped in specifically for the potential marine operation components of the HPF. The operation of the HPF may involve the requirement for a discharge of water used in the hydrogen production process and also potentially an intake and offtake system for desalination. The potential effects of discharging and releasing treated water on marine water quality are expected to be highly localised but require assessment within the EIA.

430. However, given the low level of sediment contamination in the region demonstrated by other nearby projects, and the very low likelihood 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 operational impacts associated with array infrastructure and export cables.

431. Should the results of benthic sampling demonstrate higher levels of contamination than expected, the Applicant would revisit the scope for further assessment through the EPP (see **Section 7.4.7**).

7.5.3.2.5 Underwater Noise and Vibration

432. 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 operation and maintenance (O&M) activities.

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

434. 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.

7.5.3.2.6 Electro-Magnetic Field (EMF) Effects

435. 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.

436. 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.

7.5.3.2.7 Introduction of Hard Substrate

437. 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.

7.5.3.2.8 Changes in Fishing Pressure

438. O&M activities associated with the offshore infrastructure could result in changes to fishing activity within the wind farm site 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.

7.5.3.3 Potential Impacts during Decommissioning

439. 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.

440. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-14**).

7.5.4 Potential Cumulative Effects

441. 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 Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

442. 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 wind farm site) or where management measures in place for the Project and other projects will reduce the risk of impacts happening.

443. 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

444. 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 European Economic Area (EEA) Member States to obtain up to date project information to inform the assessment.

445. 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

446. **Table 7-14** 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 7-14 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Fish and Shellfish Ecology

Potential Impact	Construction	Operation	Decommissioning
Temporary habitat loss / physical disturbance	✓	X	✓
Long term habitat loss	X	✓	X
Increased suspended sediment and sediment-redeposition	✓	X	✓
Remobilisation of contaminated sediments if present (cable and foundation installation)	X	X	X
Remobilisation of contaminated sediments if present (HPF intake / outfalls)	✓	✓	✓
Underwater noise and vibration	✓	X	✓
Changes in fishing pressure	✓	✓	✓
EMF effects	X	✓	X
Introduction of hard substrate	X	✓	X
Cumulative impacts	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Transboundary impacts	✓	✓	✓

7.5.7 Approach to Data Gathering

447. As part of the EIA process, the existing environment with respect to fish and shellfish ecology will be described as follows:

- 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.
- 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 six nautical miles.
- Commercial landings data will be supplemented with fisheries-independent scientific trawling data collected by Cefas in the annual North Sea groundfish survey (data which is also found in the ICES International Bottom Trawl Survey (IBTS)). These data overlap the study area and include non-commercial species that are not reported in landings data.
- 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), alongside information on the benthic assemblage in general.

448. **Table 7-15** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 7-15 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)	2022	Details of marine species, biotopes and sensitivity assessments. Broadscale and not specific to the study area.
National Biodiversity Network (NBN) Atlas	2022	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)	2022	A global open-access data source for biological data.
MMO Landings Data (weight and value) by species	2009 to 2021	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)	2022	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)	2022	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.

Data Source	Date	Data Contents
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.

449. 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 7-15** available for this area is 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

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

- NPS EN-1 and EN-3 (including the draft revisions of NPS EN-1 and EN-3) (DECC 2011a; DECC, 2011b; DESNZ, 2023a; DESNZ, 2023b);
- Institute of Environmental Management and Assessment (IEMA): Delivering Proportionate EIA (2017); and
- Chartered Institute of Ecology and Environmental Management (CIEEM): Guidelines for Ecological Impact Assessment (EcIA) (2018).

451. Key receptor groups will be defined (i.e. Atlantic herring and sandeel) and used as the basis for the assessment, with the sensitivity of each receptor group clearly explained within the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

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

453. 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 on fish, larvae and eggs. Hawkins *et al*. (2014) will be used as a basis for a conservative 135dB single-strike sound exposure level (SEL_{SS}) behavioural disturbance threshold in the case of herring only.

454. 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.

455. 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.

456. 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

457. 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

458. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with marine mammals, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

459. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

460. The marine mammals assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (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**; and
- **Chapter 7.8 Commercial Fisheries.**

7.6.1 Study Area

461. 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 below in **Figure 7-14**.

7.6.2 Existing Environment

462. Within the North Sea region, the occurrence of eight different marine mammal species have been identified (Hammond *et al*., 2013; Paxton *et al*., 2016; Hammond *et al*. 2017; Waggitt *et al*. 2019; Special Committee on Seals (SCOS), 2021):

- 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*.

463. 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* (The State of European Cetaceans, 2021; Sea Watch Foundation (SWF), 2023).

464. In the summer of 2022, a large-scale survey of marine mammals studied their distribution and abundance in the North-East Atlantic (SCANS-IV). Results for this survey are not yet compiled but are expected to be published by the end of 2023. Until then, the SCANS-III report will provide data on species considered in this context. The area in which the Project will be situated lies within survey block 0, where harbour porpoise was the most commonly sighted species, followed by minke whale and white-beaked dolphins (Hammond *et al.,* 2017). Within this survey block, harbour porpoise abundance was estimated at 53,485, white-beaked dolphins at 143 and minke whales at 603.

465. Further cetacean distribution maps of the North-East Atlantic, provided by Waggitt *et al*. (2020), 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*., 2020). 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.

466. In recent years an increase in bottlenose dolphins along the coastline of north-east England have been reported (Aynsley, 2017; Hacket, 2022). They have 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). Whilst bottlenose dolphin presence has been increasing in north-east England in recent years, they appear to be a coastal population at present (Hacket, 2022). Thus, bottlenose dolphin will be assessed for any potential impacts within the offshore ECC and at landfall. However, given the distance between the Array Area and the coastline, and that there is no evidence to suggest that this population of bottlenose dolphin use the Array Area further offshore, there is not expected to be any potential for impact to bottlenose dolphin due to activities at the Array Area itself.

467. 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 site and concentrate 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 of 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).

468. The Holderness coast lies just north of the Humber Estuary, in which a survey was carried out for the Humber Offshore Wind Farm. Aerial and vessel-based surveys recorded 78 grey seals and 8 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, 2021).

469. The desk-based findings outlined above are in line with site-specific surveys carried out for Teesside A & B (now known as Dogger Bank C (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 9 individuals.

470. The desk-based findings outlined above are in line with site-specific surveys carried out for offshore Creyke Beck A & B (now known as Dogger Bank A (DBA) and Dogger Bank B (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.

471. Digital aerial surveys of an area encompassing the DBD Project are underway, commencing October 2021 and continuing for a 24-month period to September 2023. Surveys are undertaken using high-resolution camera system 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 to date are harbour porpoise, common dolphin, minke whale and grey seal.

472. 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 six 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 (for activities within the offshore ECC and at landfall only);
- Common dolphin;
- Minke whale; and
- Harbour and grey seal.

7.6.2.1 Management Units

473. The Management Units (MU) for harbour porpoise, bottlenose dolphin, minke whale, white-beaked dolphin, harbour and grey seal (including key haul-out sites) are shown in **Figure 7-14**.

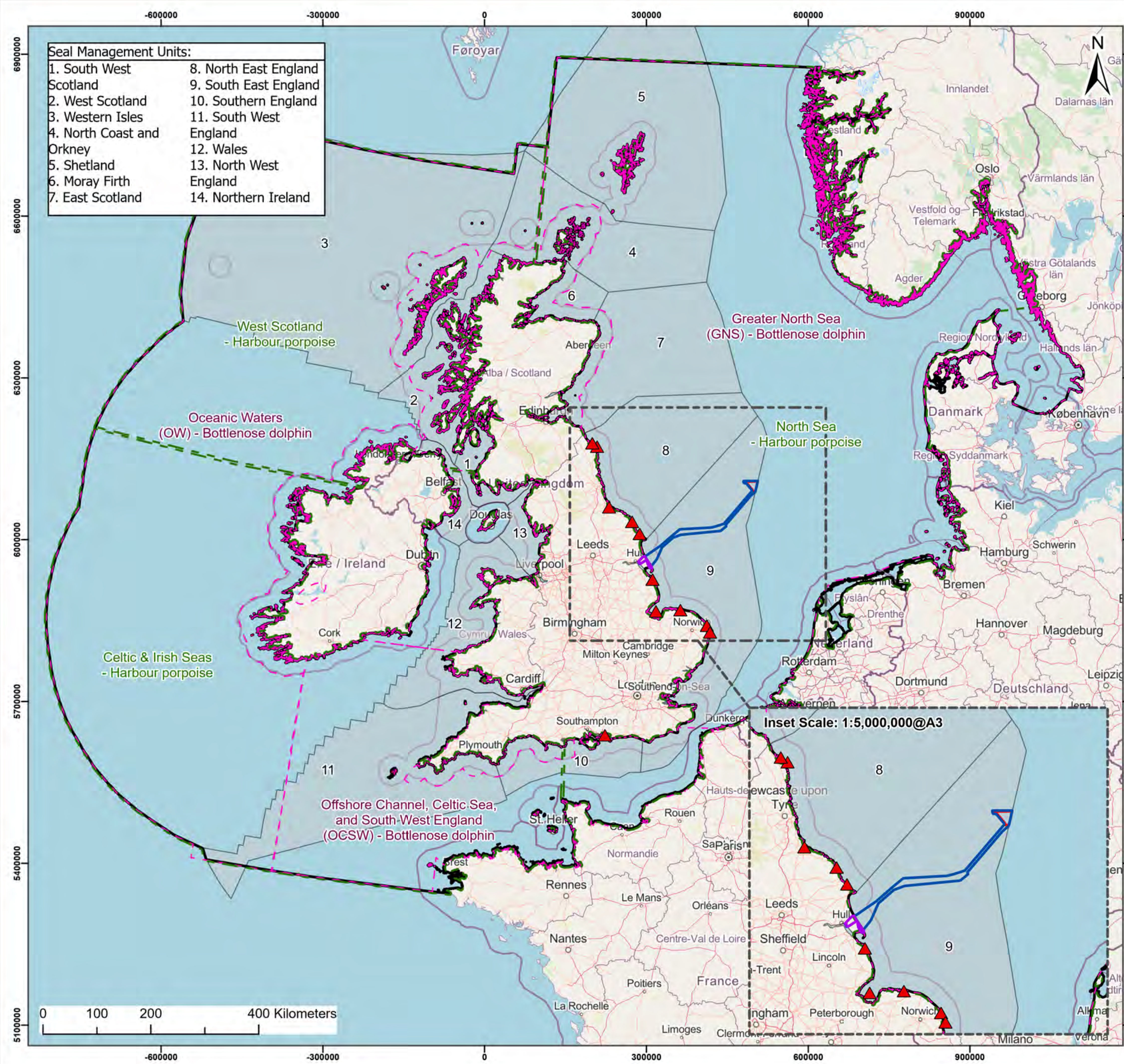
7.6.2.2 Designations

474. 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). The Offshore Scoping Area overlaps with the estuarine designated area, the Humber Estuary SAC, where grey seal are qualifying feature. Within this SAC lies Donna Nook, an important haul-out site (Donna Nook is approximately 21km from the offshore ECC) (**Figure 7-15**).

475. The Wash and North Norfolk Coast SAC lies approximately 60km from the nearest point of the onshore HPF and is designated for harbour seal, with a major haul-out sites, The Wash and Blakeney Point.

476. 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.

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



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Bottlenose dolphin Management Unit
- Harbour porpoise Management Unit
- Common dolphin, White-beaked dolphin, and Minke Whale Management Unit - Celtic and Greater North Seas (CGNS)
- Seal Management Unit
- Seal Haul Out Sites

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Management Units for Marine Mammal Species

Figure: 7-14 Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0073

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:7,000,000
00	08/03/2023	JR	LL	A3	1:7,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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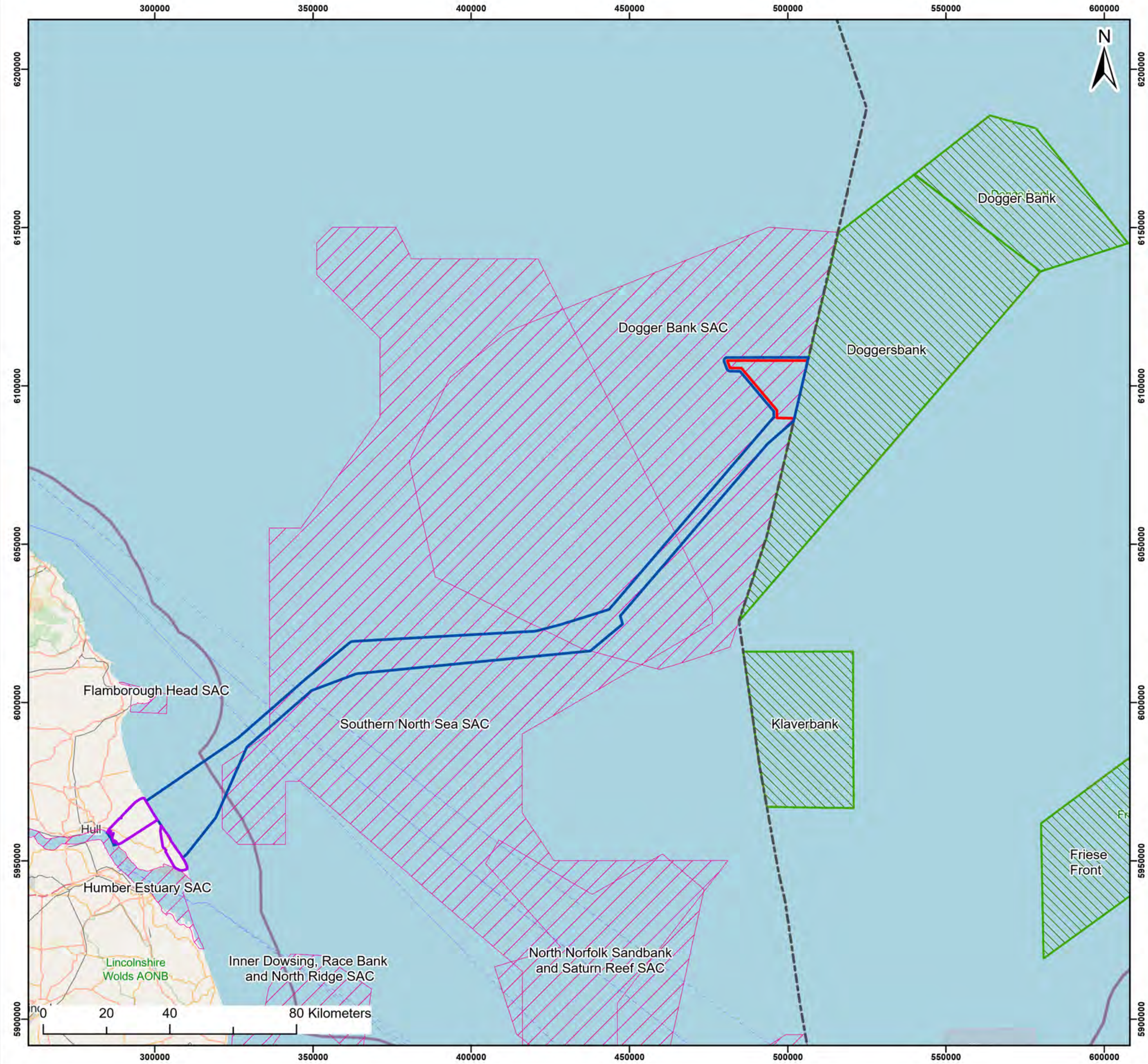

Legend:

- 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

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: UK and Overseas Designated Areas for Marine Mammal Species

Figure: 7-15

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0072

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	08/03/2023	JR	LL	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.6.3 Potential Impacts

7.6.3.1 Potential Impacts during Construction

478. 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 Development Consent Order (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

479. 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.

480. 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.

481. 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. 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 (PTS_{cum})[4]) 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)[5]. This is considered unlikely to be of significant risk to any marine mammal species, and therefore the potential for any auditory injury (PTS or TTS) related to these construction activities has been scoped out of the EIA.

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

[5] 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)

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

482. 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, and these impacts have therefore been scoped into the EIA.

483. 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.

484. 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.

485. 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.

7.6.3.1.1.3 Barrier Effects Due to Underwater Noise

486. 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. 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

487. Disturbance from landfall works, and vessel transits to and from the Project and the local port has the potential to disturb seals at haul-out sites (as shown in **Figure 7-14**), 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.

488. 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

489. 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.

490. 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

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

492. 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 Project Environmental Management Plan (PEMP) for all phases of the Project. These best practice measures are based off existing guidance to reduce collision risk for marine mammals such as the Marine Code of Conduct developed by the SWF[6] and The Scottish Marine Wildlife Watching Code developed by NatureScot[7]. 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 to avoid deliberately approaching marine mammals when sighted;
- Vessels to 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, and Vessel Code of Conduct will be produced and issued;
- The 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.

493. 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, and therefore the increased risk of collision with marine mammals during construction has been scoped out of the EIA.

[6] https://www.seawatchfoundation.org.uk/marine-code-of-conduct/
[7] https://www.nature.scot/sites/the-scottish-marine-wildlife-watching-code

7.6.3.1.5 Changes to Water Quality

494. 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). Therefore, any effects associated with an increase in suspended sediments have been scoped out of the EIA.

495. Potential impacts related to changes in water quality, such as the release of sediment bound contamination or accidental spillages due to the construction of the HPF are scoped in to the EIA specifically for the potential marine construction components of the HPF (e.g. intakes and outfalls) as information on the installation of marine infrastructure and its location is not yet confirmed.

496. However, it is proposed that where these impacts would occur during cable and foundation installation, they are 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.

497. With regards to the potential for accidental spillages, control measures as required under 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

498. 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 operation and maintenance (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

499. 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.

500. O&M activities are expected to be similar to the other construction activities (such as dredging, cable laying, and rock placement). As for other construction activities (see **Section 7.6.3.1.1**), the potential for PTS and TTS has also been scoped out of the EIA for O&M activities and vessel presence.

7.6.3.2.1.2 Behavioural Impacts Resulting from Operational Turbine Noise, O&M Activities and Vessel Noise

501. 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.

502. Potential behavioural impacts from O&M activities have been scoped into the EIA, however are expected to be lower in magnitude than those during construction, due to the absence of pile driving, and fewer vessels required for operation and maintenance (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 7.6.3.1.1.2**.

7.6.3.2.1.3 Barrier Effects Due to Underwater Noise

503. 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

504. 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 in **Figure 7-14**), 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

505. 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

506. As outlined in **Section 7.5.3.2**, the potential impacts on 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.

507. 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

508. It is proposed that the impact of remobilisation of contaminated sediments is scoped in specifically for the potential marine operation components of the HPF. The operation of the HPF may involve the requirement for a discharge of water used in the hydrogen production process and also potentially an intake and offtake system for desalination. The potential effects of discharging and releasing treated water on marine water quality are expected to be highly localised but require assessment within the EIA.

509. Given the low level of sediment contamination in the region demonstrated by other nearby projects, and the very low likelihood 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 operational impacts associated with array infrastructure and export cables (see **Chapter 7.3 Marine Water and Sediment Quality** for further details).

7.6.3.2.5 Physical Barrier Effect

510. The potential for impact from physical barrier effects during operation has been scoped out of the EIA.

511. Monitoring studies at Nysted and Rødsand have also 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 al.,* 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.

512. **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.

513. Effects on harbour porpoise are more difficult to assess as various operational activities may influence the species differently. Teilman & 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).

514. 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.

515. 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 barrier to marine mammal movement, and this potential impact has therefore been scoped out of the EIA.

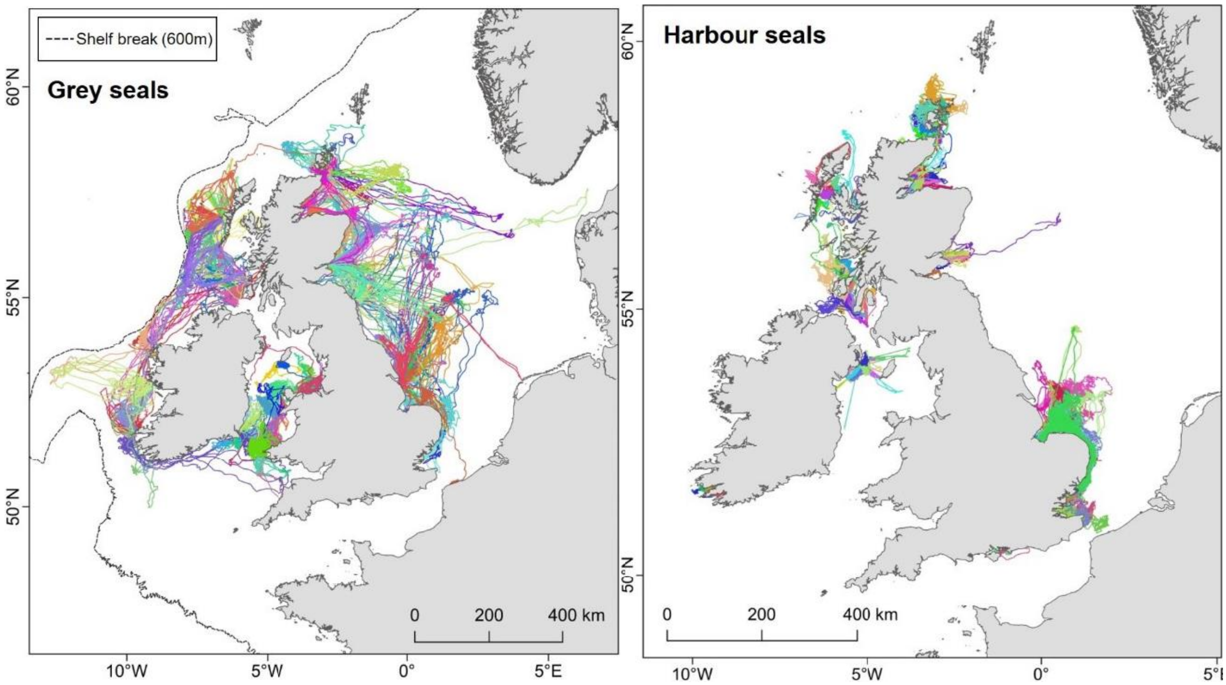

Plate 7-1 Tagged Grey Seal Movements along the East Coast of England (Carter *et al.*, 2020)

7.6.3.2.6 Vessel Interaction

516. As outlined for construction, the increased risk of collision with marine mammals during operation will be scoped out of 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 7.6.3.1.4**, will significantly reduce any potential for marine mammals to collide with vessels during O&M activities.

7.6.3.2.7 Effects from Electro-Magnetic Field (EMF)

517. 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).

518. 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 5uT (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

519. 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.

520. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-16**).

7.6.4 Potential Cumulative Effects

521. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect marine mammals receptors. Therefore, cumulative effects related to marine mammals are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

522. 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).

523. 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

524. There is potential for transboundary effects upon marine mammal receptors due to the Project's construction, O&M and decommissioning activities.

525. There is a significant level of marine development being undertaken or planned by European Economic Area (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

526. **Table 7-16** outlines the marine mammal 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 7-16 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 activities (such as dredging and rock placement) and vessel noise	X	X	X
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)	X	X	X
Changes to prey resource	✓	✓	✓
Changes to water quality	✓ (HPF only)	✓ (HPF only)	✓ (HPF only)
Physical barrier effect	X	X	X
Effects from EMF	X	X	X

Potential Impact	Construction	Operation	Decommissioning
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.6.7 Approach to Data Gathering

527. 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 Project area;
- The reference population of each marine mammal species; and
- Seal haul-out site locations and recent counts.

528. **Table 7-17** 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 7-17 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)[8]	Survey undertaken in Summer 2022	Expectation that the report will include similar data to that of SCANS-III described below.

[8] If available at the time of writing; anticipated publication in Q4 2023 (www.ascobans.org)

Data Source	Date	Data Contents
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.*, 2017)	Survey undertaken in Summer 2016	Density and abundance estimates for cetacean species in the European Atlantic and North Sea.
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	Density and abundance estimates for cetacean species in the European Atlantic and North Sea.
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.
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)	2021	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. Carter *et al.,* 2022; Jones *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, 2022)	Public sightings database (currently available data from September 2022 to March 2023)	Public sightings database, records of marine mammals at locations around the UK.
Management Units for cetaceans in UK waters (Inter-Agency Marine Mammal Working Group (IAMMWG), 2022)	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.

529. The following surveys (**Table 7-18**) are anticipated to be undertaken to inform the assessment.

Table 7-18 Proposed Baseline Surveys for Marine Mammals

Survey	Timing	Spatial Coverage
Digital aerial surveys for offshore ornithology and marine mammals baseline, following the transect methodology	24 months (October 2021 to September 2023)	Array Area plus 4km buffer area

7.6.8 Approach to Assessment

530. 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 in order to quantify the potential impact on the reference populations for marine mammals.

531. 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.

532. 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

533. 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 mammals 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?

7.7 Intertidal and Offshore Ornithology

534. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

535. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

536. 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;** and
- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation.**

7.7.1 Study Area

537. 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 marine areas outside the Offshore Scoping Area where ornithological receptors may potentially face one or more effects from the Project during any development phase, as shown in **Figure 7-16**.

538. The Offshore Scoping Area comprises:

- The Array Area – the area across which the wind turbines are placed, the completed wind farm area;
- The offshore ECC – the actual route of the offshore export cables between the Array Area and the yet to be selected landfall location along the Holderness coast, East Riding of Yorkshire; and
- A small area of intertidal habitat within the Humber Estuary in the vicinity of Saltend.

539. 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 (SNCB) 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[9].
- 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, or 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.

540. In summary, the study area approximately 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, 2022a).

7.7.2 Existing Environment

7.7.2.1 North Sea Seabirds

541. The ongoing digital aerial baseline surveys conducted for the Project to date 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: (Northern) fulmar *Fulmarus glacialis*, (northern) gannet *Morus bassanus*, (black-legged) kittiwake *Rissa tridactyla*, great black-backed gull *Larus marinus*, common gull *Larus canus*, (common) guillemot *Uria aalge*, razorbill *Alca torda*, (Atlantic) puffin *Fratercula arctica*, Arctic tern *Sterna paradisaea* and common tern *Sterna hirundo*;

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[9] 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 the non-breeding season (or wintering period when delineated from migration / passage periods) (Furness, 2015): Fulmar, gannet, great northern diver *Gavia immer*, kittiwake, great black-backed gull, herring gull *Larus argentatus*, common gull, guillemot, razorbill, puffin and velvet scoter *Melanitta fusca*; and

- Seabirds present during passage periods but not during biologically defined migration-free breeding or wintering periods (Furness, 2015): Red-throated diver *Gavia stellata*, Manx shearwater *Puffinus puffinus*, great skua *Stercorarius skua*, Arctic skua *Stercorarius parasiticus* and lesser black-backed gull *Larus fuscus*.

542. These and other seabird and waterbird species recorded across the various seasons during the full programme of baseline surveys will be accounted for during the impact assessment.

543. 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, and the cormorants and gannets, 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).

544. 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 to be 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 are located in England's southern North Sea inshore waters.

7.7.2.2 North Sea Intertidal Birds

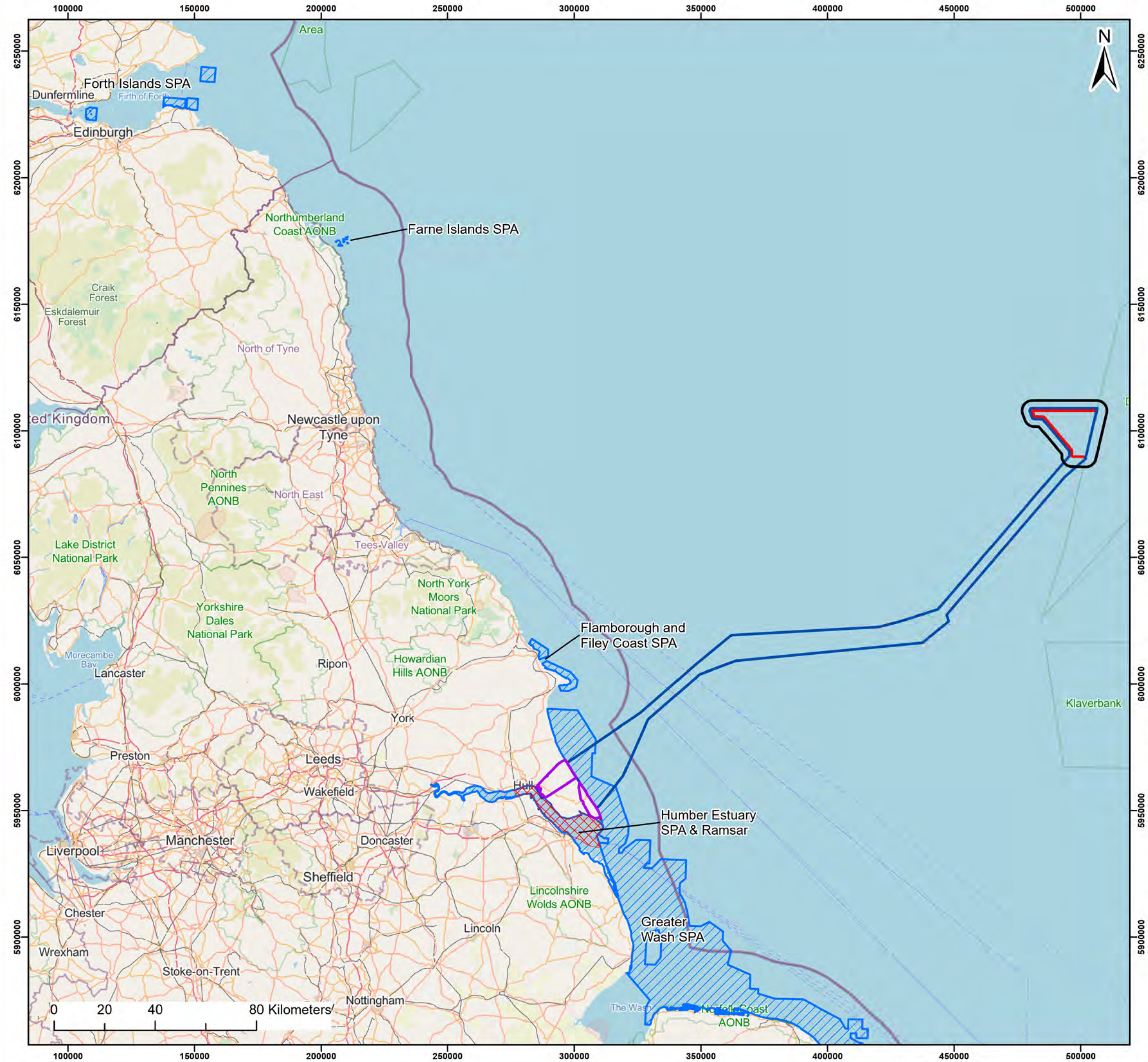
545. The ongoing overwintering bird surveys conducted for intertidal ornithology baseline characterisation for the Project to date indicate that the key species observed in the areas, and therefore of likely concern for the impact assessment are:

- Resting coastal birds: Cormorant *Phalacrocorax carbo* plus gulls including great black-backed gull, herring gull and common gull, generally flying in the intertidal area with some resting ('loafing') behaviour;

- Red-throated diver**;**

- Waterfowl flying through inshore waters**:** eider *Somateria mollissima*, teal *Anas crecca*, mallard *Anas platyrhynchos*, goosander *Mergus merganser*, wigeon *Mareca penelope*, and Brent goose *Branta bernicla*; and

- Wading birds: dunlin *Calidris alpina*, flying in the intertidal area.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Offshore Survey Area (Array Area 4km Buffer)
- Ramsar
- Special Protection Area (SPA)

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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 (Sheet 1 of 2)

Figure:	7-16	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0028		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,500,000
00	09/02/2023	JR	LMF	A3	1:1,500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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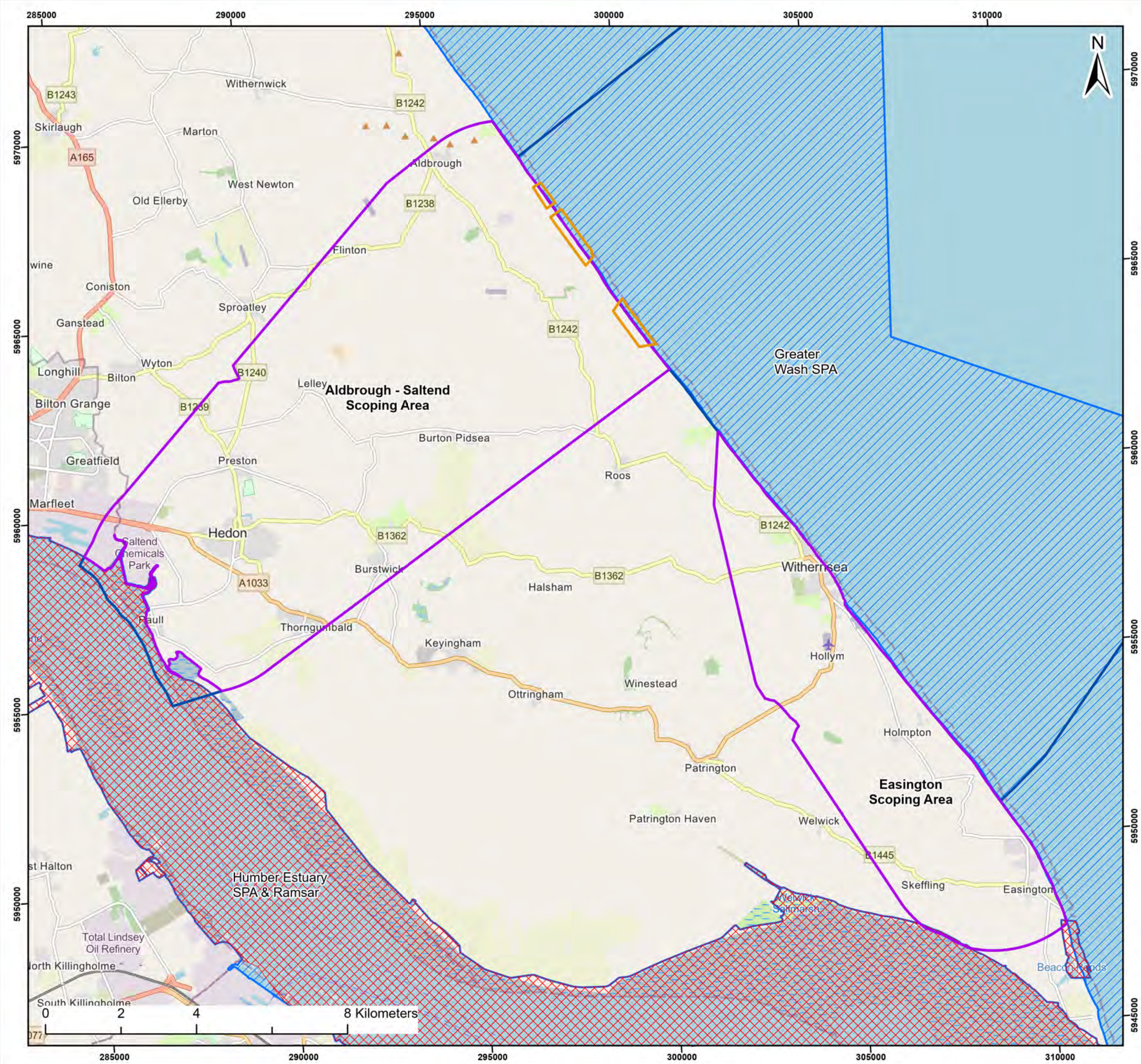

Legend:

- Offshore Scoping Area
- Onshore Scoping Area
- Intertidal Survey Areas (November 2022 - April 2023)
- Ramsar
- Special Protection Area

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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 (Sheet 2 of 2)

Figure:	7-16	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0028		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:100,000
00	09/02/2023	JR	LMF	A3	1:100,000

Co-ordinate system: British National Grid

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546. The North Sea coast of Britain forms part of the east Atlantic flyway for migratory waterbirds (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 Special Protected Area (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 bird species with a range of migratory strategies and timings. The flyway populations of a particular species include different subspecies and breeding populations 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.

547. As a result, the ‘non-breeding’ feature waterbird populations or assemblages 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

548. The widespread distribution of designated and important breeding and wintering populations of seabirds, coupled with the large foraging ranges of many breeding seabirds, means that the ornithological receptor bird species highlighted in previous desk-based scoping studies and baseline surveys for other North Sea offshore wind developments are considered likely to be present / relevant within assessments and surveys for the Project. Table 7-19**Table 7-19** shows the species expected to be present within the Array Area, and indications of their biologically defined seasons in UK waters as identified by Furness (2015).

Table 7-19 Species Expected 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*												

Species	J	F	M	A	M	J	J	A	S	O	N	D
Common gull*												
Common tern												
Fulmar												
Gannet												
Great black-backed gull												
Great skua												
Guillemot												
Herring gull												
Kittiwake												
Lesser black-backed gull												
Little gull *												
Puffin												
Razorbill												
Sandwich tern												

Species	J	F	M	A	M	J	J	A	S	O	N	D
Notes: • Source is Furness (2015) except for species marked * • First row within species: red = full breeding season, white = non-breeding period. • Second row within species: pale blue = migration seasons, dark blue = migration-free breeding season, grey = winter season, white = species considered generally absent from UK waters). • * = following Cramp & Simmons (1983) as for the Preliminary Environmental Information Report (PEIR) for Dudgeon & Sheringham Extensions, as not covered by Furness (2015)												

549. 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 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 formed by these species. This site is 207km at its nearest point from the Array Area and 22.3km at its nearest point from the Project footprint, when including the offshore ECC. Therefore, the footprint is within potential breeding season foraging range of gannet (mean maximum range 315.2km + 1 standard deviation (SD, 194.2km) across studies in Woodward *et al.* (2019)), guillemot (mean maximum range 73.2km + 1 SD (80.5km) across studies in Woodward *et al.* (2019)), razorbill (mean maximum range 88.7km + 1 SD (75.9km) across studies in Woodward *et al.* (2019)) and kittiwake (mean maximum range 156.1km + 1 SD (144.5km) across studies in Woodward *et al.* (2019)) whilst the proposed array is only within the potential foraging range of gannet and kittiwake (Woodward *et al.,* 2019).

- Farne Islands SPA: Qualifying features include breeding Arctic tern, common tern, guillemot, roseate tern *Sterna dougallii*, Sandwich tern *Thalasseus sandvicensis*, and the breeding seabird assemblage (142,490 individual seabirds also including kittiwake, (European) shag *Gulosus aristotelis,* cormorant, and puffin, as well as additional component species fulmar, black-headed gull *Chroicocephalus ridibundus*, great black-backed gull, lesser black-backed gull, herring gull and razorbill as advised by Natural England (Berwick Bank Scoping Opinion, 2022)). This site is 278km at its nearest point from the Array Area and 218km at its nearest point from the Project footprint, when including the offshore ECC. Therefore, the footprint is within potential breeding season foraging range of kittiwake, and puffin (mean maximum range 137.1km + 1 SD (128.5km) across studies in Woodward *et al.* (2019)), whilst the proposed array is only within the potential foraging range of kittiwake alone (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 301km at its nearest point from the Project footprint, when including the offshore ECC. Therefore, both the footprint and the Array Area are within potential breeding season foraging range of gannet alone (Woodward *et al.*, 2019).

550. As a whole, 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 *Melanitta nigra* and little gull *Hydrocoloeus minutus*. The overlap between the SPA and the Offshore Scoping Area as mapped is approximately 167km^2, or 4.7% 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. The breeding features (tern species) of the Greater Wash SPA are designated as such, as 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, Greater Wash SPA is expansive, terns using Greater Wash SPA in the breeding season are likely to use only areas within foraging range of their breeding colonies, and DBD is beyond the species' foraging range (Woodward *et al.* 2019) from the vast majority of designated sites indicated to be linked to Greater Wash SPA at citation (Natural England, 2018a).

551. In summary, in the breeding season only a minority of the Greater Wash SPA citation population of terns are likely to use a given sea area such as the overlap with the DBD footprint, and only a subset of these terns is expected to be linked to a designated site. During migration periods, terns may show wider utilisation of the SPA area as they are not undertaking central place foraging as during breeding – however, terns in this period will be transient and dispersed. The impact assessment will consider potential for barrier effects, disturbance and displacement effects, and changes to prey availability, on qualifying feature species of Greater Wash SPA.

7.7.2.4 Indicated Intertidal Ornithology Receptors

552. On the basis of the project location and the assessments undertaken for earlier projects in the Dogger Bank 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).

553. The Offshore Scoping Area overlaps with the Greater Wash SPA which includes within its boundary ‘intertidal mudflats and sandflats’ (Joint Nature Conservation Committee (JNCC), 2020). Among qualifying features of the SPA, tern species may use intertidal areas for foraging or resting. From examination for Dogger Bank C (DBC), intertidal-foraging common tern of overlapping designated sites were the subject of HRA re-assessment due to SPA boundary change. However, the Applicant and Natural England both concluded no Likely Significant Effect, based on species- and site-specific data. Natural England will be consulted in the first instance to confirm what survey or desk-based evidence will be required to confirm that terns of Greater Wash SPA, or other intertidal birds of conservation concern, do not utilise for foraging any intertidal habitats subject to permanent or temporary habitat loss to the Project.

554. The Offshore Scoping Area overlaps with the Humber Estuary SPA and Ramsar site at Saltend. At this location, the Project entails potential marine outfalls / intakes for the HPF. Project activities therefore have potential to impact intertidal ornithology receptors. SPA qualifying features are breeding avocet *Recurvirostra avosetta*, bittern *Botaurus stellaris*, little tern, marsh harrier *Circus aeruginosus*, plus non-breeding avocet, bar-tailed godwit *Limosa lapponica*, bittern, black-tailed godwit *Limosa limosa islandica*, dunlin, golden plover *Pluvialis apricaria*, hen harrier *Circus cyaneus*, knot *Calidris canutus*, redshank *Tringa totanus*, ruff *Philomachus pugnax*, shelduck *Tadorna tadorna* and the non-breeding waterbird assemblage. Ramsar qualifying features are the non-breeding waterbird assemblage under Ramsar criterion 5, and wintering shelduck, golden plover, knot, dunlin, black-tailed godwit, bar-tailed godwit, and redshank under Ramsar criterion 6.

555. The impact assessment will consider the potential for direct habitat loss, disturbance and displacement, and changes to prey availability on intertidal birds due to Project activities at Saltend during construction, operation of the site including the intake and outflow, and decommissioning phases. Sites reported by Natural England (2021) Conservation Advice for Marine Protected Areas to host breeding populations of breeding avocet, bittern and marsh harrier features of the SPA are located in the inner or mid estuary, at significant distance (more than 10km) from Saltend where the Project infrastructure is located. Sites reported to host breeding populations of little tern are located in sea-coastal areas of the SPA also at significant distance (more than 10km) from Saltend.

556. A figure showing the Offshore Scoping Area and potentially relevant SPAs and Ramsar sites is presented in **Figure 7-16**.

7.7.3 Potential Impacts

7.7.3.1 Potential Impacts during Construction

7.7.3.1.1 Direct Habitat Loss

557. Construction activities have the potential to cause the loss, alteration or damage to important supporting habitats for birds. Works at the landfall location could affect intertidal foraging, roosting or nesting habitats for intertidal ornithology receptors. No direct habitat loss for offshore ornithological receptors is predicted. Indirect habitat loss for offshore ornithology is considered as displacement (**Section 7.7.3.1.2**), whilst direct habitat loss for prey species will be considered under **Section 7.7.3.1.4**. Therefore direct habitat loss for intertidal receptors is scoped into the EIA, but scoped out for offshore ornithology receptors.

7.7.3.1.2 Disturbance and Displacement

558. 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 infrastructure at the Array Area and the offshore ECC. Construction activities including mechanical cutting, piling and Horizontal Directional Drilling (HDD) produce noise above water (i.e. airborne noise), underwater noise and visual imposition, which can directly disturb or displace bird species from otherwise suitable habitat. Displaced birds can enter habitats with different quality for foraging, and different densities of competitors of their own or different species, potentially leading to mortality in some individuals. Direct disturbance and displacement of intertidal and offshore ornithology receptors during construction of the Array Area and offshore ECC is therefore scoped into / out of 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, 2018b; Vattenfall, 2019).

- Offshore export cable construction: Assessment of displacement concerning construction in the offshore ECC will be quantitative for divers and auks (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). Assessment of displacement on other species due to construction works in the offshore ECC will be qualitative within the EIA.

- Construction vessel movements: Assessment will include consideration of embedded mitigation measures to reduce the potential for impacts on intertidal and offshore ornithology. 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 Management Plan (VMP) is considered a relevant embedded mitigation measures for assessing this impact.

    - Offshore receptors – Potential disturbance and displacement effects on offshore ornithology receptors from vessel movements during construction will be considered within the assessments for ‘Array construction’ and ‘Export cable construction’ displacement. Sensitivity of birds to disturbance and displacement in the offshore environment has been previously compared and scored with regard to shipping and offshore wind industry activities (Schwemmer *et al.,* 2011; Fliessbach *et al.,* 2019; Mendel *et al.,* 2019). Scoters and divers are reported to be among the most sensitive species regarding offshore vessel disturbance, while terns and gulls are reportedly among the least sensitive. Direct disturbance and displacement of offshore receptors by vessel movements associated with construction of the Array Area and offshore ECC, is therefore scoped into the EIA.

- Intertidal receptors – The nearshore routes of vessel movements to and from the Offshore Scoping Area are not considered to have potential disturbance impact on intertidal ornithology receptors (such as wading birds and specifically high tide roosting aggregations), as they will not be of appropriately small size or low draught to make sufficiently close approaches to intertidal ornithology receptors. Direct disturbance and displacement of intertidal receptors by vessel movements associated with construction of the Array Area and offshore ECC, is therefore scoped out of the EIA.

- Landfall and intertidal construction: Construction of the offshore export cables within the offshore ECC including landfall, and construction of the marine outfalls / intakes for the HPF in the nearshore environment, as considered for the Offshore Scoping Area, also carry potential risk of disturbance and displacement to intertidal ornithology receptors. Disturbance due to visual presence of plant, vessels or workers in the intertidal area, or airborne noise, can displace birds from sites they would otherwise use for foraging, or resting including in high tide roosts that can involve significant aggregations of birds and bird species. 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. Direct disturbance and displacement of intertidal ornithology receptors plus red-throated diver during landfall and intertidal construction is therefore scoped into the EIA. Assessment of construction phase displacement of intertidal receptors concerning the cable landfall and marine outfall / intake system, will be both quantitative and qualitative.

7.7.3.1.3 Accidental Pollution

559. As accidental pollution during construction is scoped out of the EIA for marine water and sediment quality (see **Section 7.3.3.1**), 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 Project Environmental Management Plan (PEMP), including the 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.

7.7.3.1.4 Changes to Prey Availability

560. Indirect impacts on birds through changes in habitat or prey availability are possible and will also be considered. Construction activities including vessel movements in and adjacent to the Offshore Scoping Area, mechanical cutting, trench excavation and piling produce noise and / or vibration and sediment suspension, which can 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. Changes to prey availability during the construction phase are therefore scoped into the EIA.

7.7.3.2 Potential Impacts during Operation

561. Potential direct impacts on intertidal and offshore ornithology receptors during operation will result from the presence of wind turbines and offshore infrastructure, as well as from operation and maintenance (O&M) activities. Displacement and barrier effects of seabirds in relation to potential effects associated with the Array Area will be considered together, whilst barrier effects in relation to migratory waterbirds will be considered separately.

7.7.3.2.1 Direct Habitat Loss

562. As for construction, the maintenance of wind farm infrastructure has the potential to affect, alter or damage supporting habitats for birds. Maintenance of cable infrastructure at the landfall location has the potential to affect supporting habitats for intertidal ornithology receptors. However, no direct habitat loss for offshore ornithological receptors is predicted. Indirect habitat loss for offshore ornithology is considered as displacement (**Section 7.7.3.2.3**), whilst direct habitat loss for prey species will be considered under **Section 7.7.3.2.5**.

563. Therefore, direct habitat loss on intertidal ornithology receptors during operation and maintenance is scoped into the EIA and out of the EIA for offshore ornithology receptors respectively.

7.7.3.2.2 Collision Risk

564. 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.

565. 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 at greatest risk of collision with wind turbines due to the high frequency with which they fly at the height of the rotor swept area. 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 in line with standard practices in UK offshore wind assessments (Band, 2012; McGregor *et al.,* 2018; Natural England, 2022), and any relevant updated guidance, should this become available. Collision risk impacts to gulls, skuas and gannet are scoped in for detailed assessment as highest risk taxonomic groups.

566. Migratory movements of waterbirds, taking place typically twice per year (respectively, inbound and return) will also be considered via the position and size of the Array Area and application of the migratory Collision Risk Model and the British Trust for Ornithology (BTO) Strategic Ornithological Support Services – Migration Assessment Tool (SOSS-MAT) (Wright *et al.,* 2012), and any relevant updates. Collision risk to migratory waterbirds is currently scoped into the EIA.

7.7.3.2.3 Disturbance and Displacement

567. Direct disturbance and displacement of intertidal and offshore ornithology receptors during operation is scoped into / out of the EIA, as detailed below:

- Operation and maintenance (O&M) within the Array Area: Displacement can lead to birds having to use habitats with lower foraging potential (e.g. due to reduced prey availability or increased competition), potentially affecting energetic budgets and leading to mortality in some individuals. Disturbance and displacement from the Array Area (and appropriate surrounding buffer[10]) due to the presence of the wind turbines will be assessed using the matrix-based approach (UK SNCB, 2022; Natural England 2022a). 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 7.7.3.2.6**). In addition, O&M activities may also be a source of noise or visual disturbance (e.g. from vessel traffic) and may also lead to displacement. O&M activities within the Array Area will be considered as part of the impact of the presence of the operational wind farm. In summary, direct disturbance and displacement of birds due to wind turbines and O&M activities within the Array Area is scoped into the EIA.
    - Species for which displacement effects due to presence of the array and associated O&M activities will be assessed include divers, gannet, guillemot, razorbill and puffin, including consideration within this that the extent to which a species may be displaced and the predicted mortality due to displacement are both considered to be variable between species.

[10] 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).

- O&M activities within the offshore ECC: It is considered that O&M activities on the offshore ECC would be infrequent, temporary and localised, and unlikely to result in detectable effects on offshore ornithology receptors at either the local or regional population level. Therefore, disturbance and displacement impact on offshore ornithology receptors due to O&M activities within the offshore ECC is scoped out of the EIA.

- O&M activities at landfall and within the intertidal area**:** Maintenance of the offshore ECC including landfall (i.e. using plant for maintenance in intertidal areas) also carries potential risk of disturbance to both intertidal and offshore (e.g. red-throated diver) ornithology receptors, similar to the impacts described for construction activities (see **Section 7.7.3.1.2**). Therefore, disturbance and displacement of intertidal ornithology receptors (plus red-throated diver) due to O&M activities at landfall and within the intertidal area is scoped into the EIA.

7.7.3.2.4 Accidental Pollution

568. As accidental pollution during operation is scoped out of the EIA for marine water and sediment quality (see **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 adhere to PEMP, including the 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.

7.7.3.2.5 Changes to Prey Availability

569. O&M activities can also indirectly cause displacement of birds through disturbance and displacement of prey fish or invertebrate species from an area or reducing the availability or accessibility of prey still present by removing or altering foraging habitat structure or increasing turbidity of the water column through altering sediment deposition rates. Operational offshore wind farms may also act as fish aggregation sites which could improve prey availability for some seabird species Therefore, changes to prey availability during the operation phase is scoped into the EIA.

7.7.3.2.6 Barrier Effects

570. Operational wind turbines can result in birds perceiving the turbine array as an obstruction and altering their flight paths to circumvent it. The potential consequences of such effects on seabirds may be greatest during the breeding season, when (as central place foragers) they are frequently commuting between the nesting colony and foraging areas to feed chicks. In such circumstances, barrier effects may substantially increase flight times and increase energy expenditure, potentially leading to impacts on survival rates or breeding productivity. For the seabird species, the impacts from barrier effects are assumed to be encompassed within the assessment of displacement due to the presence of wind turbines during operation (and as determined using the matrix approach (UK SNCB, 2017)).

571. 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. Potential impact of barrier effects on seabirds and migrant birds were previously assessed for the same array area within the Dogger Bank Teesside A & B Environmental Statement (ES), and impacts were concluded to range from ‘minor adverse’ for kittiwake, guillemot, fulmar, gannet and razorbill and all migrant birds, to 'no impact’ for remaining species (Forewind, 2014). On the basis that the Array Area occupies the same sea area and will not be expanded beyond the area covered in the previous assessment, barrier effects on intertidal and offshore ornithology receptors due to presence of wind turbines during the operation phase is therefore scoped out of the EIA.

7.7.3.2.7 Entrapment and / or Entrainment of Prey at Marine Outfall / Intake Locations for the HPF

572. The scope for the HPF includes potential seawater intake and desalination to be used in the hydrogen production, plus potential for output of brine into marine environment. Following previous assessments for seawater intake of facilities such as Sizewell C (Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2021) and Pembroke Power Station (Jacobs UK Ltd, 2016), the potential for entrapment and / or entrainment of marine prey of birds during the operation phase is scoped into the EIA.

7.7.3.3 Potential Impacts during Decommissioning

573. 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 impact on birds through potential disturbance to prey species.

574. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-20**).

7.7.4 Potential Cumulative Effects

575. 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 Cumulative Effects Assessment (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, 2022a).

576. The CEA will consider cumulative displacement / barrier effects and collision risk due to the presence of offshore infrastructure when considered alongside other projects.

7.7.5 Potential Transboundary Effects

577. 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.

578. Examples are SPAs in Ireland, France, the Netherlands and potentially other countries which include Manx shearwater, fulmar, 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.

7.7.6 Summary of Scoping Proposals

579. **Table 7-20** 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 Evidence Plan Process (EPP) and other consultation activities and as additional project information and site-specific data become available.

Table 7-20 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Intertidal and Offshore Ornithology

Potential Impact	Type of Ornithology Receptor	Construction	Operation	Decommissioning
Direct habitat loss	Offshore ornithology receptors	X	X	X
	Intertidal ornithology receptors	✓	✓	✓
Direct disturbance and displacement due to work activity in the Array Area (e.g. presence and movements of vessels and other plant, lighting of work activity)	Offshore ornithology receptors only	✓	✓	✓
Direct disturbance and displacement due to work activity in the offshore ECC	Offshore ornithology receptors only	✓	X	✓

Potential Impact	Type of Ornithology Receptor	Construction	Operation	Decommissioning
Direct disturbance and displacement due to nearshore vessel movements	Intertidal ornithology receptors only (Offshore receptors considered within 'work activity' in offshore areas above)	X	X	X
Direct disturbance and displacement due to work activity at landfall and within the intertidal area	Intertidal ornithology receptors plus red-throated diver (offshore ornithology receptor)	✓	✓	✓
Direct disturbance and displacement due to presence of wind turbines and other offshore infrastructure	Offshore ornithology receptors only (red-throated diver, gannet, auks)	X	✓	X
Barrier effect due to presence of wind turbines and other offshore infrastructure	Offshore and intertidal ornithology receptors (including migratory waterbirds)	X	X	X
Accidental pollution	Offshore and intertidal receptors	X	X	X
Changes to prey availability	Offshore and intertidal receptors	✓	✓	✓
Collision risk	Offshore ornithology receptors (gulls, skuas, gannet) and intertidal ornithology receptors (including migratory waterbirds).	X	✓	X
Entrapment and / or entrainment of Prey at marine outfall / intake locations for the HPF	Offshore ornithology receptors only	X	✓	X
Cumulative impacts	Offshore and intertidal receptors	✓	✓	✓
Transboundary impacts	Offshore ornithology receptors only	✓	✓	✓

7.7.7 Approach to Data Gathering

580. 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 will be established through a programme of monthly digital aerial surveys of the Array Area plus a 4km buffer (as per Natural England, 2022b), over a 24-month period. The survey programme commenced in October 2021 and is due to conclude 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 of intertidal areas relevant to landfall or other intertidal construction for DBD, over two winter periods. The survey programme commenced in November 2022 and is due to conclude in spring 2024. The survey area as defined for site-specific surveys for characterising the intertidal ornithology baseline of the Project from November 2022 to April 2023 is shown in **Figure 7-16**. These intertidal survey sites were identified and surveyed as intertidal locations of key importance to the Aldbrough – Saltend Scoping Area. However, if necessary, surveys at additional locations may commence in winter 2023 / 2024 to capture the baseline intertidal ornithology for other parts of the Onshore Scoping Area based on final project design; and

- Peak abundances, foraging locations and roost locations of intertidal birds will be identified for use in assessing risk of disturbance from activities and vessel movements associated with the Project.

581. 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 7-21** 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.

582. 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.

Table 7-21 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.
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.
Avian stochastic collision risk model (MacGregor *et al.,* 2018)	2018	Collision risk modelling tool incorporating stochasticity in model parameters.

Data Source	Date	Data Contents
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 Birds Survey (WeBS) report online and data (Frost *et al*., 2021)	2021	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
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 Monitoring Programme Database (JNCC, BTO)	2022	Seabird population estimates (regional, national, SPA, colonies)
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

Data Source	Date	Data Contents
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)
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

583. The following surveys are anticipated to be undertaken to inform the assessment. Surveys will be undertaken in accordance with Overarching National Policy Statement (NPS) for Energy (EN-1) and NPS for Renewable Energy Infrastructure (EN-3) and agreed in advance with Natural England where required. **Table 7-22** outlines the proposed baseline surveys to be carried out.

Table 7-22 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	Array Area plus 4km surrounding buffer areas
Land-based surveys of intertidal ornithology baseline, following adapted British Trust for Ornithology (BTO) Wetland Birds Survey (WeBS) methodology	Two full winter seasons each comprising six visits, each visit surveying during low, mid and high tide, each for at least 1.5 hours.	Intertidal survey area which is representative in terms of habitat structure and baseline disturbance levels from anthropogenic, biotic and physical factors, and has extent of area exceeding any proposed landfall footprint, i.e. incorporates buffer area. Undisturbed by observer.

7.7.8 Approach to Assessment

584. 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 SNCB, 2014; Natural England, 2022a). 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.

585. 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.

586. With respect to the assessment that will be undertaken for the Project, the generic flight height data (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).

587. 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 7-20**Table 7-20.

588. 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.

589. 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.

7.7.9 Scoping Questions to Consultees

590. 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

591. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with commercial fisheries, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

592. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

593. The commercial fisheries assessment covers fishing activity that is legally undertaken in which the catch is sold for taxable profit.

594. The commercial fisheries assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

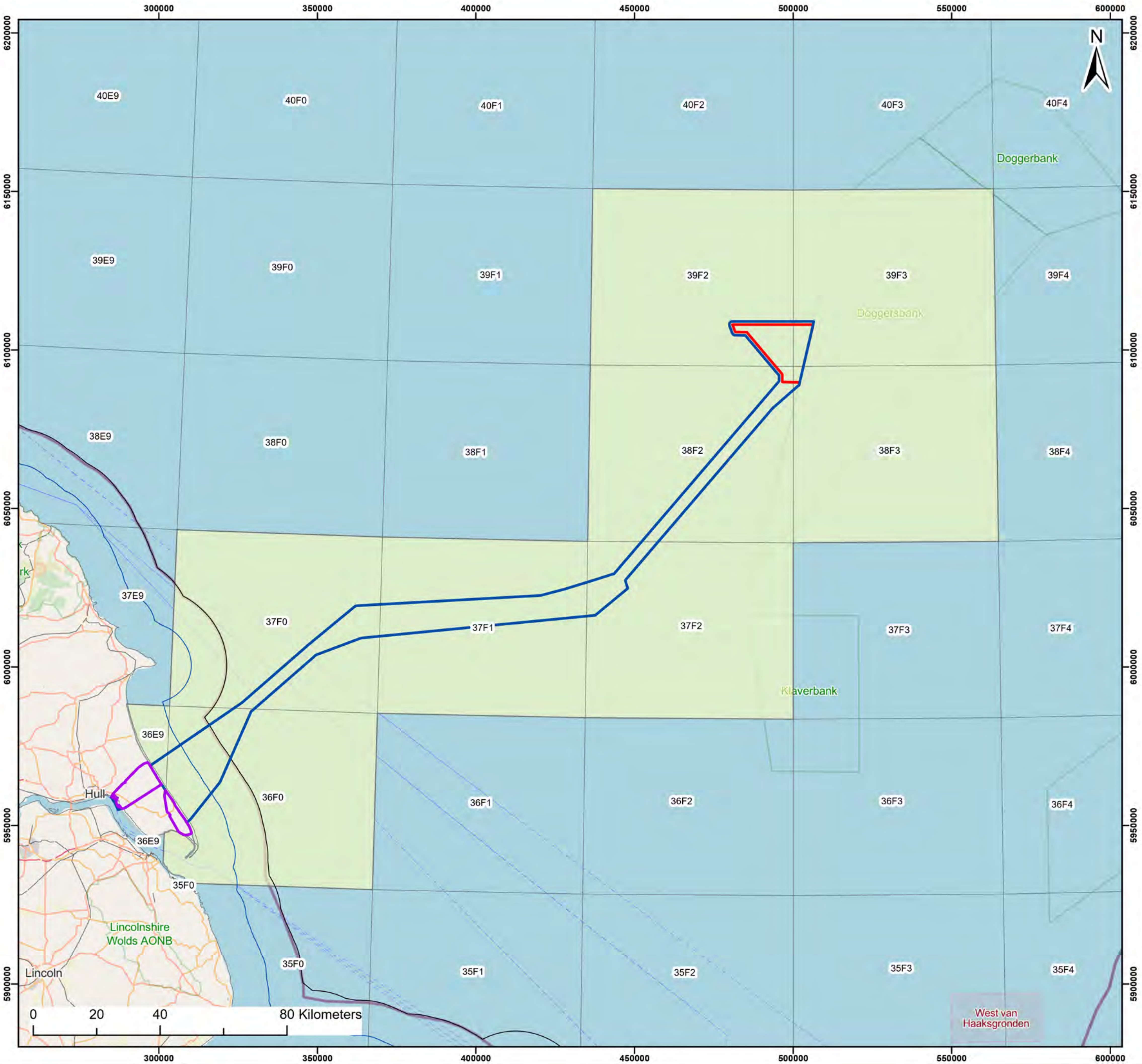
- **Chapter 7.5 Fish and Shellfish Ecology;**
- **Chapter 7.9 Shipping and Navigation;**
- **Chapter 7.13 Other Marine Users.**

7.8.1 Study Area

595. 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[11], within UK Exclusive Economic Zone (EEZ) waters, with the Array Area and large portion of the offshore ECC located outside of the 12 nautical mile (nm) 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.

596. 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 seven 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 ICES rectangles 36E9, 36F0, 37F0, 37F1, 37F2, 38F2, 38F3, 39F2 and 39F3. The study area is shown in **Figure 7-17**.

[11] 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:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Commercial Fisheries Study Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm Limit

Source: © Haskoning DHV UK Ltd, 2023; Contains OS data © Crown copyright and database rights, 2023; © ICES Spatial Facility, ICES, Copenhagen, 2023; © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM
Title: Commercial Fisheries Study Area	
Figure: 7-17	Drawing No: PC3991

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	07/02/2023	FN	SM	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.8.2 Existing Environment

7.8.2.1 Baseline Data

597. An initial desk-based review of literature and data sources was undertaken to support this scoping exercise, as presented in **Table 7-23** below. Additional data sources that will be used to inform the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) are identified in **Table 7-25** further below.

Table 7-23 Commercial Fisheries Scoping Exercise Data Sources

Data Source	Summary	Spatial Coverage in Relation to the Project
Landings statistics for the period 2017 to 2021. 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 ≥12 m 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.

Data Source	Summary	Spatial Coverage in Relation to the Project
Fishing vessel route density data, for 2021. 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.

598. It should be noted that the quantitative datasets identified in **Table 7-23** 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) and 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.

599. 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. 2017 to 2021), 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.

600. 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 1 January 2021. The TCA sets out fisheries rights and confirms that from 1 January 2021 and during a transition period until 30 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 6 to 12 nm, where historic rights allow access by the fishing fleets of authorised EU Members States.

601. 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.

602. 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

603. Landings from the study area by UK-registered vessels had an average value of £22.3 million across the period 2017 to 2021 (MMO, 2023). **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 and 37F0, within which the western portion of the offshore ECC is located. Landings from ICES rectangle 36F0 account for 52% of the total value of UK landings from the study area, and landings from rectangle 37F0 account for 25% of the total value. Across the 2017 to 2021 time period, UK landings showed a slight year-on-year decline between 2017 and 2020, increasing in 2021.

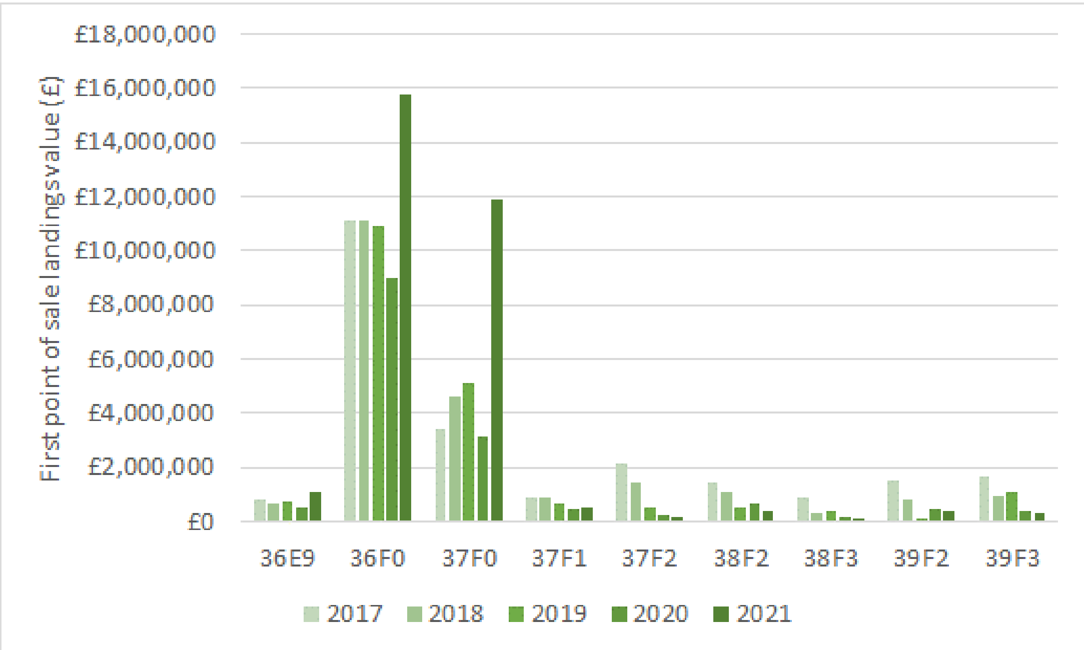


Plate 7-2 Annual Landings Value (£) by UK-Registered Vessels from the Commercial Fisheries Study Area, by ICES Rectangle, between 2017 and 2021 (MMO, 2023)

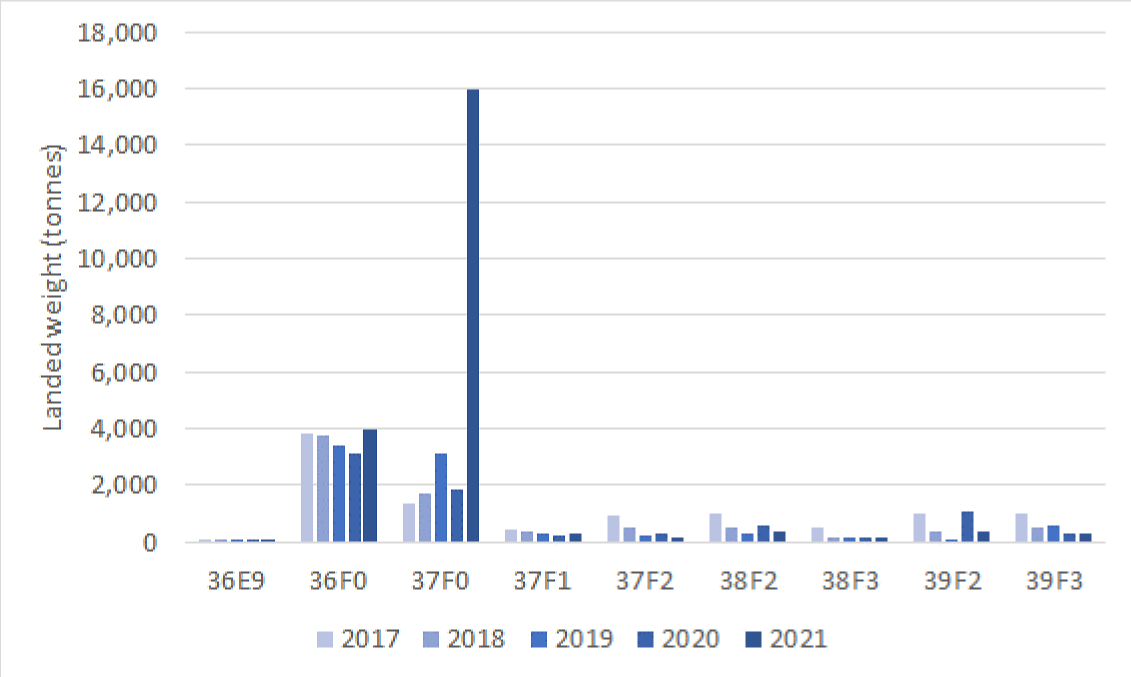


Plate 7-3 Annual Landings Weight (Tonnes) by UK-Registered Vessels from the Commercial Fisheries Study Area, by ICES Rectangle, between 2017 and 2021 (MMO, 2023)

604. **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*, Nephrops *Nephrops norvegicus* and whelks *Buccinum undatum*, account for almost 75% of total landings from the study area by value. Between 2017 and 2020, landings of shellfish displayed annual decline, but increased notably in 2021. Landings of shellfish from the study area are most significant in terms of value from inshore ICES rectangles 36F0 and 37F0.

605. Landings of demersal fish species, including plaice *Pleuronectes platessa*, turbot *Scophthalmus maximus* and lemon sole *Microstomus kitt*, account for approximately 16% 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.

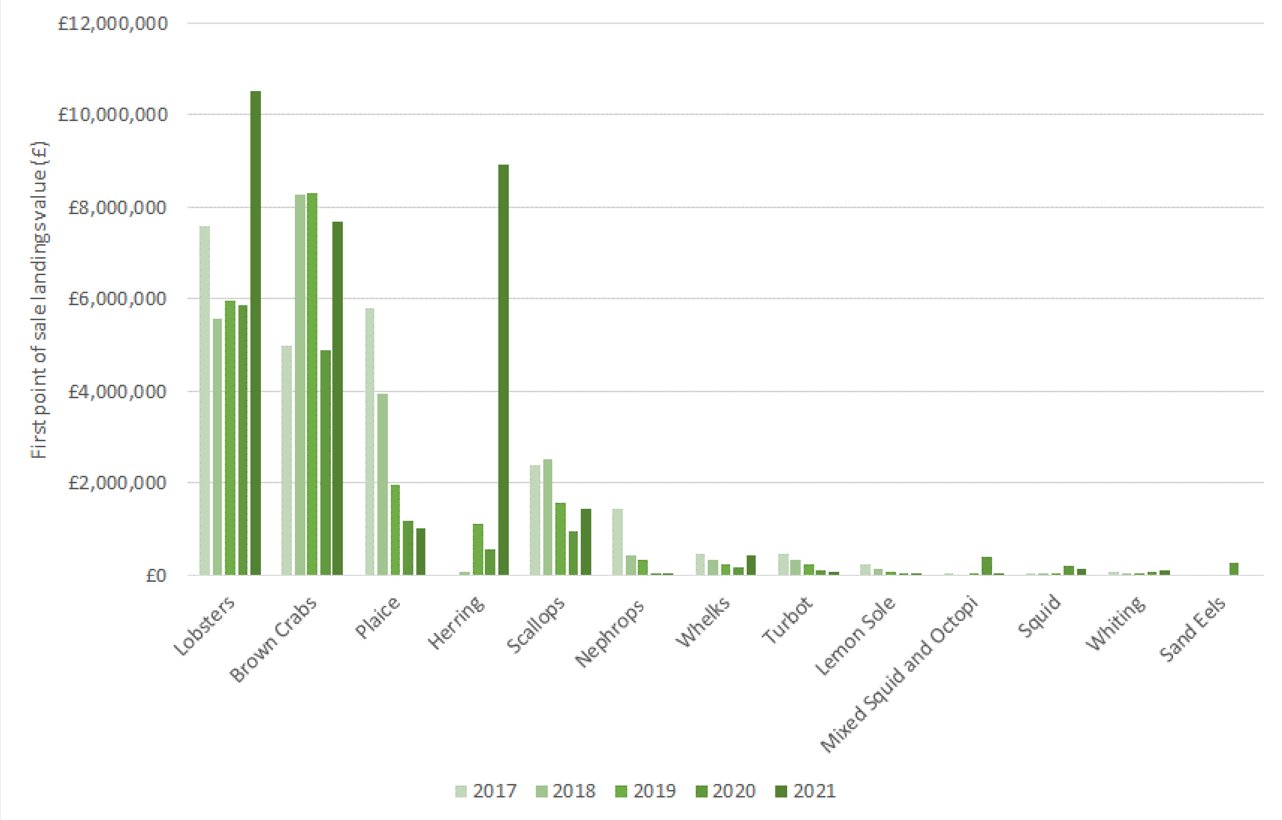


Plate 7-4 Annual Landings Value (£) by UK-Registered Vessels from the Commercial Fisheries Study Area, by Key Species, between 2017 and 2021 (MMO, 2023)

606. **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 2017 to 2021 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 not in previous years within the study period.

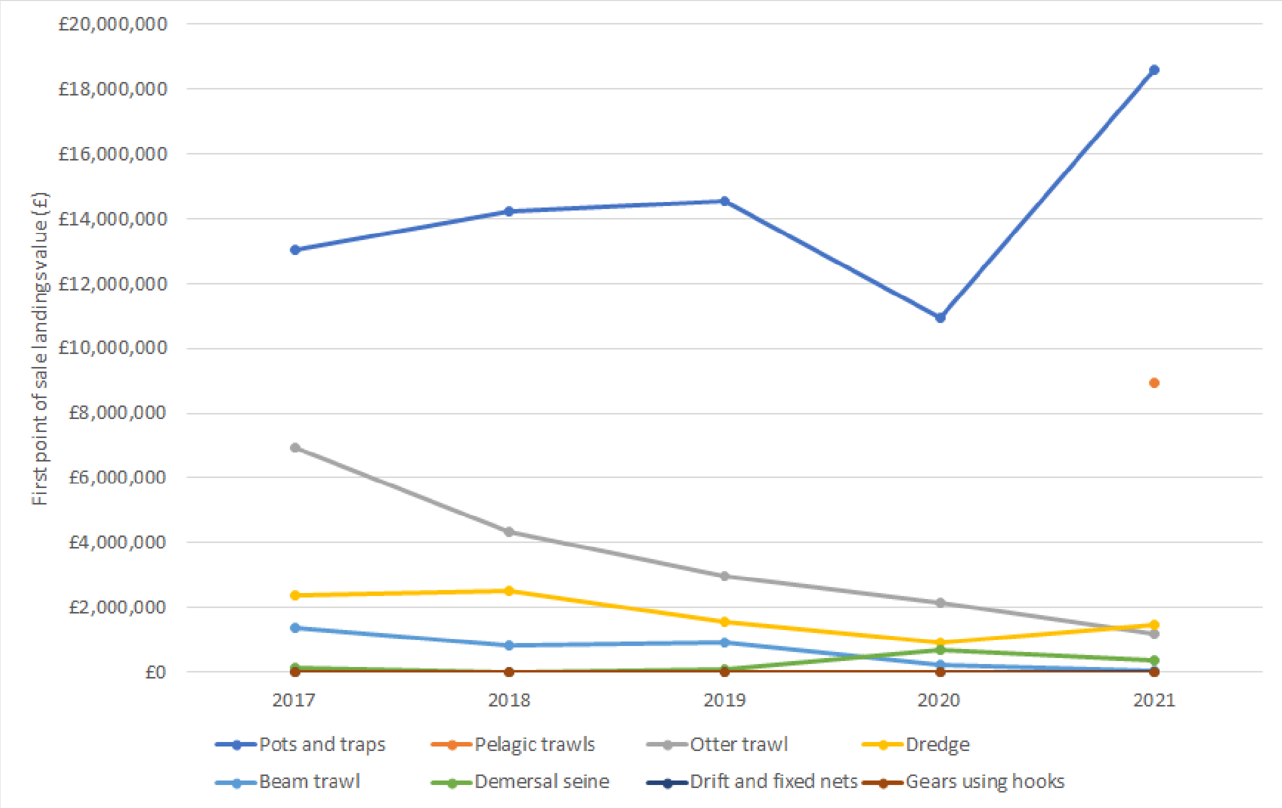


Plate 7-5 Annual Landings Value (£) by UK-Registered Vessels from the Commercial Fisheries Study Area, by Key Fishing Gear, between 2017 and 2021 (MMO, 2023)

607. Landings data indicates that across the 2017 to 2021 period, and across the study area, English-registered fishing vessels accounted for approximately 76% of total landings, with Scottish-registered vessels accounting for 23%. Vessels accounting for the majority of landings by both weight and were within the following vessel length categories: over 40m, 24 to 40m, and 12 to 15m. Key UK ports receiving landings from the study area include Bridlington, Grimsby, Peterhead and Hornsea. Non-UK ports including Floro (Norway), and Harlingen (Netherlands) also receive landings from the study area.

7.8.2.2.1.2 EU Fishing Activity

608. 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.

609. **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 12 nm limit. **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.

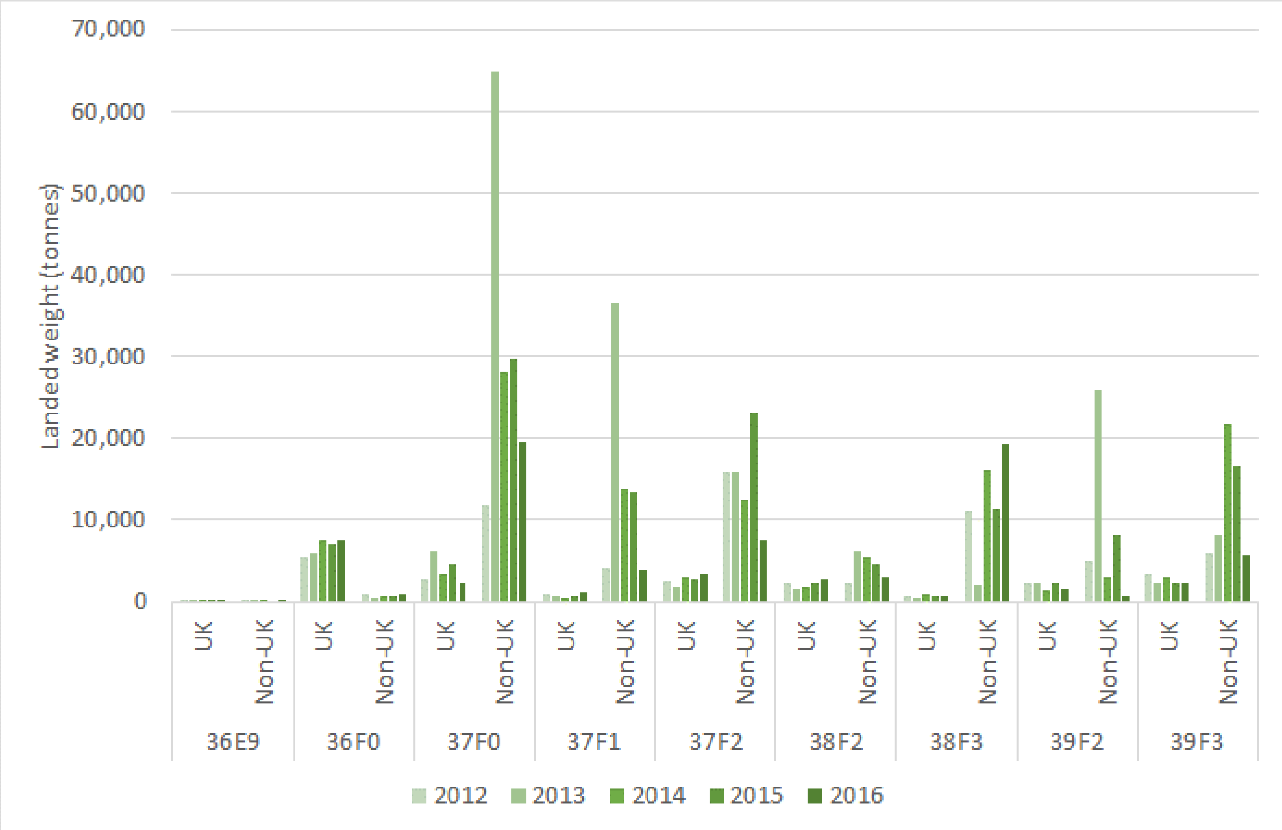


Plate 7-6 Landed Weight (Tonnes) by UK and Non-UK Vessels from the Commercial Fisheries Study Area, by ICES Rectangle, between 2012 and 2016 (EU DCF, 2023)

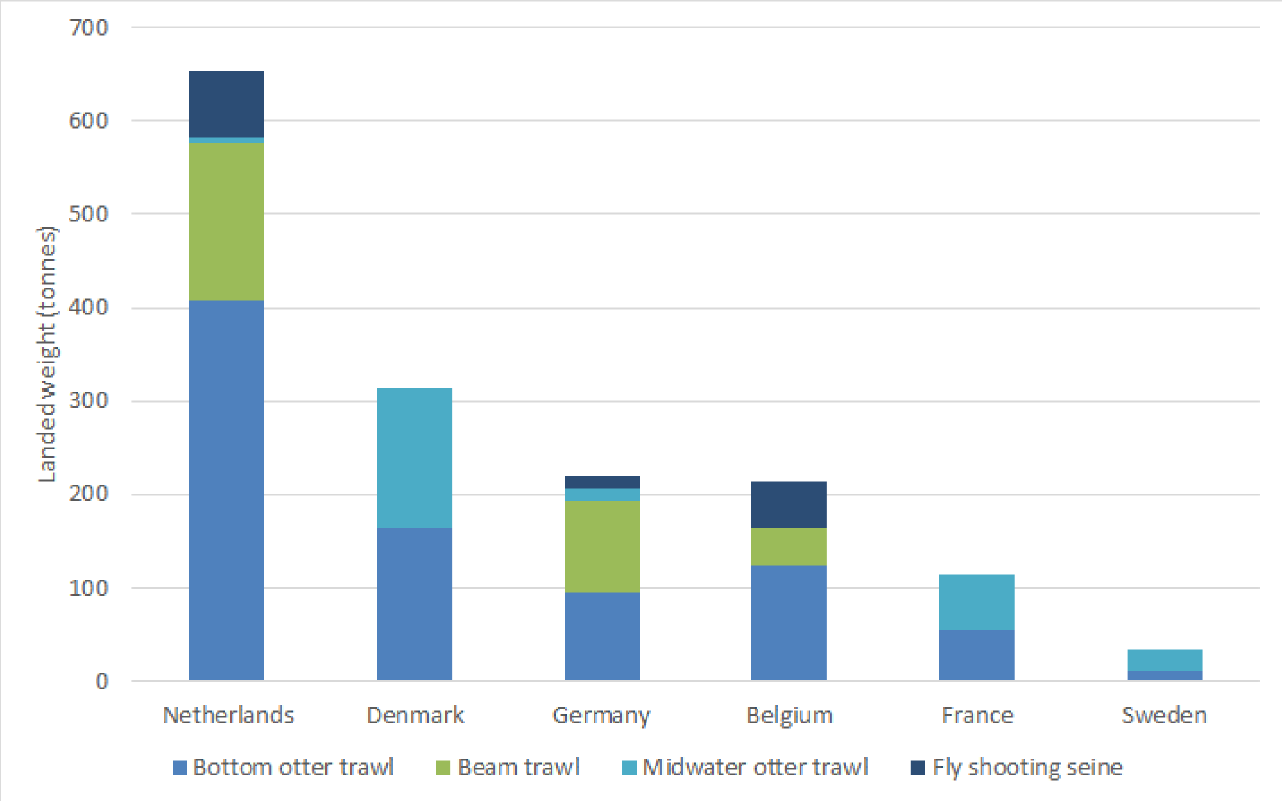


Plate 7-7 Landed Weight (Tonnes) by EU Vessels in ICES Division 4b, by Country and Gear Type between 2012 and 2016 (EU DCF, 2023)

7.8.2.2.2 Spatial Data

610. In addition to landings data, VMS data have been mapped for EU vessels (including the UK) within the study area.

611. **Figure 7-18**, 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 7-18** 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. The data does not indicate potting activity in the eastern portion of the offshore ECC or the Array Area.

612. **Figure 7-19** 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.

613. **Figure 7-20** 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.

614. **Figure 7-21** 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.

615. **Figure 7-22** indicates discrete areas of scallop dredge activity (associated with the UK fleet) with the portion of the offshore ECC that coincides with the 12 nm limit overlapping with a scallop ground. Data indicates limited scallop dredge activity across the remainder of the offshore ECC and Array Area.

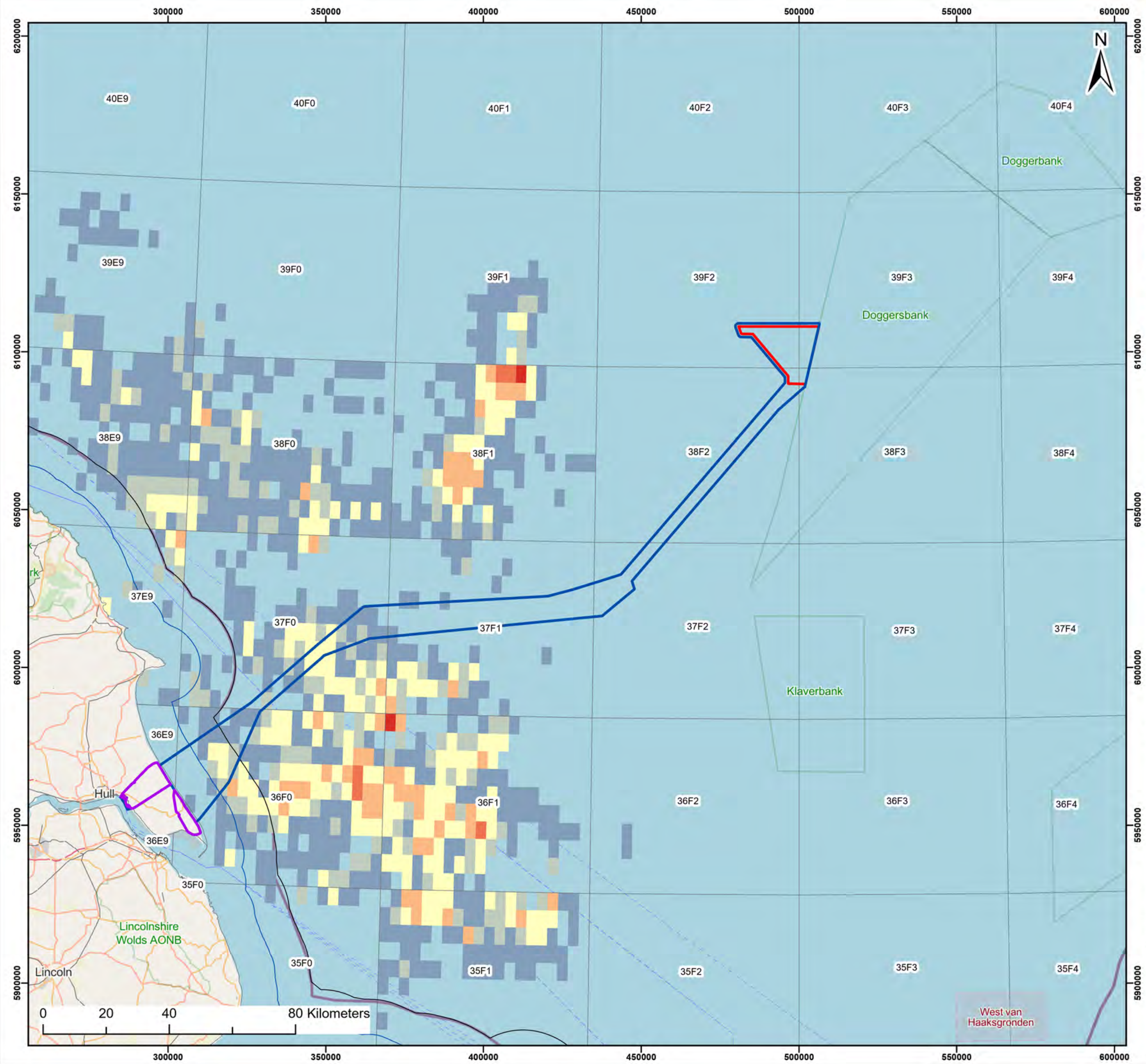
616. **Figure 7-23** presents AIS fishing vessel route density data. AIS is required to be fitted on fishing vessels ≥15m length. The data is specific to fishing vessels and indicates the route density per square kilometre per year. This data does not distinguish between transiting vessels and active 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 relatively lower levels of activity across the eastern portion of the offshore ECC and 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

617. 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.

618. 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 Special Area of Conservation (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 (see **Section 7.8.2.3**).



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm Limit

UK Potting (2019)

Total value, £

- £0.01 - £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 Landed Value (£) for UK ≥ 15m Length Vessels in 2019 (MMO, 2023)

Figure: 7-18	Drawing No: PC3991			
Revision:	Date:	Drawn:	Checked:	Size:	Scale:

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	07/02/2023	FN	SM	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables

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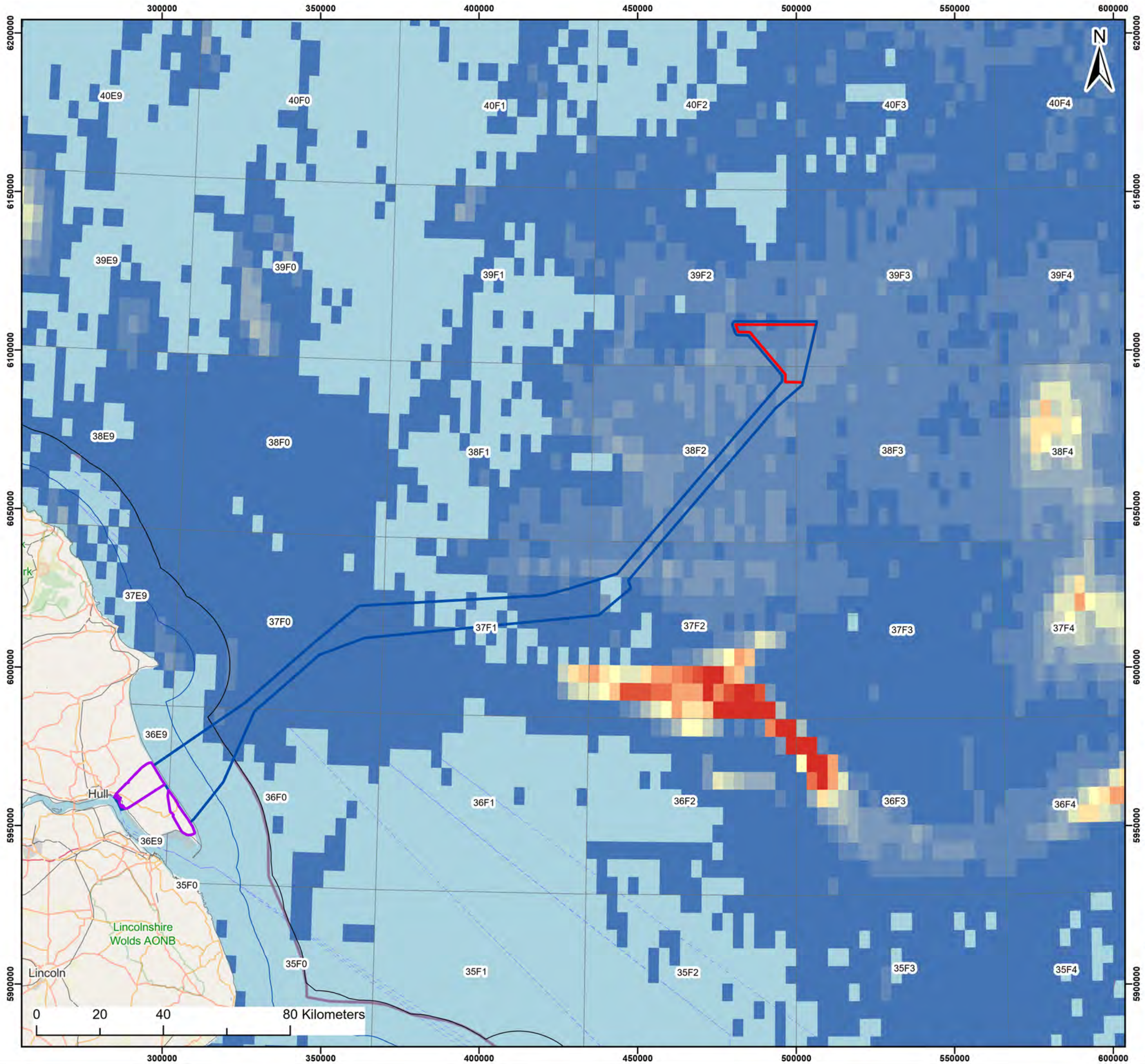

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm Limit

Otter Trawl 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 - 23.2

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Project:
Dogger Bank D Offshore Wind Farm

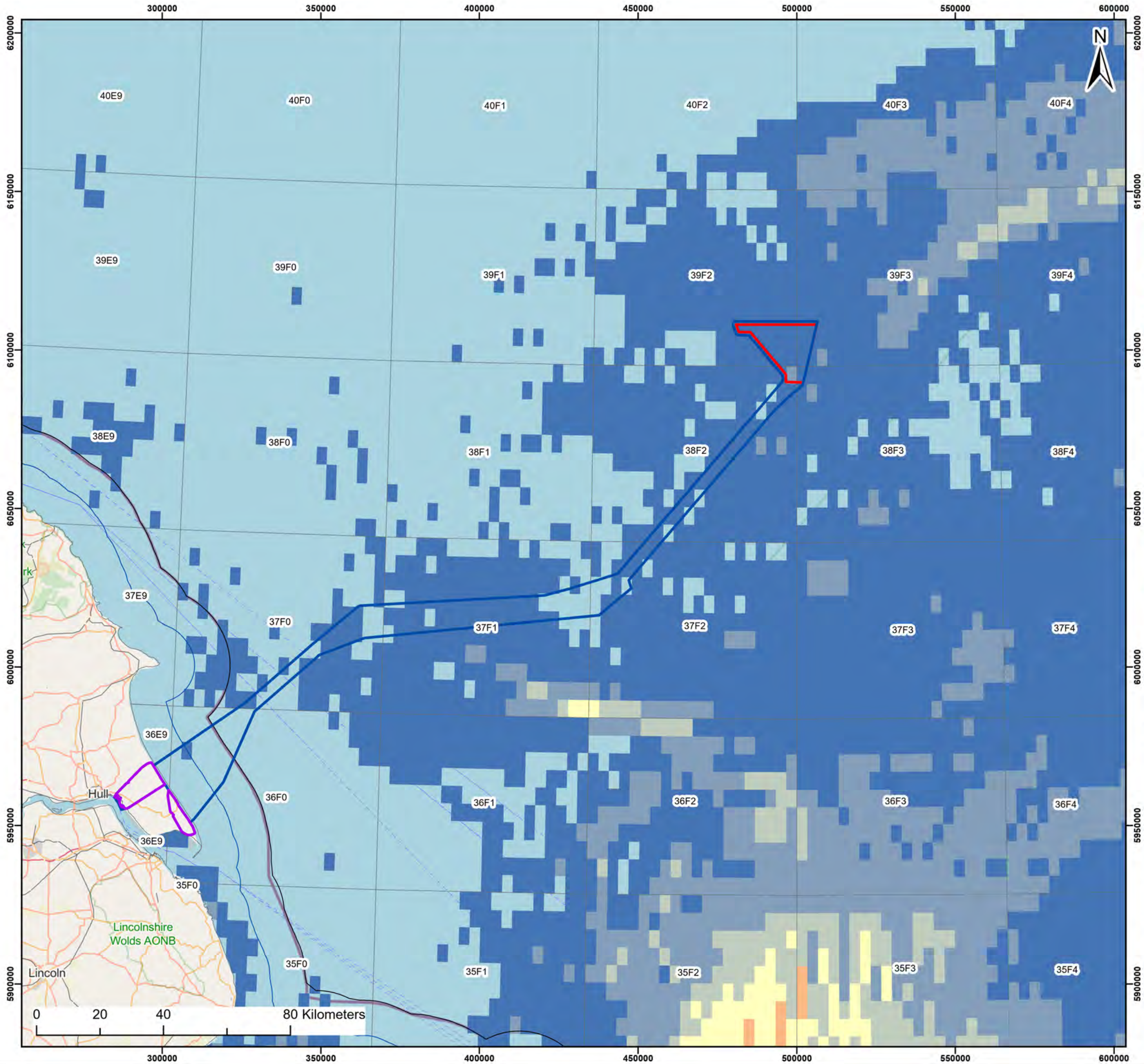
DOGGER BANK WIND FARM

Title:
Surface Swept Area Ratio 2016 to 2020 for EU (including UK) Vessels ≥ 12m in Length Using Demersal Otter Trawl Gear (ICES, 2023)

Figure:	7-19	Drawing No:	PC3991		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	07/02/2023	FN	SM	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm Limit

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:

Surface Swept Area Ratio 2016 to 2020 for EU (including UK) Vessels ≥ 12m in Length Using Beam Trawl Gear (ICES, 2023)

Figure: 7-20 | Drawing No: PC3991

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	07/02/2023	FN	SM	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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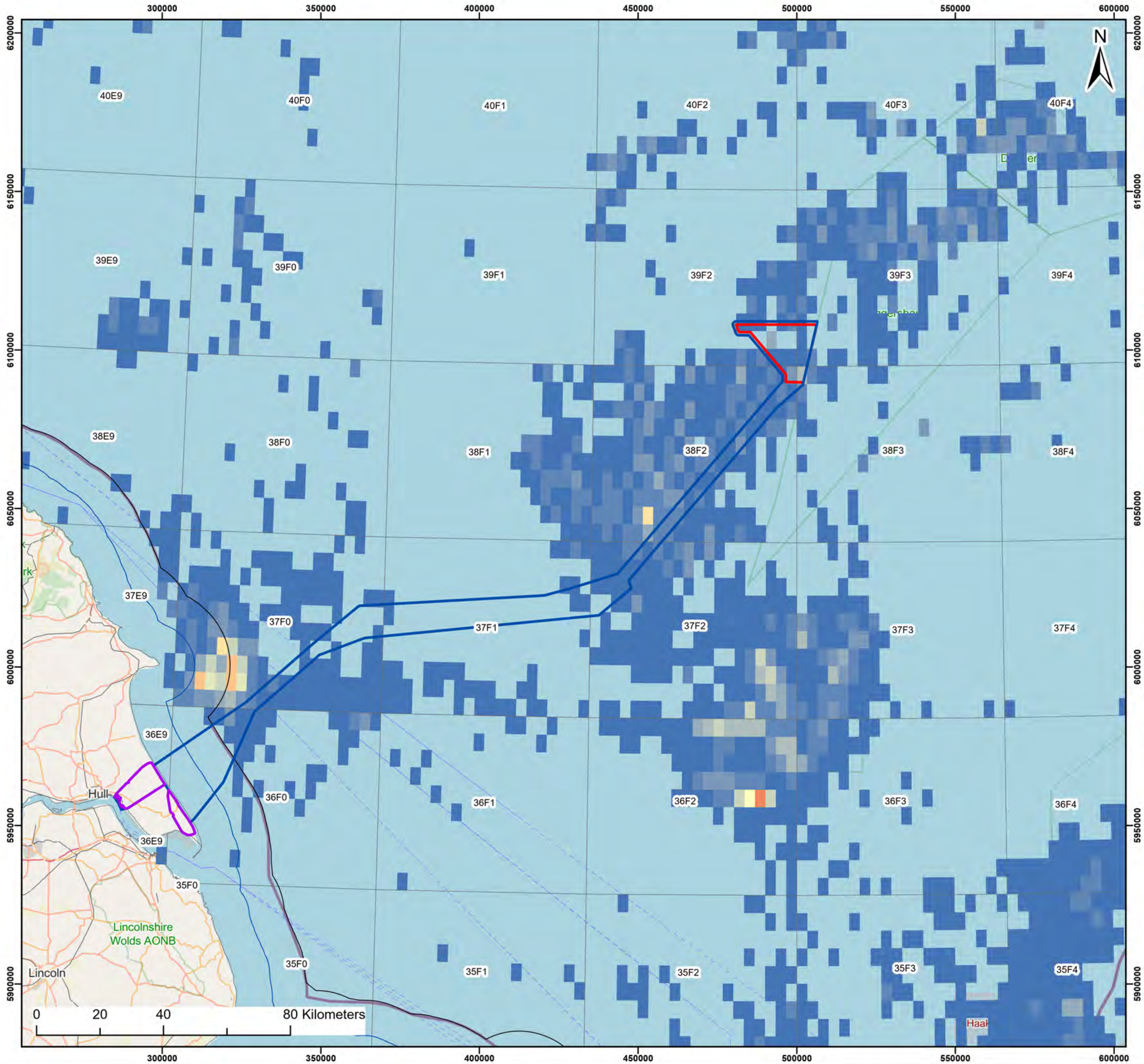

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm Limit

Demersal Seine SAR Mean

- 0.0 - 0.6
- 0.7 - 1.3
- 1.4 - 1.9
- 2.0 - 2.6
- 2.7 - 3.2
- 3.3 - 3.9
- 4.0 - 4.5
- 4.6 - 5.1
- 5.2 - 5.8
- 5.9 - 6.4
- 6.5 - 7.1
- 7.2 - 7.7
- 7.8 - 8.4
- 8.5 - 9.0
- 9.1 - 46.8

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

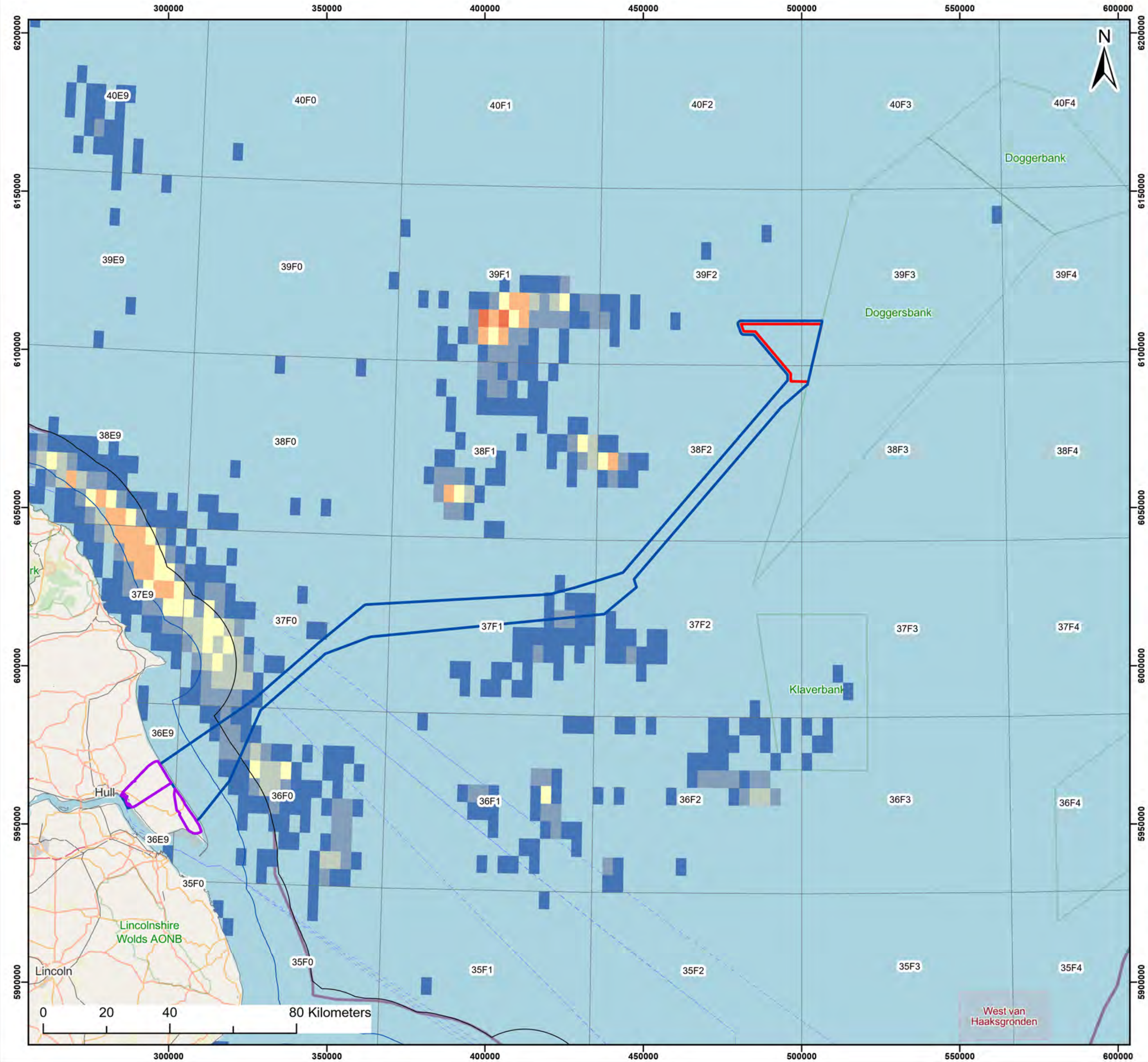
Title: Surface Swept Area Ratio 2016 to 2020 for EU (including UK) Vessels ≥ 12m in Length Using Demersal Seine Gear (ICES, 2023)

Figure: 7-21 | Drawing No: PC3991

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	07/02/2023	FN	SM	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm 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

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Surface Swept Area Ratio 2016 to 2020 for EU (including UK) Vessels ≥ 12m in Length Using Dredge Gear (ICES, 2023)

Figure:	7-22	Drawing No:	PC3991		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	07/02/2023	FN	SM	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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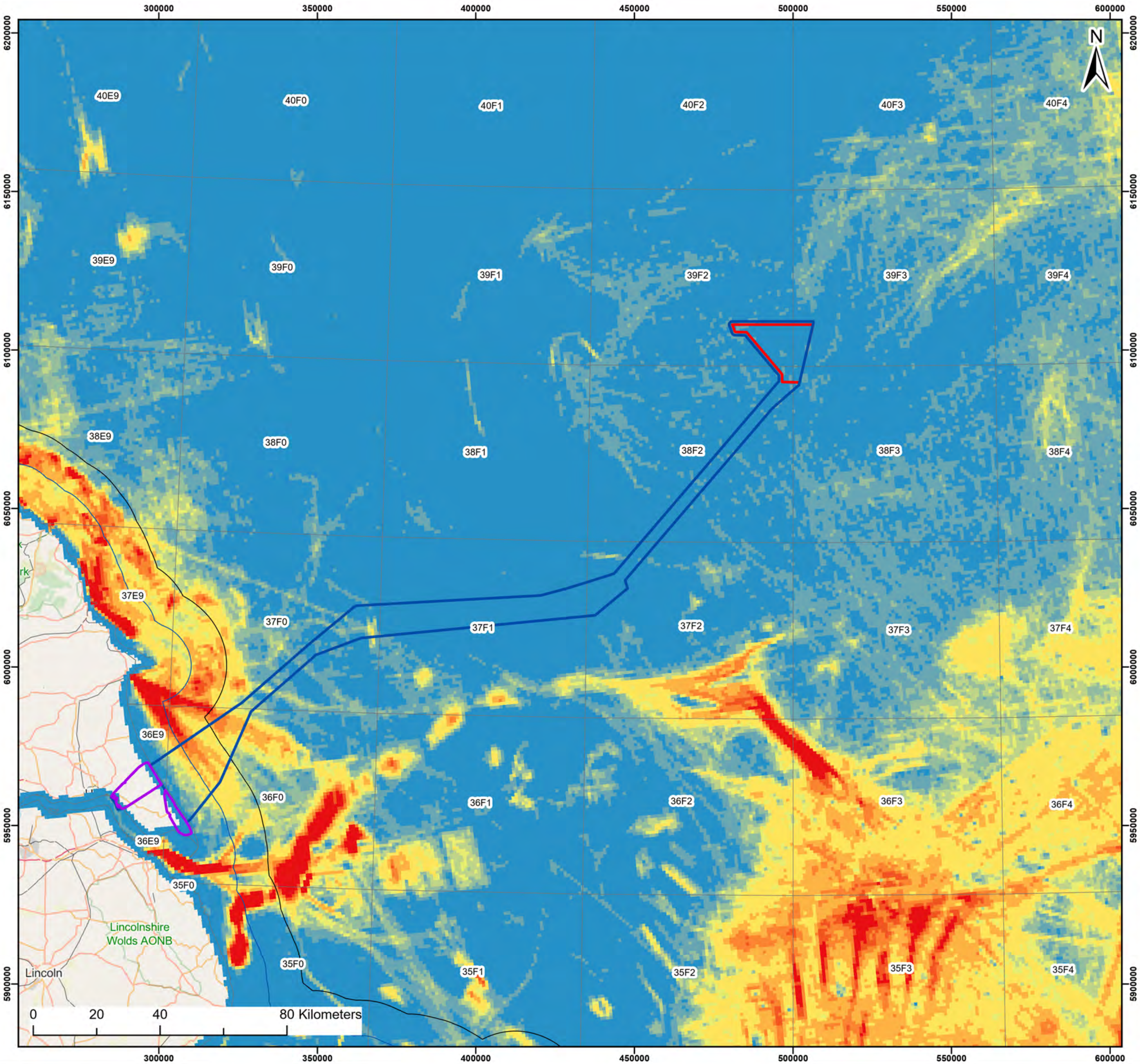

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm Limit

Fishing Vessel Route Density - 2021 (Routes per Square km per Year)

- 0 - 10
- 11 - 20
- 21 - 30
- 31 - 40
- 41 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- 201 - 250
- >250

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Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Automatic Identification System (AIS) Fishing Vessel Route Density 2021 (EMSA. 2023)

Figure: 7-23 | Drawing No: PC3991

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,200,000
00	07/02/2023	FN	SM	A3	1:1,200,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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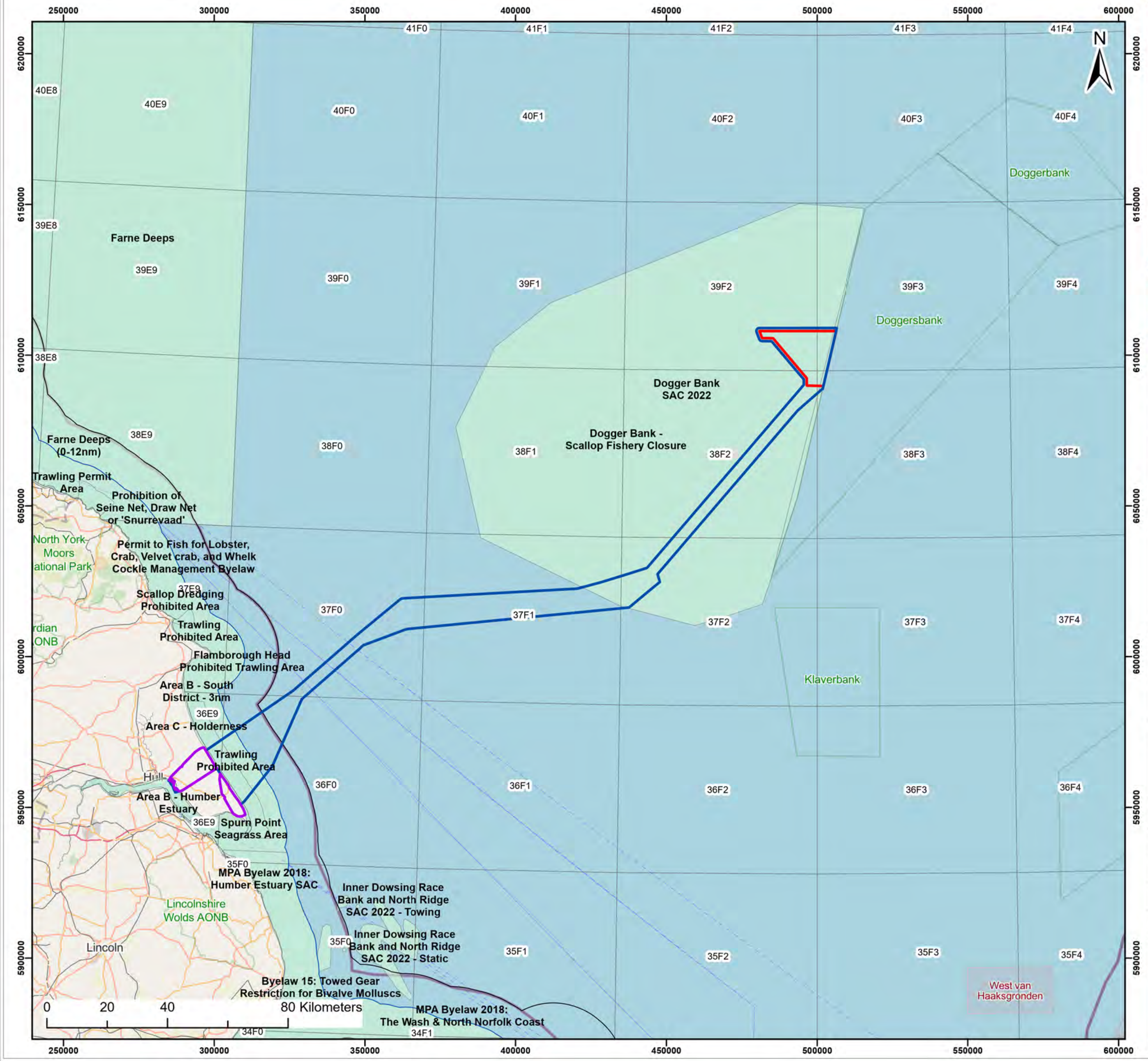

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- ICES Statistical Rectangles
- 12nm Limit
- 6nm Limit
- Fishing Restrictions

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Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Spatial Fishing Restrictions (Seafish Kingfisher Information Service, 2023)

Figure: 7-24

Drawing No: PC3991

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,250,000
00	07/02/2023	FN	SM	A3	1:1,250,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.8.2.3 Fishing Restrictions

619. 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.

620. 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.

621. Within the study area several spatial restrictions are in place that are relevant to the Project. These include (**Figure 7-24**):

- 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 6 nm 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).

622. It is noted that consultation is ongoing regarding further proposed MMO byelaws to manage use of bottom towed fishing gear in other marine protected areas in the North Sea (MMO, 2023). To the west of the study area and shown in **Figure 7-24**, fishing restrictions are also in place across the Farne Deeps, where subject to some exemptions, vessels deploying demersal trawls and seines are prohibited from fishing. Consultation has also recently commenced in relation to proposed management measures for sandeel fishing within English waters (Department for Environment, Food and Rural Affairs (Defra), 2023).

7.8.3 Potential Impacts

623. 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 National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) (Department of Energy and Climate Change (DECC), 2011b; Department for Energy Security and Net Zero (DESNZ, 2023b) and in the guidance documents identified below.

7.8.3.1 Potential Impacts during Construction

7.8.3.1.1 Reduction in Access to, or Exclusion from Established Fishing Grounds

624. 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 7-24**), 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

625. 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

626. 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

627. 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.

7.8.3.1.5 Additional Steaming to Alternative Fishing Grounds for Vessels that would Otherwise Fish within the Offshore Development Area

628. 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 7-24**), 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 Potential Impacts during Operation

7.8.3.2.1 Reduction in Access to, or Exclusion from Established Fishing Grounds

629. Operation and maintenance (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 offshore wind farm 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 7-24**), 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

630. 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 offshore wind farm 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

631. 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

632. The movement of vessels associated with the O&M 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

633. 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 7-24**), 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

634. 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 7-24**), 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

635. 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.

636. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-24**).

7.8.4 Potential Cumulative Effects

637. 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 Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

638. 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.

639. 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 that the Array Area lies within the footprint of the consented Dogger Bank C array area, and therefore will not result in additional loss or restricted access to additional seabed.

640. 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

641. Baseline data indicates the presence of foreign fishing fleet activity. Consultation with stakeholders in other relevant European Economic Area (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

642. **Table 7-24** 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.

643. 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 7-24**.

Table 7-24 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	✓	✓	✓

Potential Impact	Fishing Fleets	Construction	Operation	Decommissioning
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	✓	✓	✓

7.8.7 Approach to Data Gathering

644. It is intended that during the EIA, full acquisition and analysis of the baseline data sources listed in **Table 7-25** (in addition to those identified in **Table 7-23**) is completed in order to develop a robust understanding of the baseline environment.

Table 7-25 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

645. 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.

646. 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

647. 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.

648. The commercial fisheries impact assessment will follow the EIA 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 (Centre for Environment, Fisheries and Aquaculture Science (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 Coast Protection Act (CPA) requirements (Cefas), Marine Consents and Environment Unit (MCEU), Defra and Department of Trade and Industry (DTI), 2004).

649. Where relevant, impact assessment will be informed by the outcomes of the fish and shellfish ecology assessment and the shipping and navigation assessment.

650. 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

651. 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

652. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore ECC up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the HPF.

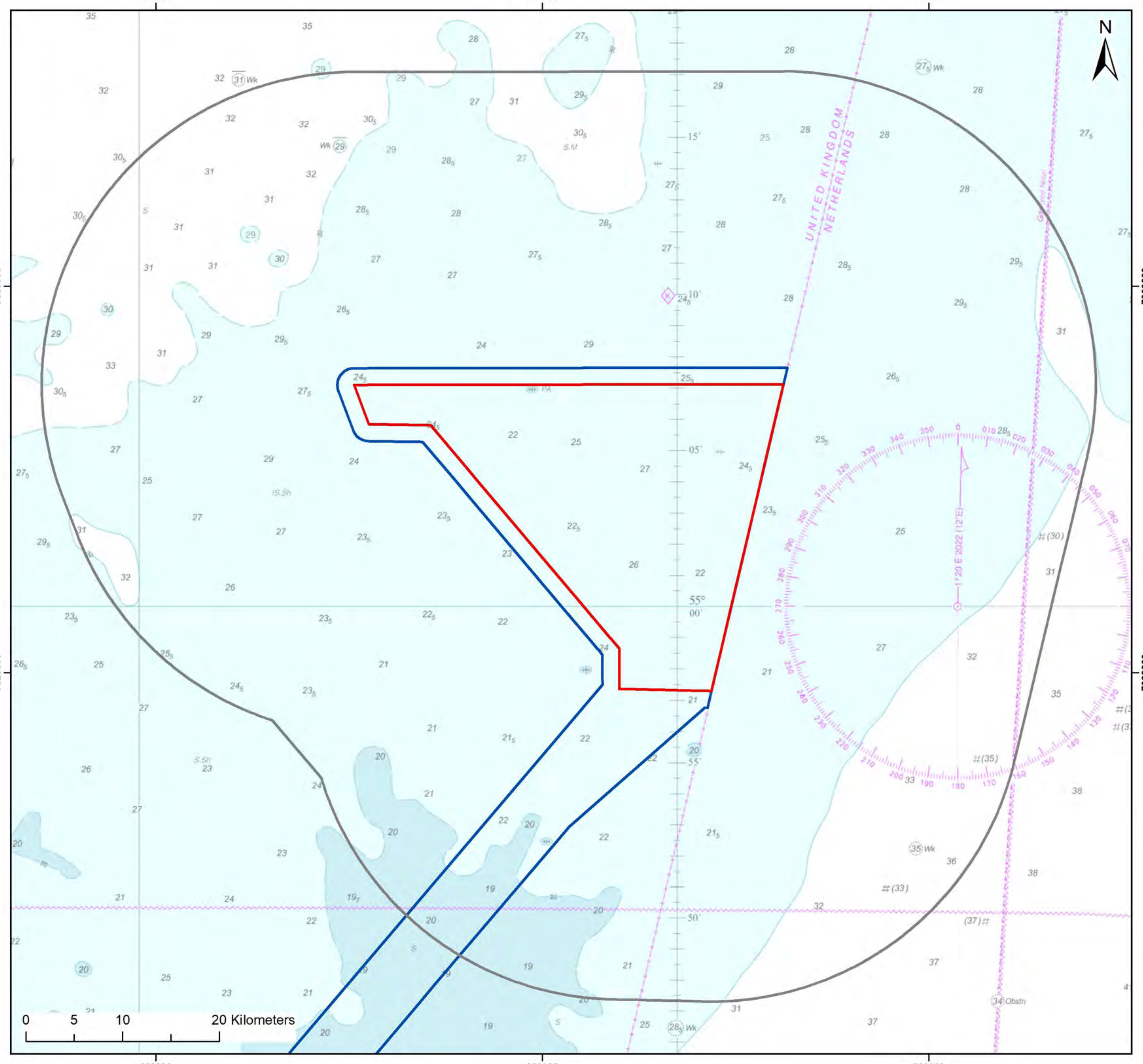
653. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

654. 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

655. The main Shipping and Navigation Study Area (hereafter referred to as 'the study area') is defined as the Array Area plus a 10 nautical mile (nm) buffer as shown in **Figure 7-25.** The 10nm buffer is standard for shipping and navigation assessments as 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 be assessed in the Navigational Risk Assessment (NRA) as a part of the Preliminary Environmental Information Report (PEIR) / Environmental Statement (ES).



Legend:

- Dogger Bank D Array Area
- Shipping And Navigation Study Area
- Offshore Scoping Area

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Shipping and Navigation Study Area

Figure:	7-25	Drawing No:	A4968-13-01		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	11/04/2023	DS	JM	A3	1:400,000
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Co-ordinate system: WGS 1984 World Mercator

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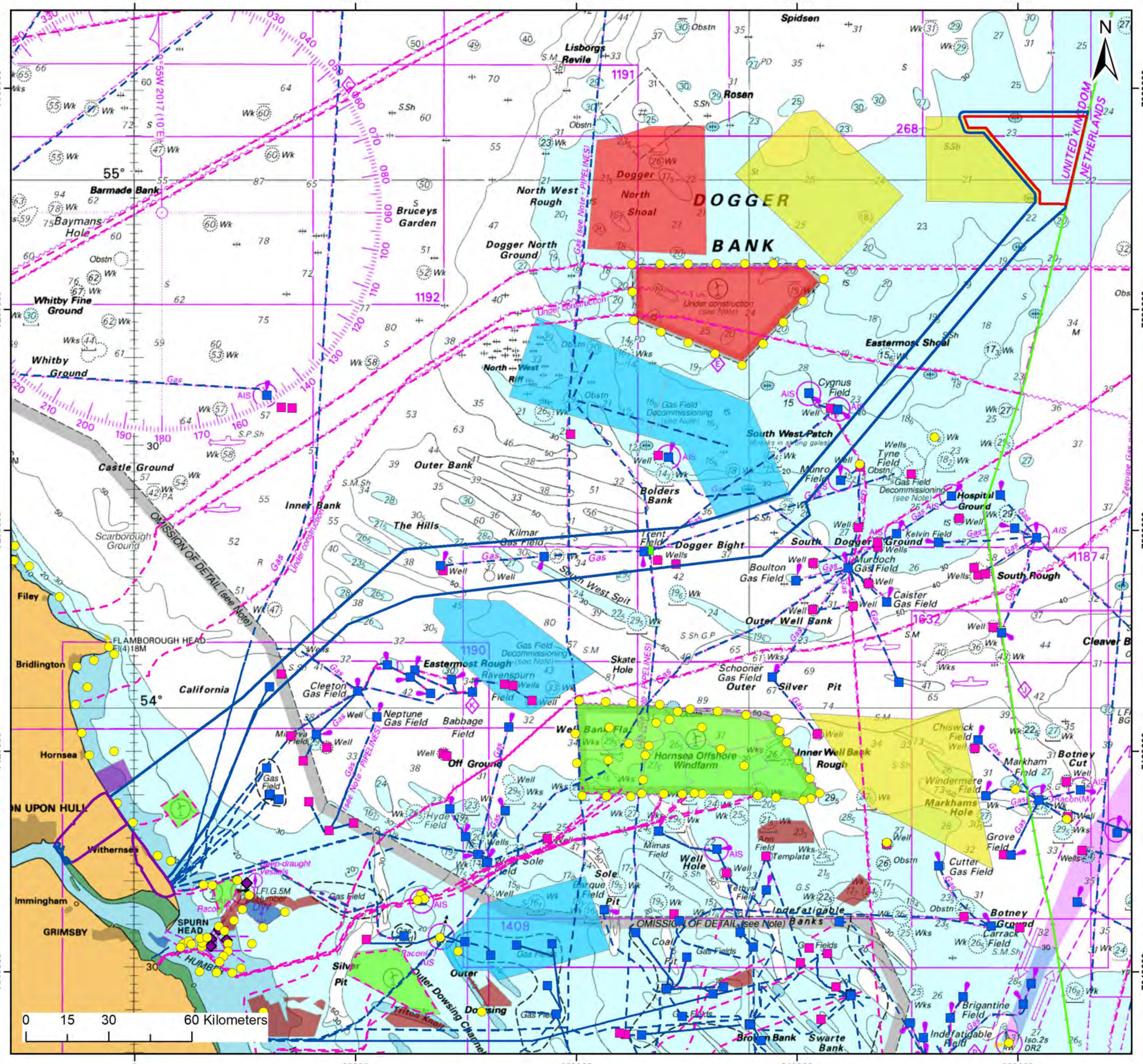

Legend:

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

Navigational Features

- Aid to Navigation
- Pilot Boarding Station
- Platform
- Well
- Manifold
- Pipeline
- Subsea Cable
- GBR-NL Border
- Dredging
- Foul Ground
- Anchorage

Other Offshore Wind Farms

- Active/In Operation
- Consented
- In Planning
- 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: 7-26 | Drawing No: A4968-13-02

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	12/04/2023	DS	JM	A3	1:1,400,000
02	01/03/2023	DS	JM	A3	1:1,400,000

Co-ordinate system: WGS 1984 World Mercator

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7.9.2 Existing Environment

7.9.2.1 Navigational Features

656. An overview of the relevant navigational features in proximity to the Offshore Scoping Area is presented in **Figure 7-26**.

657. Offshore wind farms (OWF) that are operational and are in proximity to the Offshore Scoping Area include Westermost Rough OWF which is situated within the offshore ECC approximately 4nm offshore from where the offshore ECC makes landfall. Humber Gateway OWF is situated approximately 4nm south of the offshore ECC and neighbouring Hornsea One OWF and Hornsea Two OWF are approximately 17nm and 14nm south of the offshore ECC, respectively.

658. Other OWFs that are currently in construction and are within proximity to the Offshore Scoping Area include Dogger Bank A (DBA) and Dogger Bank B (DBB), which at the time of writing are under construction. These OWFs are the closest to the Array Area, with DBA located approximately 24nm south-west of the Array Area and DBB approximately 29nm 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 which is reflected on **Figure 7-26**. DBB had its 20 construction boundary demarcation buoys placed by early February 2023 and will remain in place until the wind farm construction activities have been completed. This information is not yet reflected on the most recent United Kingdom Hydrographic Office (UKHO) Admiralty Charts, but it is noted that both DBA and DBB are under construction.

659. It is noted that Dogger Bank C (DBC) and Sofia OWFs have been consented and both have secured a Contract for Difference (CfD). Both OWFs are situated between the Project and DBB, with DBC sharing its eastern boundary with the western boundary of the Project.

660. There are four Aids to Navigation (AtoN) near the coast at the offshore ECC landfall. These include an east cardinal mark highlighting a shallow wreck to the west and a marker buoy for the diffuser at the end of the Long Sea Outfall (LSO) at Withernsea. The other two AtoNs consist of a red light which is likely marking a wreck that is visible 1m above Chart Datum (CD) and a spherical light buoy likely marking the shallow waters where the export cable for Westermost Rough OWF makes landfall. The closest AtoN to the Array Area are an east cardinal mark approximately 6nm east of the offshore ECC which marks a wreck and a special mark approximately 2nm east of the offshore ECC identifying a shallow well in the Munro gas field.

661. Oil and gas infrastructure is present surrounding most of the offshore ECC. Within the offshore ECC there are four platforms, Trent, Garrow, Kilmar, and Tolmount, all which are operational. There are also four wells associated with the Tolmount and Trent fields and one manifold, also at the Trent field. The closest platform to the Array Area is in Dutch waters in proximity to the Dogger Tail End. The closest platform to the Offshore Scoping Area in UK waters is the active Cygnus Alpha platform within the Cygnus gas field, located approximately 32nm to the south-west of the Array Area and approximately 2nm west of the offshore ECC. Most oil and gas infrastructure are to the south of the offshore ECC.

662. Several offshore pipelines and sub-sea cables are present within the vicinity of the Offshore Scoping Area with four sub-sea cables and eight pipelines intersecting the offshore ECC. The sub-sea cables which intersect include the export cable for Westermost Rough, a cable connecting the Cygnus Alpha platform to the Munro Gas Field, a disused cable, and the VSLN Northern Europe interconnector telecommunications cable between Hunmanby Bay (UK) and Eemshaven (the Netherlands). The majority of pipelines that intersect the offshore ECC include those connecting the platforms and gas fields within the offshore ECC and the Langeled pipeline which transports Norwegian natural gas to the Easington Gas Terminal in the UK.

663. 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 Exclusive Economic Zone (EEZ) / Renewable Energy Zone (REZ).

664. An area of foul ground covering approximately 10nm^2 exists between the shore points of Mappleton and Aldbrough on the Yorkshire coast and intersects the northern boundary of the offshore ECC approximately 2nm offshore from the landfall location.

665. 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 7nm south of the offshore ECC.

666. The closest charted anchorage area is the Humber Deep Water Anchorage, north of the Humber entrance, which is located approximately 9nm south of the offshore ECC.

667. 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 8nm south.

7.9.2.2 Vessel Traffic

668. 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 7.9.7**) is presented in **Figure 7-27**. 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 of 2022, the construction buoyage surrounding DBA was present during both data periods and is therefore reflected in the vessel traffic movements.

669. 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.

670. 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.

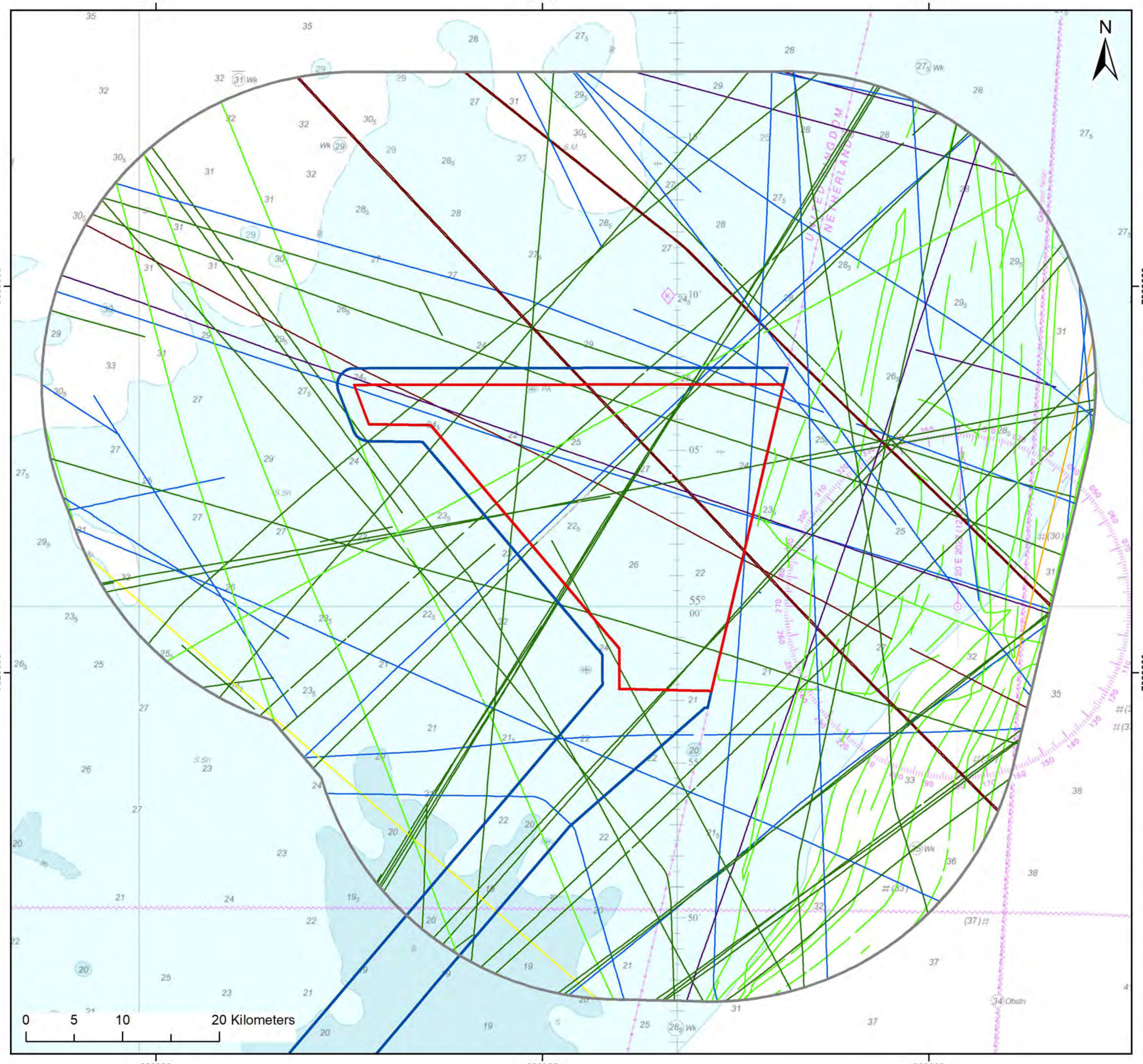
671. Vessel traffic in the study area primarily consisted of cargo vessels (41%), tankers (23%), and commercial fishing vessels (23%).

672. 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.

673. 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.

674. 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**).

675. It is noted that no recreational vessels were recorded during the data period, but this is expected with the distance 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.



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

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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: 7-27 | Drawing No: A4968-13-03

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	12/04/2023	DS	JM	A3	1:400,000
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7.9.3 Potential Impacts

7.9.3.1 Embedded Mitigation Measures

676. 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 the draft Development Consent Order (DCO) or deemed Marine Licences (DML).

677. The following are considered relevant embedded mitigation measures for shipping and navigation for the Project:

- 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 each 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 Marine Management Organisation (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 Mean High Water Springs (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

678. 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

679. 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

680. 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

681. 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

682. 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

683. 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

684. 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

685. The implementation of cable protection, cable crossings or marine outfalls / intakes associated with the HPF 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

686. 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

687. 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

688. 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 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

689. 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.

690. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-26**).

7.9.4 Potential Cumulative Effects

691. 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 Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

692. 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 7.9.8**, with all relevant effects assessed for the Project in isolation considered on the cumulative level as required.

693. 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 and DBB has commenced (based on the presence of the respective buoyed construction areas), these developments will be considered as part of the baseline assessment.

7.9.5 Potential Transboundary Effects

694. 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 European Economic Area (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.

7.9.6 Summary of Scoping Proposals

695. **Table 7-26** 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 7-26 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	✓	✓	✓
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, cable crossings or intakes / outfalls.	X	✓	X
Vessel interaction with sub-sea cables associated with the Project	X	✓	X

Potential Impact	Construction	Operation	Decommissioning
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	✓	✓	✓

7.9.7 Approach to Data Gathering

696. **Table 7-27** identifies the desk-based sources that will be 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 7-27 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 266, 277, 268, 1187, 1190, 1191 and 2182A	2021 to 2023	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.

697. 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 during the summer months. However, it is noted that smaller vessels are increasingly observed to utilise AIS voluntarily given the associated safety benefits. 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.

698. The following surveys are anticipated to be undertaken to inform the EIA and NRA. Site-specific surveys will be undertaken to ensure non-AIS vessels are characterised suitably in the establishment of the existing environment. These surveys will be compliant with MGN 654 (MCA, 2021) guidelines which require a minimum of 28 days of data consisting of AIS, visual observations and radar data collected across two 14-day periods. **Table 7-28** outlines the proposed baseline surveys to be carried out within two years of submission.

Table 7-28 Proposed Baseline Surveys for Shipping and Navigation

Survey	Timing	Spatial Coverage
14-Day summer vessel traffic survey	Between June and August 2023	Shipping and Navigation Study Area
14-Day summer vessel traffic survey	Between November 2023 and February 2024	Shipping and Navigation Study Area

7.9.8 Approach to Assessment

699. 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.

700. 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).

701. 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).

702. 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.

703. 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 below in **Table 7-29**.

Table 7-29 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

704. 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.

705. 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.

7.9.9 Scoping Questions to Consultees

706. 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

707. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

708. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

709. 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 Environmental Impact Assessment (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

710. 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 Array Area to have an impact on civil and military radars, taking into account required radar operational ranges.

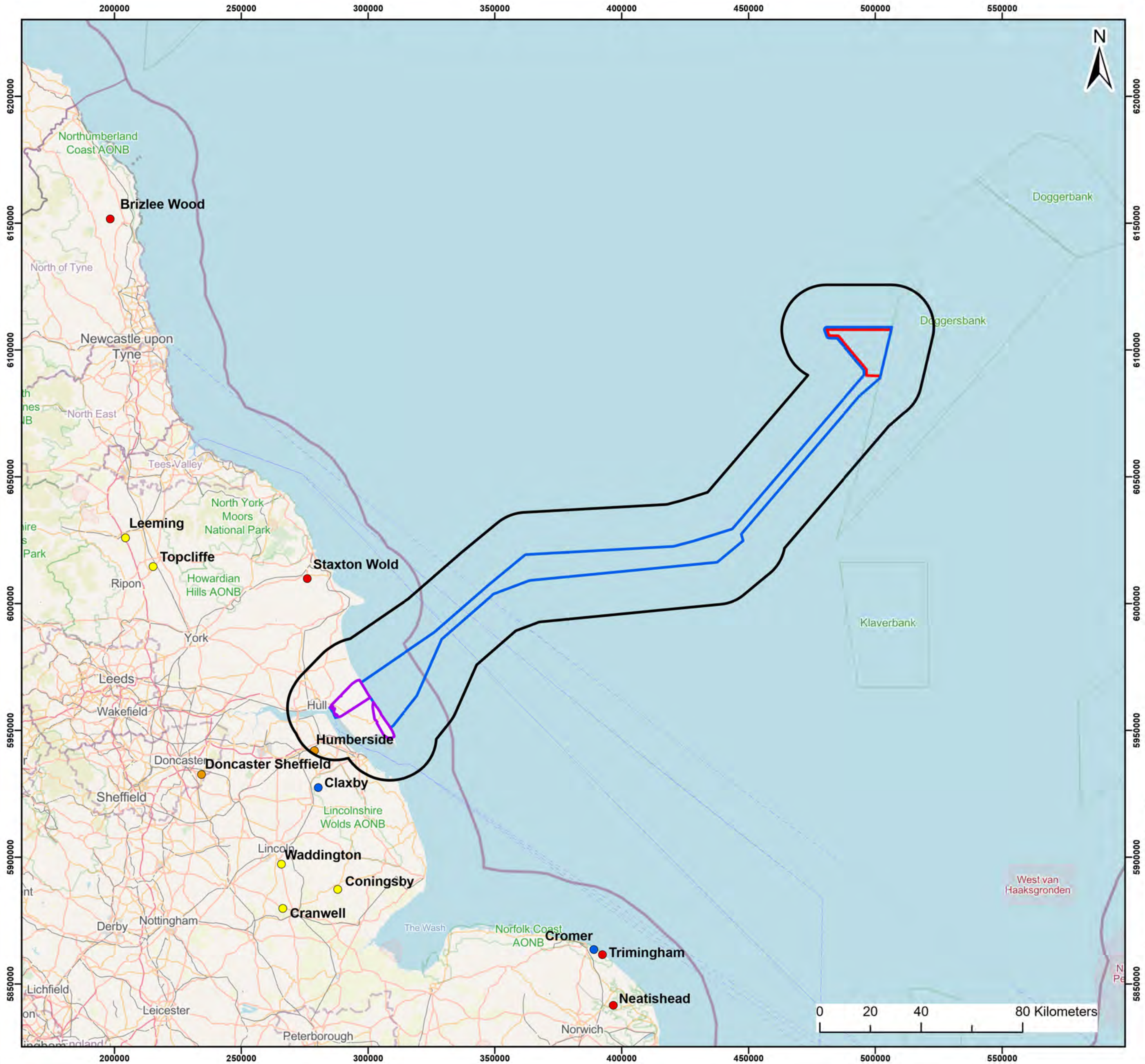
711. In general, Primary Surveillance Radars (PSR) installed on civil and military airfields have an operational range of between 40 nautical miles (nm) and 60nm. There are no radar-equipped airfields within 60nm of the Array Area.

712. The closest radar-equipped airfield is Humberside Airport which is more than 15km (8nm) south-west of the Aldbrough – Saltend Scoping Area.

713. 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 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 Array Area would not be visible to these or any other radar facilities.

714. The closest NATS radar is Claxby which is approximately 28km (15nm) south-south-west of the Aldbrough – Saltend Scoping Area, while the closest AD radar is Staxton Wold, approximately 45km (24nm) north-north-west of the Aldbrough – Saltend Scoping Area.

715. The study area is defined as the airspace within an area extending 9nm (17km) around the Offshore Scoping Area together with aviation receptors within an area extending 9nm around the Onshore Scoping Area (comprising the Aldbrough – Saltend Scoping Area and the Easington Scoping Area) (**Figure 7-28**). 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.



Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- Air Defence Radar
- Civil Airport
- Military Airfield
- NATS Radar

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Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Aviation, Radar and Military Study Area

Figure: 7-28 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0065

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,500,000
00	22/02/2023	JR	LB	A3	1:1,500,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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Legend:

- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- Civil Airport
- NATS En Route Radio Navigation Aids
- Unlicensed Airfields
- PSR 15km Safeguarded Zone
- VOR/DME 3km Safeguarded Zone

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Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM

Title:

Aviation Receptors within the Onshore Scoping Area

Figure: 7-29	Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0068

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:250,000
00	28/02/2023	JR	EH	A3	1:250,000

Co-ordinate system: British National Grid

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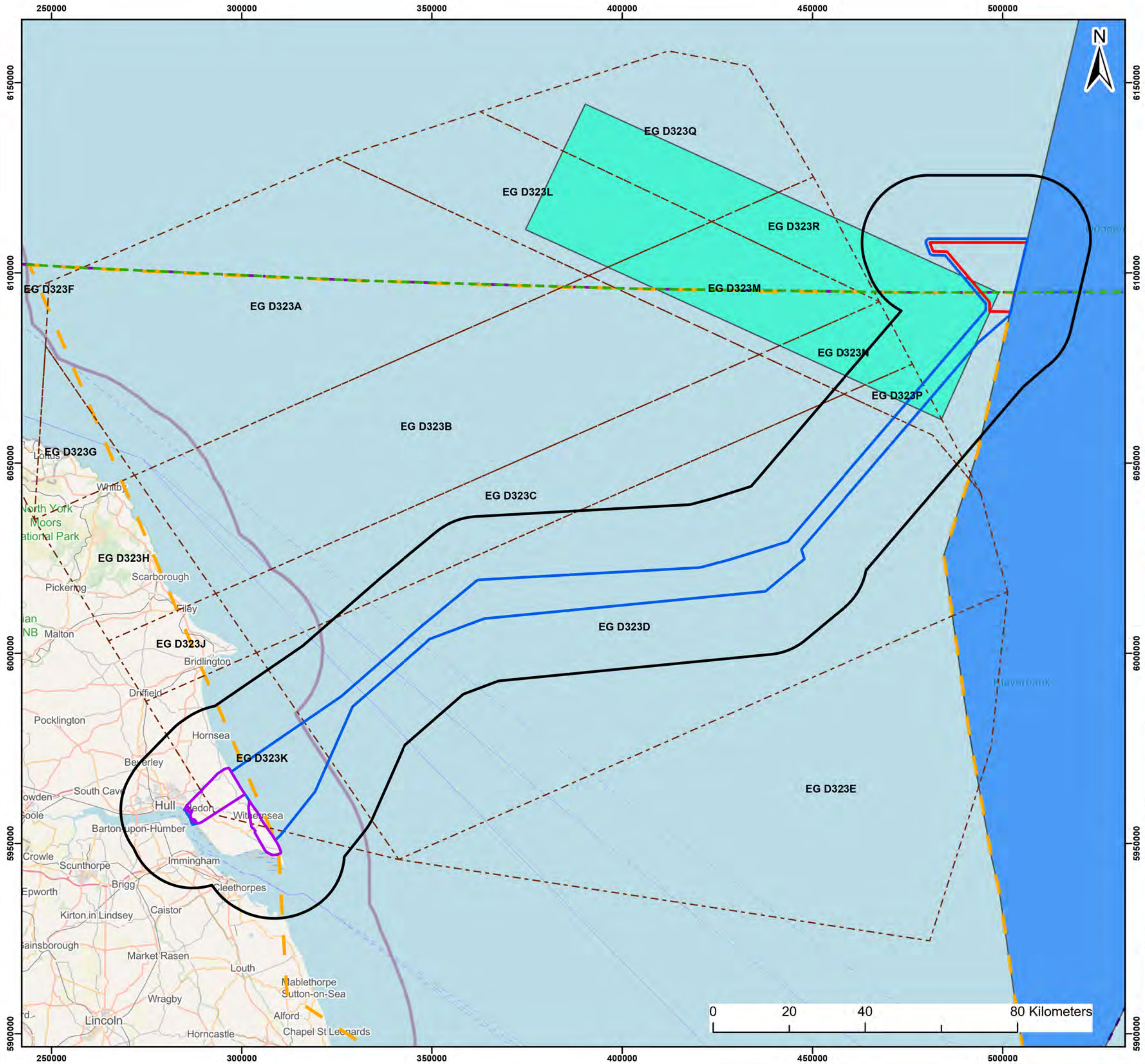

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- Air to Air Refuelling Area (AARA) Area 07
- London Flight Information Region Boundary
- North Sea Area V
- Southern Managed Danger Area
- Anglia Radar Area of Responsibility
- Scottish Flight Information Region Boundary

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Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Existing Airspace Environment

Figure: 7-30 Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0066

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,000,000
00	22/02/2023	JR	LB	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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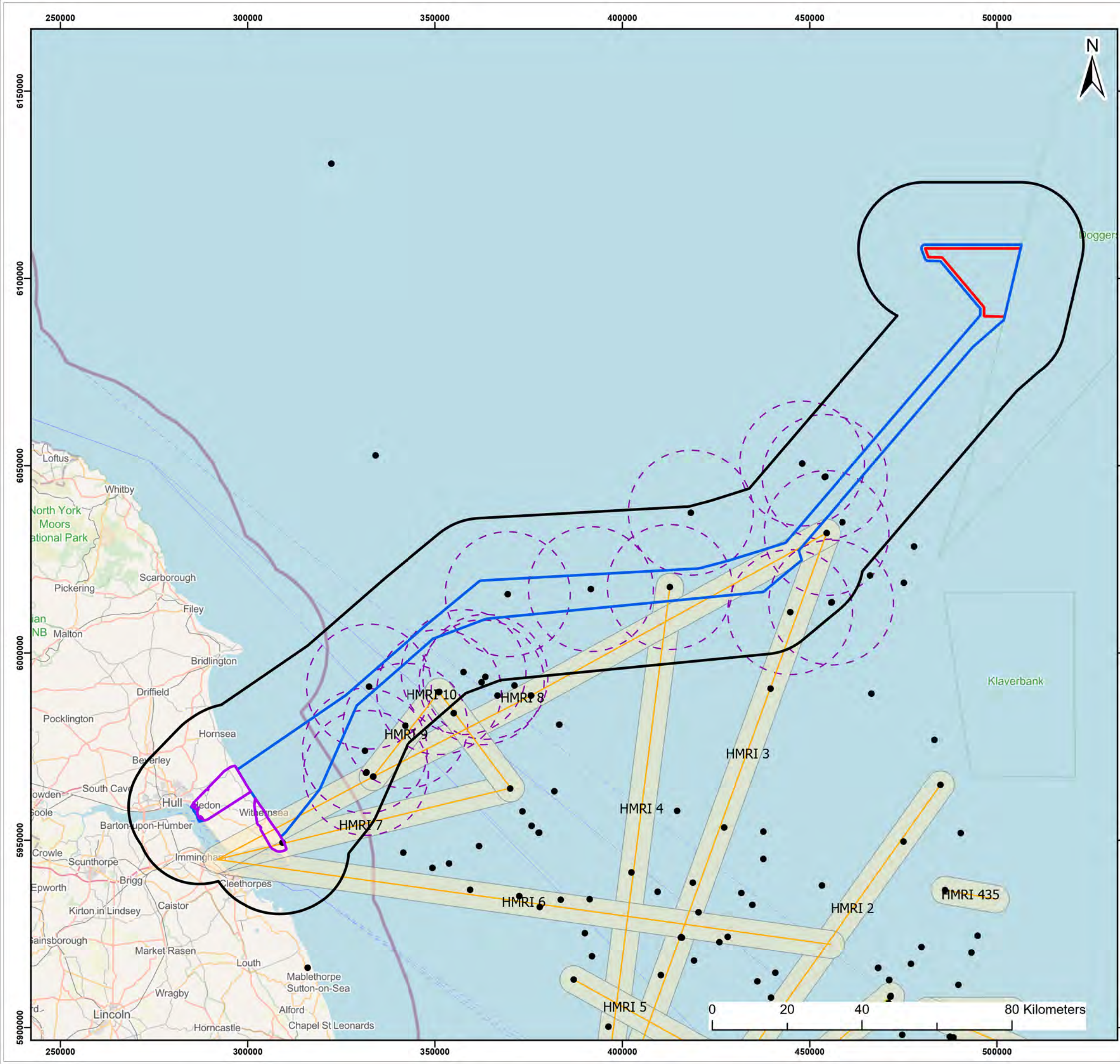

Legend:

- Dogger Bank D Array Area
- Offshore Scoping Area
- Onshore Scoping Area
- Aviation, Radar and Military Study Area (Scoping Area 9nm Buffer)
- 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: 7-31 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0067

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:1,000,000
00	22/02/2023	JR	LB	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.10.2 Existing Environment

7.10.2.1 Civil Aviation

716. The only licensed UK airport within the study area is Humberside Airport, which is approximately 260km from the Array Area and more than 15km from the Onshore Scoping Area (**Figure 7-28**). The airport is equipped with a PSR. There are no other civil or military airfields or radars within the study area.

717. 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 7-29**). The Onshore Scoping Area is just beyond 15km from Humberside's PSR and therefore impacts on PSRs are not considered further; however, consultation will still be undertaken with the airport to discuss any other potential for impact from the Project (e.g. impact on Instrument Flight Procedures).

718. There are several unlicensed airfields in the vicinity of the Onshore Scoping Area, as shown on **Figure 7-29**. 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. Hollym Airfield and Hollym West are grass runways within the Easington Scoping Area, while Garton Field Airstrip and Tansterne Grange Airstrip are within the Aldbrough – Saltend Scoping Area. Burton Constable Airstrip is less than 2km from the Aldbrough – Saltend Scoping Area.

719. A NATS en route radio navigation aid facility known as Ottringham VOR / DME (VHF Omni Directional Range / Distance Measuring Equipment) is sited within the study area, approximately 4km south-east of the Aldbrough – Saltend Scoping Area and 7km west of the Easington 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 7-29**).

720. 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 Array Area is within the Scottish FIR while the southern quarter and the offshore ECC are within the London FIR (**Figure 7-30**). 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.

721. The boundary of the Scottish FIR with the Copenhagen FIR (regulated by the Danish Civil Aviation and Railway Authority) lies 122km east of the 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 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 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 7-30**).

722. 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.

723. To enhance flight safety and expedite Search and Rescue (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 7-30**. The southern quarter of the Array Area and offshore ECC are within the Anglia Radar Area of Responsibility.

7.10.2.2 Military Aviation

724. Most of the offshore ECC lies beneath the Southern Managed Danger Area (MDA), one of four MDA complexes in UK airspace that provide segregated airspace for military flying training. Specifically, **Figure 7-30** shows that the offshore ECC lies beneath danger areas EGD323D, EGD323K and EGD323P which, when activated, have vertical limits from FL50 (approximately 5,000ft AMSL), FL150 (approximately 15,000ft AMSL) and FL100 (approximately 10,000ft AMSL) respectively, up to FL660 (approximately 66,000ft AMSL).

725. These areas of airspace are not permanently active, but rather are activated on request. Activities within the Southern MDA include high energy manoeuvres, ordnance, munitions and explosives, and electrical / optical hazards.

726. **Figure 7-30** 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

727. 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 7-31**, 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. HMRIs which overlap with or pass within 2nm of the offshore ECC are detailed in the following paragraph.

728. HMRI 7 and HMRI 8 route from the coast east of Humberside Airport to the Hyde and Munro offshore platforms respectively. HMRI 3 and HMRI 4 route from the coast north of Norwich to the Munro and Trent platforms respectively. Planned obstacles within 2nm of an HMRI should be consulted upon with the helicopter operators and the Air Navigation Service Provider which in this case is Anglia Radar.

7.10.2.4 Offshore Helidecks

729. To help achieve a safe operating environment, and incompliance with CAA guidance CAP 764: Policy and Guidelines on Wind Turbines, a 9nm consultation zone for planned obstacles exists around offshore helicopter destinations. There are 17 offshore oil and gas helidecks shown on **Figure 7-31** within 9nm of the offshore ECC:

- Boulton;
- Cavendish;
- Cleeton PQ;
- Cygnus A;
- Cygnus B;
- Garrow NUI;
- Kilmar NUI;
- Minerva;
- Munro;
- Murdoch;
- Ravenspurn North ST3;
- Ravenspurn South B;
- Ravenspurn South C;

- Rough BD;
- Tolmount;
- Trent; and
- York Platform.

730. Of these platforms, it is understood that Boulton, Cavendish, Munro and Murdoch are out of use and subject to decommissioning programmes. 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

731. 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 30km 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

732. The presence of tall crane vessels and partially completed wind turbines during the construction phase has the potential to cause interference to both military and civil radars. The construction of infrastructure within the Onshore Scoping Area has the potential to cause interference to the Humberside Airport PSR.

733. RLoS modelling indicates that wind turbines and other tall obstacles within the 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 zone for the Humberside Airport PSR. Impacts on military and civil radars during construction are therefore proposed to be scoped out of the EIA.

7.10.3.1.2 Impacts on Radio Navigation Aids

734. The construction of infrastructure within the Onshore Scoping Area has the potential to cause interference to the NATS Ottringham VOR / DME.

735. 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.

7.10.3.1.3 Creation of an Aviation Obstacle Environment

736. 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.

737. 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. 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

738. Helicopter traffic associated with the construction phase could impact on existing air traffic in the vicinity, increasing the risk of aircraft collision.

739. Existing air traffic may include S&R helicopters, helicopter traffic in support of the oil and gas and renewables industries, and military low flying. 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 Impacts of Onshore Infrastructure on Airfield Operations

740. Construction of infrastructure within the Onshore Scoping Area could have an impact on Humberside Airport's Instrument Flight Procedures and on flights at small unlicensed airfields in the vicinity. Tall buildings and / or stacks, together with construction equipment such as cranes, could potentially infringe protected Instrument Flight Procedure surfaces, and could impede aircraft from safely landing or taking off from nearby airfields. Therefore, impacts 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

741. 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 has the potential to cause interference to the Humberside Airport PSR.

742. RLoS modelling indicates that completed wind turbines within the 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 zone for the Humberside Airport PSR. Impacts on military and civil radars during operation are therefore proposed to be scoped out of the EIA.

7.10.3.2.2 Impacts on Radio Navigation Aids

743. Infrastructure within the Onshore Scoping Area has the potential to cause interference to the NATS Ottringham VOR / DME.

744. 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

745. 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.

746. 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. 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

747. Helicopter traffic associated with maintenance activities could impact on existing air traffic in the vicinity, increasing the risk of aircraft collision.

748. Existing air traffic may include S&R helicopters, helicopter traffic in support of the oil and gas and renewables industries, and military low flying. 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 Onshore Infrastructure on Airfield Operations

749. Infrastructure, specifically tall buildings and / or stacks, within the Onshore Scoping Area could have an impact on Humberside Airport's Instrument Flight Procedures and on flights at small unlicensed airfields in the vicinity. Therefore, impacts 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

750. 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.

751. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-30**).

7.10.4 Potential Cumulative Effects

752. 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 Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

753. 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

754. There is potential for transboundary effects upon aviation receptors due to the Project's construction, operation and maintenance (O&M) and decommissioning activities.

755. The airspace around the study area is used by international civil aviation and the 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

756. **Table 7-30** 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 7-30 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 onshore infrastructure on airfield operations	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

7.10.7 Approach to Data Gathering

757. 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 7-31**.

Table 7-31 Desk-Based Data Sources for Aviation, Radar and Military

Data Source	Date	Data Contents
CAP 032: UK AIP (CAA)	2023	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 (CAA)	2021	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)	2023	The main resource for information and flight procedures at all military aerodromes.
MoD Obstruction Lighting Guidance (Low Flying Operations Flight)	2020	Includes requirements for the lighting of offshore developments.

Data Source	Date	Data Contents
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.
CAP 032: UK Aeronautical Information Publication (AIP) (Civil Aviation Authority (CAA))	2023	Contains information on facilities, services, rules, regulations and restrictions in UK airspace.

7.10.8 Approach to Assessment

758. The EIA process will be supported by further desk-based studies that will identify and examine in greater detail sensitive aviation receptors. 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.

759. Stakeholders to be consulted include NATS, the MoD and Humberside Airport, together with potentially impacted offshore platform and helicopter operators, and small airfield operators.

7.10.9 Scoping Questions to Consultees

760. 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

761. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

762. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

763. 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 Environmental Impact Assessment (EIA):

- **Chapter 7.2 Marine Physical Processes.**

7.11.1 Study Area

764. The Offshore Scoping Area is shown in **Figure 1-1**. The Offshore Scoping Area encompasses the Array Area, the offshore ECC and the possible landfall locations and cover all receptors seawards of Mean High Water Springs (MHWS). All receptors landwards of MHWS will be included within the onshore archaeology and cultural heritage chapter. The Offshore Archaeology and Cultural Heritage Study Area will be limited to the extents of the Offshore Scoping Area.

7.11.2 Existing Environment

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

766. The Offshore Scoping Area stretches from the Holderness coastline of East Riding of Yorkshire to the proposed Array Area, approximately 210km offshore. The Array Area and large portions of the eastern section of the Offshore Scoping Area are located within the eastern extent of Dogger Bank. This is an area of high prehistoric archaeological significance where archaeological and palaeoenvironmental evidence related to human occupation of the UK may be preserved.

767. Dogger Bank is 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.

768. 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.

769. 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 have been undertaken for the Dogger Bank Creyke Beck A & B and Teesside A & B projects, now known as Dogger Bank A (DBA), Dogger Bank B (DBB), Dogger Bank C (DBC) and Sofia respectively. These investigations have demonstrated the presence of palaeolandscape features and sub-seabed deposits of palaeoenvironmental interest within those project boundaries. A wider study of the palaeolandscapes of the Dogger Bank projects is currently ongoing, and the DBD Project has the potential to both inform, and be informed by, this wider study.

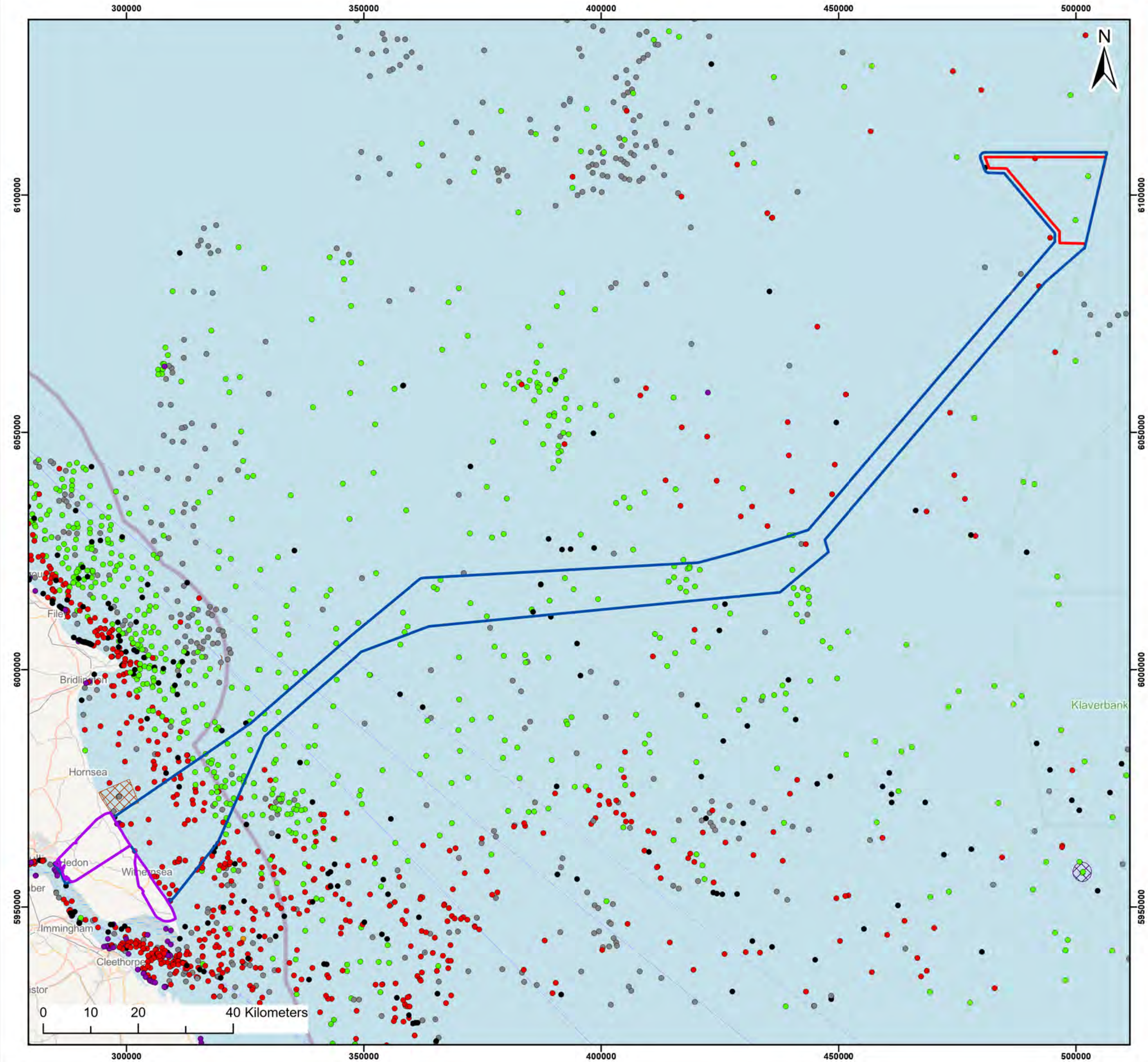
770. There are no known prehistoric sites within the Offshore Scoping Area. However, the geophysical assessment carried out for DBC (of which the DBD Array Area falls within) identified a number of shallow geological features (Royal HaskoningDHV, 2021). These palaeolandscape features where interpreted as being part of an exposed terrestrial environment which is likely to have been inhabited by human populations and are of high archaeological and palaeoenvironmental potential.

771. Within the Offshore Scoping Area, there are no nationally important wrecks protected under the Protection of Wrecks Act 1973 or Protection of Military Remains Act 1986.

772. There is high potential for other wrecks, wreck remains, aircraft and aircraft remain to be present within the Offshore Scoping Area. There is a total of 118 UK Hydrographic Office (UKHO) records within the Offshore Scoping Area, with the highest concentrations towards land. Most of these records are likely wreck related, but others are possibly related to aviation losses (**Figure 7-32**).

773. 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. Geophysical surveys carried out as part of Teesside A & B Environmental Statement (ES) failed to locate any of the UKHO records within the DBD Array Area. Within the offshore ECC, there are a further 112 UKHO records, 42 of which are ‘dead’. ‘Dead’ wrecks are wrecks which have not been identified since their loss and so are presumed not to exist.

774. Geophysical surveys undertaken for the Teesside A & B ES identified a further 14 archaeological anomalies within the DBD Array Area (Royal HaskoningDHV, 2021). These comprised one of ‘A1’ classification of anthropogenic origin of archaeological interest and 13 of ‘A2’ uncertain origin of possible archaeological interest. The geophysical assessment failed to locate any of the four UKHO records within the Array Area. However, it was noted that some of the UKHO records may be duplicates or the result of inaccurate positioning.



Legend:

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

Offshore Wrecks & Obstructions

- Other
- Dangerous Wreck
- Distributed Remains of Wreck
- Foul Ground
- Non-dangerous Wreck
- Obstruction, Undefined
- Wreck Showing any Portion of Hull/Superstructure
- Foul Area
- Foul Ground
- Non-dangerous Wreck
- Protected Wrecks

Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Designated Offshore Cultural Heritage Assets (Sheet 1 of 2)

Figure:	7-32	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0031		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	11/04/2023	JR	CM	A3	1:800,000
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Co-ordinate system: WGS 1984 UTM Zone 31N

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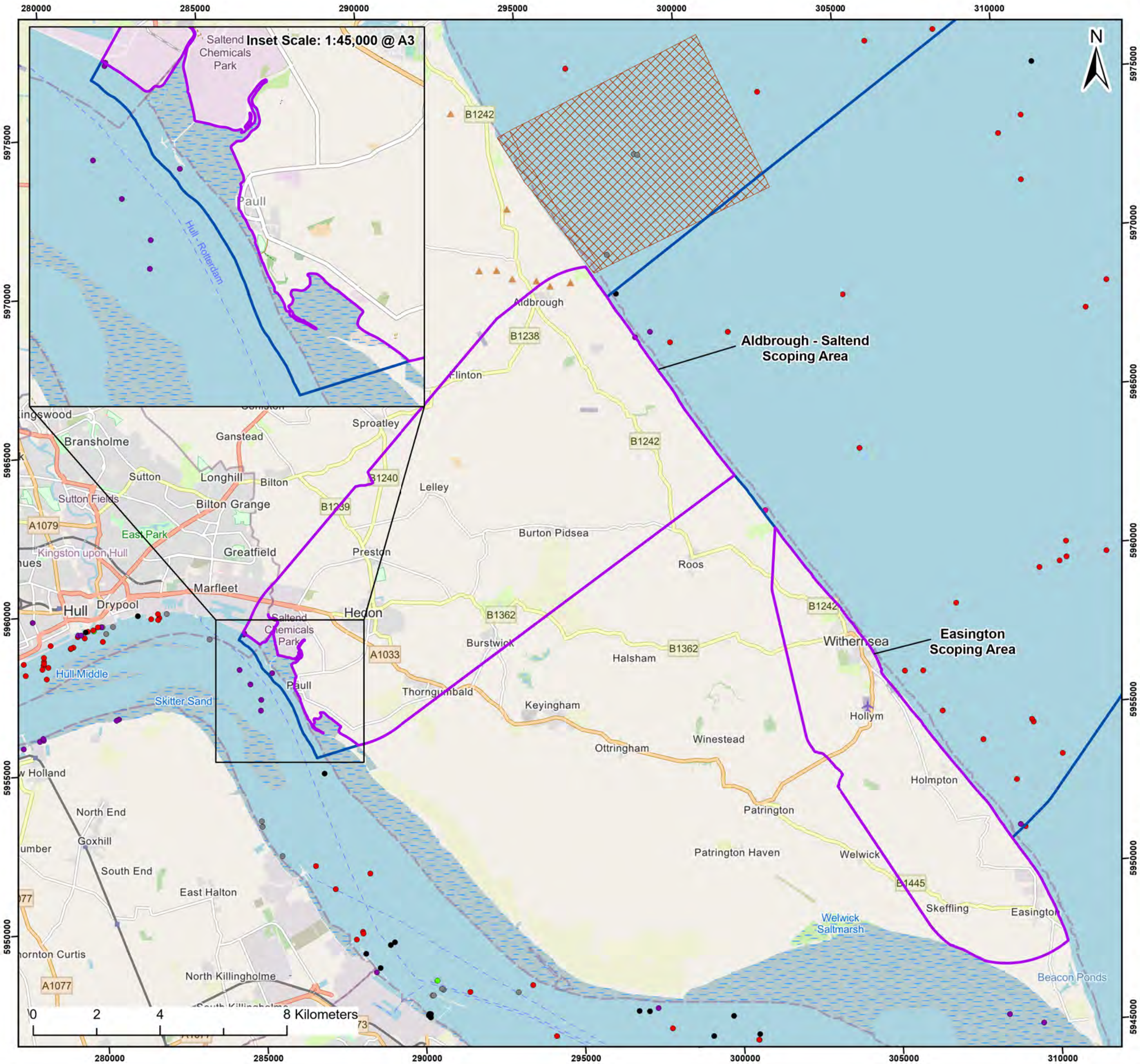

Legend:

- Offshore Scoping Area
- Onshore Scoping Area

Offshore Wrecks & Obstructions

- Other
- Dangerous Wreck
- Distributed Remains of Wreck
- Foul Ground
- Non-dangerous Wreck
- Wreck Showing any Portion of Hull/Superstructure
- Foul Ground

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Designated Offshore Cultural Heritage Assets (Sheet 2 of 2)

Figure: 7-32 | Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0051

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Co-ordinate system: British National Grid

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775. 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).

776. 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). As such, this area could hold potential for submerged palaeolandscapes and archaeology. At Owthrone cliffs for example, a submerged Mesolithic forest has been recorded along with Mesolithic Axes and a Bronze Age dugout canoe. The high rate of erosion along the coastline has also resulted in numerous lost villages including (but not limited to) Owthorne, Newsham, Ringborough and Monkwire (Sheppard, 1912).

777. Heritage Gateway records the presence of coastal defences related to World War I (WWI) and World War II (WWII) all along the Holderness coast. These heritage assets are likely to be present within the intertidal zones of the possible landfall locations.

778. Within the section of the Offshore Scoping Area which currently falls within the Humber Estuary there are two recoded UKHO entries, one of which is recorded as ‘dead’ and the other as lifted.

779. The potential receptors that may be present within the Offshore Scoping Area are summarised as:

- Palaeolandscape features and sub-seabed deposits of palaeoenvironmental interest;
- Prehistoric occupation sites;
- Wreck and aviation remains; and
- Occupation activity related to all periods of human activity within the intertidal zone.

7.11.3 Potential Impacts

780. 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 National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) (Department of Energy and Climate Change (DECC), 2011) and in the guidance documents listed in **Section 7.11.8**.

781. Heritage assets may be affected by direct physical changes or by indirect changes to their setting (Historic England, 2017).

782. 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), from construction related activities (i.e. seabed clearance and anchoring) and any direct impacts from the potential discharging of water / brine from the proposed HPF. These impacts will be reviewed as the Project develops.

783. 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**).

784. 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).

785. 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

786. Direct impact may occur if archaeological material is present within the footprint of the Project (e.g. cabling, foundations, footprint of jack-up vessels).

787. Direct impacts to heritage assets within the Array Area are scoped out of the EIA on the basis that these have already been assessed in the Teesside A & B ES. The ES concluded that, with the application of industry standard mitigation measures, all residual effects within Teesside B (now known as DBC) would be of negligible significance or that no discernible impact would occur. The same conclusions are considered to apply to the DBD Array Area. These industry standard mitigation measures would include:

- The archaeological assessment of pre-construction geophysical data to inform:
    - the implementation of Archaeological Exclusion Zones (AEZ); and
    - the identification of geophysical anomalies of possible archaeological for avoidance, where possible, through micro-siting of design, or further investigation;
- Geoarchaeological assessment (with consideration of the wider study of the

palaeolandscapes of the Dogger Bank projects which is currently ongoing);

- Ground truthing and further investigation, where required, using a Remote Operated Vehicle (ROV) or divers;
- On-board archaeological watching briefs (e.g. during clearance operations where there is considered to be high risk to archaeological material); and
- The implementation of a Protocol for Archaeological Discoveries (PAD).

788. The approach to archaeological investigation and mitigation will be set out in an Outline Written Scheme of Investigation (WSI) which will be prepared in accordance with the '*Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects'* (The Crown Estate, 2021). The Outline WSI will be submitted alongside the ES and Development Consent Order (DCO) application for the Project.

789. Direct impacts to heritage assets within the offshore ECC are scoped into the EIA, as this footprint has not previously been subject to assessment.

790. 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.

791. 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 in the Teesside A & B ES 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 would not result into a material change to the character of the historic seascape.

7.11.3.2 Potential Impacts during Operation

792. 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 and potential discharge of water / brine from the HPF). Similarly, this can occur in exceptional circumstances such as the replacement of cabling.

793. As for construction impacts described above (see **Section 7.11.3.1**), whilst direct impacts within the offshore ECC are scoped into the EIA, direct impacts within the Array Area are scoped out of the EIA. The Teesside A & B ES concluded that, with the application of industry standard mitigation measures, all residual effects within Teesside B (now known as DBC) would be of negligible significance or that no discernible impact would occur. The same conclusions are considered to apply to the DBD Array Area for the operation phase.

794. 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.

795. 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

796. 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.

797. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 7-32**).

7.11.4 Potential Cumulative Effects

798. 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, Dogger Bank South (DBS) and Sofia Offshore Wind Farms (RWE). There are also potential benefits of regional accumulation of data which DBD can feed into. Therefore, cumulative effects related to offshore archaeology and cultural heritage are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

799. 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.

800. 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.

801. 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

802. 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.

803. As such, direct transboundary impacts at construction, operation and decommissioning are all scoped into the EIA.

804. 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, operation and maintenance (O&M) and decommissioning activities. An assessment of transboundary effects will be based on the ‘zone of influence’ identified at the Preliminary Environmental Information Report (PEIR) / ES stage.

7.11.6 Summary of Scoping Proposals

805. **Table 7-32** 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 Evidence Plan Process (EPP) and other consultation activities and as additional project information and site-specific data become available.

Table 7-32 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 (offshore ECC only)	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
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

806. 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 7-33.**

Table 7-33 Desk-Based Data Sources for Offshore Archaeology and Cultural Heritage

Data Source	Data Contents
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
British Geological Survey (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.

Data Source	Data Contents
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.

807. In addition to the data presented in **Table 7-33**, the data presented in **Table 7-34** is proposed to be collected for the EIA assessment.

Table 7-34 Proposed Baseline Surveys for Offshore Archaeology and Cultural Heritage

Survey	Timing	Spatial Coverage
Geophysical Survey (magnetometer (mag.), multibeam echosounder (MBES), side scan sonar (SSS) and sub bottom profiler (SBP) survey	Completed in 2022	Partial offshore ECC
	To be completed in 2023	Offshore ECC

808. It is proposed that all data from the offshore ECC will be archaeologically assessed by a suitably qualified and experienced contractor (anticipated to be Wessex Archaeology). This will be carried out in accordance with industry good practice set out in available guidance such as Marine Geophysics Data Acquisition, Processing, and Interpretation (Historic England, 2013).

809. 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.

810. Data from the Array Area has also been acquired, but this will not be subject to an archaeological assessment, as direct impacts within the Array Area have been scoped out of the EIA. However, SBP data from the Array Area acquired in 2022 will be made available to inform the wider palaeolandscapes study of the Dogger Bank projects, which is currently ongoing.

811. Geotechnical investigations are scheduled to take place; however, the exact programme is unknown. Allowance will be made for archaeological involvement in the planning of the survey, and the samples will be made available for geoarchaeological assessment by a qualified and experienced archaeological contractor if required.

812. 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

813. The offshore archaeology assessment will be informed by the interpretation of the geophysical survey data (namely the MBES and SSS data to identify seabed features, such as wrecks, mag. data to identify magnetic anomalies and SBP and MBES data to identify palaeolandscape features).

814. An offshore archaeological desk-based assessment 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 7-33**. Dependent upon the results, a walkover survey at the landfall may be carried out 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.

815. 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 AEZs where appropriate. This mitigation strategy will be set out in the Outline WSI which will be submitted alongside the ES and DCO application. Although direct impacts within the Array Area have been scoped out of EIA, the Outline WSI will cover both the offshore ECC and Array Area to ensure that a commitment to archaeological investigation and mitigation, as relevant to both known and potential heritage assets, is captured across the extents of the DCO application boundary.

816. 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' Standard and Guidance for Historic Environment Desk-Based Assessments (2020) and Code of Conduct (2022);
- Institute of Environmental Management and Assessment (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).

817. 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

818. 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

819. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

820. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1)**, the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

821. The seascape, landscape and visual impact assessment (SLVIA) will consider all seascape and visual receptors seaward of Mean High Water Springs (MHWS) where there is the potential for them to be significantly affected by the offshore elements of the scheme. Impacts on onshore landscape and visual receptors from the onshore components of the Project, including intertidal and nearshore works associated with the landfall, will be considered within the Landscape and Visual Impact Assessment (LVIA) (See **Chapter 8.10 Landscape and Visual Impact**).

822. The SLVIA is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

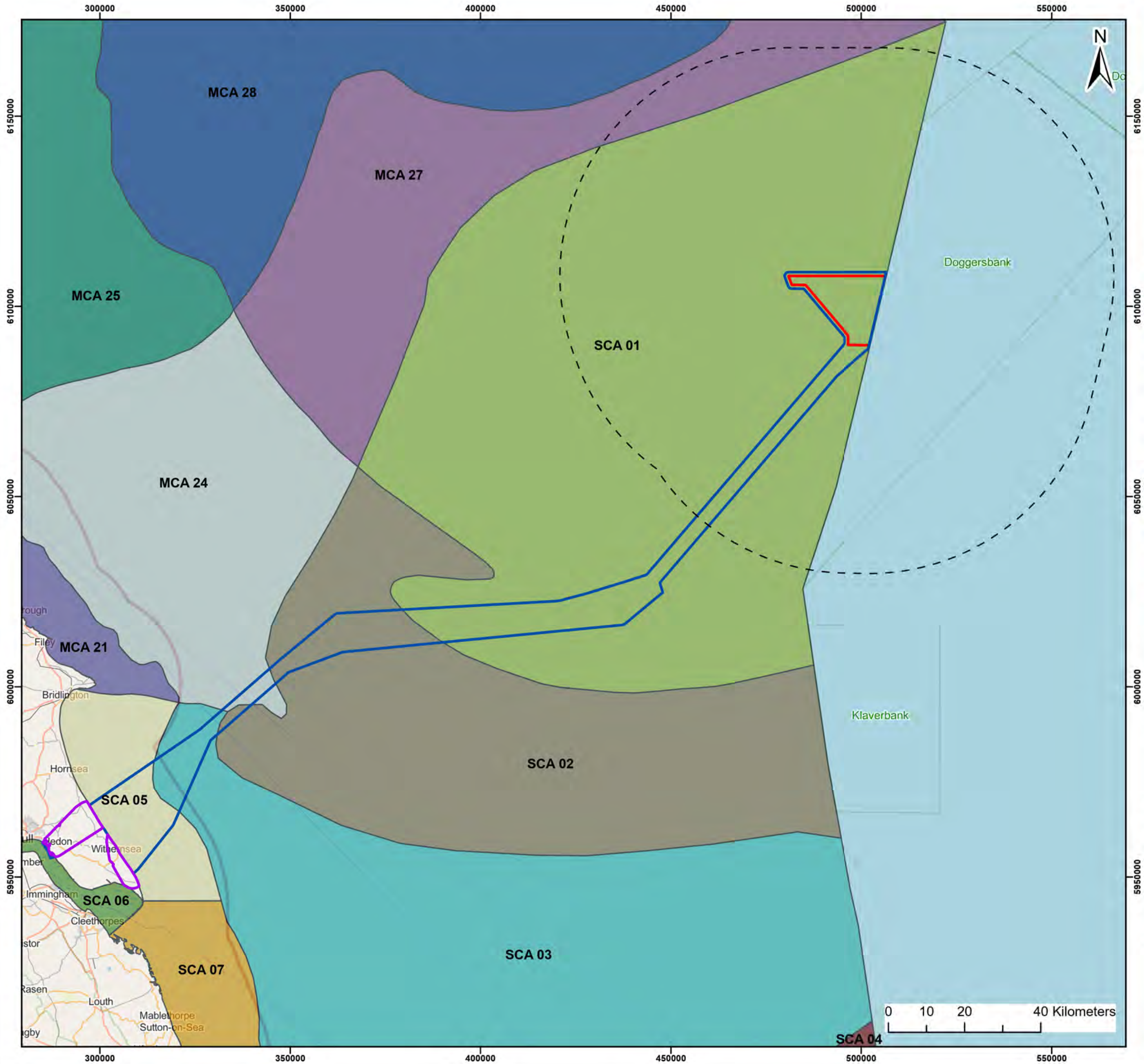
- **Chapter 7.11 Offshore Archaeology and Cultural Heritage;**
- **Chapter 7.13 Other Marine Users;** and
- **Chapter 8.10 Landscape and Visual Impact.**

7.12.1 Study Area

823. 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 elements on seascape character, landscape character and visual amenity.

824. 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. Therefore, the offshore ECC is not considered as part of the study area.

825. 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 7-33**.



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

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Seascape, Landscape and Visual Impact Study Area

Figure: 7-33

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0059

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00	22/02/2023	JR	EH	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

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7.12.2 Existing Environment

826. 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.

827. **Figure 7-33** 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. At its closest point, the study area for the offshore element of the Project is approximately 150km from the coast at Flamborough Head.

828. 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 Dogger Bank C (DBC) array area. The DBD Array Area is also approximately 18km from the array area for the consented Sofia Offshore Wind Farm, 44km from the array area of the consented Dogger Bank A (DBA) Offshore Wind Farm, and 52km from the array area of the consented Dogger Bank B (DBB) Offshore Wind Farm. These are each located to the west of the DBD Array Area. The planned Dogger Bank South (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.

829. In the original Dogger Bank Teesside A & B Environmental Statement (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 assessment.

830. The character of the seascape in UK waters is defined at a national scale in the seascape assessments published by the Marine Management Organisation (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.’

831. There is no known seascape assessment for Dutch waters, though the above characteristics are likely to be similar across the international boundary.

832. Due to the curvature of the earth, there would be no visibility of the above water Project infrastructure (maximum turbine height of 364m 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 is unlikely to 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.

833. Any offshore platforms, whether part of the Array Area or within the offshore ECC, would be a minimum of 140km 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

834. During construction of the offshore infrastructure (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.

835. The limited offshore export cable installation will be of a short duration and will utilise 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 cable will be located beneath the seabed and not observable from any point onshore.

836. Impacts during the temporary construction phase of the offshore infrastructure 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.

837. 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**.

838. 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

839. The susceptibility of the seascape is likely to be low due to the presence of consented and under-construction 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 operational impacts on seascape character are scoped out of the SLVIA.

7.12.3.2.2 Landscape Character and Designated Landscapes

840. Due to the intervening distance of 140km between the nearest offshore platform to shore (and 210km distance from the Array Area) and the coastal and non-coastal landscapes, the presence of the offshore elements 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 operational impacts on landscape character and designations resulting from the Project are scoped out of the SLVIA.

7.12.3.2.3 Visual Receptors

841. 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 infrastructure from the coast, due to the minimum intervening distance of approximately 140km. 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 operation of the Project are scoped out of the SLVIA.

7.12.3.3 Potential Impacts during Decommissioning

842. 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

843. 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 cumulative impacts are also scoped out.

7.12.5 Potential Transboundary Effects

844. There is potential for transboundary effects upon landscape and visual receptors due to the Project's construction, operation and maintenance (O&M) and decommissioning activities.

845. 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 (Dogger Bank 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

846. **Table 7-35** outlines the seascape, landscape and visual impacts which are proposed to be scoped out of the EIA.

Table 7-35 Summary of Impacts Proposed to be Scoped Out (X) for Seascape, Landscape and Visual Impact

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

847. 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

848. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

849. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

850. 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 Environmental Impact Assessment (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

851. 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.

7.13.2 Existing Environment

852. 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

853. 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 7-36** and shown on **Figure 7-34.**

Table 7-36 Offshore Wind Farm Projects within 50km of the Array Area

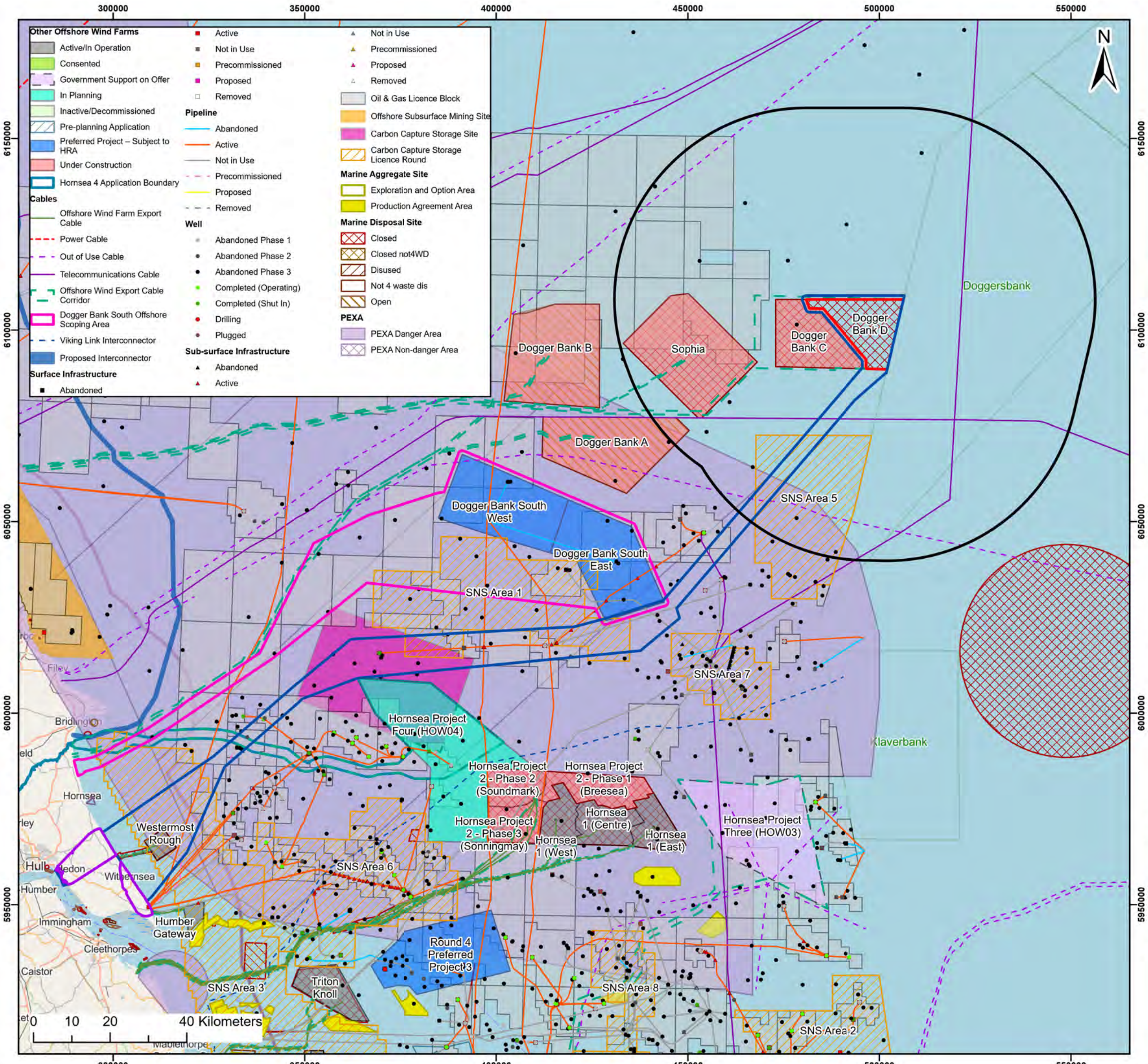
Offshore Wind Farm	Distance from the Offshore Scoping Area (km)	Status
Dogger Bank A (DBA)	49	Under construction
Dogger Bank C (DBC)	Adjacent	Under construction
Sofia	18	Under construction

854. Offshore wind farm ECCs within the Offshore Scoping Area are listed with their status in

855. **Table** 7-37 and shown on **Figure 7-34**.

Table 7-37 Offshore Wind Farm Projects Export Cables within the Offshore Scoping Area

Offshore Wind Farm	Wind Farm Status
Westermost Rough	In operation
Hornsea Project 4	In planning



Legend:

- Dogger Bank D Array Area
- Dogger Bank D Array Area 50km Buffer
- Offshore Scoping Area
- Onshore Scoping Area

Source: © Haskoning DHV UK Ltd, 2023; © Cefas, 2022; © North Sea Transmission Authority, 2023; © JNCC, 2022; © RWE, 2023; © Natural England, 2022; © KIS-ORCA, 2022. Contains data provided by The Crown Estate that is protected by copyright and database rights. © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Other Marine Users

Figure: 7-34

Drawing No: PC3991-RHD-OF-ZZ-DR-Z-0033

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	11/04/2023	JR	CM	A3	1:1,000,000
01	16/03/2023	JR	LA	A3	1:1,000,000

Co-ordinate system: WGS 1984 UTM Zone 31N

sse Renewables equinor

7.13.2.2 Oil and Gas Infrastructure

856. 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.

857. 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) is approximately 86km south-west of the Array Area, which 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).

858. 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.

859. Within the Offshore Scoping Area, there are nine pipelines that cross the offshore ECC carrying a range of products, including gas, condensate, chemical (not specified), hydraulic and methanol. These are listed in **Table 7-38** and displayed in **Figure 7-34.** No pipelines run through the Array Area.

Table 7-38 Pipelines within the Offshore Scoping Area

Pipeline	Material	Status	Number of crossings
Tyne to Trent	Gas	Active	Runs through the corridor without fully crossing
Cygnus to ETS		Active	1
Esmond to Bacton		Active	1
Shearwater to Bacton		Active	1
Langeled		Active	1
Kilmar Export	Chemical and Gas	Active	Runs through the corridor without fully crossing
Garrow to Kilmar		Active	Runs through the corridor without fully crossing
Cleeton to Whittle	Chemical, Hydraulic, Condensate and Gas	Active	1

Pipeline	Material	Status	Number of crossings
Cavendish	Methanol and Water	Not in use	1

860. The Offshore Scoping Area also overlaps with the following oil and gas blocks, licenced for exploration and production: 47/2d, 47/2b, 47/3g, 42/27, 42/28d, 42/28c, 42/28b, 42/28e, 42/29b, 43/22a, 42/23a, 43/24b, 43/24a, 44/12e, 44/12a.

7.13.2.3 Sub-Sea Cables

861. The southern North Sea contains a considerable number of cables, primarily telecommunication connections between the UK and continental Europe. Within the Offshore Scoping Area, four active sub-sea cables and one out of use cable cross the offshore ECC:

- Hornsea Four offshore ECC;
- Westermost Rough offshore ECC;
- Tampnet MCCS telecommunications cable;
- Tata North telecommunications cable; and
- The out of use Norderney to Scarborough telecommunications cable.

862. There are no existing cables present within the Array Area.

7.13.2.4 Carbon Capture Storage

863. A new leasing round opened by the North Sea Transition Authority (NSTA) in June 2022, includes two Carbon Capture Storage (CCS) areas within the offshore ECC. These two areas are the following:

- Southern North Sea Area 1; and
- Southern North Sea Area 5.

864. Outside of the NSTA leasing round, the site of the proposed Northern Endurance CCS Project falls within 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 crossing the offshore ECC in two locations.

7.13.2.5 Marine Aggregates and Mining

865. 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.

866. 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**.

7.13.2.6 Disposal Sites

867. There are four open disposal sites within 50km of the Offshore Scoping Area, namely Bridlington A, Dogger Bank A, Dogger Bank B and Hornsea Disposal Area 1. The closest of these active disposal sites is Dogger Bank A, which is located approximately 23km from the closest point to the Offshore Scoping Area boundary. There are two closed disposal sites within the Offshore Scoping Area, namely, Dogger Bank Teesside A (DG030) disposal site which encompasses the Array Area and the Westermost Rough (HU207) disposal site, as shown in **Figure 7-34**. Furthermore, the closed Dogger Bank Teesside B (DG025) disposal site also lies 18km to the west of the Array Area (**Figure 7-34**).

7.13.2.7 Ministry of Defence Activities

868. The following Practice and Exercise Areas (PEXA) encompass the Offshore Scoping Area:

- D323C;
- D323D; and
- D323F.

869. These sites are designated as Royal Airforce (RAF) Danger Areas for Air Combat Training and High Energy Manoeuvres between 5,000 and 66,000 ft.

870. 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 Joint Nature Conservation Committee (JNCC) and the Marine Management Organisation (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 License 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

871. 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.

872. 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

873. The Offshore Scoping Area overlaps with other wind farm infrastructure (see **Section 7.13.2.1**) and 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 proposed Hornsea Project Four ECC (**Figure 7-34**). Where cable crossings are required, crossing agreements will be sought with cable owners and operators, and appropriate installation and protection measures developed.

874. 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 Sofia offshore wind farm) will be assessed, supported by engagement with the relevant operators. Therefore, the potential inference with other wind farms will be scoped into EIA.

7.13.3.1.2 Potential Interference with Oil and Gas Operations and Decommissioning Activities

875. 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.

876. Any conflicts with oil and gas industry vessel and helicopter operations will be assessed as **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.

877. 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 inference 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

878. 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 14 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 CCS Sites

879. The Offshore Scoping Area overlaps with two proposed leasing CCS sites within the offshore ECC and the Northern Endurance project which is also within the offshore ECC (see **Section 7.13.3.1.4**). There is a potential pathway for interaction between the Project and these CCS sites, although any potential effects of this close proximity will be mitigated by engagement with the relevant CCS operators and the appropriate crossing agreements. However, as the scale of the potential interaction is unknown at this time, construction impacts on CCS sites will be scoped into the EIA.

7.13.3.1.5 Impacts on Disposal Sites

880. The Offshore Scoping Area does not overlap with any active disposal sites (**Figure 7-34**), with the closest active disposal site being Dogger Bank A, located approximately 23km from the closest point to the Offshore Scoping Area boundary and as such there are no pathways for impacts to occur. Therefore, construction impacts on disposal sites will be scoped out of the EIA.

881. Vessel traffic associated with transits to and from open disposal sites within 50km of the Offshore Scoping Area is considered in **Chapter 7.9 Shipping and Navigation**.

7.13.3.1.6 Impacts on Aggregate Sites

882. 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 13km from the closest point to the Offshore Scoping Area boundary. Therefore, construction impacts on aggregate sites will be scoped out of the EIA. Any dredger transit conflicts will be addressed as part of **Chapter 7.9 Shipping and Navigation**.

7.13.3.1.7 Impacts on MoD Activities

883. The construction of the Project has the potential to interact with multiple MoD activities, due to overlaps with PEXAs (see **Section 7.13.3.1.7**). However, 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. Therefore, construction impacts on MoD activities will be scoped out of the EIA.

7.13.3.2 Potential Impacts during Operation

884. The presence of permanent offshore infrastructure has the potential to impact projects either within or adjacent to the Offshore Scoping Area.

885. Vessel movements during the operation phase may also affect neighbouring activities (see **Chapter 7.9 Shipping and Navigation**).

7.13.3.2.1 Potential Interference with Other Wind Farms

886. The presence of permanent offshore infrastructure has the potential to impact other wind farm projects that are in close proximity. Any impacts of wind turbines and offshore substations structures on vessel activities, including those related to other offshore wind farms will be addressed as part of **Chapter 7.9 Shipping and Navigation**. Therefore, potential interference with other wind farms during the operation phase will be scoped out of the EIA.

7.13.3.2.2 Potential Interference with Oil and Gas Operations and Decommissioning Activities

887. 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, marine aggregate extraction and recreational sailing will be addressed as part of **Chapter 7.9 Shipping and Navigation**.

888. Potential impacts on helicopter operations associated with the oil and gas industry will be addressed as part of **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.

889. Vessel movements during the operation phase may also affect other users. However, impacts from operation and maintenance (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 the other chapters, potential interference with oil and gas operations and decommissioning 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

890. 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 which will ensure that specific controls are in place 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 CCS Sites

891. The presence of permanent offshore infrastructure has the potential to impact CCS projects, for the Northern Endurance project and the two leasing round areas, that are in close proximity (see **Section 7.13.3.1.4**). However, this is likely to be mitigated through engagement with the relevant CCS operators during the construction phase. Vessel movements in terms of O&M activities will be addressed as part of **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

892. The Offshore Scoping Area does not overlap with any active disposal sites (**Figure 7-34**), with the closest active disposal site being Dogger Bank A, which is located approximately 23km from the closest point to the Offshore Scoping Area boundary 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.

893. Vessel traffic associated with transits to and from open disposal sites within 50km of the Offshore Scoping Area is considered in **Chapter 7.9 Shipping and Navigation**.

7.13.3.2.6 Impacts on Aggregate Sites

894. 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 13km from the closest point to the Offshore Scoping Area boundary, 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 addressed as part of **Chapter 7.9 Shipping and Navigation**.

7.13.3.2.7 Impacts on MoD activities

895. During the operation phase, MoD activities may be affected by the presence of exclusion 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

896. 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.

897. 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 7-39**).

7.13.4 Potential Cumulative Effects

898. 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 receptors. Potential impacts of the Project on other offshore infrastructure and 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.

899. Therefore, it is not anticipated that there will be pathways for significant cumulative effects that cannot be appropriately mitigated for, and cumulative impacts are proposed to be scoped out of the EIA.

7.13.5 Potential Transboundary Effects

900. There is potential for transboundary effects upon other marine users due to the Project's construction, O&M and decommissioning activities. However, the closest offshore wind farm is in German waters approximately 90km away (H2-20), adjacent to Dutch exploration block E01. There have been no international cables or pipelines identified which could come into conflict with the Project. Should there be any updates to new projects identified through the course of the EIA which could have transboundary impacts, these will be considered in the EIA. However, at this stage given the lack of interaction and pathways between existing transboundary receptors and the Project, transboundary impacts have been scoped out of the EIA.

7.13.6 Summary of Scoping Proposals

901. **Table 7-39** outlines the other marine user 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 7-39 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	✓	X	✓
Potential interference with oil and gas operations and decommissioning 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	X	X	X
Transboundary impacts	X	X	X

7.13.7 Approach to Data Gathering

902. The following information has been considered during the production of this Scoping Report and will be considered further within the Preliminary Information Report (PEIR) and Environmental Statement (ES) where relevant matters are scoped in to the EIA process.

903. 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 7-40**.

Table 7-40 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

904. The datasets within **Table 7-40** are shown in **Figure 13-34**.

905. 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

906. 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.

907. 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

908. 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

909. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

910. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

7.14.1 Study Area

911. 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 Mean High Water Springs (MHWS) where the offshore export cables make landfall.

7.14.2 Existing Environment

912. 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 (NO_x), particulate matter (PM) and sulphur dioxide (SO_2).

913. 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).

914. From January 1st, 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% by mass. The IMO 2020 would lead to a 77% reduction in overall sulphur oxide (SO_x) emissions from vessels, which is equivalent to an annual reduction of around 8.5Mt SO_x (IMO, 2019).

915. In addition, the North Sea is also a designated Emission Control Area (ECA) under the MARPOL Convention for SO_x and NO_x, 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 January 1st, 2015, vessels entering and transiting through the North Sea ECA must comply with a SO_x limit of 0.1%. Furthermore, the IMO also adopts a progressive approach to the control of marine diesel engine NO_x emissions. Vessels constructed on or after January 1st, 2021, must comply with the most stringent Tier III controls on diesel engines when entering and transiting through the North Sea ECA.

916. 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 NO_x, SO_x, primary $PM_{2.5}$ and primary PM_{10} respectively. Projections based on changes in shipping activity and international maritime legislation suggest that NO_x emissions will increase from 2020 onwards, while decreases in SO_2 and PM emissions are expected (AQEG, 2017).

917. 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), 2023). 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 (East Riding of Yorkshire Council, 2012).

7.14.3 Potential Impacts

918. 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

919. 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 operation and maintenance (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.

920. In addition, construction and O&M activities 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 yet to be selected landfall location, it is anticipated that these works would be highly localised 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.

921. As part of embedded mitigation, the Project would incorporate vessel management strategies and maintenance requirements as required in its Development Consent Order (DCO) application documents to ensure the most efficient use of vessels as practicable and compliance with relevant national and international maritime air quality standards and legislation, including the MARPOL Annex VI Regulations.

922. It is anticipated that decommissioning impacts would be similar in nature to those of 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.

923. 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 Environmental Impact Assessment (EIA).

7.14.4 Potential Cumulative Effects

924. 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

925. 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 European Economic Area (EEA) Member States. 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

926. **Table 7-41** outlines the offshore air quality impacts which are proposed to be scoped out of the EIA.

927. 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 7-41 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

928. 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

929. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with offshore airborne noise, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, the offshore export cable corridor (ECC) up to the yet to be selected landfall location within the East Riding of Yorkshire and the potential marine intake / outfall system for the Hydrogen Production Facility (HPF).

930. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

7.15.1 Study Area

931. 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 Mean High Water Springs (MHWS) where the offshore export cables make landfall.

7.15.2 Existing Environment

932. 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 source), 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.

933. The existing background noise in nearshore parts of the study area that are in proximity to more urbanised locations such as Withernsea and Easington, may be expected to be slightly higher due to land-based sources which are likely to be diurnally variable.

934. 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.

935. Marine ecological receptors 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**.

936. 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. 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 (East Riding of Yorkshire Council, 2012).

7.15.3 Potential Impacts

937. 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.

7.15.3.1 Potential Impacts during Construction

938. Offshore construction activities have the potential to increase airborne noise within the Array Area and the offshore ECC. The main sources of airborne noise would be from the vessels associated with cable laying, foundation installation and the construction of other above-sea structures such as the Offshore Substation Platform (OSP). Construction activities associated with the Project would be temporary in nature and primarily carried out at a significant distance from shore, mostly within the Array Area.

939. Nearshore construction activities that will generate airborne noise will be limited to the installation of the offshore export cables at landfall, and the installation of potential outfall and intake pipes associated with the HPF, which may involve either Horizontal Directional Drilling (HDD) works or ploughing, trenching or jetting if open cut trenching is utilised. It is anticipated that construction airborne noise impacts would be localised and of a relatively short duration compared to the entire construction programme.

940. 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 near the yet to be selected landfall location, it is anticipated that their impacts would be experienced transiently and infrequently.

941. Given the likely negligible increases in 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.

7.15.3.2 Potential Impacts during Operation

942. During operation, increases in offshore airborne noise would be expected to be limited to the movement of turbine blades, as well as operation and maintenance (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 (i.e. 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.

943. Given the likely negligible increases in 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.

7.15.3.3 Potential Impacts during Decommissioning

944. 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.

945. Therefore, it is proposed that all offshore airborne noise impacts associated with decommissioning are scoped out of the EIA.

7.15.4 Potential Cumulative Effects

946. 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 should be scoped out of the EIA.

7.15.5 Potential Transboundary Effects

947. It is noted that the 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 based to surrounding European Economic Area (EEA) Member States. It is therefore considered that all transboundary offshore airborne noise impacts should be scoped out of the EIA.

7.15.6 Summary of Scoping Proposals

948. **Table 7-42** outlines the offshore airborne noise impacts which are proposed to be scoped out of the EIA.

949. The potential for disturbance to intertidal and offshore ornithology receptors from airborne noise will be considered within **Chapter 7.7 Intertidal and Offshore Ornithology**.

950. 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;**

951. Construction works within the nearshore area with potential to influence local noise levels and thus affect coastal receptors have been considered within **Chapter 8.8 Onshore Noise and Vibration**.

Table 7-42 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

7.15.7 Scoping Questions to Consultees

952. 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

953. This part of the Scoping Report presents the existing environment within the Onshore Scoping Area (**Figure 1-1**) 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 Environmental Impact Assessment (EIA).

954. 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.

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

8.2 Geology and Ground Conditions

956. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) 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 export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

957. 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 Environmental Impact Assessment (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

958. 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 of the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES).

959. 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 Control of Major Accident Hazard (COMAH) sites, groundwater abstraction wells and Source Protection Zones (SPZ). This is due to the higher risk posed by COMAH sites, the sensitivity of groundwater abstraction wells and associated SPZs. With the exception of COMAH sites, 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

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8.2.2 Existing Environment

960. 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

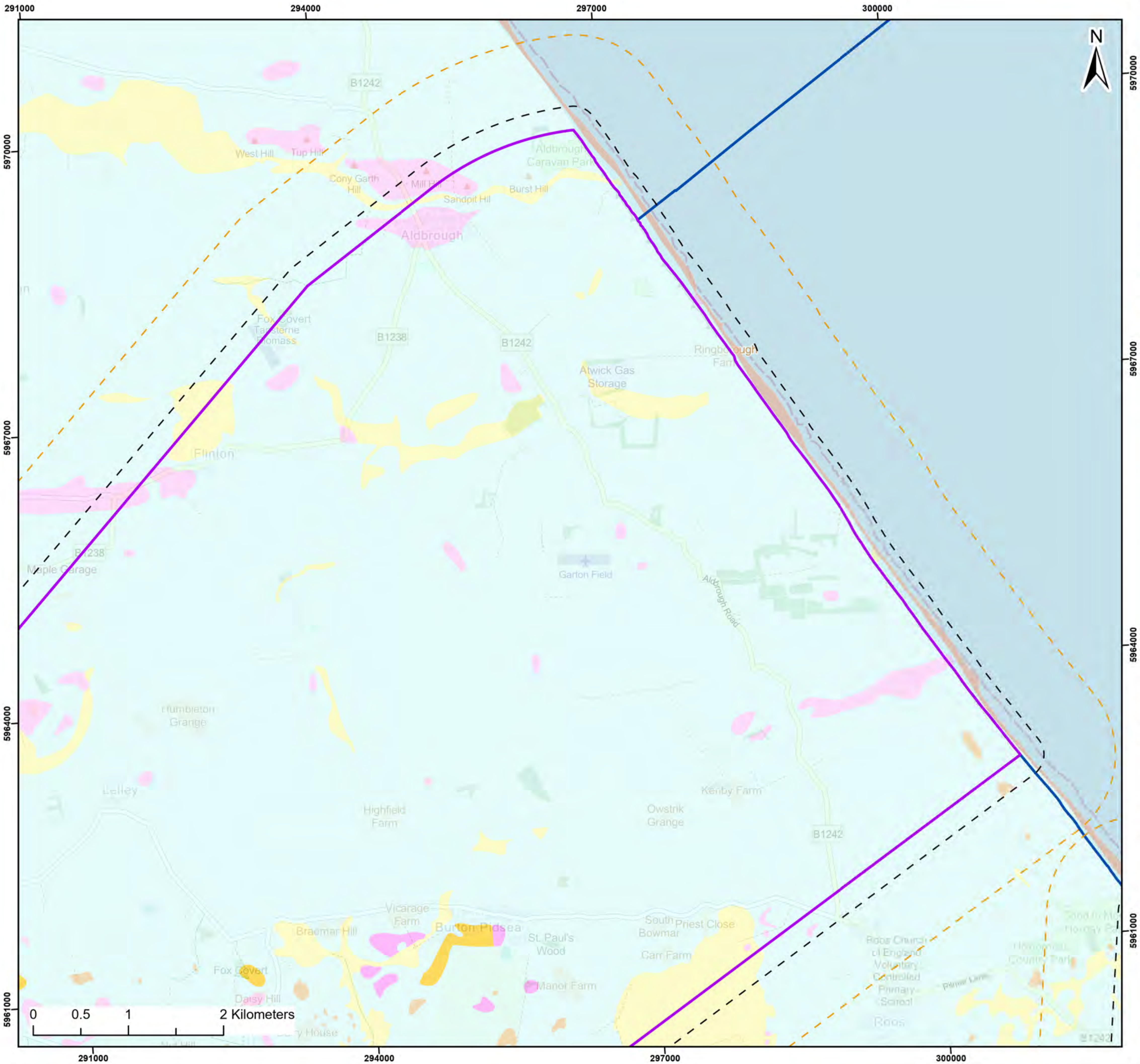
Parameter	Details
Geology and aquifer designations	A review of the published geological mapping available on the British Geological Survey (BGS) Geoindex website (accessed January 2023) and BGS map portal (BGS Geological Map for Hornsea Solid and Drift, Sheet number 73, 1998 and BGS Geological Map Patrington Solid and Drift Sheet number 81 – including parts of Sheets 82 and 90, 1991) 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: • Blown Sands (Secondary A Aquifer); • Beach And Tidal Flat Deposits (undifferentiated Aquifer) - clay, silt and sand (Secondary A Aquifer); • Alluvium – clay, silt, sand and gravel (Secondary A Aquifer); • Tidal Flat Deposits – clay and silt (Unproductive strata); • Lacustrine Deposits – sand, silt and clay (Secondary B Aquifer); • Marine Beach Deposits – sand and gravel (Secondary A Aquifer); • Storm Beach Deposits (Secondary A Aquifer); • Peat (unproductive strata); • Kelsey Hill Gravels (Beds) - sand and gravel (Secondary A Aquifer); • Kelsey Hill Gravels (Beds) - clay and silt (Unproductive strata); • Glaciofluvial Deposits – sand and gravel (Secondary A Aquifer); and • Glacial Till (Secondary Undifferentiated Aquifer). The majority of the northern part of the Onshore Scoping Area is underlain by Glacial Till with isolated pockets of the other Superficial Deposits identified. The Alluvium covers large areas to the south of the Onshore Scoping Area with isolated pockets of the other Superficial Deposits identified.

Parameter	Details
	Bedrock: • Rowe Chalk Formation – chalk (Principal Aquifer); and • Flamborough Chalk Formation – chalk (Principal Aquifer) The Rowe formation subcrops to the north most part of the Onshore Scoping Area and is underlain by the Flamborough Chalk formation which subcrops on the remainder and the south of the Onshore Scoping Area.
Groundwater vulnerability	The Environment Agency's groundwater vulnerability map (Environment Agency, 2020), as viewed on MAGIC maps, indicates that the vulnerability of the groundwater underlying the study area ranges from 'low' to 'high'. A low groundwater vulnerability classification indicates that the overlying superficial deposits afford some 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	An isolated SPZ 1 is located within the study area between Sproatley Road and Long Lane (near the settlement of Flinton). The remainder of the study area is not located within a SPZ. The location of the SPZ is illustrated in **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: • Preseton New Drain; • Nuttles; • Sproatley Drain; • Lelly Drain; • Fox Covert Drain; • Lambwath Stream; • Mill Drain; • South Pasture Drain; • Skeckling Drain; • East Carr Drain; • Owstwick Drain; • Catchwater Drain; • Winstead Drain;

Parameter	Details
	• Nevills Drain; • Old Hive Dyke; • Punda Drain; • Keyinghame Drain; and • The Humber. Statutory Main Rivers located either wholly or partially within the study area, as illustrated on **Figure 8-4**, include the following: • Fosse Drain; • Hedon Haven; • Westlands Drain; • Burstwick Drain; • Old Fleet; • Thorngumbald Drain; and • an unnamed river. 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 Onshore Scoping 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) - Dimlington Cliff; Humber Estuary (also Special Conservation Area (SAC), Special Protection Area (SPA) and Ramsar site). Local Geological Sites (LGS) - Branmere Nr Aldbrough; Sunderland Bottom, North of Halsham; and South Holderness Coast Line.
Coal Authority Mapping	The Coal Authority Interactive Mapper (accessed 30 January 2023) indicates that there are no high risk development areas or coal mining reporting areas within the study area.
Nitrate Vulnerable Zones (NVZ)	The study area is located within the Winestead Drain from source to Humber NVZ, Sands / Keyingham / Roos Drain from source to Humber, Burstwick Drain from source to

Parameter	Details
	Humber NVZ and Wyton Drain / Sproatley Dr from source to Humber 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 (East Riding of Yorkshire Council 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 (**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 ALC Grades 2 – 4 (very good to poor quality agricultural land) agricultural land within study area. ALC Grade 4 is located within the Easington Scoping Area only. The majority of land within both areas of the Onshore Scoping Area is classified as ALC Grade 2 (see **Chapter 8.5 Soils and Land Use** for additional details on agricultural land).
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, Aldbrough, Flinton, Preston, Hedon, Burstwick and Withernsea. Named industrial features within the study area that may represent potential sources of contamination include: • Gassco AS UK Branch; • Rough Gas Terminal; • BP West Sole Terminal; • Dimlington Gas Terminal; • Hollym airfields (two locations); • Waxholme Trading Park; • SSE Aldbrough Gas Storage; • Garton Field (airfield); • Paull AGI (National Grid); • Saltend Power Station; • Saltend South Substation; • Saltend North Substation; • Saltend Chemicals Park; and

Parameter	Details
	• Kingstone International Business Park. There are nine records of historical landfill sites and one authorised landfill site located within the study area (**Figure 8-7**). Information in relation to wastes accepted at these sites will be gathered as part of the EIA process. There is the potential for the onshore elements of the Project to be located within or adjacent to brownfield land (land that has previously been developed). The nature of the previous development associated with the brownfield land may also represent potential sources of contamination.



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)
- Glaciofluvial Deposits, Devensian – Sand & Gravel
- Kelsey Hill Gravels (Beds) – Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium – Clay, Silt, Sand & Gravel
- Blown Sand - Sand
- Head – Clay, Silt, Sand & Gravel
- Storm Beach Deposits – Sand, Gravel & Boulders
- Beach & Tidal Flat Deposits (Undifferentiated) – Clay, Silt & Sand
- Marine Beach Deposits – Sand & Gravel
- Tidal Flat Deposits – Clay & Silt
- Peat - Peat
- Clay with Flints Formation – Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels (Beds) – Clay & Silt

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				
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Co-ordinate system: British National Grid

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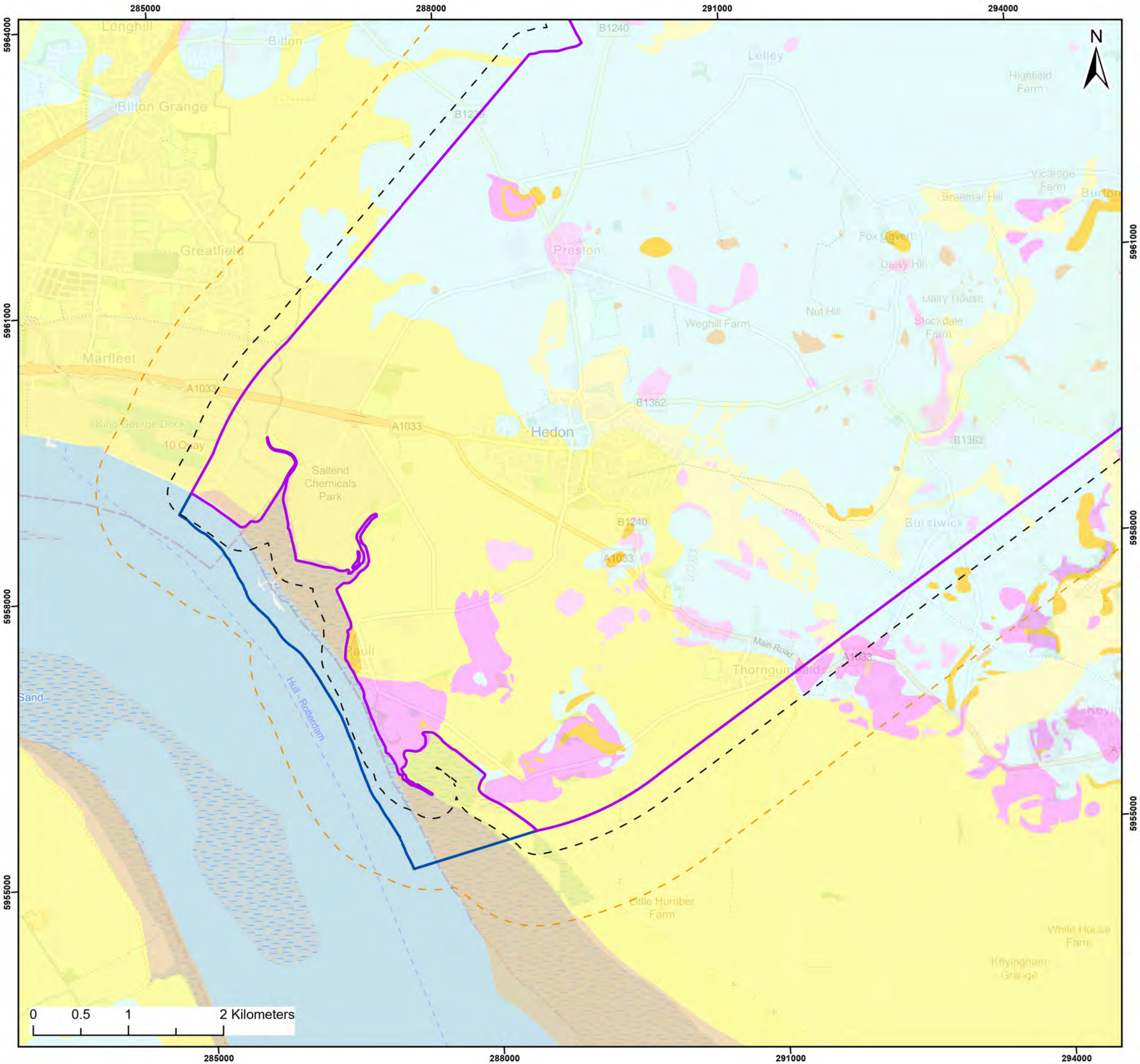

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- Beach & Tidal Flat Deposits (Undifferentiated) – Clay, Silt & Sand
- Marine Beach Deposits – Sand & Gravel
- Tidal Flat Deposits – Clay & Silt
- Peat - Peat
- Clay with Flints Formation – Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels (Beds) – Clay & Silt

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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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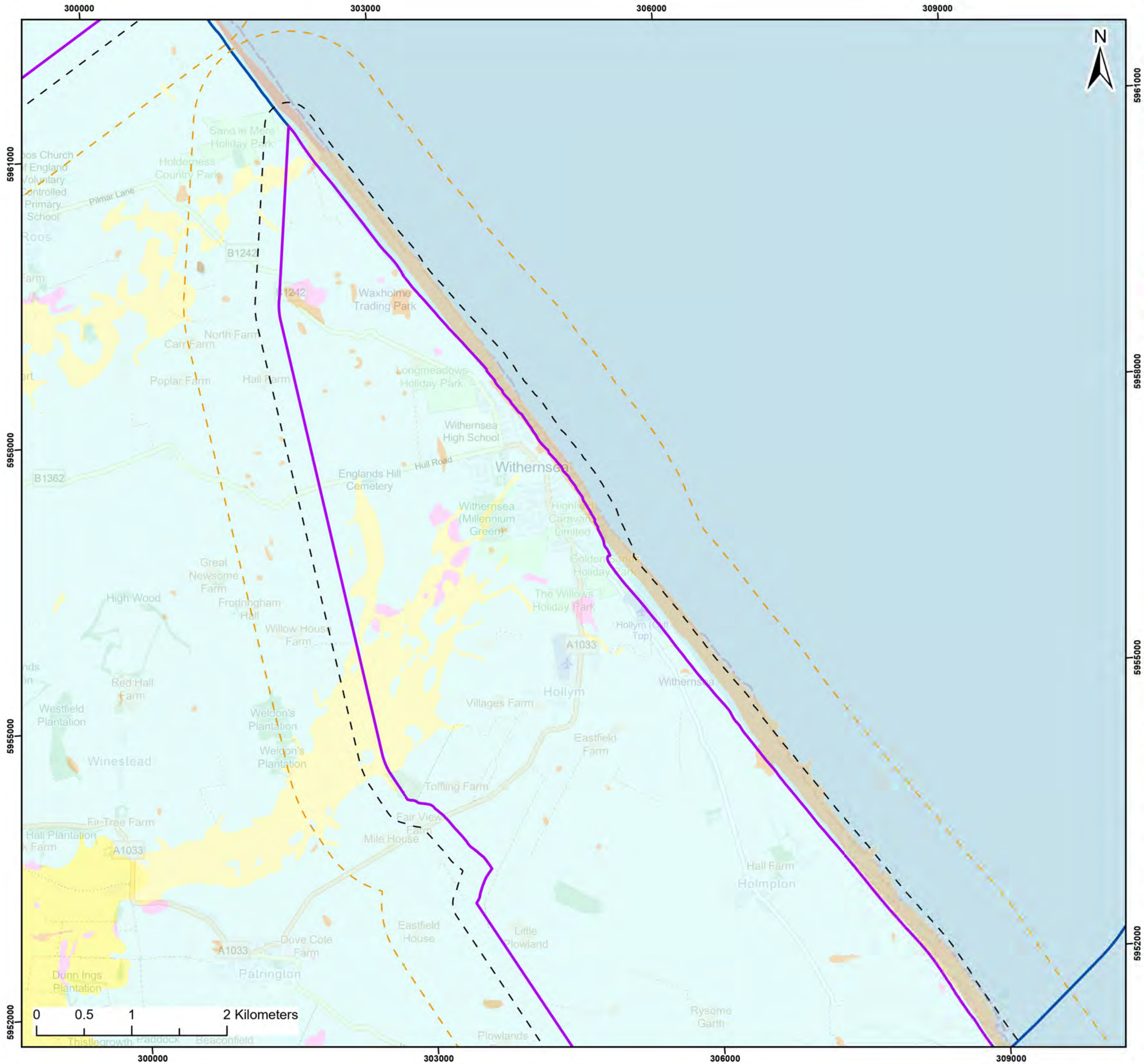

Legend:

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- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Glaciofluvial Deposits, Devensian – Sand & Gravel
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- Till, Devensian - Diamicton
- Alluvium – Clay, Silt, Sand & Gravel
- Blown Sand - Sand
- Head – Clay, Silt, Sand & Gravel
- Storm Beach Deposits – Sand, Gravel & Boulders
- Beach & Tidal Flat Deposits (Undifferentiated) – Clay, Silt & Sand
- Marine Beach Deposits – Sand & Gravel
- Tidal Flat Deposits – Clay & Silt
- Peat - Peat
- Clay with Flints Formation – Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels (Beds) – Clay & Silt

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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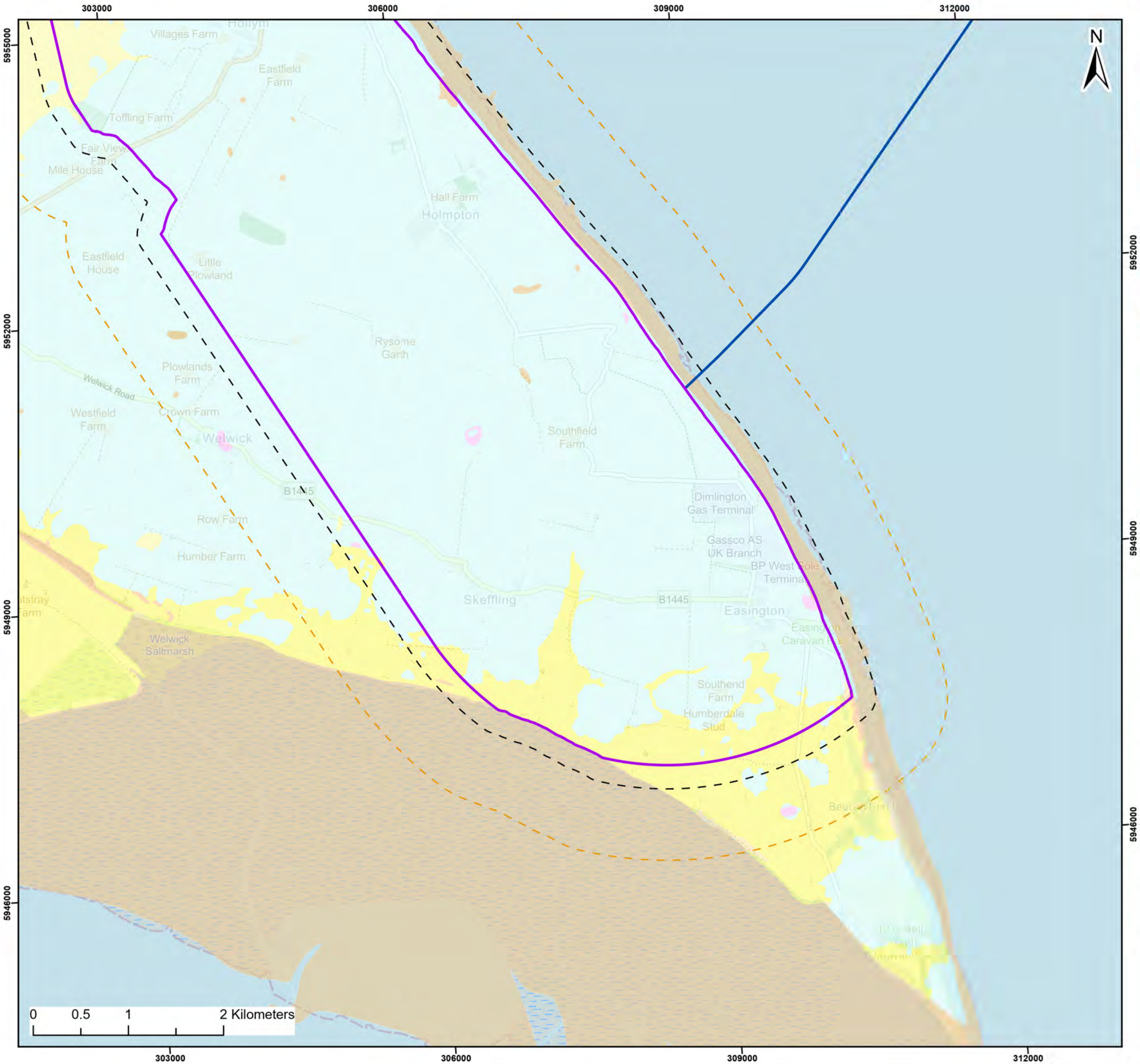

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Glaciofluvial Deposits, Devensian – Sand & Gravel
- Kelsey Hill Gravels (Beds) – Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium – Clay, Silt, Sand & Gravel
- Blown Sand - Sand
- Head – Clay, Silt, Sand & Gravel
- Storm Beach Deposits – Sand, Gravel & Boulders
- Beach & Tidal Flat Deposits (Undifferentiated) – Clay, Silt & Sand
- Marine Beach Deposits – Sand & Gravel
- Tidal Flat Deposits – Clay & Silt
- Peat - Peat
- Clay with Flints Formation – Clay, Silt, Sand & Gravel
- Kelsey Hill Gravels (Beds) – Clay & Silt

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

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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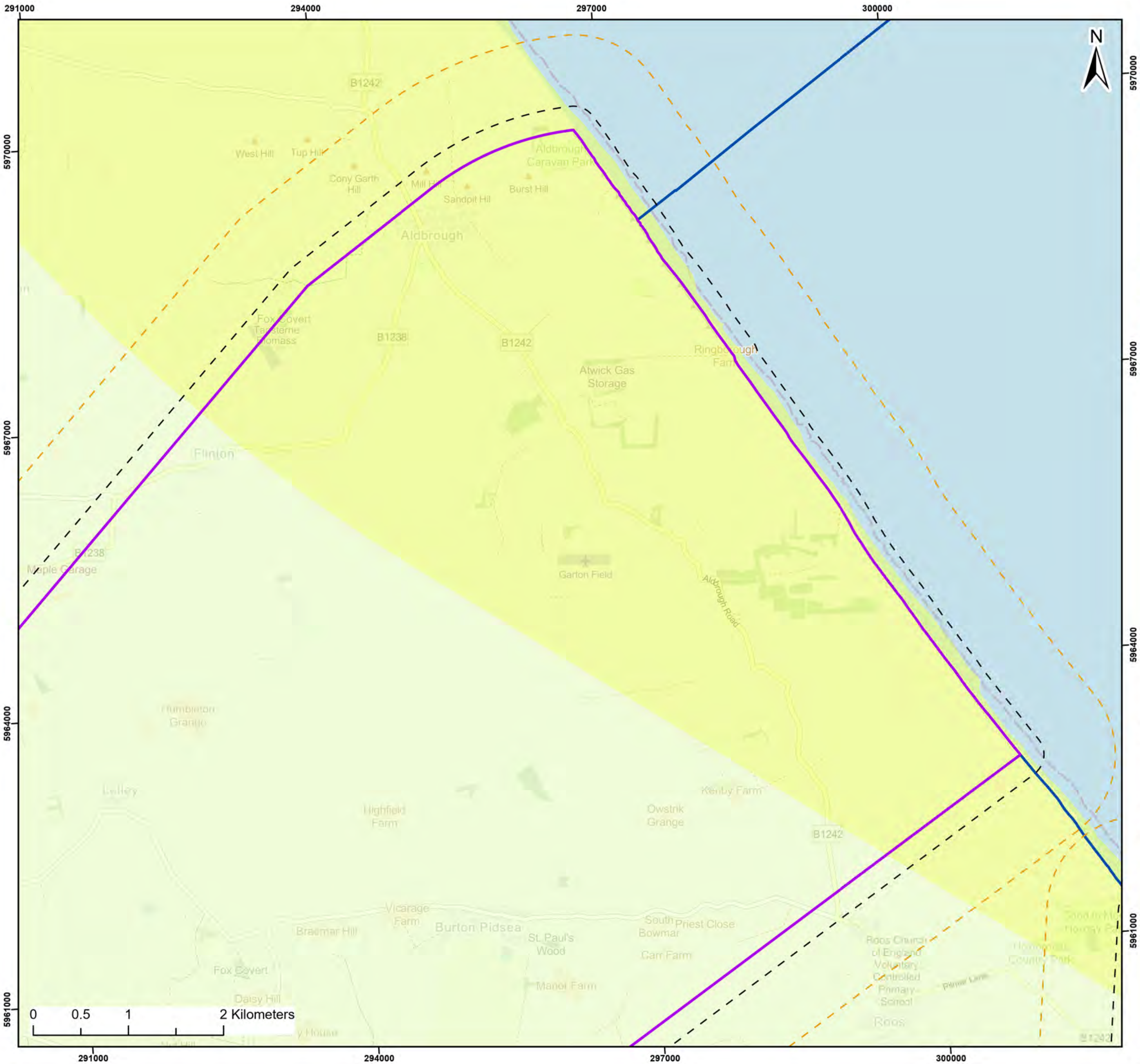

Legend:

- 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)
- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk

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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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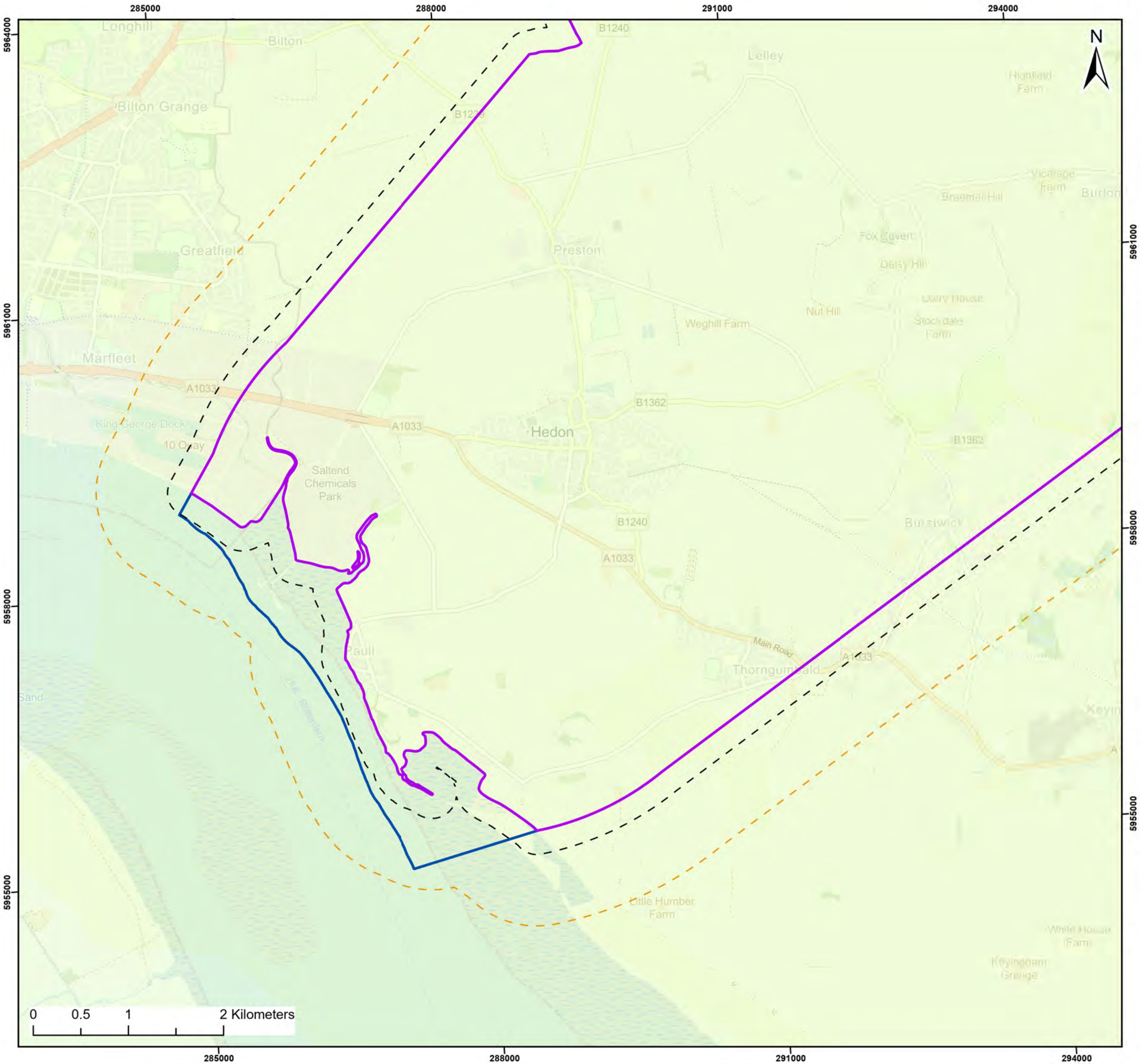

Legend:

- 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)
- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk

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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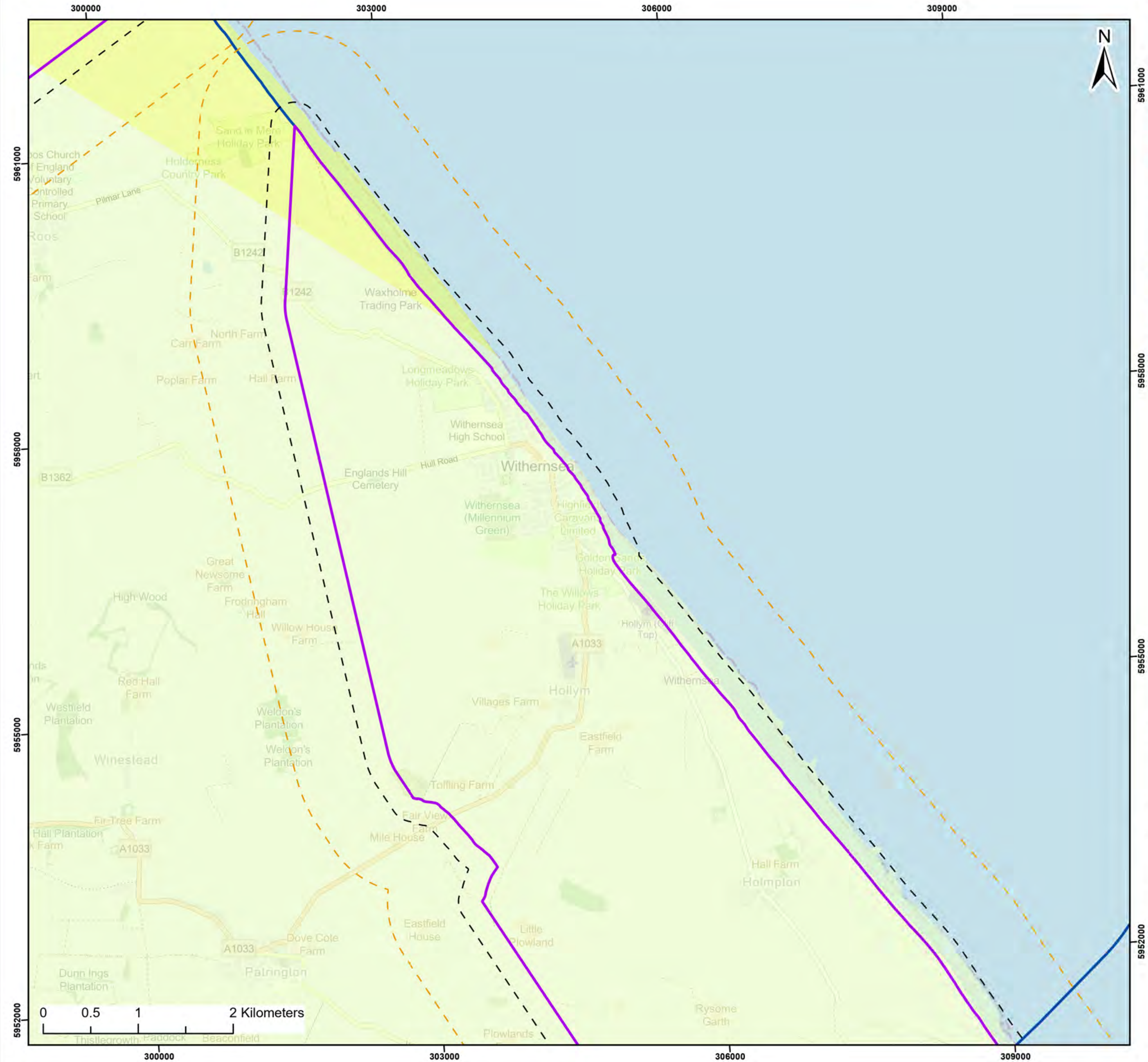

Legend:

- 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)
- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk

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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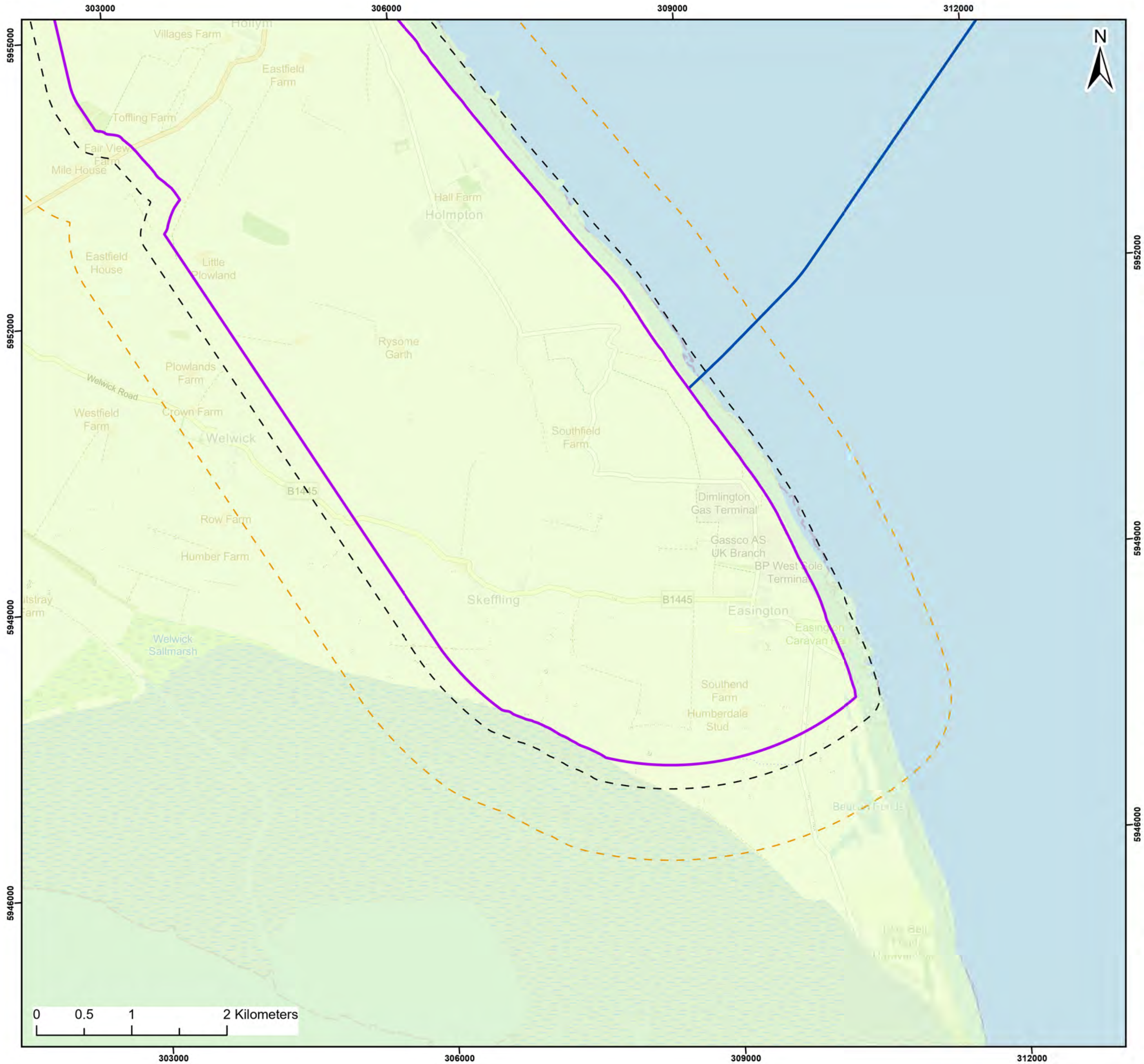

Legend:

- 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)
- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk

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		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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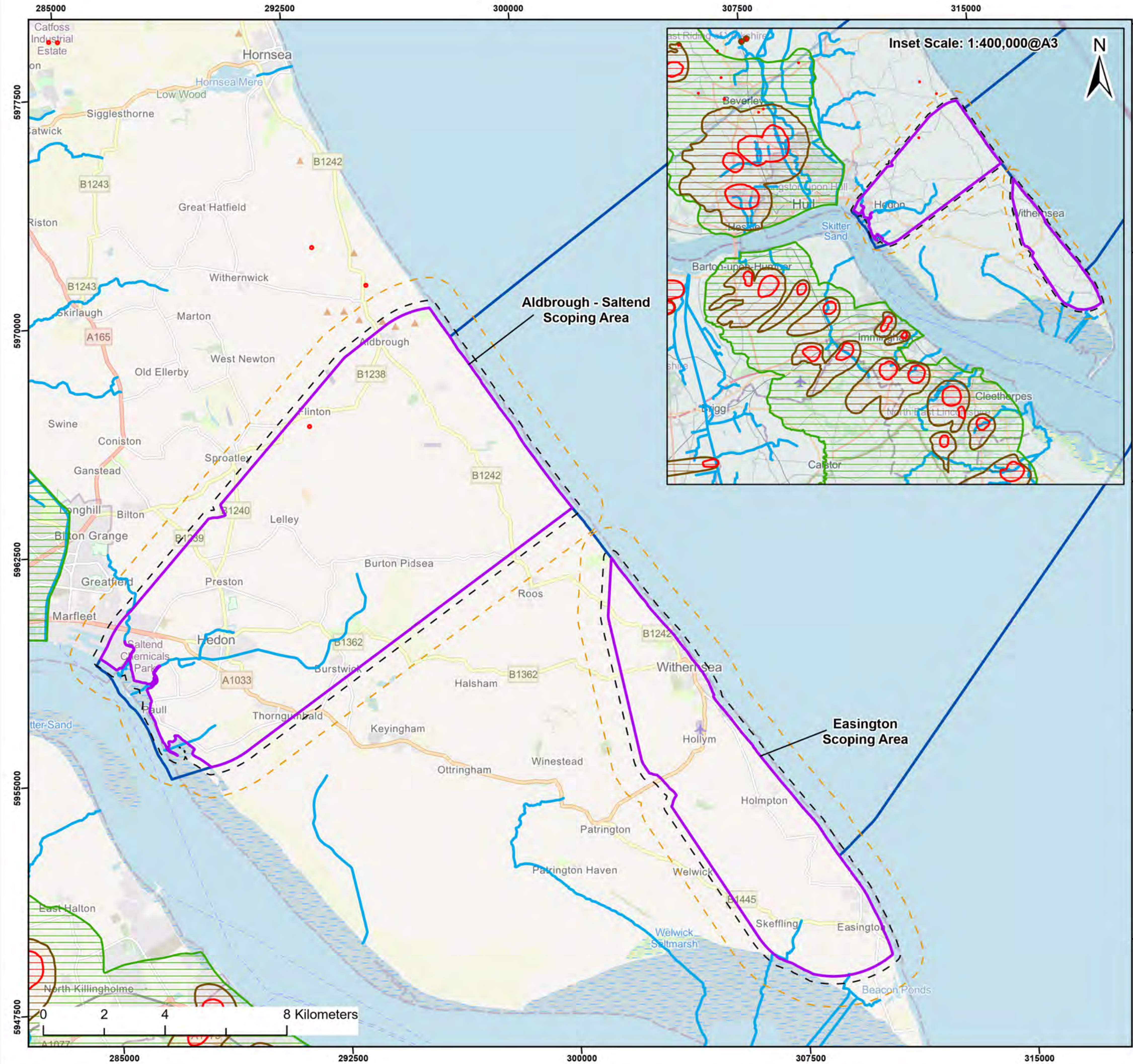

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Statutory Main River

Source Protection Zone

- 1
- 2
- 3
- 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: Source Protection Zones and Statutory Main Rivers

Figure:	8-4	Drawing No:	PC3991-RHD-ON-ZZ-DR-Z-0037		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/04/2023	JR	AG	A3	1:125,000
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Co-ordinate system: British National Grid

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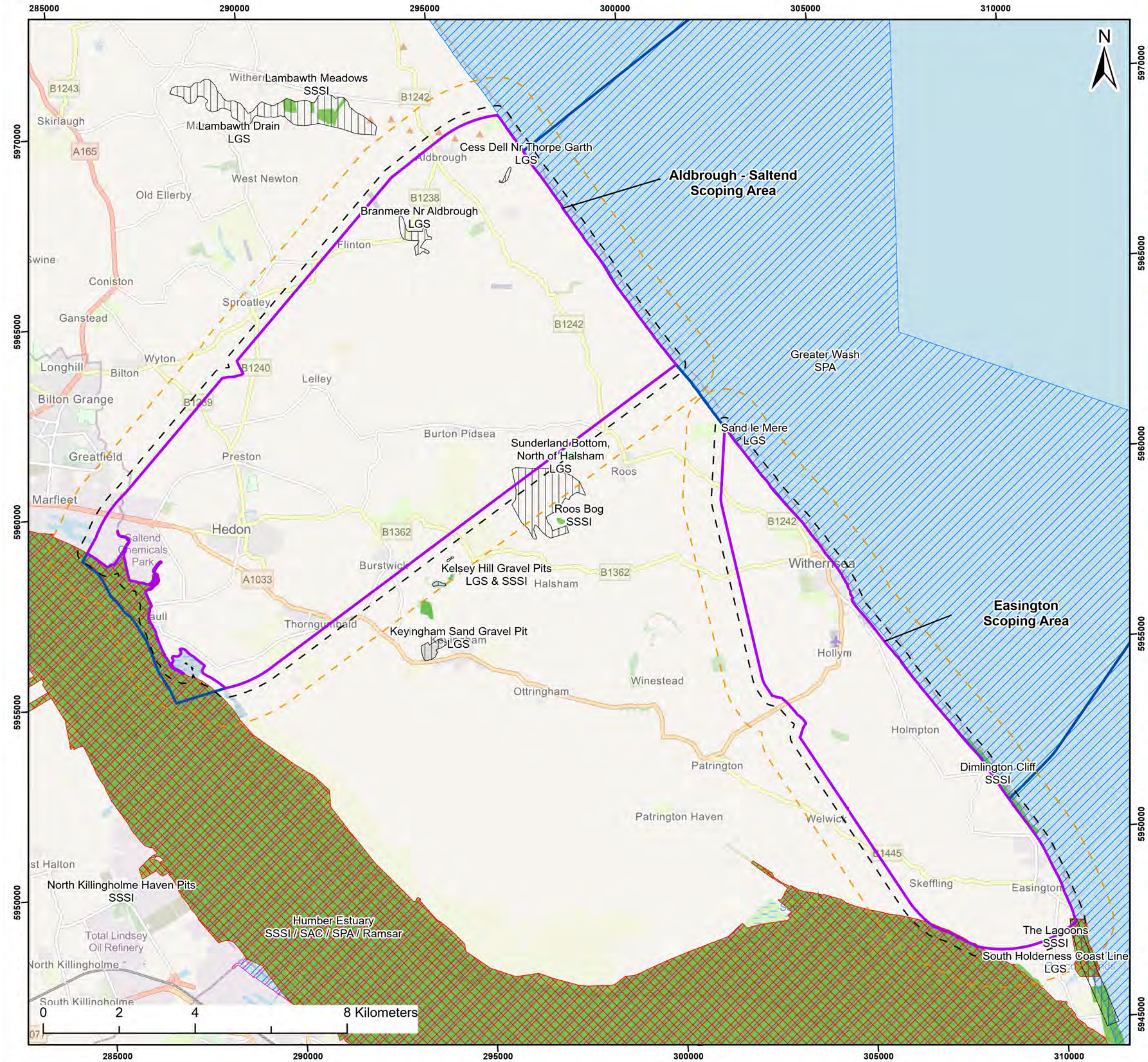

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Local Geological Site (LGS)
- Ramsar
- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

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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		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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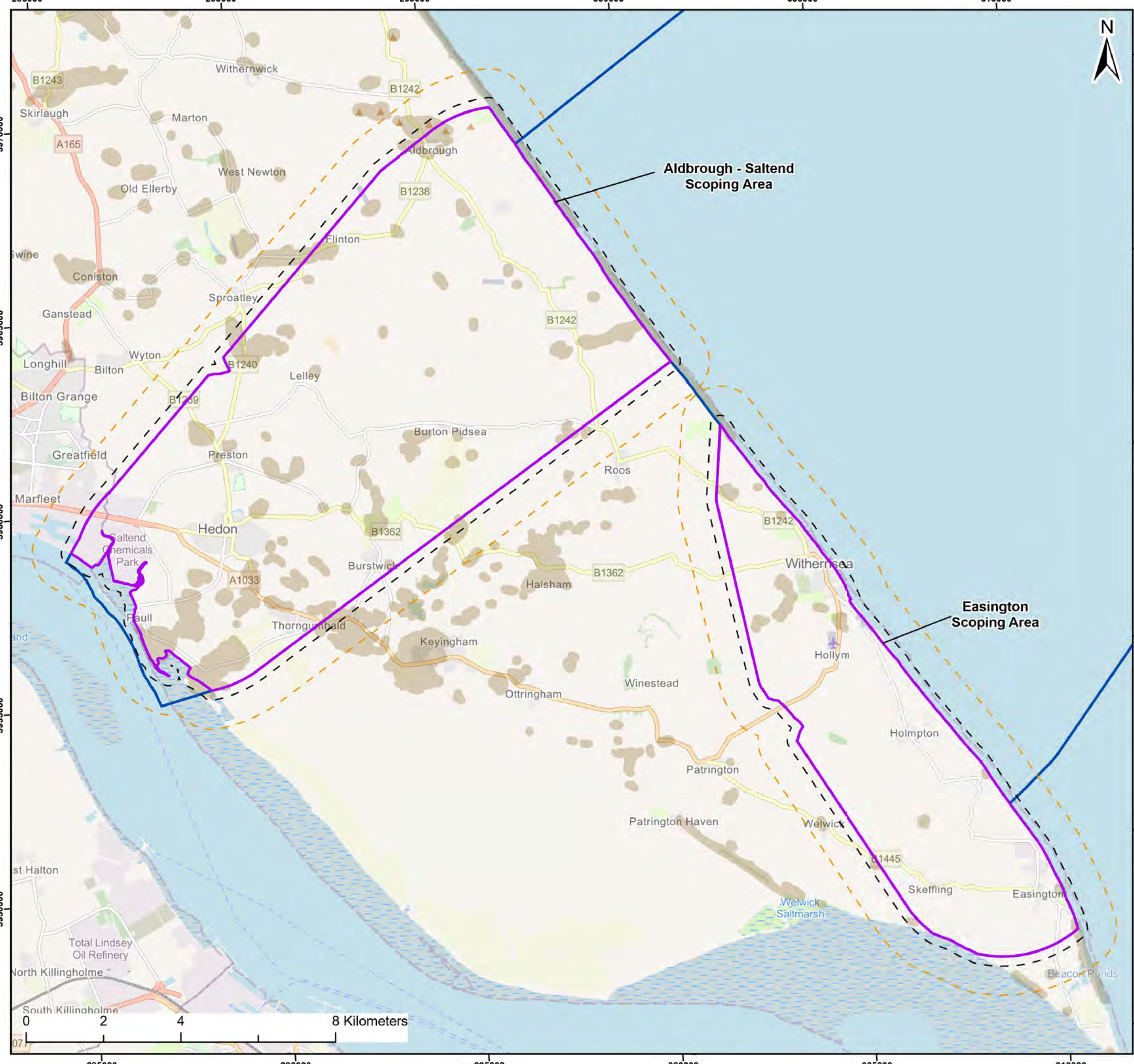

Legend:

- 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)
- Mineral Safeguarding Area

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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		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/04/2023	JR	AG	A3	1:100,000
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Co-ordinate system: British National Grid

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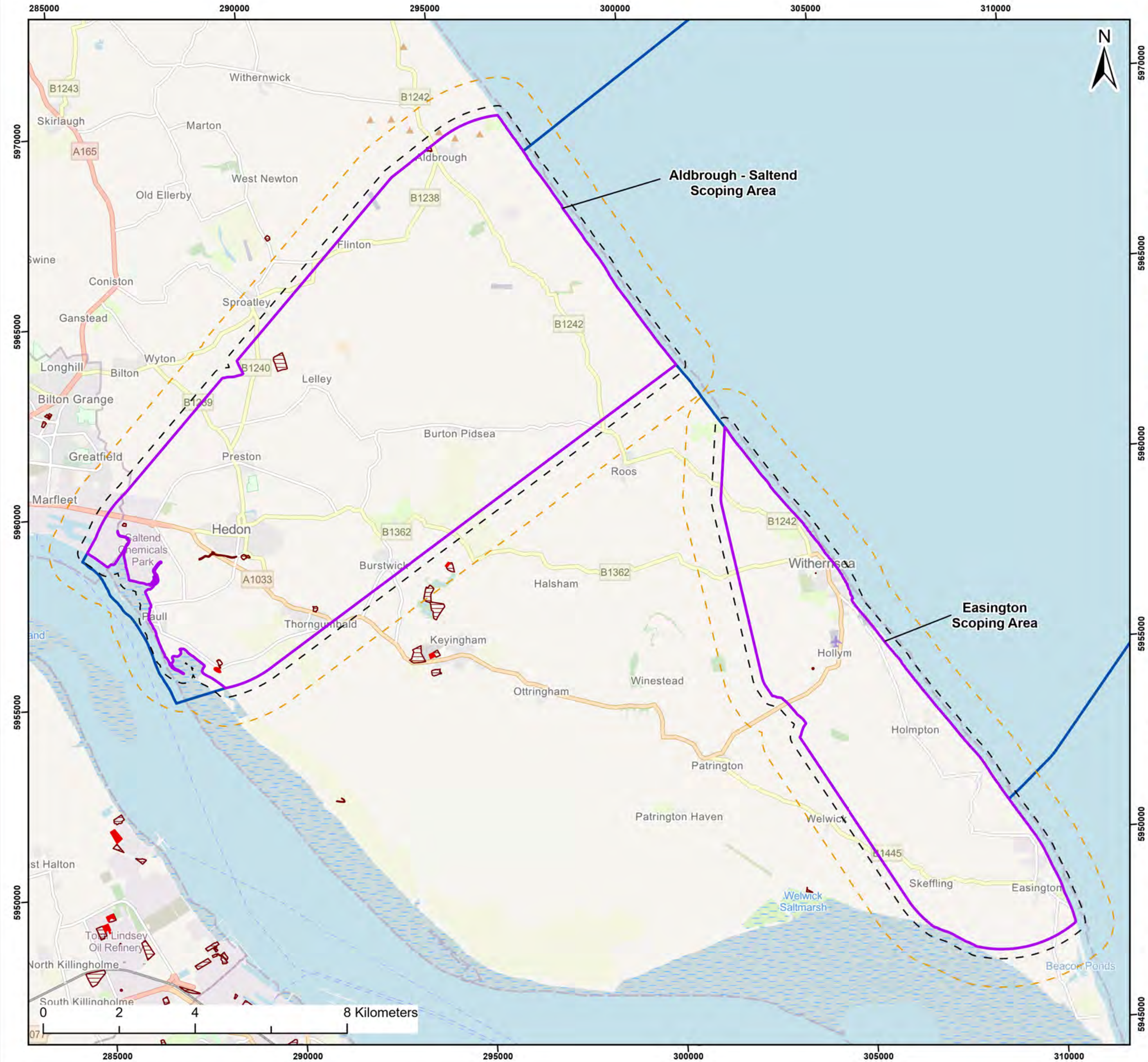

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Geology and Ground Conditions Study Area Extension (Onshore Scoping Area 1km Buffer)
- Geology and Ground Conditions Study Area (Onshore Scoping Area 250m Buffer)
- Authorised Landfill Site
- Historic Landfill Site

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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

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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8.2.3 Potential Impacts

8.2.3.1 Potential Impacts during Construction

8.2.3.1.1 Impacts to Human Health

961. The excavation of cable trenches, earthworks and piling (if required for the HPF), 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 previous 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

962. 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.

963. During construction, surface layers will be excavated allowing increased infiltration of rainwater and surface run-off to the sub-surface. This could potentially mobilise existing sources of contamination and create new pathways to the superficial aquifers. This could indirectly lead to a deterioration in groundwater quality.

964. 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. 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 existing sources of contamination to migrate into the Principal Aquifer.

965. Direct impacts to the Principal Aquifers and groundwater abstractions (if present) may occur because of the adopted piling methodology. Piling may be required to provide foundations for buildings at the HPF. Piling has the potential to create new preferential pathways allowing existing sources of contamination to migrate into the underlying superficial and bedrock aquifers leading to a deterioration in groundwater quality.

966. 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.

967. Due to the potential impacts to groundwater outlined above, both direct and indirect impacts have been scoped into the EIA.

8.2.3.1.3 Impacts to Surface Waters and Ecological Habitats

968. Installation of the onshore export cables and construction of the HPF will require substantial earthworks, as well as the potential for piling for the HPF. 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.

969. 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.

970. Due to the potential impacts to surface waters and ecological habitats, an assessment of the potential impacts on these receptors has been scoped into the EIA.

8.2.3.1.4 Impacts to Designated Geological Sites

971. 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

972. 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

973. 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

974. 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 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

975. 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 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)

976. 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 of 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

977. Should unexpected excavation works be required during the operation 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

978. Future extraction of mineral resources would be prevented within permanent easements, the HPF area 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

979. 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

980. 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 this phase. Should 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

981. It is anticipated that decommissioning impacts on local air quality would be similar in nature to those of construction, although the magnitude of impact is likely to be lower.

982. 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

983. 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 Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

984. 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

985. **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 Evidence Plan Process (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	✓	✓	✓
Impacts to the built environment	✓	✓	✓
Impacts to agricultural land	✓	✓	✓
Cumulative impacts	✓	✓	✓

8.2.6 Approach to Data Gathering

986. 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.
East Riding of Yorkshire Council and Hull City Council	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.

Data Source	Data Contents
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, SPAs, SACs, SSSIs, 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.

987. Any additional datasets will be identified through ongoing consultation with stakeholders.

8.2.7 Approach to Assessment

988. 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).

989. The baseline for geology and ground conditions will be established in general accordance with the Environment Agency '*Land Contamination Risk Management Framework'* (2021), 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.

990. 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**.

991. 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

992. 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 / 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?

8.3 Onshore Air Quality and Dust

993. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with onshore air quality and dust, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

994. The onshore air quality and dust assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation;**
- **Chapter 8.9 Traffic and Transport;** and
- **Chapter 9.2 Human Health.**

8.3.1 Study Area

995. During construction, the onshore elements of the Project may give rise to construction phase dust and fine particulate matter, Non-Road Mobile Machinery (NRMM) emissions and road traffic emissions. These aspects will be assessed and presented at the Preliminary Environmental Information Report (PEIR) stage.

996. Offshore air quality impacts are proposed to be scoped out of the assessment, as they are unlikely to be significant (discussed further in **Chapter 7.14 Offshore Air Quality**).

997. Within the PEIR, the Onshore Air Quality and Dust Study Area (hereafter referred to as ‘the study area’) will be defined using the criteria detailed below:

- Construction phase dust and fine particulate matter emissions:
    - Human receptors within 350m of the Onshore Development Area and within 50m of routes used by construction vehicles (for routes used by construction-generated traffic up to 500m from the Onshore Development Area); and
    - Ecological receptors within 200m of the Onshore Development Area and within 50m of routes used by construction vehicles (for routes used by construction-generated traffic up to 500m from the Onshore Development Area).
- Construction phase NRMM emissions:
    - Human and ecological receptors within 200m of the Onshore Development Area where NRMM will be located.
- Construction phase road traffic emissions:
    - Human and ecological receptors within 200m of all roads that trigger the

Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) traffic screening criteria and adjoining roads within 200m, referred to as the Affected Road Network (ARN).

998. For the purposes of this scoping chapter, the Onshore Scoping Area (**Figure 1-1**, defined in **Chapter 1 Introduction**) has been used to define the existing environment noted below.

8.3.2 Existing Environment

999. Air quality effects arising from the construction of projects of this nature are typically associated with the impacts of dust generation and road traffic emissions. The spatial extent of the road network which is utilised by the Project is not yet fully defined but is likely to include road links within the East Riding of Yorkshire Council's jurisdiction as well as that of Hull City Council. As such, at this stage, baseline air quality conditions have been considered within both local authority areas.

1000. The Onshore Scoping Area is located within the East Riding of Yorkshire Council's area of jurisdiction. The latest air quality Annual Status Report (East Riding of Yorkshire Council, 2022) notes that air quality within the area is good, and no statutory Air Quality Management Areas (AQMA) have been declared. The Onshore Scoping Area is predominantly rural in nature and therefore higher levels of pollutants are likely to occur in closer proximity to major roads and more densely populated areas in East Riding of Yorkshire Council such as Withernsea, Easington, Patrington, Burton Pidsea, Hedon as well as residential areas in Kingston upon Hull.

1001. It is expected that roads within Hull City Council's area of jurisdiction may be used by project-related traffic to access the port within the city centre. The latest air quality Annual Status Report (Hull City Council, 2022) states that Hull City Council declared a statutory AQMA within the city centre due to emissions from the A63 trunk road. There is a National Highways project currently under construction which is expected to improve air quality and result in a future revocation of the AQMA. Elsewhere within the city, the focus is to continue to reduce pollutant concentrations by implementation of several actions to improve air quality.

8.3.2.1 Sensitive Receptors

1002. The following receptors may be sensitive to changes in air quality:

- Human receptors present within scattered settlements across the Onshore Scoping Area, and more isolated residential properties that are within 350m of dust generating construction works and within 200m of roads along which project generated traffic may travel; and

- Designated ecological sites (including Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Ramsar sites, National Nature Reserves (NNR), Local Nature Reserves (LNR), Local Wildlife Sites (LWS) and ancient woodlands), where these sites contain habitats or features which are sensitive to changes in airborne pollutant concentrations or nitrogen and / or acid deposition within 50m of construction works and 200m of the road network may also be affected. The designated sites within the Onshore Scoping Area are presented in **Table 8-4.**

Table 8-4 Designated Sites within the Onshore Scoping Area

Data Source	Ecological Designation
Greater Wash	SPA
Humber Estuary	SSSI / Ramsar / SAC / SPA
Kelsey Hill Gravel Pits	SSSI
The Lagoons	
Lambwath Meadows	
Dimlington Cliffs	
Bail Wood	LWS and ancient woodland
Paull Fort	LWS
Meadow Area 4	
Marfleet - Withernsea Disused Railway Line	
Sproatley Grange	
Out Newton - Skeffling	
Hollym	
Hollym Carrs	
Withernsea Millennium Green	

8.3.3 Potential Impacts

8.3.3.1 Potential Impacts during Construction

1003. Impacts during construction may occur at human and ecological receptors as a result of the generation of dust and particulate matter during onshore construction works, e.g.:

- Stockpiles of stripped soils prior to reinstatement / landscaping;

- On-site vehicular movements and plant operations;
- Off-site vehicle movements;
- De-vegetation works;
- Construction of and use of construction compounds near the route to support works throughout the Project;
- Construction of temporary laydown areas;
- Construction and use of access tracks to allow movement of plant to facilitate construction;
- Installation of fencing;
- Earthworks and temporary drainage;
- Road crossings for minor roads;
- Horizontal Directional Drilling (HDD) or other trenchless crossing techniques for major roads, railway lines, sensitive water courses, SSSI, etc.;
- Onshore export cable installation and joint bay installation;
- Access track and construction compound reinstatement; and
- HDD at landfall.

1004. Impacts may also occur as a result of exhaust emissions such as gaseous oxides of nitrogen, such as nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of 10µm or less (PM_{10}) from construction phase plant and road vehicle movements during construction. These emissions will add to existing pollutant concentrations at human receptors and pollutant concentrations and deposition levels of pollutants at designated ecological sites. As such, dust and air quality impacts during construction have been scoped into the EIA.

8.3.3.2 Potential Impacts during Operation

1005. It is anticipated that there will be small scale tanking of oxygen and hydrogen however this is not expected to give rise to any air quality impacts during the operation phase, therefore the impacts would be negligible. In addition, during normal operation, the infrastructure would not generate any emissions to air during the production of hydrogen. Maintenance activities would generate a nominal amount of additional road vehicles on an infrequent basis, which would not give rise to any significant air quality effects.

1006. As noted in **Chapter 3 Project Description**, the water electrolysis technology will be selected from alkaline electrolysis (AEL), proton exchange membrane (PEM), or solid oxide electrolyser cells (SOEC) options. Each hydrogen production method has no direct air pollutant emissions. Oxygen may be vented to the atmosphere or captured for export (e.g. for industrial or medical use). Balance of plant infrastructure including water treatment, compressors and drying units will be electrically powered and also have no direct air emissions. Hydrogen and oxygen are odourless, and potential odour releases from water treatment will be negligible. There is a potential for sulphur hexafluoride (SF_6) emissions from electrical equipment such as switchgears as part of the HPF. However, the SF_6 emissions are anticipated to be negligible and therefore not requiring an assessment of short term SF_6 air quality impacts. It is anticipated that if there is the potential risk of leakage of SF_6 emissions, a continuous leak detection monitoring program should ensure that such leaks are controlled and minimised. Potential impacts associated with hydrogen, oxygen and SF_6 emissions associated with the HPF are therefore scoped out of the EIA.

1007. There are currently different external cooling loop options being considered, one of which is a cooling tower. Although there are no air pollutant emissions from the cooling towers, there may be a periodic visible plume release, depending on prevailing atmospheric conditions. If this design option is taken forward, a visible plume assessment will be undertaken within the air quality assessment of the EIA and assessed further within the Landscape and Visual Impact Assessment (**Chapter 8.10 Landscape and Visual Impact**).

1008. There may also be a requirement for backup power which could rely on diesel, natural gas or hydrogen as fuel source. Air pollutant emissions associated with fuel combustion include greenhouse gases (mainly carbon dioxide (CO_2)), nitrogen oxides (NO_x), sulphur oxides (SO_x) and fine particles. The backup power facility is likely to be for periodic, short term use and for use under emergency circumstances, however, depending on the design option an assessment of short term air quality impacts will be undertaken. It is therefore proposed that operational air quality impacts associated with the backup power provision are scoped into the EIA.

8.3.3.3 Potential Impacts during Decommissioning

1009. It is anticipated that decommissioning impacts on local air quality would be similar in nature to those of construction, although the magnitude of impact is likely to be lower.

1010. The same potential impacts identified for construction will therefore be scoped in (and out) of the EIA for the decommissioning phase (as per **Table 8-5**).

8.3.4 Potential Cumulative Effects

1011. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect onshore air quality and dust receptors. Therefore, cumulative effects related to air quality and dust are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1012. Any other project with the potential to result in impacts that may act cumulatively with the Project will be identified during consultation and following a review of available information. These projects would then be included in the CEA.

1013. The assessment will consider the potential for significant cumulative effects to arise due to the construction and decommissioning of the Project, including the onshore ECC and the HPF infrastructure (including the Onshore Converter Station and / or Onshore Substation), in the context of other developments that are existing, consented or at application stage.

8.3.5 Summary of Scoping Proposals

1014. **Table 8-5** outlines the onshore air quality 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 8-5 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for the Onshore Air Quality and Dust

Potential Impact	Construction	Operation	Decommissioning
Impacts of emissions of dust on human and ecological receptors	✓	X	✓
Impacts of emissions from plant and machinery on human health and ecological sites	✓	X	✓
Impacts of emissions from road traffic on human health and ecological sites	✓	X	✓
Impact from visible plume (from cooling towers) on human receptors	X	✓ (if cooling tower option is taken forward for the HPF)	X
Impacts of emissions associated with the HPF (only from backup power on human and ecological sites)	X	✓	X
Cumulative impacts	✓	X	✓

8.3.6 Approach to Data Gathering

1015. It is expected that there will be sufficient data available from monitoring undertaken by the relevant local authorities as part of their statutory duties for use in the air quality assessment. As such, it is not proposed to collect any primary datasets (i.e. a project-specific air quality survey) for the assessment. However, this will be reviewed once the Onshore Development Area, and the study area, are refined to ensure that appropriate data are available. This will be discussed and agreed with stakeholders through the EPP.

1016. It is anticipated that, due to coronavirus pandemic (COVID-19), baseline air quality data collected during 2020 and 2021 would not be representative of long term baseline conditions due to atypical traffic flows in this period. As such, it is expected that 2019 and 2022 (if available) monitoring data will be used in the assessment to characterise baseline conditions. This approach has been adopted in the consideration of air quality for UK development consenting and in this case would be agreed with the relevant authorities through the EPP.

1017. The sources of information that will be used to inform the baseline assessment are listed in **Table 8-6** and include:

- Air quality monitoring data collected by the local authorities;
- Department for Environment, Food and Rural Affairs' (Defra) mapped background pollutant concentrations for 1km x 1km grid squares across the UK (Defra, 2020); and
- The Air Pollution Information System (APIS) website (UK Centre for Ecology and Hydrology (UKCEH), 2023) for background pollution concentrations and deposition rates at designated ecological sites.

Table 8-6 Desk-Based Data Sources for Onshore Air Quality and Dust

Data Source	Date	Data Contents
East Riding of Yorkshire Council Air Quality Annual Status Report 2022	2017 to 2021	Local monitoring data and baseline information
Hull City Council Air Quality Annual Status Report 2022	2017 to 2021	Local monitoring data and baseline information
Defra Local Air Quality Management (LAQM) Support Portal	Assessment years	2018 1km x 1km grid background pollution maps
Background pollutant mapping data	Assessment years	Defra 1km x 1km background pollution mapping
MAGIC GIS resource	2023	Designated ecological site information

Data Source	Date	Data Contents
UKCEH APIS	2023	Details of critical loads for ecological habitats

8.3.7 Approach to Assessment

1018. Existing air quality conditions within the study area will be characterised using the data sources as identified in **Table 8-6**.

1019. Identification of potential sensitive receptors will be identified using Ordnance Survey mapping data for human receptors and the Defra MAGIC website for designated ecological sites. No field surveys are proposed to inform the characterisation of the existing environment.

1020. The air quality assessment will be undertaken in accordance with the following guidance documents:

- Defra (2022) Local Air Quality Management Technical Guidance LAQM.TG (22);
- IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction;
- IAQM and EPUK (2017) Land-Use Planning and Development Control: Planning for Air Quality;
- IAQM (2020) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites;
- Joint Nature Conservation Committee (JNCC) (2021) Guidance on Decision Making Thresholds for Air Pollution; and
- Natural England (2018) Natural England's Approach to Advising Competent Authorities on the Assessment of Road Traffic Emissions under the Habitats Regulations.

1021. An assessment of dust generated during construction will be undertaken in accordance with IAQM guidance (IAQM, 2016). The assessment is risk-based, and the risk of dust impacts will be determined for both human and ecological receptors in proximity to the construction works. Mitigation measures will be recommended which are commensurate with the identified risk to ensure that significant impacts would not occur.

1022. During construction, NRMM and plant can increase air emissions which may impact upon human and ecological receptors. Technical guidance provided by Defra (Defra, 2022) states that emissions from NRMM on construction sites are typically unlikely to lead to significant air quality impacts. However, intensive construction activities, for example HDD works, may temporarily increase pollutant concentrations in the vicinity of receptors. The location of human and ecological receptors in relation to construction works will be reviewed to determine whether any further assessment of emissions from NRMM is required at the PEIR stage. If required, this assessment may be qualitative or quantitative depending on the scale and nature of activities, their duration and existing air quality conditions.

1023. The increase in construction traffic flows generated by the Project will be screened using criteria in IAQM and EPUK (IAQM and EPUK, 2017) and Natural England (Natural England, 2018) guidance. Where traffic flows exceed the screening criteria and there are relevant human or ecological receptors located within 200m of the road, a detailed dispersion modelling assessment will be undertaken to consider impacts at these locations. Concentrations of NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) will be predicted at human receptors, and concentrations of NOx, ammonia and associated nutrient nitrogen and / or acid deposition will be calculated at ecological receptors. The significance of effects at human receptors will be determined in accordance with IAQM and EPUK guidance (IAQM and EPUK, 2017). The significance of impacts on ecological receptors will be considered by the Project's terrestrial ecologists (see **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation**).

1024. A quantitative plume visibility assessment will also be performed from the periodic visible plume release from cooling towers (if required). The significance of effects at human receptors will be determined in accordance with Horizontal Guidance Note Integrated Pollution Prevention and Control (IPPC) H1 (2003).

1025. Additionally, a detailed dispersion modelling assessment will be undertaken to consider the significance of effects on human and ecological receptors from the operation of the backup power. The approach would be discussed as part of EPP (as set out in **Chapter 6 Consultation**), and the relevant input parameters and receptor locations would be agreed with stakeholders prior to undertaking the assessment.

8.3.8 Scoping Questions to Consultees

1026. The following questions are posed to consultees to help them frame and focus their response to the onshore air quality and dust scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the onshore air quality and dust impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the onshore air quality and dust 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?

8.4 Water Resources and Flood Risk

1027. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with water resources and flood risk, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1028. The water resources and flood risk assessment covers the hydrology, geomorphology and quality of surface waters, the quantity and quality of groundwaters, potable water resources and flood risk.

1029. The water resources and flood risk assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **Chapter 8.2 Geology and Ground Conditions;**
- **Chapter 8.5 Soils and Land Use**; and
- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation.**

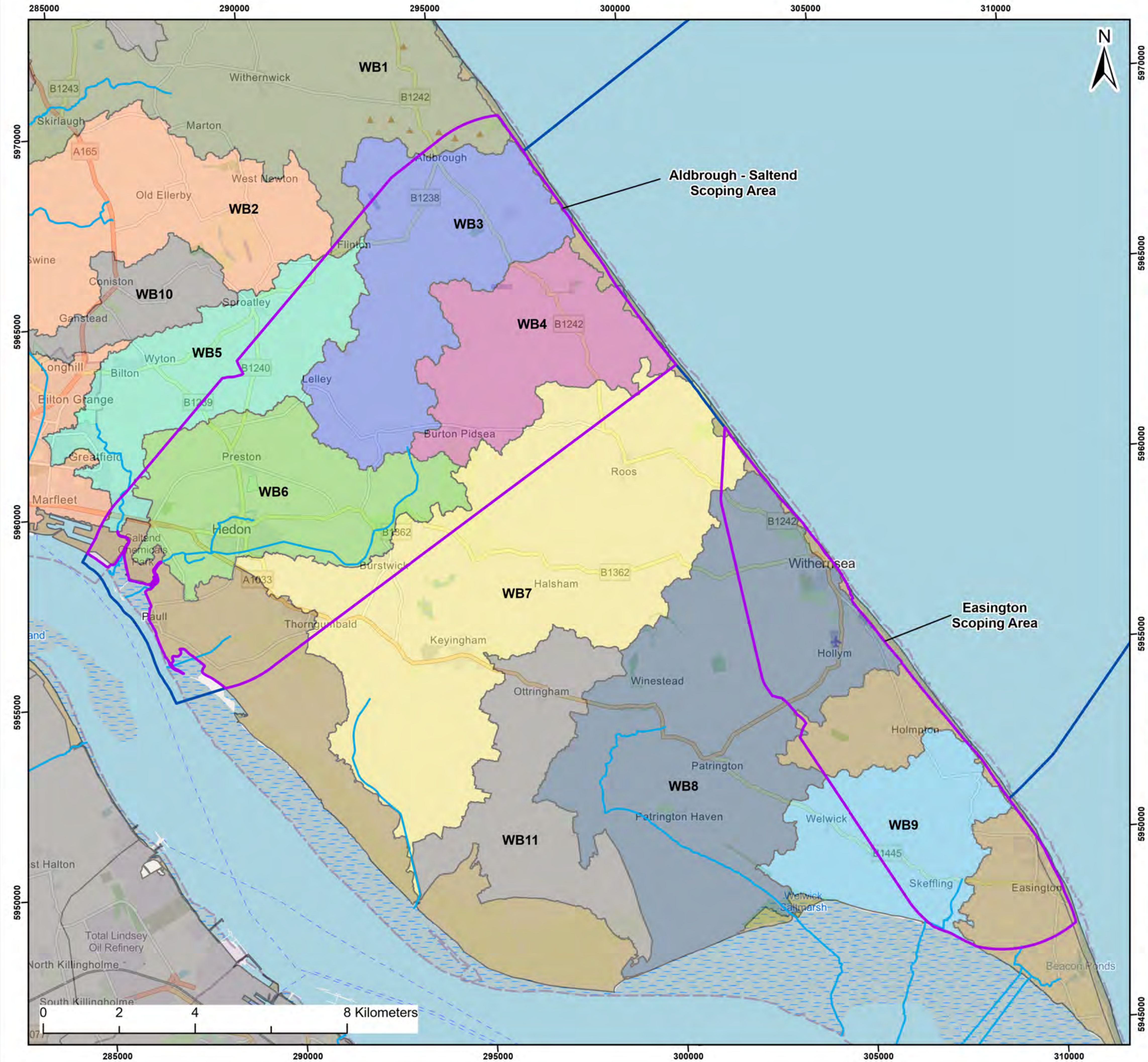
8.4.1 Study Area

1030. The Onshore Scoping Area encompasses the area for the proposed onshore ECC, the HPF and any pipework connection to the wider distribution network or storage facility.

1031. The Onshore Scoping Area is comprised of two areas, the Aldbrough – Saltend Scoping Area and the Easington Scoping Area (see **Figure 1-1**).

1032. The Surface Water Resources Study Area include all surface hydrological catchments (as defined in the Humber River Basin Management Plan (RBMP) (Environment Agency, 2022a) that would contain components of the Project, or are hydrologically connected to (i.e. directly downstream) these catchments (**Figure 8-8**).

1033. The Groundwater Resources Study Area will include all large-scale hydrogeological units (as defined in the Humber RBMP) (Environment Agency, 2022a) that underlie the Project or are hydrologically connected to these units (**Figure 8-9**).



Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Statutory Main River

WFD River Water Body Catchments

- WB1: Lambwath Stream from Source to Foredyke Stream
- WB2: Holderness Drain from Foredyke Stream to Humber
- WB3: Humbleton Beck Catchment
- WB4: Burton Pidsea Drain Lower Catchment
- WB5: Oldfleet/Wyton/Sproatley Drain from Source to Humber
- WB6: Burstwick Drain from Source to Humber
- WB7: Sands/Keyingham/Roos Dr from Source to Humber
- WB8: Winestead Drain from Source to Humber
- WB9: Fosse drain / Skeffling Drain
- Coastal - Humber
- Catchments Outside of the Study Area - WB10: Conistone Ganstead Area; WB11: Ottringham Drain from Ottringham Grange to Humber

Source: © Haskoning DHV UK Ltd, 2023; © Environment Agency, 2023. © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Surface Water Resources

Figure: 8-8 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0040

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/04/2023	JR	AG	A3	1:100,000
00	09/02/2023	JR	ID	A3	1:100,000

Co-ordinate system: British National Grid

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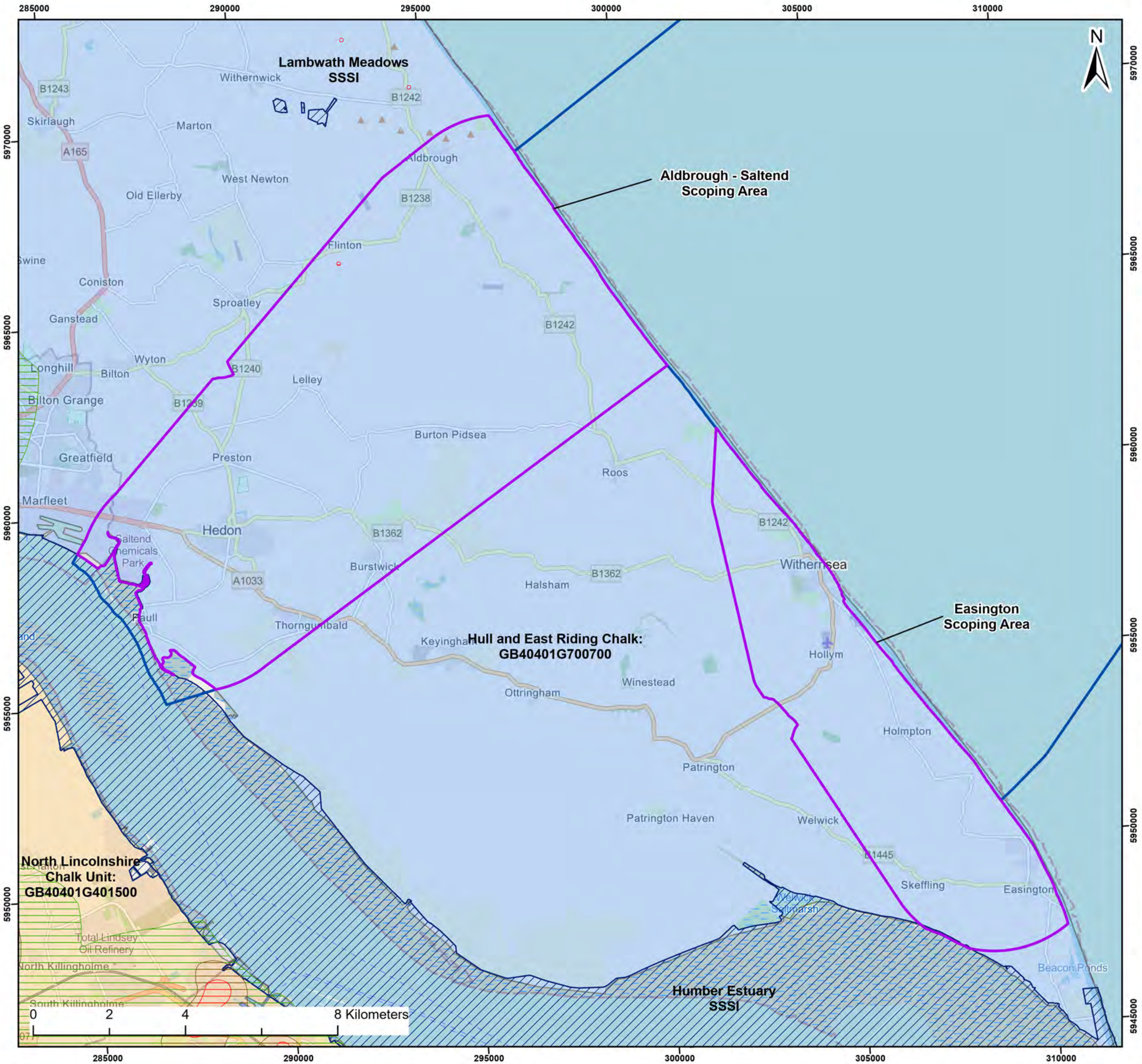

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Groundwater Dependent Terrestrial Ecosystems (GWDTES)

WFD Groundwater Bodies

- Hull and East Riding Chalk
- North Lincolnshire Chalk Unit

Source Protection Zone

- 1
- 2
- 3

Source: © Haskoning DHV UK Ltd, 2023; © Environment Agency, 2023; © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Groundwater Resources

Figure: 8-9

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0042

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/04/2023	JR	AG	A3	1:100,000
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Co-ordinate system: British National Grid

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8.4.2 Existing Environment

8.4.2.1 Aldbrough – Saltend Scoping Area

8.4.2.1.1 Surface Water Drainage

1034. Surface water drainage in the Aldbrough – Saltend Scoping Area is achieved by watercourses that rise adjacent to the North Sea coast and flow inland towards the Humber Estuary. This drainage pattern reflects a general decrease in elevation from 20m above Ordnance Datum (AOD) near the coast to 0 to 10m AOD at the estuary.

1035. The Aldbrough – Saltend Scoping Area comprises a number of surface water catchments, which are analogous to the river water body catchments identified in the Humber RBMP (Environment Agency, 2022a) (**Figure 8-8** and **Figure 8-10**). These surface water catchments (and their Water Frame Directive (WFD) water body IDs) are listed below. Where applicable, the names of Main Rivers within the Aldbrough – Saltend Scoping Area are also provided:

- Lambwath Stream from Source to Foredyke Stream (GB104026066860);
- Humbleton Beck Catchment (GB104026066610);
    - Main River: Burstwick Drain
- Burton Pidsea Drain Lower Catchment (GB104026066590);
- Sands / Keyingham / Roos Dr from Source to Humber (GB104026067230);
- Burstwick Drain from Source to Humber (GB104026067200);
    - Main River: Burstwick Drain and unnamed right bank tributary that flows through the urban area of Hedon

1036. Oldfleet / Wyton / Sproatley Drain from Source to Humber (GB104026066600);

- Main River: Old Fleet

- Holderness Drain from Foredyke Stream to Humber (GB104026066800); and
- Humber Lower (GB530402609201).

1037. Adjacent to the North Sea and Humber Estuary there are also areas of coastal catchment (as shown on **Figure 8-8** and **Figure 8-10**). These are areas which drain directly to coastal or estuarine waters, rather than through a river water body. The Main Rivers of Burstwick Drain and Old Fleet flow to the Humber Estuary through areas of coastal catchment. Thorngumbald Drain is also designated as Main River, and this short watercourse is located entirely within an area of coastal catchment downstream of Thorngumbald.

1038. Surface water catchments are divided into a large number of ordinary watercourses, including those managed by the local Internal Drainage Board (IDB). Although IDB drains are too numerous to list at this stage, they include the following catchments within the South Holderness IDB area:

- Preston;
- Keyingham; and
- Thorngumbald.

1039. With the exception of some smaller watercourses near the North Sea coastline, channel planforms are typically straight and are very likely to have been re-sectioned for land drainage and flood defence purposes.

8.4.2.1.2 Surface Water Quality

1040. A summary of the water quality data shown in the Catchment Data Explorer (Environment Agency, 2022b) for the surface water bodies in the Aldbrough – Saltend Scoping Area is provided in **Table 8-7**. Significant water management issues that are affecting water quality include point source (sewage and landfill leaching) and diffuse (agricultural) pollution and physical modifications to river channels for land drainage and flood protection. Most water bodies are also affected by high concentrations of nutrients, resulting in pressures on aquatic invertebrates and in some cases fish and aquatic plants.

1041. Although the chemical status of all water bodies is adversely affected by polybrominated diphenyl ethers (PBDE) and mercury, these failures are very widespread and do not necessarily indicate a specific source of contaminants in the catchments. In 2019, the Environment Agency changed some methods and increased their evidence base for the assessment of chemical status. Due to these changes, all water bodies in England now fail chemical status. There are four groups of pollutants that cause the significant change in chemical classification, and two of these are present in the Aldbrough – Saltend Scoping Area (PBDEs – a group of brominated flame retardants, and mercury).

1042. Wider failures in the Humber Estuary (benzo(g-h-i)perylene, benzo(b)fluoranthene) are likely to indicate hydrocarbon contamination from extensive industrial, commercial and urban development in the catchment.

Table 8-7 Water Quality Summary Data for Surface Water Catchments in the Aldbrough – Saltend Scoping Area (Environment Agency, 2022b)

Water Body	Type and Designation	Ecological Status / Potential	Chemical Status	Reasons for Not Achieving Good Status (RNAG)
Lambwath Stream from Source to Foredyke Stream	River Heavily modified	Moderate ecological potential	Fail	• Phosphate • Invertebrates • Dissolved oxygen • Mitigation Measures Assessment • PBDE • Mercury and Its compounds
Humbleton Beck Catchment	River Artificial	Moderate ecological potential	Fail	• Ammonia • Phosphate • Invertebrates • PBDE • Mercury and Its compounds
Burton Pidsea Drain Lower Catchment	River Heavily modified	Moderate ecological potential	Fail	• Ammonia • Phosphate • Invertebrates. • Dissolved oxygen • PBDE • Mercury and Its compounds

Water Body	Type and Designation	Ecological Status / Potential	Chemical Status	Reasons for Not Achieving Good Status (RNAG)
Sands / Keyingham / Roos Dr from Source to Humber	River Artificial	Moderate ecological potential	Fail	• Ammonia • Phosphate • Invertebrates. • Dissolved oxygen • PBDE • Mercury and Its compounds • Cypermethrin
Burstwick Drain from Source to Humber	River Artificial	Moderate ecological potential	Fail	• Phosphate • Invertebrates. • Dissolved oxygen • PBDE • Mercury and Its compounds
Oldfleet / Wyton / Sproatley Drain from Source to Humber	River Artificial	Moderate ecological potential	Fail	• Dissolved oxygen • PBDE • Mercury and Its compounds
Holderness Drain from Foredyke Stream to Humber	River Artificial	Moderate ecological potential	Fail	• Ammonia • Phosphate • Invertebrates • Dissolved oxygen • Fish • Mitigation Measures Assessment • PBDE

Water Body	Type and Designation	Ecological Status / Potential	Chemical Status	Reasons for Not Achieving Good Status (RNAG)
				• Perfluorooctane sulphonate (PFOS) • Mercury and Its compounds
Humber Lower	Transitional Heavily modified	Moderate ecological potential	Fail	• Invertebrates • Dissolved Inorganic Nitrogen • Angiosperms • Mitigation measures Assessment • PBDE • PFOS • Benzo(g-h-i)perylene • Benzo(b)fluoranthene • Mercury and Its compounds

8.4.2.1.3 Groundwater

1043. The Chalk bedrock that underlies the Aldbrough – Saltend Scoping Area (**Figure 8-9**) comprises a single groundwater body (Hull and East Riding Chalk), as defined under the Humber RBMP (Environment Agency, 2022a). This groundwater body supports a Principal aquifer, defined as providing significant quantities of drinking water, and water for business needs. Principal aquifers may also support rivers, lakes and wetlands.

1044. Across the majority of the Aldbrough – Saltend Scoping Area, superficial deposits support Secondary (undifferentiated) aquifers, defined as aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value. There are also smaller Secondary A and Secondary B Aquifers in the Aldbrough – Saltend Scoping Area. These are located near Aldbrough, along Burstwick Drain and Owstwick Drain, and south-west of Hedon. Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers. Secondary B aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics such as fissures or eroded layers.

1045. Groundwater vulnerability is medium risk across the majority of the Aldbrough-Saltend Onshore Scoping. A zone of low risk runs north-west to south-east across the Aldbrough – Saltend Scoping Area south of Hedon. There are also isolated medium-high risk areas near the North Sea coast, near Owstwick Drain and Burstwick, and either side of the low risk area near Hedon, including adjacent to the Humber Estuary.

1046. The Aldbrough – Saltend Scoping Area does not cross the boundaries of any Drinking Water Protected Area (DWPA) or Safeguard Zone. There is an individual borehole for public water supply (Source Protection Zone (SPZ) 1 (inner protection)) located near Frinton.

8.4.2.1.4 Flood risk

8.4.2.1.4.1 Fluvial and Coastal Flood Risk

1047. The East Riding Level 1 Strategic Flood Risk Assessment (SFRA) (East Riding of Yorkshire Council, 2019) notes that much of the East Riding of Yorkshire is defended against fluvial and coastal flooding. On this basis, much of the flood risk posed to the Aldbrough – Saltend Scoping Area comprises a residual risk as a result of flood events exceeding the standard of protection afforded by the defence, defence or pumping failure, or flooding behind the defences due to local runoff or groundwater (East Riding of Yorkshire Council, 2019).

1048. The online Flood Map for Planning, reproduced as **Figure 8-11**, provides a summary of the Flood Zones in the Aldbrough – Saltend Scoping Area. This mapping shows that much of the area is in Flood Zone 1 (<0.1% Annual Probability (AP)).

1049. Within the relatively flat River Hull valley, there are extensive areas of land in Flood Zone 2 (0.1% to 1% AP) and Flood Zone 3 (>1% AP). Specifically, the south-western area of the Aldbrough – Saltend Scoping Area is affected by Flood Zone 2 and 3, extending from Paull on the River Hull estuary to Preston and Burstwick to the east.

1050. Narrow areas of Flood Zone 2 and 3 cross the Aldbrough – Saltend Scoping Area, associated with Burstwick Drain, which is a tributary of the Hedon Haven (itself a tributary of the River Hull). The central and eastern parts of the Aldbrough – Saltend Scoping Area are mostly located within Flood Zone 1.

8.4.2.1.4.2 Surface Water Flood Risk

1051. Surface water flood risk has been obtained from the Environment Agency Long Term Flood Risk Information online mapping, as shown on **Figure 8-11**.

1052. This mapping shows that surface water flood risk is high in many places across the Aldbrough – Saltend Scoping Area, mainly via isolated areas of ponding and discrete flow pathways. For example, in the area south of Aldbrough, which is at low risk of flooding from rivers and seas (Flood Zone 1), there are numerous narrow high risk (3.3%) flow paths associated with existing drains / watercourses, that drain towards Humbleton.

1053. As noted previously, the Aldbrough – Saltend Scoping Area is partially located in the South Holderness Internal Drainage District (IDD) which is managed by the South Holderness IDB. The Aldbrough – Saltend Scoping Area includes two sub-catchments comprising the Keyingham sub-catchment and Thorngumbold sub-catchment. Within these sub-catchments there are a number of IDB Maintained Drains.

8.4.2.1.4.3 Groundwater Flood Risk

1054. Groundwater emergence maps for the East Riding of Yorkshire indicate that the vast majority of the Aldbrough – Saltend Scoping Area is likely to be at low susceptibility to groundwater flood risk. This is according to groundwater mapping provided in the East Riding Level 1 SFRA (East Riding of Yorkshire Council, 2019).

8.4.2.2 Easington Scoping Area

8.4.2.2.1 Surface Water Drainage

1055. Surface water drainage in the Easington Scoping Area is achieved primarily by short watercourses that rise close to the coastline and drain to the adjacent North Sea. Winestead Drain is the only larger catchment, and this rises near Withernsea and flows south-west (out of the Easington Scoping Area) to join the River Humber.

1056. The Easington Scoping Area comprises a number of surface water catchments, which are analogous to the WFD water body catchments identified by the Environment Agency in the Anglian RBMP (Environment Agency, 2022a) (**Figure 8-8** and **Figure 8-10**). These surface water catchments (and their WFD water body IDs) are listed below. Where applicable, the names of Main Rivers are also provided:

- Winestead Drain from Source to Humber (GB104026066570);
- Sands / Keyingham / Roos Dr from Source to Humber (GB104026067230); and
- Fosse drain / Skeffling Drain (GB104026066530).
    - Main River: Fosse Drain

1057. Adjacent to the Humber Estuary there are also areas of coastal catchment. A very short section of unnamed Main River drains to the Humber Estuary through an area of coastal catchment west of Lockham (as shown on **Figure 8-8** and **Figure 8-10**).

1058. These surface water catchments are divided into a large number of ordinary watercourses, including those managed by the local IDB. Although IDB drains are too numerous to list at this stage, they include the Skeffling catchment within the South Holderness IDB area.

8.4.2.2.2 Surface Water Quality

1059. A summary of the Environment Agency's Catchment Data Explorer WFD water quality data (Environment Agency, 2022b) for the surface water bodies in the Easington Scoping Area is shown in **Table 8-8**. Significant water management issues that are affecting water quality include point source (sewage and landfill leaching) and diffuse (agricultural) pollution, and physical modifications to river channels for land drainage and flood protection. There are also issues associated with the poor management of pesticides (high levels of pendimethalin and cypermethrin). Nutrients concentrations are also elevated, resulting in pressures on aquatic invertebrates, and in some cases fish.

1060. Although the chemical status of all water bodies is adversely affected by PBDE and mercury, these failures are very widespread across the country and do not necessarily indicate a specific source of contaminants in the catchments. In 2019 the Environment Agency changed some methods and increased their evidence base for the assessment of chemical status. Due to these changes, all water bodies in England now fail chemical status. There are four groups of pollutants that cause the significant change in chemical classification, and two of these are present in the Easington Scoping Area (PBDEs – a group of brominated flame retardants, and mercury).

8.4.2.2.3 Groundwater

1061. Similar to Aldbrough – Saltend Scoping Area, chalk bedrock that underlies the Easington Scoping Area supports the same groundwater body (Hull and East Riding Chalk) (**Figure 8-9**). This groundwater body supports a Principal aquifer and across the majority of the Easington Scoping Area, superficial deposits support Secondary (undifferentiated) aquifers. There are also smaller Secondary A aquifers in the Winestead Drain valley and close to Skeffling (adjacent to the Humber Estuary). There are also several small, isolated Secondary B Aquifers, mainly in the Withernsea area.

1062. Groundwater vulnerability is medium across the majority of the Easington Scoping Area. There are small areas of medium-high risk adjacent to the North Sea coastline, and near Easington. At Easington, there is also a small area of soluble rock risk. This means there are solution features that would enable the rapid movement of a pollutant.

1063. The Easington Scoping Area does not cross the boundaries of any DWPA or Safeguard Zone, or SPZ.

Table 8-8 Water Quality Summary Data for Surface Water Catchments in the Easington Scoping Area (Environment Agency, 2022a)

Water Body	Type and Designation	Ecological Status / Potential	Chemical Status	Reasons for Not Achieving Good Status (RNAG)
Winestead Drain from Source to Humber	River Heavily modified	Moderate ecological potential	Fail	• Biochemical Oxygen Demand (BOD) • Dissolved oxygen • Ammonia • Fish • PBDE • Mercury and Its compounds • Pendimethalin
Fosse drain / Skeffling Drain	River Artificial	Moderate ecological potential	Fail	• Ammonia • Phosphate • Invertebrates. • PBDE • Mercury and Its compounds
Sands / Keyingham / Roos Dr from Source to Humber	River Artificial	Moderate ecological potential	Fail	• Ammonia • Phosphate • Invertebrates. • Dissolved oxygen • PBDE • Mercury and Its compounds • Cypermethrin

8.4.2.2.4 Flood Risk

8.4.2.2.4.1 Fluvial and Coastal Flood Risk

1064. As discussed above, the East Riding of Yorkshire is mostly defended against fluvial and coastal flooding. Flood risk to the area is mostly considered to comprise of a residual risk.

1065. The online Flood Map for Planning, reproduced as **Figure 8-11** provides a summary of the Flood Zones in the Easington Scoping Area. This mapping shows that much of the area is located in Flood Zone 1 (<0.1% AP).

1066. There are areas of land in the Easington Scoping Area that are located within Flood Zone 2 (0.1% to 1% AP) and Flood Zone 3 (>1% AP). Specifically, the southern area of the Easington Scoping Area is affected by Flood Zone 2 and 3, extending from Skeffling to Easington on the River Hull estuary.

1067. Another area to the north of the Easington Scoping Area is shown to be affected by Flood Zone 2 and 3 flood extents, comprising existing agricultural land which extends towards Withernsea. The central and eastern parts of the Easington Scoping Area are mostly in Flood Zone 1.

8.4.2.2.4.2 Surface Water Flood Risk

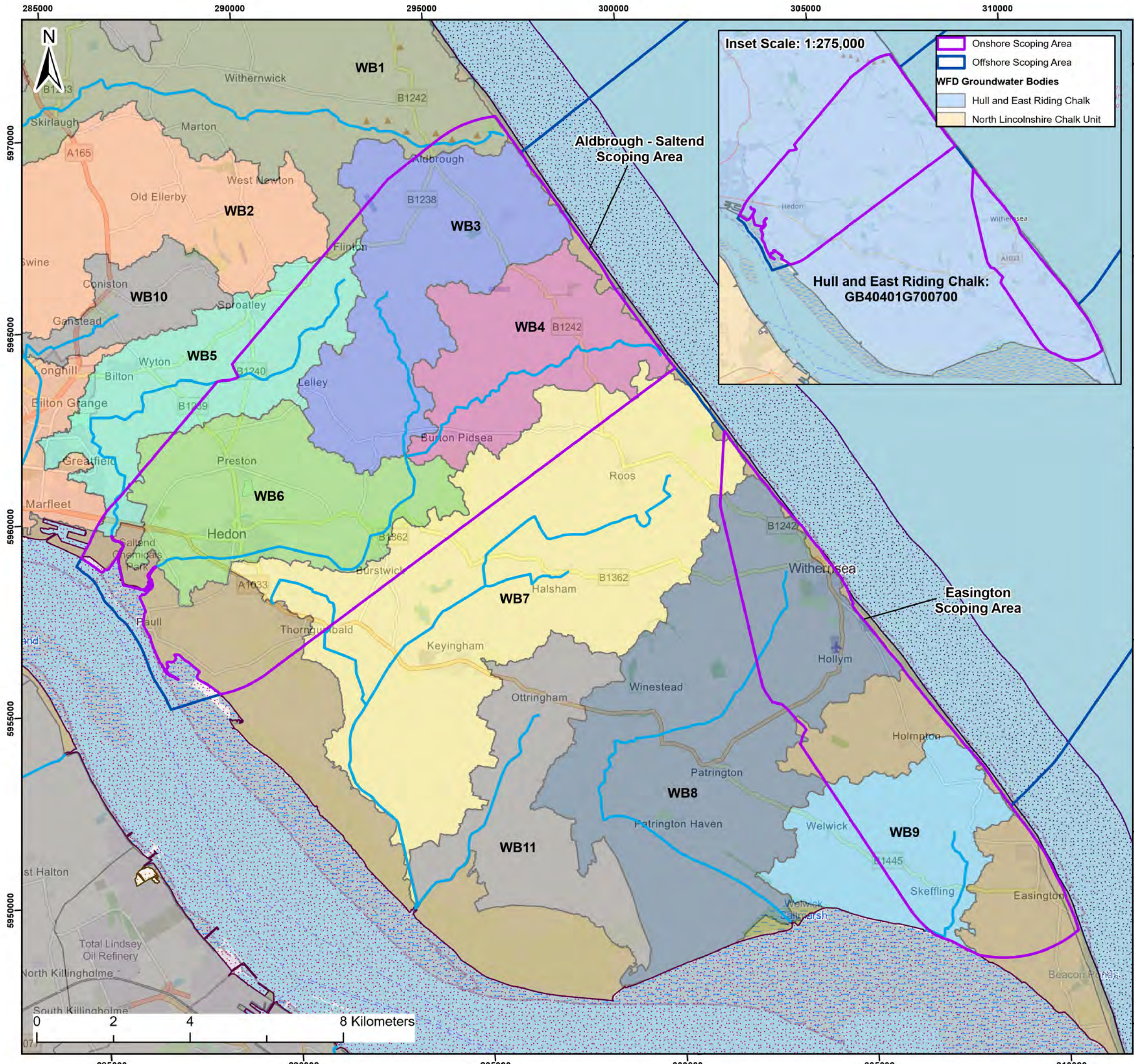
1068. Surface water flood risk has been obtained from the Environment Agency Long Term Flood Risk Information online mapping, as shown on **Figure 8-11**.

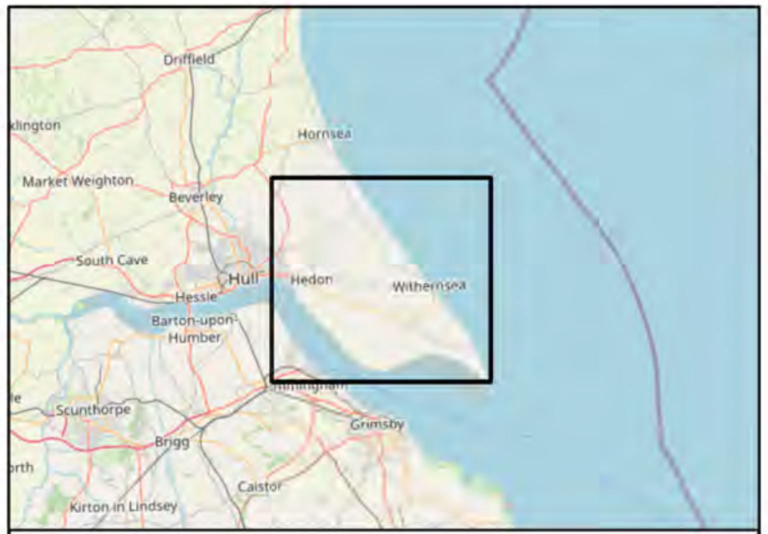
1069. This mapping shows that surface water flood risk is high in many places across the Easington Scoping Area, mainly via isolated areas of ponding and discrete flow pathways. For example, there are numerous narrow high risk (3.3%) flow paths associated with existing drains / watercourses, such as Fosse Drain which runs adjacent to and east of Skeffling town.

1070. Similar to the Aldbrough – Saltend Scoping Area, the Easington Scoping Area is partially located in the South Holderness Internal Drainage District (IDD) which is managed by the South Holderness IDB. The Easington Scoping Area is partially located in the Winestead sub-catchment and the IDB Maintained Drain known as the Main Drain is within this area.

8.4.2.2.4.3 Groundwater Flood Risk

1071. As discussed above for the Aldbrough – Saltend Scoping Area, groundwater emergence maps for the East Riding of Yorkshire indicate that the vast majority of the Easington Scoping Area is likely to be at low susceptibility to groundwater flood risk. This is according to groundwater mapping provided in the East Riding Level 1 SFRA (East Riding of Yorkshire Council, 2019).





Legend:

- Onshore Scoping Area
- Offshore Scoping Area

WFD Transitional & Coastal Water Bodies

- Humber Lower
- North Killingholme Haven Pits
- Yorkshire South

WFD River Water Body Catchments

- WB1: Lambwath Stream from Source to Foredyke Stream
- WB2: Holderness Drain from Foredyke Stream to Humber
- WB3: Humbleton Beck Catchment
- WB4: Burton Pidsea Drain Lower Catchment
- WB5: Oldfleet/Wyton/Sproatley Drain from Source to Humber
- WB6: Burstwick Drain from Source to Humber
- WB7: Sands/Keyingham/Roos Dr from Source to Humber
- WB8: Winestead Drain from Source to Humber
- WB9: Fosse drain / Skeffling Drain
- Coastal - Humber
- Catchments Outside of the Study Area - WB10: Conistone Ganstead Area; WB11: Ottringham Drain from Ottringham Grange to Humber

WFD River, Canal & Surface Water Transfer Water Bodies

- River

Source: © Haskoning DHV UK Ltd, 2023; © Environment Agency, 2023; © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Water Framework Directive (WFD) Areas

Figure: 8-10

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0043

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Co-ordinate system: British National Grid

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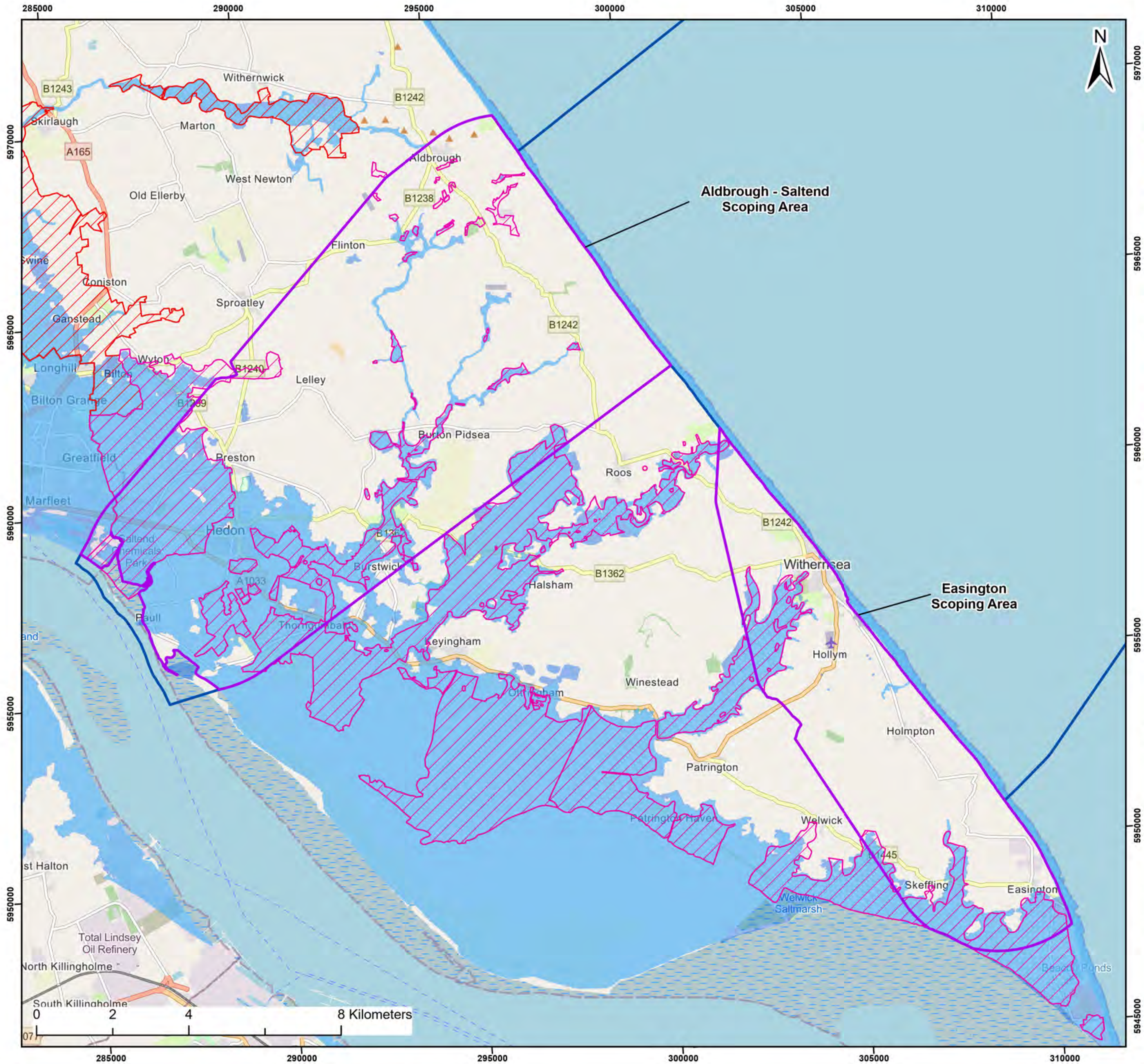

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Flood Zone 2
- Flood Zone 3

Internal Drainage Boards

- Beverley and North Holderness Internal Drainage Board
- South Holderness Internal Drainage Board

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Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Flood Risk (Sheet 1 of 2)

Figure:	8-11	Drawing No:	PC3991-RHD-ON-ZZ-DR-Z-0044		
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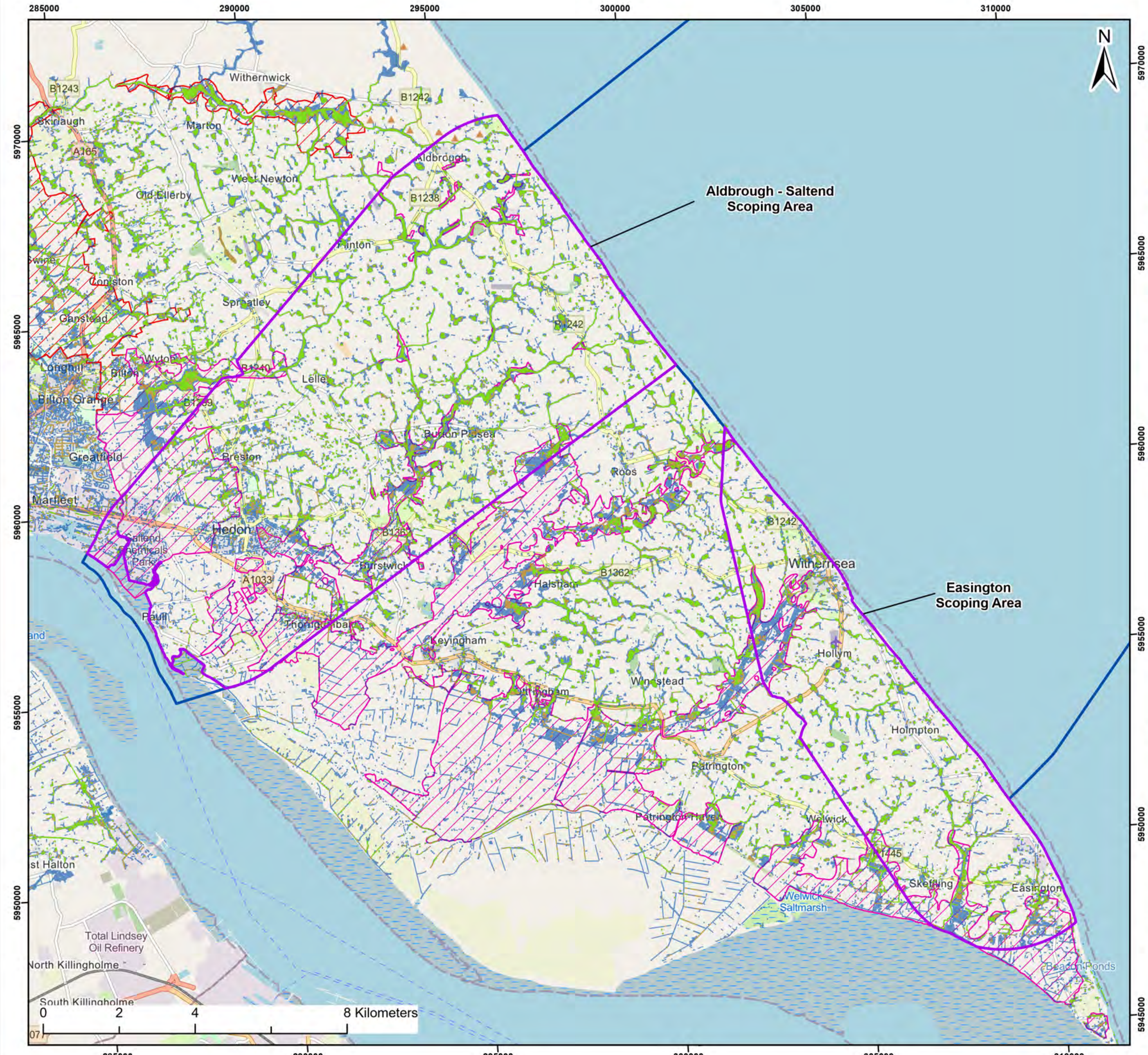

Legend:

Onshore Scoping Area

Offshore Scoping Area

Risk of Surface Water Flooding

3.3% Annual Chance

1% Annual Chance

0.1% Annual Chance

Internal Drainage Boards

Beverley and North Holderness Internal Drainage Board

South Holderness Internal Drainage Board

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Flood Risk (Sheet 2 of 2)

Figure: 8-11 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0044

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Co-ordinate system: British National Grid

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8.4.3 Potential Impacts

8.4.3.1 Potential Impacts during Construction

1072. The following sections outline the potential construction impacts scoped into the EIA. No potential construction impacts have been scoped out of the EIA at this stage.

8.4.3.1.1.1 Direct Disturbance on Surface Water Bodies

1073. Construction activities within the Onshore Scoping Area could directly impact upon the geomorphology, hydrology, water quality and physical habitats of the identified surface water bodies. Disturbance could occur from the installation of new structures and buildings along with buried electrical cables / pipelines and associated infrastructure (e.g. temporary access crossings over surface watercourses).

1074. Disturbance could also occur in the event of an accidental release of drilling fluid from trenchless drilling techniques (e.g. Horizontal Directional Drilling (HDD)) used to install cables or pipeline below sensitive watercourses. In addition, installation of buried infrastructure beneath watercourses and associated flood defences could potentially constrain any future upgrades to these defences. Therefore, direct disturbance on surface water bodies during construction is scoped into the EIA.

8.4.3.1.1.2 Increased Sediment Supply

1075. Construction activities could increase soil erosion and the supply of fine sediment (e.g. clays, fine silts and sands) to surface watercourses. This could arise from earthworks and vegetation removal to construct the onshore ECC and temporary / long term infrastructure. Increased sediment supply would increase turbidity levels within the water column, resulting in greater fine sediment deposition on the channel bed. In turn this could alter local geomorphological adjustment rates and impact upon in-channel morphological features.

1076. Higher sediment loads could also smother bed habitats, reduce light penetration, and decrease temperature and dissolved oxygen levels. These impacts could adversely affect stream biota, such as fish, macroinvertebrates and macrophytes. Therefore, increased sediment supply during construction is scoped into the EIA.

8.4.3.1.1.3 Supply of Contaminants to Surface and Groundwater

1077. The operation of construction machinery working in or adjacent to surface watercourses has the potential to accidentally release lubricants, fuels and oils into a surface water bodies. Trenchless techniques, such as HDD, as well as any piling and foundation construction works at the HPF, could also introduce contaminants to the underlying groundwaters and aquifers. Contamination could also be caused by spillages, leakage and in-wash from vehicle storage areas following rainfall, accidental release of foul waters (e.g. from welfare facilities) and construction materials, such as cement and inert drilling fluids (bentonite) at trenchless crossings. Such contaminants could enter the aquatic system and adversely affect its surface water physico-chemistry. This could have associated impacts upon stream biota. Temporary discharges during the construction phase, including treated effluent from welfare facilities could also impact upon surface and groundwater quality.

1078. Any activities that disturb the ground, such as excavation, HDD or piling, could discharge contaminants below ground and potentially adversely affect groundwater quality and quantity elements. Groundwater quality and quantity could also be affected by saline ingress in relation to sub-surface activities (e.g. HDD).

1079. Construction activities will adhere to industry good practice measures as detailed in the Environment Agency's Pollution Prevention Guidance (PPG) notes (PPG1, PPG5, PPG8 and PPG21). Although the Environment Agency's PPG notes have been revoked in England, they have been updated as Guidance for Pollution Prevention (GPP notes) for use in Scotland and Northern Ireland (NetRegs, 2022). Updates are included in the measures listed below. Construction Industry Research and Information Association (CIRIA) best practice (Control of water pollution from construction sites: Guidance for consultants and contractors (C532) (2001)) will also be adhered to. Specific measures will potentially include:

- Minimising the amount of time stripped ground and soil stockpiles are exposed;
- Only removing vegetation from the area that needs to be exposed in the near future;
- Seeding or covering stockpiles;
- Using geotextile silt fencing at the toe of the slope, to reduce the movement of silt – this should be installed before soil stripping has begun and vehicles start tracking over the site;
- On-site retention of sediment to be maximised by routeing all drainage through the site drainage system;
- Include measures to intercept sediment runoff at source in the drainage system using suitable filters to remove sediment from water discharged to the surface drainage network;
- Plant and wheel washing is carried out in a designated area of hard standing at least 10m from any watercourse or surface water drain, rock outcrop (hard rock at surface) or karstic sinkhole;
- Traffic movements would be restricted to minimise surface disturbance;

- Divert clean water away from the area of construction work in order to minimise the volume of contaminated water;
- Waste water from temporary welfare facilities will be appropriately captured and either collected and tankered off site for appropriate treatment or treated on site prior to discharge under an environmental permit; and
- Routeing the cable to avoid water resources and flood risk receptors where possible. In locations where large areas of exposed ground lie adjacent to watercourses, buffer strips of vegetation will be retained where possible to prevent runoff.

1080. Other embedded best practice measures include:

- Limiting the extent of open excavations along the onshore cable corridor to short sections of adequate length to carry out excavation and installation and there is no need for tracking over the trench sections at any one time (work fronts); and
- Temporary works areas (e.g. construction compounds and trenchless crossing areas) within the onshore project area may comprise hardstanding of permeable material, such as gravel aggregate or alternatively matting / timber or similar, underlain by geotextile or another suitable material to a minimum of 50% of the exposed area. This would minimise the area of open ground.

1081. Therefore, taking into account best practice embedded mitigation, supply of contaminants to surface and groundwater during construction is scoped out of the EIA.

8.4.3.1.1.4 Changes to Surface and Groundwater Flows and Flood Risk

1082. Site preparation and construction activities within the Onshore Scoping Area could lead to an increase in surface water runoff due to alterations in surface drainage patterns and surface flows. Infiltration rates could be reduced because of soil compaction by construction vehicles and surface infrastructure. Increased surface runoff could have an adverse impact on the geomorphology of surface watercourses (e.g. through associated bed and bank scour and increase in fine sediment input). Sub-surface excavations and associated dewatering could also result in changes to sub-surface flow patterns and an increase in surface flows.

1083. Flood risk could be altered and / or increased, particularly in areas designated as Flood Zone 2 or 3. Sub-surface flow patterns could also be altered due to potential changes in infiltration rates and surface flow patterns (e.g. associated with HDD). Increased surface runoff could affect watercourses that rely on assisted pumping. Therefore, changes to surface and groundwater flows and flood risk during construction are scoped into the EIA.

8.4.3.2 Potential Impacts during Operation

1084. The following sections outline the potential operational impacts scoped into the EIA. **Section 8.4.3.2.4** includes impacts scoped out of the EIA.

8.4.3.2.1 Supply of Contaminants to Surface and Groundwater

1085. There is the potential for accidental release of contaminants to surface and groundwater during planned and unplanned operational maintenance. Activities could lead to accidental release of fine sediment, oils, fuels and lubricants to surface water bodies. This could adversely affect the geomorphology and water quality of the surface water drainage network. Accidental spillage or leakage of fuel oils or lubricants could also impact upon the surface water quality and connected groundwater quality. This in turn could impact aquatic ecology and the use of water resources for abstractions. Operation and maintenance (O&M) activities will also adhere to the best practice measures set out in **Section 8.4.3.1.1.3**, therefore, supply of contaminants to surface and groundwater during operation are scoped out of the EIA.

8.4.3.2.2 Changes to Surface and Groundwater Flows and Flood Risk

1086. Long term onshore infrastructure (i.e. the HPF) is likely to increase the impermeable area across the surface water catchments. This could decrease infiltration rates and permanently change surface runoff pathways which may increase and / or alter flood risk. The greatest flood risk impact from these changes is likely to be in parts of the Onshore Scoping Area designated as Flood Zone 2 or 3. Increased surface runoff could impact on watercourses that rely on assisted pumping.

1087. Ground disturbance during installation of the cable trench, pipework or foundations for buildings and structures is likely to change the transmissivity of the ground which overlays the cable infrastructure after reinstatement and may therefore become a preferential corridor for sub-surface water flow. Changes to the proportion of groundwater contained in surface waters could potentially alter water chemistry and impact upon the quality of water-dependent habitats. Therefore, changes to surface and groundwater flows and flood risk during operation are scoped into the EIA.

8.4.3.2.3 Water Abstraction and Effluent Discharge

1088. Due to the high volumes of water required for the HPF, it is likely that water abstraction and / or water treatment would be needed. At this stage, full details are not available and will be confirmed in a separate water resource and availability study. However, for a worst case assessment it is assumed the following stages may be required:

- Abstraction of water (surface freshwater, seawater and / or groundwater) to supply the HPF and / or cooling water;
- Filtering, clarification, disinfection;
- Desalination; and

- Discharge of wastewater, including brine if desalinisation is required (note this may include higher than ambient temperature water).

1089. Water abstraction and treatment at the HPF means there is the potential for adverse impacts on surface and groundwater quantity due to abstraction. Reduced surface and groundwater quantity could also impact upon aquatic habitats and species due to changes in flow depth, velocity and volume. Groundwater abstraction has the potential cause saline intrusion and could also adversely affect any groundwater dependent terrestrial ecosystems (GWDTE).

1090. Discharge of treated wastewater could adversely affect water quality in receiving surface water catchments. Quality elements assessed under the Water Environment Regulations (WER) (e.g. physico-chemistry (including water temperature) and biology) could be affected, which has the potential to cause a deterioration in water body status. If desalination is required, wastewater (potentially warm brine) would be discharged to the marine environment. This impact is discussed in **Chapter 7.3 Marine Water and Sediment Quality**. Potential impacts to marine water bodies will also be assessed in a separate WER compliance assessment.

1091. Potential operational impacts associated with water abstraction and effluent discharge will be scoped into the EIA at this stage and updated in the Preliminary Environmental Information Report (PEIR).

8.4.3.2.4 Potential Impacts Scoped Out During Operation

1092. Direct disturbance of surface water bodies during operation has been scoped out of the EIA, as post-construction there will be no mechanisms by which elements of the Project could directly disturb (e.g. trenching, disturbing channel bed and banks) water bodies. This is consistent with other recent projects, such as the Dudgeon Extension and Sheringham Shoal Extension Projects (Equinor, 2019) as there is no evidence of any impact.

8.4.3.3 Potential Impacts during Decommissioning

1093. 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.

1094. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 8-9**).

8.4.4 Potential Cumulative Effects

1095. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect water resources and flood risk receptors. Therefore, cumulative effects related to water resources and flood risk are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1096. Potential plans and projects that would be screened for inclusion in the CEA would include other offshore wind farms, housing developments, and any other projects that have the potential for effect on hydromorphology, surface and groundwater quantity and quality, and flood risk.

8.4.5 Summary of Scoping Proposals

1097. **Table 8-9** outlines the water resources and flood risk 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 8-9 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Water Resources and Flood Risk

Potential Impact	Construction	Operation	Decommissioning
Direct disturbance of surface water bodies	✓	X	✓
Increased sediment supply	✓	X	✓
Supply of contaminants to surface and groundwater	X	X	X
Changes to surface and groundwater flows and flood risk	✓	✓	✓
Water abstraction and effluent discharge	X	✓	X
Cumulative impacts	✓	✓	✓

8.4.6 Approach to Data Gathering

1098. As part of the EIA process, the existing environment with respect to freshwater quality and resource will be described, including, but not limited to the following:

- The hydrology, geomorphology and quality of surface freshwater features, including rivers, canals, lakes and drainage ditches;
- The quality and quantity of groundwaters;
- Surface and groundwater abstractions;
- Designated sites with potential to be affected by changes to freshwater quality and resource; and
- Flood risk.

1099. **Table 8-10** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 8-10 Desk-Based Data Sources for Water Resources and Flood Risk

Data Source	Date	Data Contents
Environment Agency	2019 (updated August 2022)	The Catchment Data Explorer (https://environment.data.gov.uk/catchment-planning) provides information on WFD River Basin Districts Management Catchments, Operational Catchments and WFD water bodies.
	Undated	Flood Map for Planning showing the flood zones within the onshore scoping area (https://flood-map-for-planning.service.gov.uk/)
	Updated January 2023	The Water Quality Archive provides data on water samples taken at sampling points from coastal or estuarine waters, rivers, lakes, ponds, canals or groundwaters. (https://environment.data.gov.uk/water-quality/view/landing)
Lead Local Flood Authority (LLFA) (East Riding of Yorkshire Council)	Undated	Historic flood incident information relating to high, surface water and / or drainage flooding
East Riding of Yorkshire Council and Environment Agency	Undated	Any previous site investigation data and public sewer records.
South Holderness IDB	Undated	Information related to IDB maintained drains, historic flood incidents and wider catchment management practices
Department for Environment, Food and Rural Affairs (Defra)	Undated	MAGIC map (www.magic.defra.gov.uk) showing aquifer designations, designated sites and SPZs
Natural England	Undated	MAGIC map (www.magic.defra.gov.uk) showing for information on designated sites and reasons for designation
British Geological Survey (BGS)	Undated	1:50,000 geological mapping of the Onshore Scoping Area

1100. A geomorphology baseline survey will also be undertaken to inform the EIA, as outlined in **Table 8-11**. This will provide additional data on the watercourses which are scoped into the next stage of the EIA. This will be undertaken in accordance with best practice geomorphological walkover methodologies. Agreement on the method and scope of the survey will be obtained from the Environment Agency prior to undertaking the survey.

Table 8-11 Proposed Baseline Surveys for Water Resources and Flood Risk

Survey	Timing	Spatial Coverage
Geomorphology baseline	2023 (survey date to be confirmed)	The geomorphology baseline survey will collect information about the existing condition of the major watercourses within the Onshore Scoping Area. It will specifically focus on reaches where crossings of main rivers or other sensitive watercourses are proposed.

8.4.7 Approach to Assessment

1101. The EIA will focus on potential impacts on two groups of receptors:

- Water resources, including the hydrology, geomorphology and water quality of surface waters (e.g. rivers, canals, lakes and reservoirs); the quantity and quality of groundwater; abstractions from surface and groundwaters (e.g. Principal, Secondary A and Secondary Undifferentiated aquifers) and associated designated sites (e.g. SPZs, DWPAs); water-dependent habitats and groundwater-dependent terrestrial ecosystems, including designated sites (e.g. Special Areas of Conservation (SAC), Special Protected Areas (SPA), Sites of Special Scientific Interest (SSSI)); and water supply infrastructure (including treatment plants, pumping stations and distribution networks) and surface and foul drainage infrastructure; and

- Flood risk to the Project from all sources, including fluvial, coastal, surface water, groundwater, sewer and reservoir flooding, and changes in flood risk from all sources (fluvial, coastal, surface water, groundwater, sewer and reservoir flooding) resulting from the Project.

1102. Whilst there are clear links between the two groups of receptors, the assessment of receptor sensitivity and the magnitude of effect may differ. Definitions of receptor sensitivity and value and impact magnitude and significance will be developed with reference to guidance for the assessment of water resources impacts provided by the Department of Transport (2022) and the Department for Levelling Up, Housing and Communities (DLUHC) (2022).

1103. The approach to assessment will be discussed and agreed through production of a method statement and discussion with stakeholders as part of the EPP (as set out in **Chapter 6 Consultation**). Consultation will be undertaken at key stages throughout the EIA process. Following the refinement of the Onshore Development Area, further liaison with the stakeholders including the Environment Agency, Natural England, the LLFA and appropriate water companies will be undertaken to agree the approach and methodology for data collection for EIA purposes and the specific assessment methodology.

8.4.7.1 Supporting Assessments

1104. The EIA will be supported by two additional assessments:

- A Flood Risk Assessment (FRA) would be undertaken in accordance with the National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021) and the accompanying Planning Practice Guidance for Flood Risk and Coastal Change (DLUHC, 2022) to assess the flood risk to the development and surrounding areas. This would inform the identification of any required mitigation measures; and
- A WER Compliance Assessment (which includes risks to ecological status) will be required to assess compliance with the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Initially, this would consist of three stages (screening, scoping and impact assessment), in accordance with the Planning Inspectorate's guidance (Planning Inspectorate, 2017).

8.4.8 Scoping Questions to Consultees

1105. The following questions are posed to consultees to help them frame and focus their response to the water resources and flood risk scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the water resources and flood risk impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the water resources and flood risk 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?

8.5 Soils and Land Use

1106. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with soils and land use, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1107. The soils and land use assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **Chapter 8.2 Geology and Ground Conditions;**
- **Chapter 8.4 Water Resources and Flood Risk;**
- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation;**
- **Chapter 8.9 Traffic and Transport**; and
- **Chapter 9.3 Socio-Economics, Tourism and Recreation.**

8.5.1 Study Area

1108. The Soils and Land Use Study Area (hereafter referred to as 'the study area'), will be defined on the basis of direct and indirect impacts. It is assumed that direct impacts to soils and land use will occur wholly within the Onshore Scoping Area (see **Figure 1-1**). The study area for indirect impacts will be limited to a maximum of 1km from the Onshore Scoping Area (**Figure 8-12**).

8.5.2 Existing Environment

8.5.2.1 Existing Land Uses

1109. use within the study area is predominantly arable agricultural land in active use. A range of other land cover types are also present, including:

- Built-up urban areas including the settlements of Aldbrough, Burton Pidsea, Preston, Hedon, Thorngumbald, Withernsea and Easington;
- Areas of industry including:
    - Gassco AS UK Branch;
    - Rough Gas Terminal;
    - BP West Sole Terminal; Dimlington Gas Terminal;
    - Hollym airfields (two locations);

  - Waxholme Trading Park;
  - SSE Aldbrough Gas Storage;
  - Garton Field (airfield);
  - Paull AGI (National Grid);
  - Saltend Power Station;
  - Saltend South Substation;
  - Saltend North Substation;
  - Saltend Chemical Park;
  - Kingstone International Business Park; and
- Non-agricultural land such as areas of wetland, woodland, watercourses and recreational land uses (e.g. Burstwick Country Club).

1110. Multiple public rights of way (PRoW) and cycle routes are recorded as being wholly or partially located within the study area, with the England Coast Path currently approved within the study area but not yet open, and with establishment works in progress or planned. National Cycle Network (NCN) Route 66 is present in the study area adjacent to the south-west of the Aldbrough-Saltend Scoping Area. No other national trails are located within the study area (**Figure 8-13**).

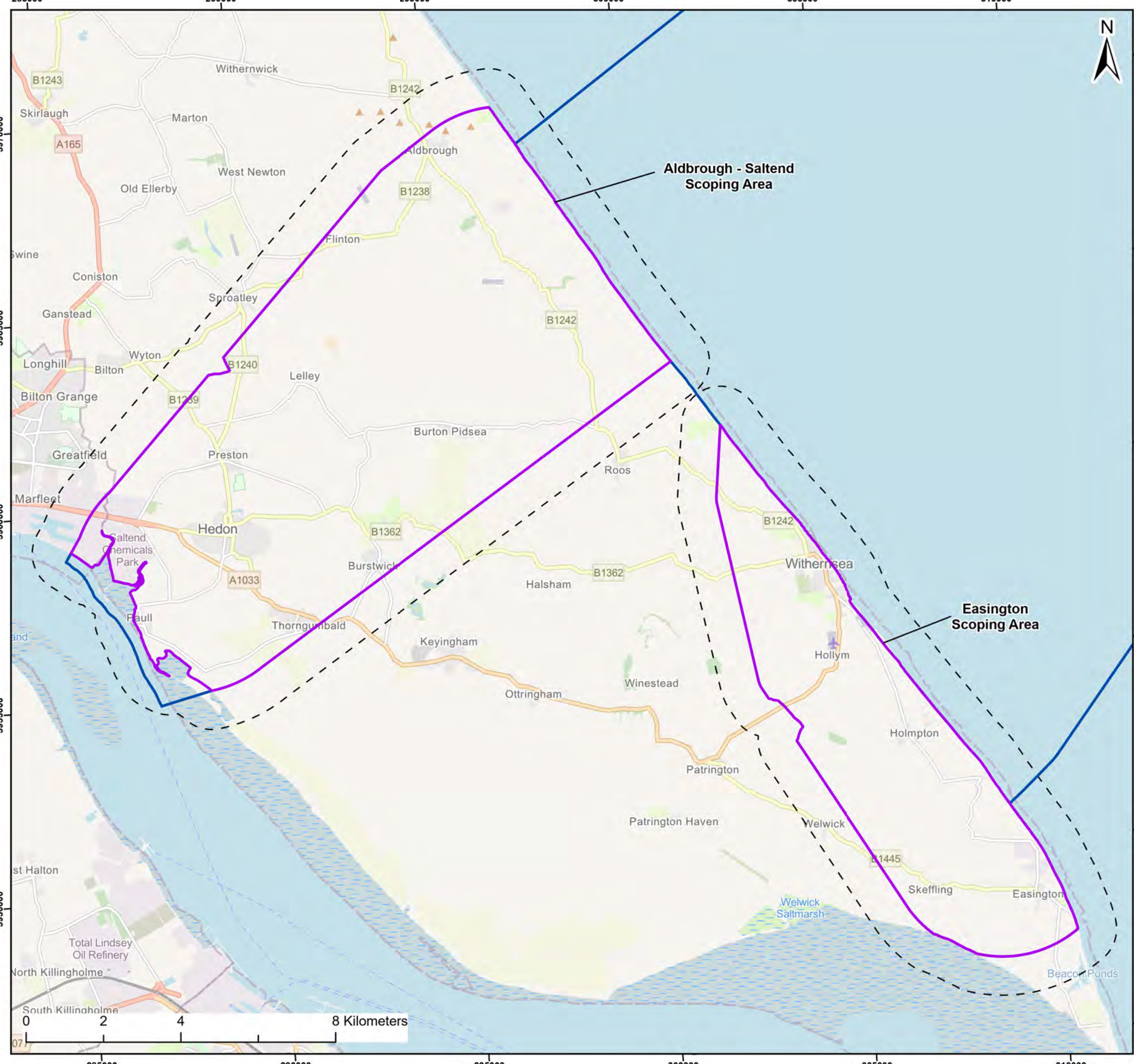
1111. There are eight records of historical landfill sites and one authorised landfill site located within the study area. These will be discussed within **Chapter 8.2 Geology and Ground Conditions**.

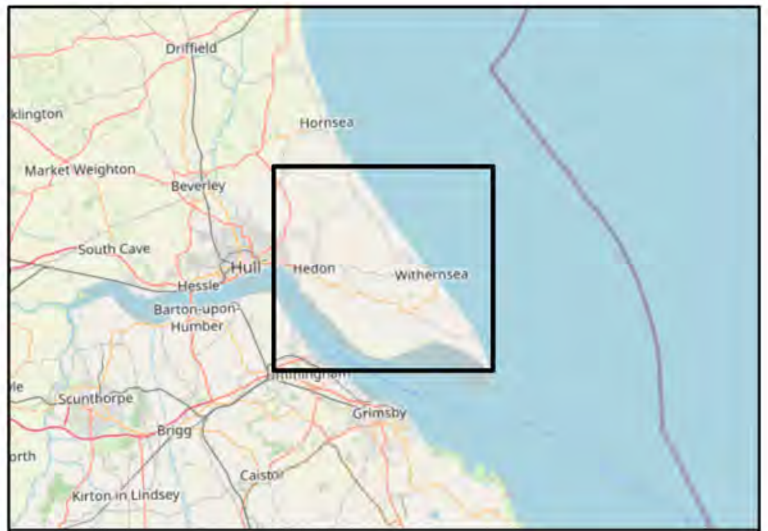
8.5.2.2 Agricultural Land and Soil Quality

1112. The agricultural land which comprises the majority of the study area is considered in terms of its agricultural value using Natural England's Agricultural Land Classification (ALC) dataset. ALC grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. 'Best and Most Versatile' (BMV) agricultural land is defined as Grades 1, 2 and 3a (with Grade 3 split into 3a and 3b). As Grade 3 is not split within Natural England's ALC mapping dataset, at this stage it has been assumed that all Grade 3 land could be Grade 3a.

1113. The study area contains agricultural land of Grades 2 to 4. The majority of land within the Onshore Scoping Area is classified as ALC Grade 2, with ALC Grade 4 located within the Easington Scoping Area only (**Figure 8-14**).

1114. There are two areas of land within the study area that are held under Entry Level plus Higher Level Environmental Stewardship Schemes (ESS). These areas are located to the west of Hollym and Out Newton (**Figure 8-15**). These schemes are designed to encourage environmentally beneficial land management practices via financial incentives.





Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Soils and Land Use Study Area (Onshore Scoping Area 1km Buffer)

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Soils and Land Use Study Area

Figure: 8-12 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0045

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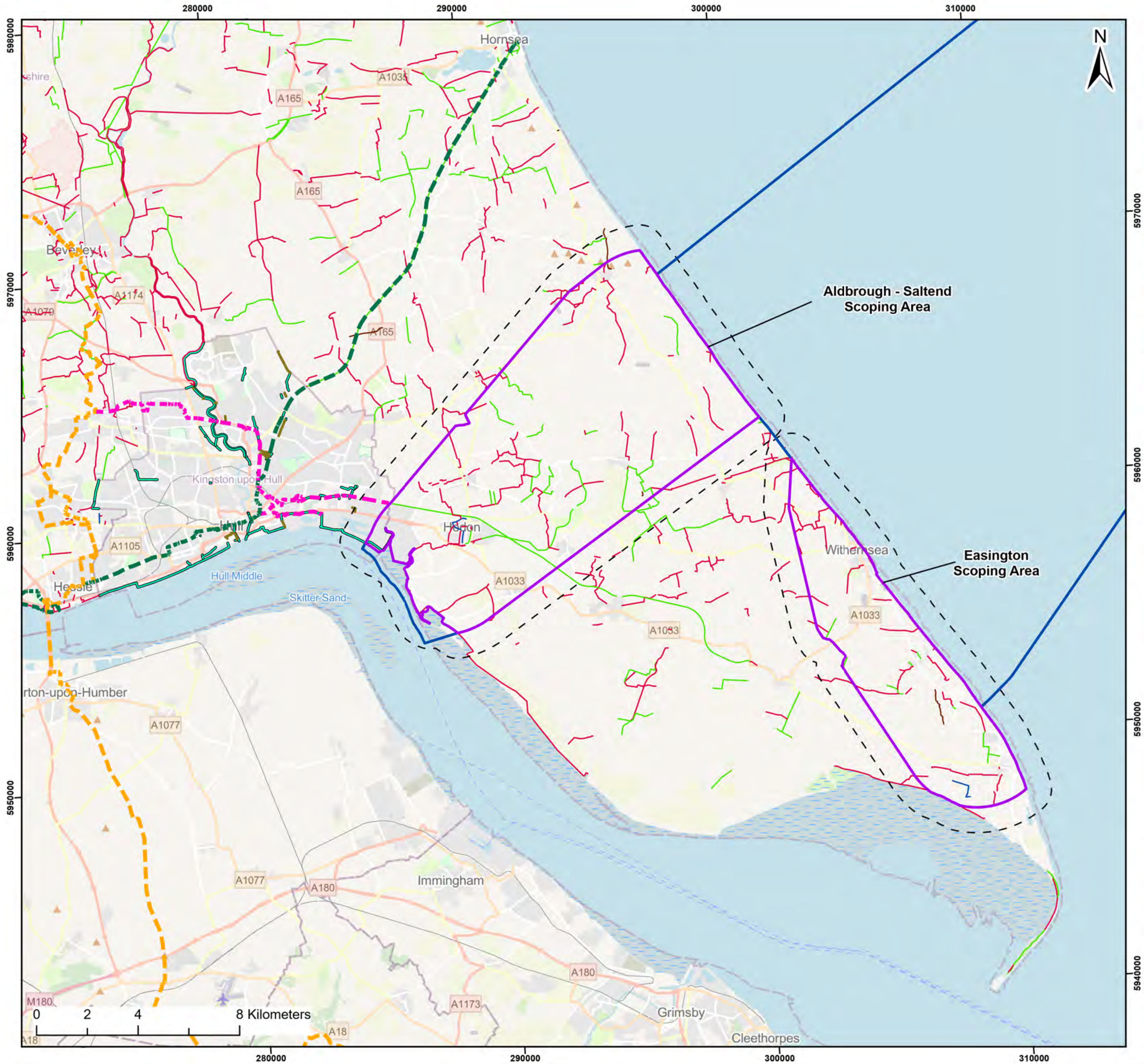

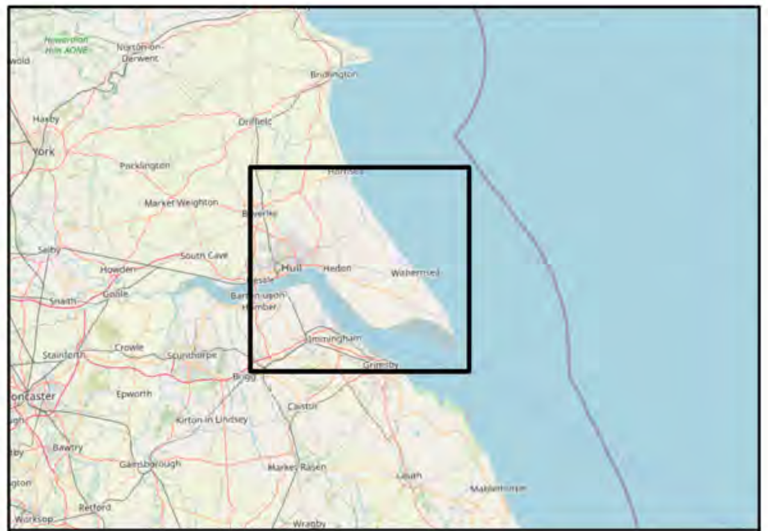

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Soils and Land Use Study Area (Onshore Scoping Area 1km Buffer)

National Cycle Network

- Route 1
- Route 65
- Route 66

East Riding of Yorkshire Public Rights of Way

- Footpath
- Bridleway
- Byway Open to All Traffic
- Restricted Byway

Hull Public Rights of Way

- Public Right of Way
- Proposed Public Right of Way

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Public Rights of Way and Cycle Routes

Figure: 8-13

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0061

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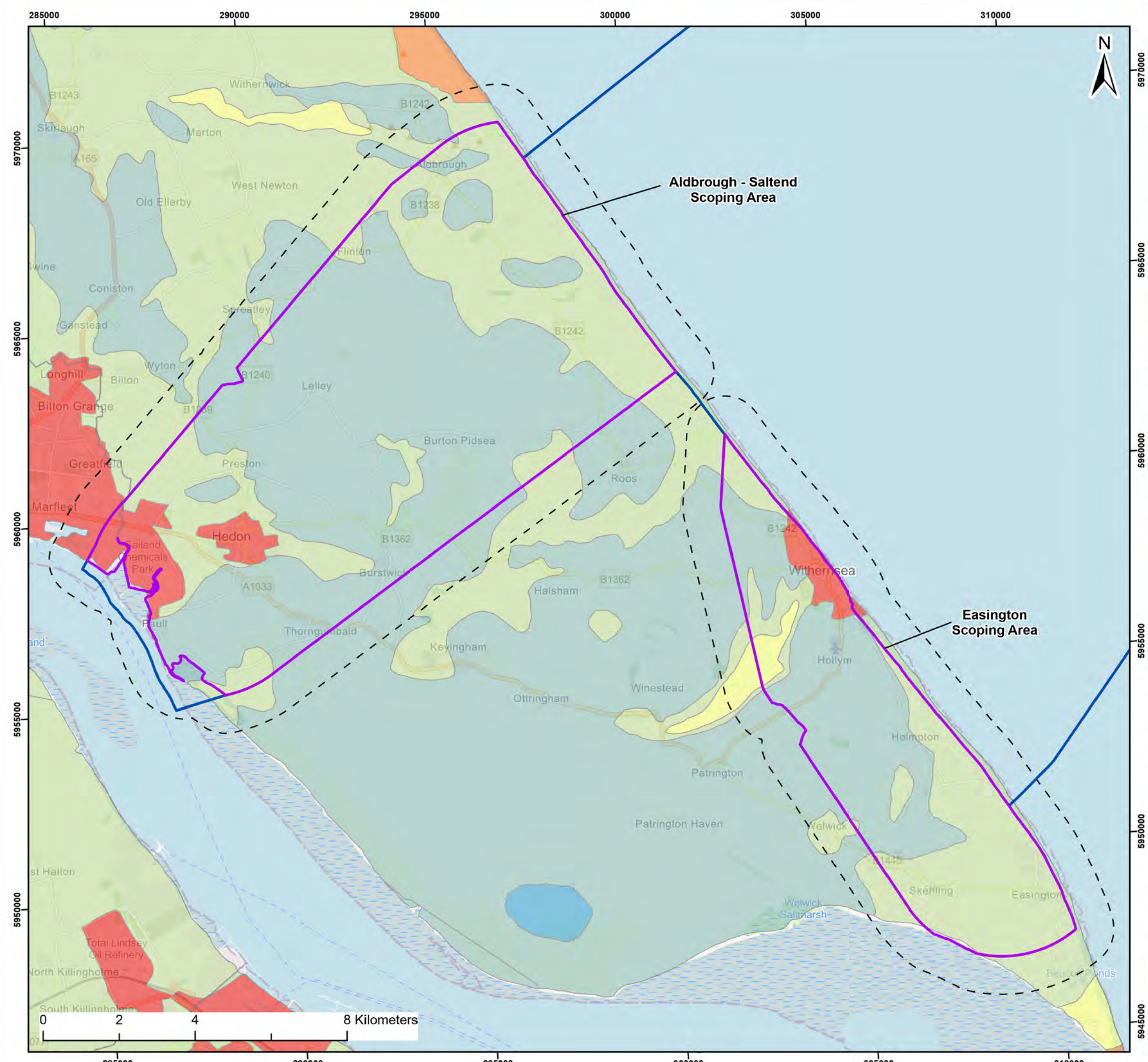

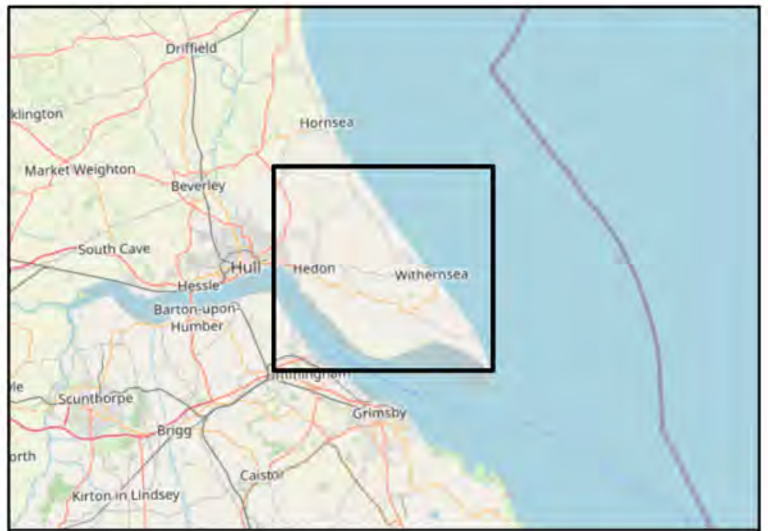

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Soils and Land Use Study Area (Onshore Scoping Area 1km Buffer)

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Agricultural Land Classification

Figure:	8-14	Drawing No:	PC3991-RHD-ON-ZZ-DR-Z-0046		
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Co-ordinate system: British National Grid

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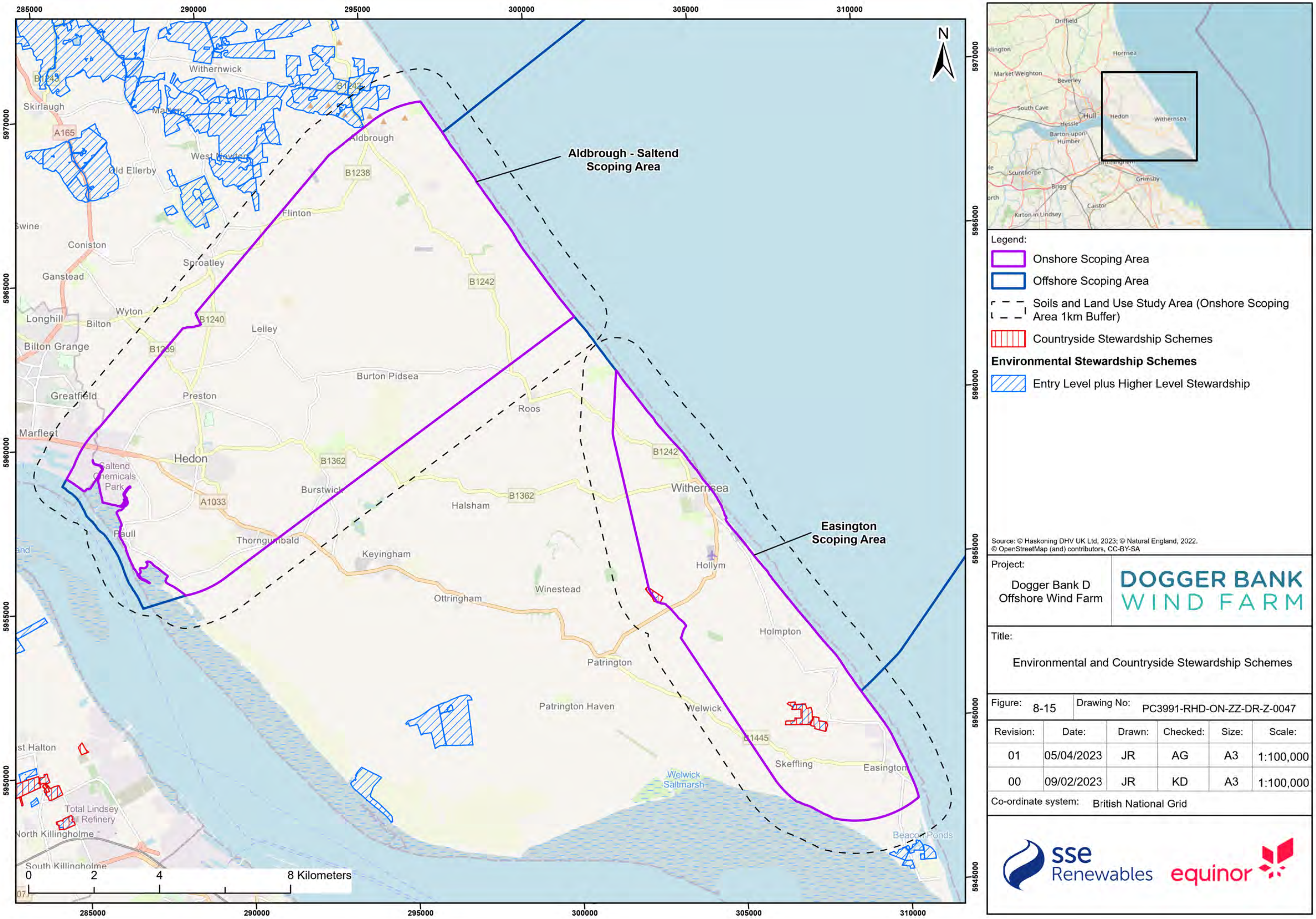

Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- Soils and Land Use Study Area (Onshore Scoping Area 1km Buffer)
- Countryside Stewardship Schemes

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Environmental and Countryside Stewardship Schemes

Figure: 8-15 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0047

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Co-ordinate system: British National Grid

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1115. Multiple Middle Tier and Higher Tier Countryside Stewardship Schemes (CSS) are located throughout the study area (**Figure 8-15**). Similar to ESS, the overarching aim of CSS is to look after and improve the environment via financial incentives.

1116. Further information relating to Environmental Land Management Schemes (ELMS) will be gathered as part of the EIA process, noting that the new ELMS elements, which are comprised of the Sustainable Farming Incentive, Local Nature Recovery, and Landscape Recovery, will be launched in tranches from 2022 to 2024.

8.5.2.3 Development Proposals and the Green Belt

1117. With reference to the East Riding of Yorkshire Local Plan 2012 – 2029, adopted 2016 (East Riding of Yorkshire Council, 2016), there are a number of site allocations located within the study area, these include:

- Residential – policy references AD-1, ALD-A, ALD-B, ALD-C, ALD-D, PRES-A, PRES-B, WITH-A and WITH-B (all of which are sites allocated for housing developments);
- Employment – policy reference HAV-A (site allocated to cater for the expansion of the Port of Hull); and
- Mixed use - policy reference WITH-D (site allocated for both retail sites and housing developments).

1118. The existing local plan (East Riding of Yorkshire Council, 2016) includes a number of other land uses and features covered by polices in the plan, including (but not limited to):

- Heritage assets and areas;
- Conservation areas (biodiversity and geodiversity features);
- Mineral Safeguarding Areas; and
- Strategic aviation consultation zones.

1119. With reference to the Hull Local Plan 2016 – 2032 (Hull City Council, 2017) there are site allocations within the study area associated with the expansion of the Port of Hull and employment opportunities.

1120. There are no areas of green belt land located within the study area.

8.5.2.4 Utilities

1121. It is anticipated that utilities are present within the study area. These are likely to include telecommunications, buried and above ground electricity cables, gas and public water mains. Detailed utilities data will be sought once the study area has been refined during the EIA process.

8.5.3 Potential Impacts

8.5.3.1 Potential Impacts during Construction

8.5.3.1.1 Agricultural Drainage

1122. There is the potential for construction works to impact on both natural and artificial drainage systems within the study area. This in turn could impact on the risks associated with surface water flooding to agricultural land itself and surrounding environment. Potential impacts on drainage are also discussed in **Chapter 8.4 Water Resources and Flood Risk**. The potential impacts on agricultural drainage have therefore been scoped into the EIA.

8.5.3.1.2 Disruption to Farming Practices

1123. The majority of the study area is located within areas currently associated with agricultural production. There is potential for adverse impacts on farming and other land use practices through the temporary loss of land availability, restricted access and disruption caused by working areas and construction traffic. Impacts on farming practices are therefore scoped into the EIA.

8.5.3.1.3 Soil Degradation and Erosion

1124. There is potential for adverse impacts to soil structure and future agricultural productivity of soils impacted during the construction phase through the use of heavy machinery and disturbance associated with ground works. Changes to soils can affect biological activity and water retention leading to loss or change in agricultural productivity.

1125. There is also the potential for soil erosion to occur as a result of excavation, storage and reinstatement processes that are likely to occur during construction works. Such erosion may be due to changes in water pathways or wind derived. Due to the above mechanisms soil degradation and erosion is scoped into the EIA.

8.5.3.1.4 Stewardship and Land Management Schemes

1126. There is potential for ecological and financial impacts to areas under ESS, CSS or the emerging ELMS regime, to occur as a result of construction activities. Potential impacts on such stewardship and land management schemes will therefore be scoped into the EIA.

8.5.3.1.5 Existing Utilities

1127. During the construction phase, cable installation activity has the potential to impact on telecommunications, water, power and gas infrastructure through intrusive excavation works or associated disruption. Therefore, potential impacts on such services have been scoped into the EIA.

8.5.3.1.6 PRoWs and Cycle Routes

1128. Temporary impacts on PRoWs and NCN routes may occur due to construction activities, notably where construction works directly overlap such routes. Any temporary changes / re-direction of PRoWs to allow construction to be undertaken may cause temporary changes to usage and opportunities for recreation and these aspects will be scoped into the EIA.

8.5.3.2 Potential Impacts during Operation

8.5.3.2.1 Agricultural Drainage

1129. Long term infrastructure and hardstanding at the HPF plus the presence of buried cables has the potential to permanently impact upon land drainage affecting crop yield, and such potential impacts will be scoped into the EIA. Potential impacts on drainage are also discussed in **Chapter 8.4 Water Resources and Flood Risk**.

8.5.3.2.2 Disruption to Farming Practices

1130. The presence of long term above ground infrastructure at the HPF, plus any cable Transition Joint Bays (TJB) and associated easements for access, will potentially result in the long term loss of land, including agricultural land, and therefore also a loss in the productivity of these areas. Given the extent of BMV within the study area, there is a potential loss of BMV during the lifetime of the Project.

1131. It is not envisaged that buried cable will affect farming practices due to burial depth. This will be confirmed in the Preliminary Environmental Information Report (PEIR) but as a precaution, and until burial depth can be confirmed, the potential for buried infrastructure to restrict farming practices during the operation phase will be scoped into the EIA.

1132. Buried cable systems have the potential to emit heat, therefore potentially causing impacts to soil characteristics and productivity. The electrical system will be designed to minimise heat loss to a level which is unlikely to affect crop growth. Operational cable heat emission effects will therefore be scoped out of the EIA.

8.5.3.2.3 Soil Degradation and Erosion

1133. Impacts associated with soil degradation and erosion are not anticipated to occur during the operation phase of the Project, given the careful reinstatement that will take place. Operational impacts to soil degradation and erosion will be scoped out of the EIA.

8.5.3.2.4 Stewardship and Land Management Schemes

1134. There is the potential for land associated with existing / future stewardship and land management schemes within the footprint of the HPF to be permanently taken out of use during the operation phase. This issue will be scoped into the EIA.

1135. Land located at landfall and within the onshore ECC would be reinstated following construction and will not be significantly impacted as a result of the operation phase of the Project. This issue will be scoped out of the EIA.

8.5.3.2.5 Existing Utilities

1136. Any maintenance works that may be required during the operation phase of the Project would be undertaken following consultation with potentially affected utility providers, with the location of existing services identified prior to commencement of any works. Utility crossings will be undertaken in accordance with industry standard practice as agreed with the relevant utility owners. The Development Consent Order (DCO) application for the Project will also include protective provisions in favour of the utilities providers in order to provide protection for their assets. Therefore, it is not anticipated that existing utilities will be impacted during the operation phase of the Project, and this is scoped out of the EIA.

8.5.3.2.6 PRoWs and Cycle Routes

1137. There is the potential for long term diversions to PRoWs in areas associated with the HPF during the lifetime of the Project. There is also the potential for health and safety impacts to occur in areas associated with above ground infrastructure. These issues will be scoped into the EIA.

1138. For buried infrastructure, long term diversions to PRoWs as well as impacts to public health are not anticipated, and this issue is scoped out of the EIA.

1139. As the Onshore Scoping Area does not directly overlap with any NCN routes, and there will be no long term diversions required, it is proposed that impacts will be scoped out of the EIA during the operation phase. NCN routes are also covered separately within **Chapter 8.9 Traffic and Transport**.

8.5.3.3 Potential Impacts during Decommissioning

1140. 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.

1141. The same potential impacts identified for construction will therefore be scoped in (and out) of the EIA for the decommissioning phase (as per **Table 8-12**).

8.5.4 Potential Cumulative Effects

1142. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect soils and land use receptors. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1143. Potential cumulative impacts related to soils and land use include other nearby development projects with temporal and spatial overlaps that may interact with the same utilities or existing land uses.

8.5.5 Summary of Scoping Proposals

1144. **Table 8-12** outlines the soils and land use 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 8-12 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Soils and Land Use

Potential Impact	Construction	Operation	Decommissioning
Agricultural drainage	✓	✓	✓
Disruption to farming practices (in general)	✓	✓ (buried infrastructure may be scoped out once cable burial depths are confirmed)	✓
Disruption to farming practices (soil heating)	X	X	X
Soil degradation and erosion	✓	X	✓
Stewardship and land management schemes	✓	✓ (from the HPF only)	✓
Existing utilities	✓	X	✓
PRoWs and cycle routes	✓	✓ (for PRoWs and in relation to the HPF only)	✓
Cumulative impacts	✓	✓	✓

8.5.6 Approach to Data Gathering

1145. The existing environment will be characterised using the data sources set out in **Table 8-13**.

Table 8-13 Desk-Based Data Sources for Soils and Land Use

Data Source	Date	Data Contents
Natural England	2020s	• ALC maps • ESS • England Coast Path details and mapping
Countryside and Rights of Way Act 2000 – Section 4 Conclusive Registered Common Land, Natural England	2021	• Common land • Countryside Rights of Way (CRoW)
East Riding of Yorkshire Council Hull City Council	2023	• Planning policy adopted proposals maps • Definitive PRoW mapping
Ordnance Survey (OS) mapping Aerial photography	Various	• 'A' Roads • Railway lines • Urban areas
Utilities records requested from local utilities suppliers (various) and Environmental Monitoring and Assessment Programme (EMAP) website	2023	Utilities

1146. Any additional datasets will be identified through ongoing consultation with stakeholders. No surveys are proposed to inform the assessment of impacts related to soils and land use.

8.5.7 Approach to Assessment

1147. The soils and land use assessment will identify and assess the likely impacts of the Project and identify appropriate mitigation measures if required. The assessment will consider both direct and indirect impacts.

1148. The methodology for the assessment of the impacts on soils and land use will be informed by the following guidance:

- Design Manual for Roads and Bridges (DMRB) LA 109 Geology and Soils (Highways Agency, 2019);
- DMRB LA 112 Population and Human Health (Highways Agency, 2020);
- Department for Environment, Food and Rural Affairs (Defra) guidance including the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2018);
- A New Perspective on Land and Soil in Environmental Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2022); and
- Environmental Land Management Schemes (UK Government, 2021).

1149. The reform of agricultural policy and spending in England and the introduction of ELMS is developing and guidance will be obtained on this matter when available.

1150. Soils and land use 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.

8.5.8 Scoping Questions to Consultees

1151. The following questions are posed to consultees to help them frame and focus their response to the soils and land use scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the soils and land use impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the soils and land use 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?

8.6 Onshore Ecology, Ornithology and Nature Conservation

1152. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with onshore ecology, ornithology and nature conservation, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1153. The onshore ecology, ornithology and nature conservation assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **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;** and
- **Chapter 8.8 Onshore Noise and Vibration.**

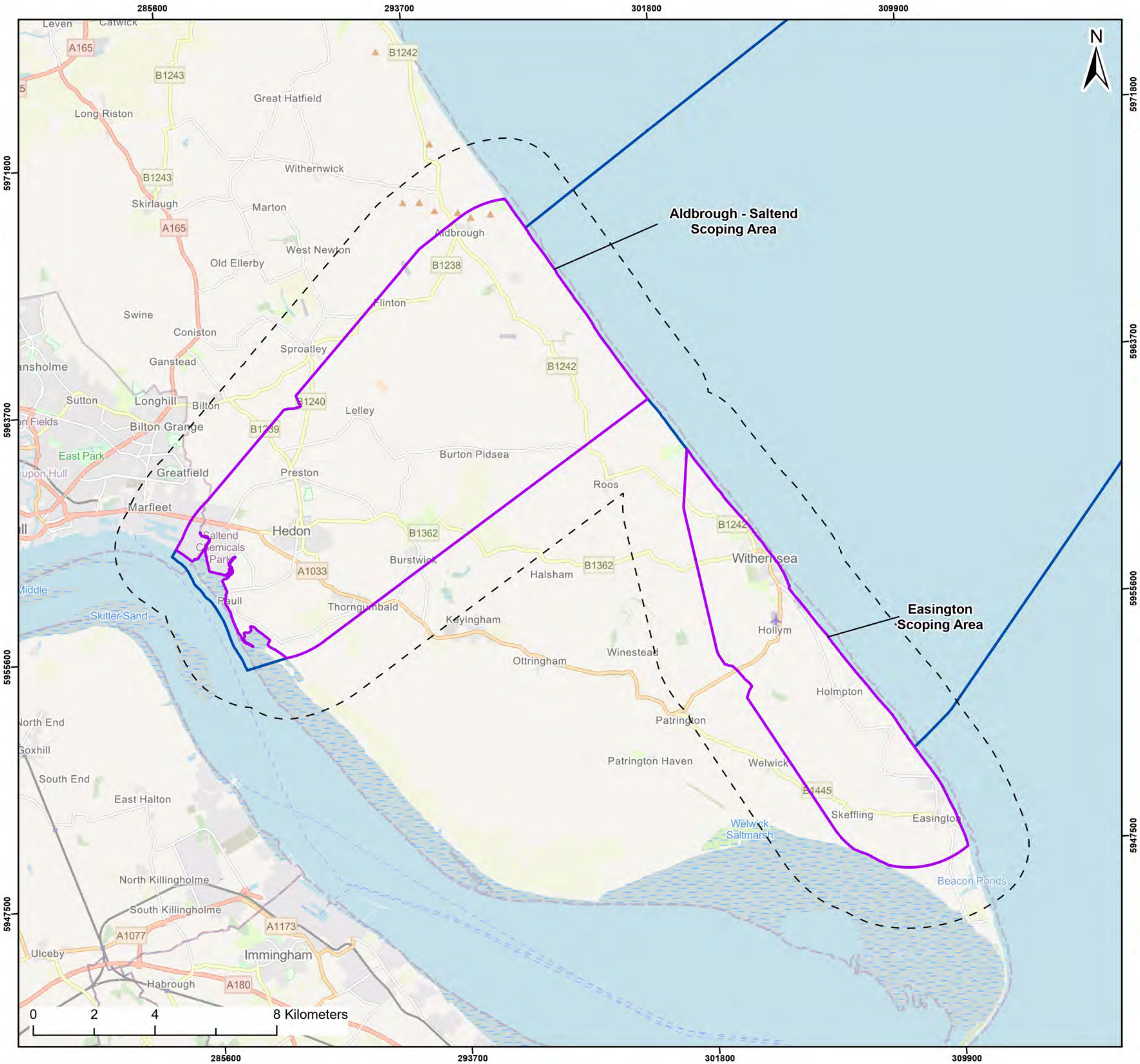
8.6.1 Study Area

1154. The Onshore Ecology, Ornithology and Nature Conservation Study Area (hereafter referred to as ‘the study area’) as presented on **Figure 8-16** is comprised of the Onshore Scoping Area extending seaward as far as Mean High Water Springs (MHWS) plus a 2km buffer. A 2km study area was chosen as effects in relation to onshore ecology and ornithology receptors from the construction and operation of the Project are unlikely to occur outside of this distance.

1155. The Onshore Scoping Area encompasses the area for the proposed onshore ECC, the HPF and any pipework connection to the wider distribution network or storage facility. It is spilt into two areas, the Aldbrough – Saltend Scoping Area and the Easington Scoping Area as presented on **Figure 1-1**.

8.6.2 Existing Environment

1156. The existing environment is predominately an agricultural landscape, comprising areas of arable and grazing pasture. There are hedgerows present between many of the fields, forming field boundaries and also linking small patches of woodland. Waterbodies, drains and ditches are located throughout the study area.



Legend:

- Offshore Study Area
- Onshore Study Area
- Ecology and Nature Conservation Study Area (Onshore Scoping Area 2km Buffer)

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Project:

Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:

Onshore Ecology, Ornithology and Nature Conservation Study Area

Figure: 8-16	Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0048				
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Co-ordinate system: British National Grid

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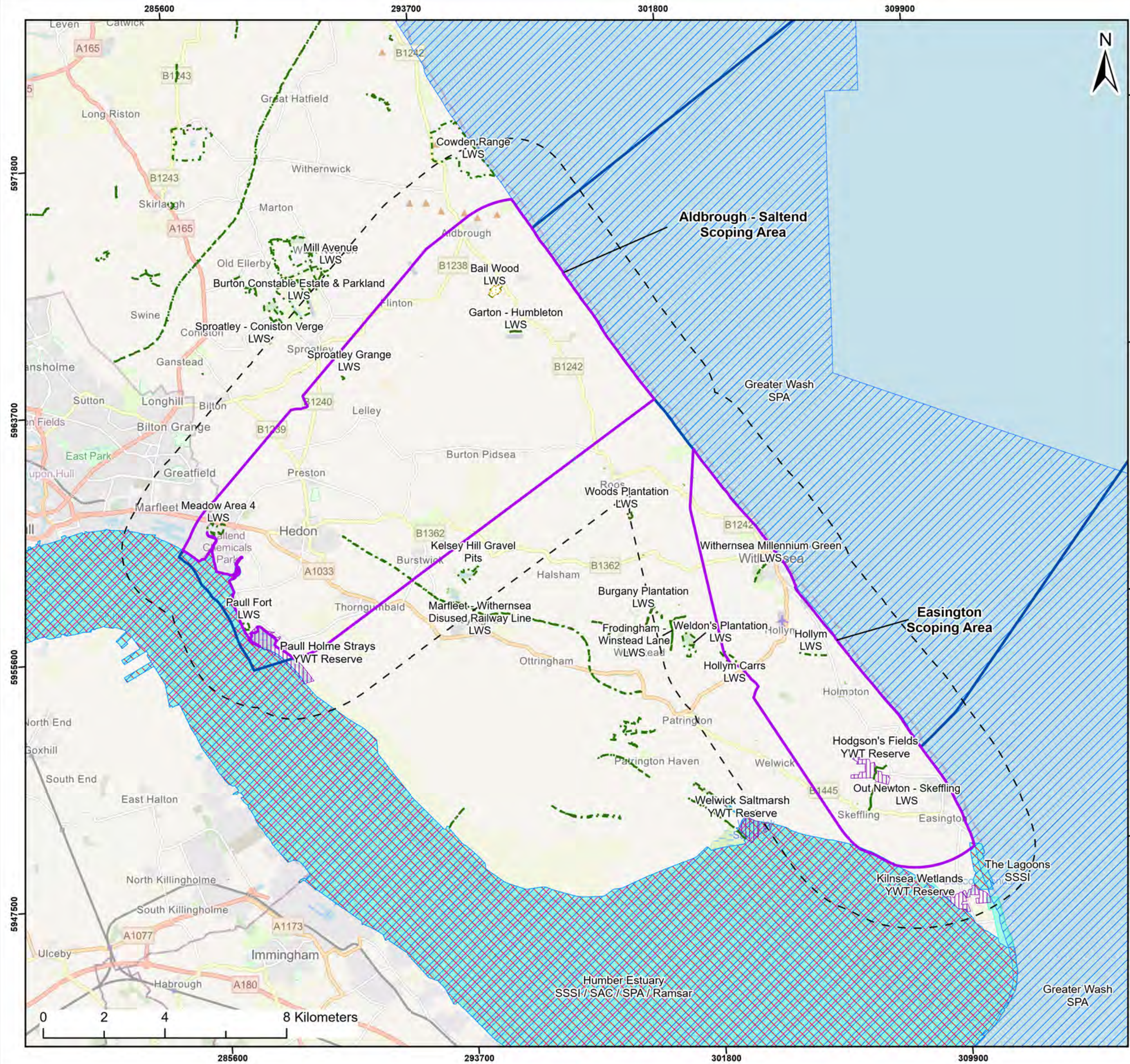

Legend:

- Offshore Study Area
- Onshore Study Area
- Ecology and Nature Conservation Study Area (Onshore Scoping Area 2km Buffer)
- Ancient Woodland
- Traditional Orchard
- Ramsar
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Yorkshire Wildlife Trust (YWT) Reserve
- Site of Special Scientific Interest (SSSI)
- Local Wildlife Sites (ENV4)

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Nature Conservation Areas

Figure: 8-17

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0049

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Co-ordinate system: British National Grid

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8.6.2.1 Designated Sites

1157. There are a total of 16 designated (statutory and non-statutory) sites located within the Onshore Scoping Area and a further 11 located within the 2km buffer (i.e. the study area). These are presented on **Figure 8-17. Table 8-14** provides a desciption of the designated site and their features of interset (where available). **Table 8-14** also identifies whether the designated site lies within the Onshore Scoping Area (and therfore direct impacts may occur) or within the study area (and therefore impacts are limited to indirect effects).

1158. Sites designated for marine or intertidal interest are excluded from this table. These are considered in **Chapter 7.4 Benthic and Intertidal Ecology** and **Chapter 7.7 Intertidal and Offshore Ornithology**. It should be noted that there are a number of Sites of Special Scientific Interest (SSSI) designated for geology with no biological features of interest. These are considered in **Chapter 8.2 Geology and Ground Conditions**.

Table 8-14 Designated Sites Within the Onshore Ecology, Ornithology and Nature Conservation Study Area

Site Name and Designation	Qualifying Features(s)	Distance from the Scoping Area Boundary
Humber Estuary Ramsar	Qualifies under the following criterion: Criterion 3: The dune slacks at Saltfleetby-Theddlethorpe on the southern extremity of the Ramsar site (over 20km south-west of the study area) are the most north-easterly breeding site in Great Britain of the natterjack toad Bufo calamita. Criterion 5: The site regularly supports waterfowl. The five-year peak mean in 1996 / 1997 to 2000 / 2001 was 153,934 waterfowl in non-breeding season. Criterion 6: • Eurasian golden plover *Pluvialis apricaria* • Red knot Calidris canutus • Dunlin Calidris alpina • Black-tailed godwit *Limosa limosa* • Bar-tailed godwit *Limosa lapponica* • Common redshank *Tringa totanus* • Common shelduck Tadorna tadorna	Located partially within the Aldbrough – Saltend Scoping Area and adjacent to the south boundary of the Easington Scoping Area.

Humber Estuary Special Protection Area (SPA)	Qualifies under Article 4.1 of the EU Birds Directive by supporting: During wintering season: • Avocet Recurvirostra avosetta • Bittern Botaurus stellaris • Hen harrier Circus cyaneus • Golden plover Pluvialis apricaria • Bar-tailed godwit During passage: • Ruff *Philomachus pugnax* During breeding: • Bittern • Marsh harrier *Circus aeruginosus* • Avocet • Little tern *Sterna albifrons* Qualifies under Article 4.2 of the EU birds directive by supporting: In wintering season: • Shelduck • Red knot • Dunlin • Black-tailed godwit • Redshank During passage: • Red knot • Dunlin • Black-tailed godwit • Redshank Qualifies under Article 4.2 of the EU birds directive as it is used regularly by over 20,000 waterbirds (waterbirds as defined by the Ramsar Convention) in any season. In the non-breeding season, the area regularly supports 153,934	Located partially within the Aldbrough – Saltend Scoping Area and adjacent to the south boundary of the Easington Scoping Area.

Site Name and Designation	Qualifying Features(s)	Distance from the Scoping Area Boundary
	individual waterbirds (five-year peak mean 1996 /1997 to 2000 / 2001).	
Humber Estuary SSSI	The Humber Estuary supports nationally important numbers of 22 wintering waterfowl and nine passage waders, and a nationally important assemblage of breeding birds of lowland open waters and their margins.	Located partially within the Aldbrough – Saltend Scoping Area and adjacent to the south boundary of the Easington Scoping Area.
Greater Wash SPA with marine components	Qualifies under Article 4.1 of the EU Birds Directive by supporting: • Red-throated diver *Gavia stellata* • Little gull Hydrocoloeus minutus • Sandwich tern Sterna sandvicensis • Common tern Sterna hirundo • Little tern Sternula albifrons Qualifies under Article 4.2 of the EU birds directive by supporting: • Common scoter Melanitta nigra	Located adjacent to the east boundaries of Aldbrough – Saltend Scoping Area and the Easington Scoping Area.
The Lagoons SSSI	This site supports a colony of over 1% of the British breeding population of little tern, The lagoons are utilised by a variety of waders on spring and autumn passage, and the area is a noted location for wintering coastal passerines such as shorelark and snow bunting.	Located partially within the Easington Scoping Area at the south-east boundary.
Bail Wood Local Wildlife Site (LWS)	Conserving and enhancing biodiversity	Located wholly within the Aldbrough – Saltend Scoping Area
Garton - Humbleton LWS	Conserving and enhancing biodiversity	Located wholly within the Aldbrough – Saltend Scoping Area
Spoatley Grange LWS	Conserving and enhancing biodiversity	Located wholly within the Aldbrough – Saltend Scoping Area
Meadow Area 4 LWS	Conserving and enhancing biodiversity	Located wholly within the Aldbrough – Saltend Scoping Area
Paull Fort LWS	Conserving and enhancing biodiversity	Located wholly within the Aldbrough – Saltend Scoping Area

Site Name and Designation	Qualifying Features(s)	Distance from the Scoping Area Boundary
Hodgson’s Fields Yorkshire Wildlife Trust (YWT) Reserve	This site encompasses 45ha area of rough grassland and scrub within the arable landscape.	Located wholly within the Easington Scoping Area
Withernsea Millenium Green LWS	Conserving and enhancing biodiversity	Located wholly within the Easington Scoping Area
Hollym LWS	Conserving and enhancing biodiversity	Located wholly within the Easington Scoping Area
Out Newton Skeffling LWS	Conserving and enhancing biodiversity	Located wholly within the Easington Scoping Area
Paull Holme Strays YWT Reserve	This site supports thousands of wintering wading birds as well as water vole and other wildlife.	Located partially within the Aldbrough – Saltend Scoping Area
Marfleet Withernsea Disused Railway Line LWS	Conserving and enhancing biodiversity	Located partially within the Aldbrough – Saltend Scoping Area
Hollym Carrs LWS	Conserving and enhancing biodiversity	Located partially within the Easington Scoping Area at the west boundary.
Cowden Range LWS	Conserving and enhancing biodiversity	Located partially within the study area, 0.8km to the west of the Aldbrough – Saltend Scoping Area
Kelsey Hill Gravel Pits LWS	Conserving and enhancing biodiversity	Within the study area, 1km to the east of the Aldbrough – Saltend Scoping Area
Mill Avenue LWS	Conserving and enhancing biodiversity	Within the study area, 1.7km to the west of the Aldbrough – Saltend Scoping Area.
Burton Constable Estate and Parkland LWS	Conserving and enhancing biodiversity	Within the study area, 1.9km to the west of the Aldbrough – Saltend Scoping Area.
Sproatley - Consiston Verge LWS	Conserving and enhancing biodiversity	Within the study area, 1.9km to the west of the Aldbrough – Saltend Scoping Area.

Site Name and Designation	Qualifying Features(s)	Distance from the Scoping Area Boundary
Kilnsea Wetlands YWT Reserve	This site provides refuge for passage and wintering roosting waders.	Within the study area, 0.8km to the south of the Easington Scoping Area
Frodringham Winstead Lane LWS	Conserving and enhancing biodiversity	Within the study area, 1km to the west of the Easington Scoping Area.
Welwick Saltmarsh YWT Reserve	This site supports birds including wintering raptors and owls.	Within the study area, 1.8km to the west of the Easington Scoping Area
Burgany Plantation LWS	Conserving and enhancing biodiversity	Within the study area, 1.8km to the west of the Easington Scoping Area.
Woods Planation LWS	Conserving and enhancing biodiversity	Within the study area, 1.9km to the west of the Easington Scoping Area.

8.6.2.2 Terrestrial Habitats

1159. UK Habitats of Principal Importance recorded within the study area include the following:

- Maritime cliff and slope;
- Coastal and floodplain grazing marsh;
- Good quality semi improved grassland;
- Lowland meadows;
- Reedbeds;
- Ancient woodland;
- Deciduous woodland;
- Traditional orchard;
- Wood-pasture; and
- Parkland

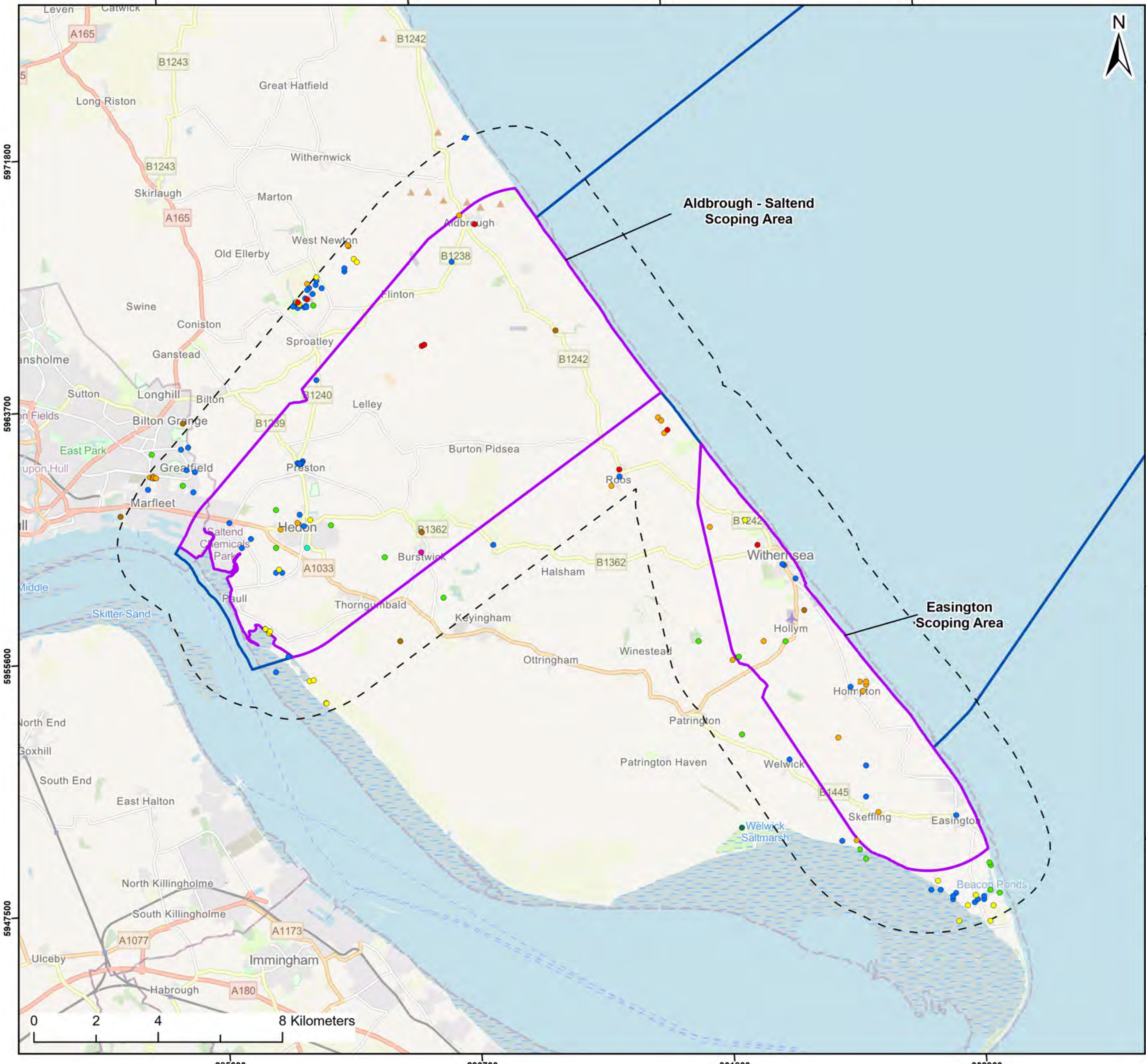
1160. Coastal saltmarsh and mudflats are also within the study area but are not considered within this chapter and are considered within **Chapter 7.4 Benthic and Intertidal Ecology**.

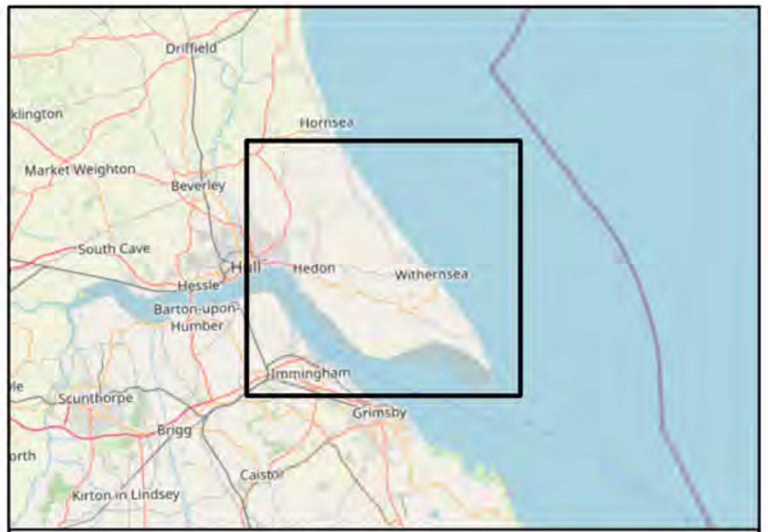
8.6.2.3 Protected, Notable and Non-Native Invasive Species

1161. The desk study review by North and East Yorkshire Ecological Data Centre (NEYEDC) on 6 February 2023, as presented in **Figure 8-18**, has identified the following protected and notable species, which may be present within the study area:

- Amphibians including great crested newt *Triturus cristatus*;
- Badger Meles meles;
- Bats;
- Birds (breeding and over-wintering);
- Terrestrial and aquatic invertebrates;
- Water vole Arvicola amphibius and otter Lutra lutra; and
- Reptiles.

1162. Invasive non-native species (INNS) have also been recorded within the Onshore Scoping Area, namely American mink *Neovison vison*, Japanese knotweed *Raynoutria japonica*, Canadian waterweed *Elodea canadensis*, Nuttall's waterweed *Elodea nuttallii*, curly waterweed *Lagarosiphon major*, Himalayan balsam *Impatiens glandulifera*, and Japanese rose *Rosa rugosa*.





Legend:

- Offshore Study Area
- Onshore Study Area
- Ecology and Nature Conservation Study Area (Onshore Scoping Area 2km Buffer)

Species Record

- Bat
- Fish
- Invasive Non-Native Species (INNS)
- Insect
- Other (plant)
- Reptile
- Amphibian
- Bird
- Terrestrial Mammal

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Biological Records Map

Figure: 8-18 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0050

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Co-ordinate system: British National Grid

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8.6.3 Potential Impacts

1163. Construction activities are anticipated to include, but are not limited to:

- Installation of temporary haul roads;
- Installation of temporary construction compounds;
- Onshore export cable routeing;
- Intrusive ground works including:
    - Open cut method for cable or duct installation;
    - Horizontal Directional Drilling (HDD) or similar trenchless techniques;
    - Piling; and
    - Construction of any long term above ground structures.
- Any other general construction activities, such as;
    - Plant movement;
    - Material laydown;
    - Marking and grading;
    - Reinstatement;
    - Material transport;
    - Plant operations (emissions, noise emissions, vibration);
    - Use of lighting / light emissions;
    - Water abstraction and water discharges; and
    - Waste storage.

1164. The anticipated construction programme is provided in **Chapter 3 Project Description,** with the Project anticipated to have an operational lifetime of 35 years.

8.6.3.1 Potential Impacts during Construction

8.6.3.1.1 Direct and Indirect Impacts to Designated Sites

1165. As presented in **Table 8-14**, the Humber Estuary SPA, Ramsar Site and SSSI are located partially within the Aldbrough – Saltend Scoping Area and adjacent to the south boundary of the Easington Scoping Area. The Greater Wash SPA is located on the east boundaries of both areas of the Onshore Scoping Area. The Lagoons SSSI is located partially within the Easington Scoping Area.

1166. There are six non-statutory designated sites within the Aldbrough – Saltend Scoping Area, two partially within the Onshore Scoping Area and a further five within the study area boundary.

1167. There are four non-statutory designated sites within Easington Scoping Area, one partially within the Onshore Scoping Area and a further five within the study area boundary.

1168. The onshore ECC refinement process will be planned to minimise impacts to statutory and non-statutory designated sites (wherever possible). Trenchless techniques (such as HDD methods) may also be used, where feasible, to avoid both long term and temporary impacts to any sites that could not be avoided. In the absence of detailed design, it is assumed that the following impacts to designated sites could occur during construction:

- Long term loss or damage of a habitat within the Onshore Scoping Area that is a feature of interest of a designated site;
- Long term loss or disturbance of species that are present and are a feature of interest of a designated site; and
- Long term loss or damage to a habitat that forms functionally linked land for the Humber Estuary SPA / Ramsar / SSSI or Greater Wash SPA qualifying bird species.

1169. Potential indirect impacts upon statutory and non-statutory designated sites within the study area during construction consist of the following:

- Temporary impacts from lighting, noise and dust may occur as part of the construction activities; and
- Impacts upon sites designated for habitats with hydrological components may occur if construction activities alter local drainage patterns.

1170. All potential direct and indirect impacts to designated sites during the construction phase will be assessed and are therefore scoped into the EIA.

8.6.3.1.2 Direct Impacts (Long Term and Temporary Loss and Fragmentation) to Habitats

1171. There is likely to be long term and / or temporary loss of habitats and biodiversity as a result of construction activities.

1172. The onshore ECC refinement process will be planned to minimise long term habitat loss and the avoidance of the most sensitive habitats (wherever possible). HDD methods may also be used, where feasible, to avoid both long term and temporary impacts to habitats. Where habitats are temporarily disturbed, they will be reinstated as soon as practicable.

1173. Any impacts upon Habitats of Principle Importance arising from all construction activities will be scoped into the EIA. This will include loss of habitats such as sections of hedgerows and other habitats that support protected and notable species.

8.6.3.1.3 Direct and Indirect (Noise, Emissions and Lighting) Impacts on Legally Protected Species

1174. There is a direct risk to species present within the area, including birds, during the construction phase through the possibility of increased mortality. The loss of biodiversity and habitats will also impact species' foraging opportunities.

1175. There are indirect risks to protected species where the proximity of construction footprints may lead to the disturbance and / or displacement of species through noise, lighting, vibration, fugitive dust, increased human presence, etc. There have not yet been species-specific surveys to determine presence or absence of protected species, therefore, at this stage all protected species are assumed to be present within the study area and scoped into EIA.

8.6.3.1.4 Spread of Invasive Non-Native Species

1176. The data search from the East Riding of Yorkshire Records Centre has identified the presence of INNS within both areas of the Onshore Scoping Area and the study area. The control (where required) of invasive species within the study area will be included in a project-specific Ecological Management Plan (EMP). The potential impact of invasive species has been scoped into the EIA.

8.6.3.2 Potential Impacts during Operation

8.6.3.2.1 Direct and Indirect Impacts to Designated Sites

1177. The long term above ground presence of the HPF has the potential for:

- Long term loss or damage of a habitat within the Onshore Scoping Area that is a feature of interest of a designated site;
- Long term loss or disturbance of species that are present and are a feature of interest

of a designated site; and

- Long term loss or damage to a habitats that forms functionally linked land for the Humber Estuary SPA / Ramsar / SSSI or Greater Wash SPA qualifying bird species.

1178. Areas above the buried cable systems would return to their previous land use and would not represent permanent loss or fragmentation of habitats.

1179. Potential indirect impacts upon statutory and non-statutory designated sites within the study area during construction consist of the following:

- Temporary impacts from lighting, noise and dust may occur as part of the construction activities; and
- Impacts upon sites designated for habitats with hydrological components may occur if construction activities alter local drainage patterns.

1180. All potential direct and indirect impacts to designated sites during the operation phase will be assessed and are therefore scoped into the EIA.

8.6.3.2.2 Long Term Loss and Fragmentation to Habitats

1181. The long term above ground presence of the HPF has the potential to lead to the long term loss of areas of ecological value or fragmentation of habitats depending on the preferred locations for development. Areas above the buried cable systems would return to their previous land use and would not represent long term loss or fragmentation of habitats. Any impacts upon Habitats of Principle Importance during the operation phase will be scoped into the EIA.

8.6.3.2.3 Indirect Impacts on Legally Protected Species from Noise

1182. Operational noise from the onshore components of the Project has the potential to indirectly disturb noise sensitive species, e.g. bats and birds.

1183. There are indirect risks to protected species where the proximity of operational facilities may lead to the disturbance and / or displacement of species through noise disturbance. There have not yet been species-specific surveys to determine presence or absence of protected species, therefore, at this stage all protected species are assumed to be present within the study area and scoped into the EIA.

8.6.3.2.4 Indirect Impacts on Legally Protected Species from Emissions to Air

1184. **Chapter 8.3 Onshore Air Quality and Dust** identifies that there will not be any impacts from emissions to air during the normal operation of the HPF, apart from when backup power is required in emergency situations and for periodic testing and maintenance. Given the potential for air quality impacts to occur, indirect effects from air quality changes on ecological receptors are scoped into the assessment, but this is likely to be restricted to the effects from the backup power.

1185. There are indirect risks to protected species where the proximity of operational facilities (including access roads for staff and supply chain movement) may lead to the disturbance and / or displacement of species through emissions to air. There have not yet been species-specific surveys to determine presence or absence of protected species, therefore, at this stage all protected species are assumed to be present within the study area and scoped into the EIA.

8.6.3.2.5 Indirect Impacts on Legally Protected Species from Light Disturbance

1186. During the operation phase of the Project, it is not yet known if there will be a need for continuous lighting on any boundary, fencing security, parking and the HPF, therefore, a precautionary approach must be taken. If there is the requirement for continuous lighting, there is the potential for disturbance impacts within the zone of influence, which is from the edge of the light spill plus a 50m buffer.

1187. The impacts of lighting may affect light sensitive species such as bats, terrestrial mammals, otter and invertebrates if present within the study area. There have not yet been species-specific surveys to determine presence or absence of protected species, therefore, at this stage all protected species are assumed to be present within the study area and scoped into the EIA.

8.6.3.2.6 Impacts from Ongoing Maintenance

1188. Maintenance and inspection of the onshore components of the Project will be required periodically throughout the operation phase. Where required, these are likely to be small-scale and localised, thus involving minimal disturbance to adjacent habitats and protected species.

1189. Periodic inspections as well as potential unplanned maintenance works may require access to buried cables. If this is required, it is likely that impacts on protected species and habitats will be similar to those during the construction phase with temporary loss and fragmentation of habitats and spread of non-native invasive species. The impacts are likely to be more localised, smaller scale and short term in nature during the operation phase than the construction phase. Potential impacts from ongoing maintenance are therefore scoped into the EIA.

8.6.3.3 Potential Impacts during Decommissioning

1190. 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.

1191. The same potential impacts identified for construction are therefore scoped in (and out) for decommissioning (as per **Table 8-15**)

8.6.4 Potential Cumulative Effects

1192. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect onshore ecology, ornithology and nature conservation receptors. Therefore, cumulative effects related to onshore ecology, ornithology and nature conservation are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1193. The Project could have additional impacts on onshore ecology, ornithology and nature conservation through interactions with other planned projects such as:

- Other offshore wind farm infrastructure;
- Other energy generation infrastructure;
- Building and / or housing developments;
- Installation or upgrades of roads;
- Installation or upgrade of cables and pipelines; and
- Coastal protection works.

1194. Other projects that may act cumulatively with the Project will be identified following a review of available information and as part of consultation for the EIA.

1195. The assessment will identify the potential for any significant effects to arise from any phase of the Project interacting cumulatively with other developments that are existing, consented or in the application stage of planning.

8.6.5 Summary of Scoping Proposals

1196. **Table 8-15** outlines the onshore ecology, ornithology and nature conservation 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 8-15 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Onshore Ecology, Ornithology and Nature Conservation

Potential Impact	Construction	Operation	Decommissioning
Direct and indirect impacts to designated sites	✓	✓	✓
Direct impacts to habitats (long term and temporary loss and fragmentation)	✓	✓	✓
Direct and indirect impacts on legally protected species (noise, emissions and lighting)	✓	✓	✓
Spread of INNS	✓	X	✓
Impacts from ongoing maintenance	X	✓	X
Cumulative impacts	✓	✓	✓

8.6.6 Approach to Data Gathering

1197. Detailed survey information is required to identify the potential effects on terrestrial ecology receptors within the areas identified for the onshore ECC, possible landfall locations and possible HPF sites. This information will be informed through a habitat and protected species walkover survey of these areas plus a 50m buffer for the Preliminary Ecological Appraisal (PEA) and a 250m buffer for great crested newts and birds, subject to when and access agreements are in place. These survey areas will be presented in the Preliminary Environmental Information Report (PEIR).

1198. The PEA survey will include mapping of habitats in UK Habitat Classification system methodology, condition assessment and identification of signs of or suitable habitats for UK protected species, following the UK Habitat Classification System survey (Butcher *et al.*, 2020; Chartered Institute of Ecology and Environmental Management (CIEEM), 2017).

1199. Habitat condition assessments will also be completed to inform any Biodiversity Net Gain (BNG) requirement, using the most up-to-date Biodiversity Metric published by Natural England.

1200. All proposed onshore ecology surveys will be undertaken within their optimal surveying windows, by suitably qualified ecologists, in accordance with industry accepted survey guidance. **Table 8-17** presents the surveys that will be carried out to inform the EIA.

1201. As part of the EIA process, the existing environment with respect to onshore ecology, ornithology and nature conservation will be described, including, but not limited to the Onshore Air Quality and Dust Study Area plus a 250m buffer. The assessment of air quality effects from the use of the backup generator at the HPF may indicate that additional surveys may be required, should the extent of emissions extend outside of the 250m buffer described above. Any air quality effects on ecological receptors will be reviewed based on the requirement for, and design of, any emissions infrastructure at the HPF and relevant receptors identified and described in relation to this potential impact on a wider basis.

1202. Identification of potential sensitive receptors will be undertaken using habitat, ecological surveys and further liaison with stakeholders through the EPP.

1203. **Table 8-16** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 8-16 Desk-Based Data Sources for Onshore Ecology, Ornithology and Nature Conservation

Data Source	Data Contents
Joint Nature Conservation Committee (JNCC) information sheets (https://jncc.gov.uk)	European designated sites (SPA, SAC, Ramsar sites)
JNCC Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk)	UK Habitats of Principal Importance
National Biodiversity Network (NBN) website (www.nbnatlas.org) North and East Yorkshire Ecological Data Centre	Protected and Notable species
NEYEDC	All species records, local and non-statutory sites data, habitat data, and statutory site data
Yorkshire Wildlife Trust (https://www.ywt.org.uk/)	Information on Yorkshire Wildlife Trust sites

1204. The following surveys are anticipated to be undertaken to inform the assessment. Surveys will be informed by the guidance outlined in the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland. **Table 8-17** outlines the proposed optimal baseline surveys to be carried out on relevant ecological receptors.

Table 8-17 Proposed Baseline Surveys for Onshore Ecology, Ornithology and Nature Conservation

Species	Optimal Survey Window	Spatial Coverage
Great crested newt surveys	Mid-April to June	A District Level Licencing (DLL) enquiry to Natural England will determine whether DLL or a traditional licencing route will be taken for great crested newts. Surveys (if required) will consist of Habitat Suitability Index (HSI) surveys of all waterbodies (ponds and watercourses) within a 250m buffer of the onshore ECC, possible landfall locations, possible HPF sites and haul roads followed by eDNA survey (if required) of all suitable waterbodies to determine the presence or likely absence of great crested newt.
Badger surveys	February to April, and September to November	If badger setts are identified within a 30m buffer of the onshore ECC, possible landfall locations, possible HPF sites and haul roads, badger activity surveys will be required to assess the activity status.
Bat activity surveys (foraging and commuting)	April to October	These surveys will consist of activity transect surveys of suitable commuting and foraging habitats within the onshore ECC, possible landfall locations, possible HPF sites and haul roads as well as within any areas of potential light spill from the HPF. Static bat detector monitoring will also be used.
Bat emergence / re-entry surveys (roosting)	May to September	Bat emergence / re-entry surveys will be completed on features (e.g. trees and structures) suitable for supporting roosting bats that may be impacted (i.e. removed, or very close to works) by the Project to assess for presence or likely absence of bat roosts.
Water vole surveys	April to September	The water vole surveys will cover suitable aquatic habitats within 250m of the onshore ECC, possible landfall locations, possible HPF sites and haul roads to assess for the presence or likely absence of water voles.
Otter surveys	Any time of year but optimal survey period in spring	The otter surveys will cover suitable aquatic habitats 250m of the onshore ECC, possible landfall locations, possible HPF sites and haul roads to assess the Project to assess for the presence or likely absence of otters.
Reptile surveys	April to June, and September	Reptile surveys will cover suitable habitats within the onshore ECC, possible landfall locations, possible HPF sites and haul roads that may support significant populations of reptiles and which may be impacted by the Project.
Breeding bird surveys	March to July	This survey will cover suitable habitats within 250m of the onshore ECC, possible landfall locations, possible HPF sites and haul roads that may be impacted by the Project and / or afforded protection for breeding birds.

Species	Optimal Survey Window	Spatial Coverage
Wintering bird surveys	October to March inclusive (Potentially also April, May, August and September if consultation with stakeholders identifies the needs for passage survey)	This survey will cover suitable habitats (including any functionally linked habitats) that may be impacted by the Project and / or afforded protection for over-wintering birds. Passage surveys may also be required between April and May, and August and September.
Invertebrate survey (terrestrial)	Mid-April to October	This survey will cover terrestrial habitats that may support rare or notable invertebrates within the onshore ECC, possible landfall locations, possible HPF sites and haul roads.
Invertebrate survey (aquatic)	July to September	This survey will cover aquatic habitats that may support rare or notable invertebrates within the onshore ECC, possible landfall locations, possible HPF sites and haul roads
Botanical surveys (such as National Vegetation Classification)	April to August (depending on habitat type)	These surveys will cover valuable habitats within the onshore ECC, possible landfall locations, possible HPF sites and haul roads

8.6.7 Approach to Assessment

1205. An Ecological Impact Assessment (EcIA) will be undertaken in accordance with the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (September 2018).

1206. The EcIA is undertaken to assess the ecological effects of a planned development while considering any possible avoidance, mitigation and enhancement measures. The factors that affect ecological impact will be assessed in terms of their extent and magnitude, duration and reversibility and the timing and frequency.

1207. The assessment will broadly include the following steps: scoping (including habitat and species surveys), value assessments, impact assessments, mitigation, compensation, enhancement and reporting. Any European Protected Species (EPS) licencing that is required is normally completed after consent is granted for the Project.

1208. Onshore ecology, ornithology and nature conservation 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.

8.6.8 Scoping Questions to Consultees

1209. The following questions are posed to consultees to help them frame and focus their response to the onshore ecology, ornithology and nature conservation scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the onshore ecology, ornithology and nature conservation impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the onshore ecology, ornithology and nature conservation 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?

8.7 Onshore Archaeology and Cultural Heritage

1210. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with onshore archaeology and cultural heritage, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1211. The onshore 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 Environmental Impact Assessment (EIA):

- **Chapter 7.11 Offshore Archaeology and Cultural Heritage;**
- **Chapter 8.4 Water Resources and Flood Risk;**
- **Chapter 8.8 Onshore Noise and Vibration;**
- **Chapter 8.9 Traffic and Transport;** and
- **Chapter 8.10 Landscape and Visual Impact.**

8.7.1 Study Area

1212. For the purpose of this Scoping Report, the initial heritage study areas used are simply the current extent of the Onshore Scoping Area.

1213. The Onshore Scoping Area is comprised of two areas, the Aldbrough – Saltend Scoping Area and the Easington Scoping Area (**Figure 1-1** and shown on **Figure 8-19**).

1214. As part of the EIA process the study areas for onshore archaeology and cultural heritage will be updated based on refinements to the Project, such as preferred options for the onshore ECC and the HPF. Once refined, the study areas for onshore archaeology and cultural heritage to be used in the EIA will be agreed with consultees and will be based on standard industry practices. These study areas are likely to include, but not be limited to the following:

- Known non-designated heritage assets within 500m of the Onshore Development Area;
- Potential for buried archaeological remains and previously unrecorded above ground heritage assets within 500m of the Onshore Development Area;
- Designated heritage assets within 1km of the Onshore Development Area and 5km of the refined substation and HPF area of search, to inform a setting assessment of heritage assets identified as potentially being affected by the Project through a change in their setting; and
- Designated heritage assets along the coast which could be affected by the presence of offshore infrastructure will be included in the assessment, identified through both

professional judgement and consideration of a Zone of Theoretical Visibility (ZTV) developed by Landscape and Visual Impact (LVIA) consultants.

1215. It should be noted that for the Designated Heritage Assets Study Area within the EIA the currently proposed 5km buffer around the refined HPF may incorporate many designated assets within the urban area of Hull where no visibility / change to setting would occur. Should this be the case the Designated Heritage Assets Study Area will be refined accordingly to only include areas where there exists some potential for changes to setting of assets within 5km. As such, a refined Designated Heritage Assets Study Area will be agreed through the Evidence Plan Process (EPP) with the relevant Historic Environment Services, pending any refinement of the proposed location of the substations or HPF.

8.7.2 Existing Environment

1216. The region has a rich and varied history of archaeological and geological interest, providing local distinctiveness and contributing to the area's character, culture and economy (East Riding of Yorkshire Council, 2005). The navigable rivers, fertile floodplains, secure hill-tops and mineral resources and have all contributed to the region's historic environment (Government Office for Yorkshire and The Humber, 2008).

1217. The earliest evidence of human occupation on the Holderness plain can traced to the Neolithic. At this time the area would likely have consisted of lakes, marshes, islands and woodland. The rising sea levels of the Bronze Age would likely have enabled the use of waterways as a communication link as far as the Pennines and via the Trent to the Midlands. Early drainage of this area occurred in medieval times and continued until the mid-18th century (Natural England, 2015).

1218. Fertile soils from glacial deposits and progressive vegetation clearance have resulted in much of the Holderness area now being under the plough. Grassland is confined largely to the wetter more poorly drained areas and woodland occurring in small plantations (East Riding of Yorkshire, 2018). These low-lying parts of the East Riding have a considerable palaeoenvironmental resource, and the study of the wetland deposits such as the peats, silts and clays can provide important information on past environments and climatic conditions.

1219. There are a number of scheduled monuments within both the Aldbrough – Saltend Scoping Area and the Easington Scoping Area, several of which date back to the medieval period. Evidence of prehistoric and Romano-British settlement can be seen through cropmark and earthwork evidence from aerial photographs (East Riding of Yorkshire Council, 2018).

1220. Settlement is generally concentrated on the high areas of hills and ridges and comprises larger villages, which tend to be nucleated, and smaller villages, more linear in form. The number of Conservation Areas and Listed Buildings in this part of Holderness is a testament to the quality and character of the built heritage.

8.7.2.1 The Aldbrough – Saltend Scoping Area

1221. The Aldbrough – Saltend Scoping Area (**Figure 8-19**) is one of the two areas of the Onshore Scoping Area, consisting of land located between Aldbrough and Saltend, where the onshore infrastructure may be located. The Aldbrough – Saltend Scoping Area covers an area of approximately 10,982 hectares (ha) from the Holderness Coast in the north-east to the Humber Estuary in the south-west.

1222. A search of designated heritage assets from the National Heritage List of England (NHLE) has been carried out for all designated heritage assets within the Aldbrough – Saltend Scoping Area. As shown on **Figure 8-19**, within the Aldbrough – Saltend Scoping Area there are:

- Eight Scheduled Monuments: Burstwick Castle (List Number : 1003467), Hedon medieval town, (List Number 1003779), Shaw Fosse moated site (List Number 1007847), Paull Holme moated site and tower (List Number 1007875), Moated site at North Park Farm (List Number 1008047), Ravenspurn cross, (List Number 1015313), Paull Point Battery, coastal artillery battery and Submarine Mining Establishment (List Number 1020425) and Two moated sites and associated features 520m north of Grimston Garth (List Number 1021241);
- 157 Listed Buildings comprising, 9 Grade I Listed Buildings, 9 Grade II* Listed Buildings and 139 Grade II Listed Buildings; and
- Eight Conservation Areas, including key historic towns such as Hedon, Burton Pidsea and Aldbrough.

1223. Given the largely rural, agricultural nature of the Onshore Scoping Area, it is anticipated there will be a high potential for previously unrecorded buried archaeological remains dating from the prehistoric to modern periods.

1224. Due to the current size of the Onshore Scoping Area, data for non-designated heritage assets from the Humber Historic Environment Record (HER) has not been acquired at this stage. The Humber HER data will be acquired to inform the subsequent EIA process.

8.7.2.2 The Easington Scoping Area

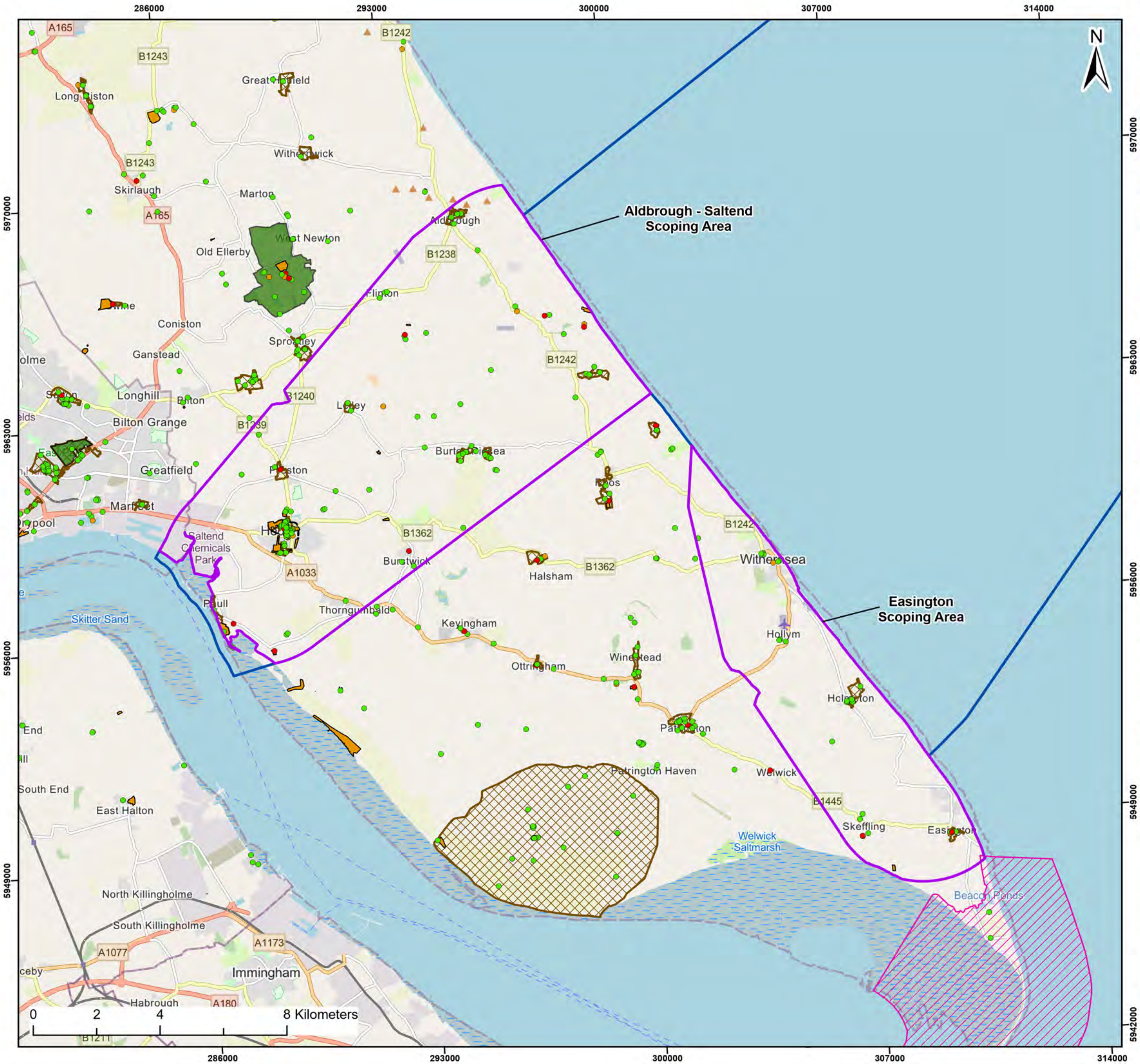
1225. The Easington Scoping Area is one of the two areas of the Onshore Scoping Area, consisting of land in the vicinity of Easington, where the onshore infrastructure may be located. The Easington Scoping Area covers an area of 4,397ha from Withernsea in the north to Kinsea in the south.

1226. A search of designated heritage assets from the NHLE has been carried out for all designated heritage assets within the Easington Scoping Area. As shown on **Figure 8-19**, within the Easington Scoping Area there are:

- Two Scheduled Monuments: Tithe barn (List Number 1003470); and moated monastic grange 300m south west of Winsetts Farm (List Number 1015309);

- 26 Listed Buildings comprising two Grade I Listed Buildings, two Grade II* Listed Buildings and 22 Grade II Listed Buildings;
- Two Conservation Areas, Eastingon and Holmpton; and
- The Spurn Heritage Coast.

1227. Due to the current size of the Onshore Scoping Area, data for non-designated heritage assets from the Humber Historic Environment Record (Humber HER) has not been acquired at this stage. The Humber HER data will be acquired to inform the subsequent EIA process (see **Chapter 5 EIA Methodology**).



Legend:

- Offshore Scoping Area
- Onshore Scoping Area
- Conservation Area
- Heritage Coast
- Registered Park & Garden
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

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Project:	
Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM

Title:

Designated Onshore Cultural Heritage Assets

Figure:	8-19	Drawing No:	PC3991-RHD-OF-ZZ-DR-Z-0051		
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Co-ordinate system: British National Grid

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8.7.3 Potential Impacts

1228. Potential impacts to heritage assets include both direct and indirect impacts, as well as changes in the setting of heritage assets which could affect heritage significance.

1229. A direct physical impact is one in which construction works involved with the Project (e.g. excavations, and groundworks) result in a direct physical change to the fabric of a heritage asset (e.g. partial or complete removal). Direct impacts also include hydrological changes which may cause desiccation and drying out of any wetland deposits and associated preserved waterlogged archaeological / geoarchaeological remains. Similarly, should an area become inundated, as a result of the Project, this too can impact heritage assets.

1230. An indirect physical impact is one that results from the Project but is not caused by direct (planned) intervention from the Project's construction (e.g. vibration from groundworks / construction traffic affecting the fabric of a heritage asset or changes in ground conditions resulting in an effect on preservation conditions beyond the Project's parameters). Impacts to the significance of a heritage asset may also occur if a development changes the surroundings in which a heritage asset is located, experienced, and appreciated (i.e. its setting). Similarly, historic character may also be affected if the Project results in a change to the prevailing landscape character of the area.

8.7.3.1 Potential Impacts during Construction

1231. Due to the current size of the Onshore Scoping Area, at this stage a general assessment of potential impacts associated with the onshore elements of the construction phase on specific sensitive receptors is presented below.

1232. Construction activities which could affect the onshore archaeology and cultural heritage resource include:

- Any intrusive groundworks, including trenchless cable installation, piling, draining, and open cut trench excavation;
- Construction of any temporary works areas or long term above ground infrastructure such as for the HPF and any pipework connection to the wider distribution network or storage facility; and
- General construction activities such as plant movement or increased traffic movements.

1233. The potential impacts during construction that will be assessed and are therefore scoped into the EIA include:

- Direct, physical impacts to designated heritage assets;
- Direct, physical impacts to known and unknown non-designated heritage assets;

- Indirect, physical impacts to designated heritage assets;
- Indirect, physical impacts to non-designated heritage assets;
- Change to the setting of designated heritage assets, which could affect their heritage significance; and
- Change to the setting of non-designated heritage assets, which could affect their heritage significance.

1234. Changes in setting due to construction activities will be temporary and of sufficiently short duration that they would not give rise to significant impacts to the setting of historic landscapes, which could affect their heritage significance, and as such, impacts upon the setting of such assets during the construction phase have therefore been scoped out of the EIA. However, impacts for the operation phase of the Project will be assessed.

8.7.3.2 Potential Impacts during Operation

1235. Where the Project's onshore infrastructure is buried sub-surface (i.e. infrastructure associated with the buried cable systems), there will be limited potential for further direct impacts to the onshore archaeology and cultural heritage resource during the operation phase. Direct physical impacts to heritage assets are therefore scoped out of the EIA.

1236. Activity which could have an ongoing impact to onshore archaeology and cultural heritage includes the presence of the HPF (including option for cooling tower and associated visible plume) and any pipework connections to the wider distribution network or storage facility. Any long term above ground infrastructure has the potential to result in a change to the setting of heritage assets, which could affect heritage significance.

1237. Impacts could arise from the visual intrusion of the Project's onshore infrastructure, which would change views towards and away from heritage assets (in particular the HPF and the associated option for a cooling tower and visible plume). Impacts could also occur from a perceptible change in noise and lighting, which would change the way heritage assets are experienced. The impacts could be both adverse and beneficial, depending on the heritage asset, its location, the contribution of the setting to the value of the asset. There is a potential, therefore, for the operation of the Project to result in a significant effect (both adverse and beneficial).

1238. The potential impacts during operation that will be assessed and are therefore scoped into the EIA include:

- Change to the setting of designated heritage assets, which could affect their heritage significance;
- Change to the setting of non-designated heritage assets, which could affect their heritage significance; and
- Change to the setting of historic landscapes, which could affect their heritage significance.

1239. As all indirect physical impacts will be associated with construction works (as described above (see **Section 8.7.3.1**), it is proposed that indirect, physical, impacts to designated and non-designated heritage assets during operation are scoped out of the EIA.

8.7.3.3 Potential Impacts during Decommissioning

1240. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

1241. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 8-18**).

8.7.4 Potential Cumulative Effects

1242. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect onshore archaeology and cultural heritage receptors. Therefore, cumulative effects related to onshore archaeology and cultural heritage are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1243. The Project could interact cumulatively with other projects, which also have the potential for impacts associated with the onshore archaeology and cultural heritage resource. These cumulative impacts are considered primarily as:

- Direct, physical impact to the archaeological resource of the immediate and wider area / region; and
- Change in the setting of designated and / or non-designated heritage assets which could affect their heritage significance.

1244. Where these impacts occur because of the Project, in combination with other developments within the area with similar associated impacts, there is the potential for the impacts to be of greater significance than when assessed individually. It is therefore proposed that cumulative effects on heritage assets are scoped into the EIA.

8.7.5 Summary of Scoping Proposals

1245. **Table 8-18** outlines the onshore 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.

Table 8-18 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Archaeology and Cultural Heritage

Potential Impact	Construction	Operation	Decommissioning
Direct, physical, impacts, to designated heritage assets	✓	X	✓
Direct, physical, impacts to known and unknown non-designated heritage assets	✓	X	✓
Indirect, physical, impacts to designated heritage assets.	✓	X	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	X	✓
Changes to the setting of designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Changes to the setting of non-designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to the setting of historic landscapes, which could affect their heritage significance.	X	✓	X
Cumulative impacts	✓	✓	✓

8.7.6 Approach to Data Gathering

1246. The data sources that will be accessed to characterise the existing historic environment with respect to onshore archaeology and cultural heritage presented in **Table 8-19**.

Table 8-19 Desk-Based Data Sources for Onshore Archaeology and Cultural Heritage

Data Source	Data Contents
British Geological Survey (BGS)	Historic borehole logs and the wider geological background for the region.
NHLE	Data on all designated heritage assets within England, maintained by Historic England. GIS data for all Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Humber HER	Contains data on all recorded non-designated heritage assets. The data includes archaeological, historic landscape character and historic building

Data Source	Data Contents
	information. Information on previous events (archaeological surveys and investigations) will also be obtained.
National Mapping Project (NMP) data maintained by Historic England	NMP data forms a national dataset of potential archaeological sites and landscapes discovered by aerial photographs. The Humber HER hold limited NMP data and have advised the remaining data is acquired from Historic England, who hold the full dataset.
Heritage records maintained by Historic England	Other records maintained by Historic England containing information derived from the former National Buildings Record and National Archaeological Record.
East Riding of Yorkshire Council [Heritage] Conservation Areas	Conservation Areas within the East Riding of Yorkshire
ZTV Model	Any ZTV produced by the LVIA team will be assessed to help inform settings assessment. Heritage specific viewpoints and subsequent photomontages will also be requested and coordinated through the LVIA team, as the settings assessment progresses.
Existing archaeological studies and published sources	Background information on the archaeology of the area, including the results of previous archaeological assessments, evaluation and investigations, where available.
Humber HER, Historic England Archive, other regional and local records offices.	Aerial Photographs, LiDAR data and historic maps to assist in the detection and assessment of archaeological remains.

1247. **Table 8-20** presents the surveys that will be undertaken in 2023 and 2024 to inform the assessment in accordance with industry guidelines and agreed in advance with the relevant historic environment stakeholders.

Table 8-20 Proposed Baseline Surveys for Onshore Archaeology and Cultural Heritage

Survey	Timing	Spatial Coverage
Walkover Survey	To support the Preliminary Environmental Information Report (PEIR)	Targeted areas identified through desk-based baseline collation will be visited to identify current land use and any potential unrecorded non-designated heritage assets, as well as ground truthing of certain designated and non-designated assets.
Setting Assessment Site Visits	To support PEIR	Heritage assets identified as potentially being affected by the Project (through a change in their setting impacting heritage significance) will be visited to inform the setting assessment.
Priority (then further / full) Geophysical Survey	To support PEIR	Priority (PEIR) then full (or as close to full as possible) coverage in the Environmental Statement (ES) - Initially targeted / prioritised areas for geophysical survey, identified

Survey	Timing	Spatial Coverage
		through desk-based baseline collation and assessment activity, e.g. Aerial photographic and LiDAR analysis. These are to include sample areas of seemingly 'blank' land, if / where no features were identified in the desk-based assessment. Techniques proposed for this survey include magnetometry, and any other techniques deemed as required (appropriate and proportionate) following the findings of the desk-based assessment. As far as possible full coverage geophysics should then be captured for the ES / Development Consent Order (DCO) application stage.
Geoarchaeological desk-based assessment	To support PEIR	Based on the refined onshore development area. Will determine the scope of any required bespoke approaches to onsite monitoring of engineering-led site investigation (SI) / ground investigation (GI) work and whether any further bespoke approaches would be required.
Archaeological and Geoarchaeological elements to any engineering-led SI / GI work	To support PEIR / ES if required (based on initial baseline surveys and geoarchaeological desk-based assessment)	Bespoke approaches, including the possibility of onsite monitoring and watching brief associated with any engineering-led SI / GI work or equivalent, if / when applicable e.g. test pits, boreholes, etc.
Targeted Trial Trenching (where land access available under the terms of licence agreements pre-application)	To support PEIR / ES if required (based on initial baseline surveys and geoarchaeological desk-based assessment)	Targeted locations to be informed by desk-based approaches and priority geophysical survey. Generally carried out to inform ES stage, if / where land access is achievable, we would look to undertake an initial programme pre-application (e.g. targeting areas of likely archaeology and project-related pinch-points)

1248. Following these initial baseline surveys, the requirement for initial targeted archaeological evaluation (e.g. trial trenching) will be considered and discussed with stakeholders as part of the EPP. If targeted trial trenching is required it will be undertaken at areas where the baseline surveys and geophysical surveys have identified a high potential for buried archaeological remains to be present, and / or at key areas of onshore project infrastructure such as HPF and landfall and / or at other project-related pinch-points.

8.7.7 Approach to Assessment

1249. Assessment of the onshore archaeology and cultural heritage resource will be an iterative and ongoing process that will be combined with ongoing site selection work to refine the Project's onshore ECC and HPF locations.

1250. The impact assessment upon the onshore archaeology and cultural heritage resource will follow a heritage significance-based approach to historic environment decision-making.

1251. A commercial search of the Humber HER will be undertaken once the Onshore Scoping Area has been further refined. The data will also form the basis of the PEIR / ES non-designated baseline data set. Further research will also be undertaken to inform the baseline data, including assessment of archaeological archive reports, published archaeological articles, monographs and other sources.

1252. Once refined, the study areas for onshore archaeology and cultural heritage to be used in the EIA, will be agreed with consultees and based on standard industry practices. These study areas are likely to include, but not be limited to the following:

- Designated heritage assets within 1km of the onshore ECC and 5km of the HPF;
- A setting assessment of heritage assets identified as potentially being affected by the Project through changes to their setting; and
- Known non-designated heritage assets within 500m of the onshore ECC and the HPF.

1253. Identification of heritage assets potentially affected by the Project will be undertaken through spatial analysis of the heritage data within a Geographic Information Systems (GIS) framework.

1254. Initial consideration of the setting of heritage assets and any potential for impact upon heritage significance will be undertaken as part of the setting assessment. This will be informed by walkover surveys and site visits. A full consideration of, and conclusions regarding, setting impacts will be made in the final ES following finalisation of the Project's design.

1255. Identification of any areas which will potentially be subject to intrusive archaeological evaluation as part of the EIA process, would be decided through consideration of the baseline data and non-intrusive surveys and would be discussed and agreed in consultation with the East Riding of Yorkshire Council and Humber Archaeological Partnership as part of the EPP.

1256. The EIA will be undertaken with reference to and / or in accordance with the following primary legislation, policy, standards and guidance:

- Ancient Monuments and Archaeological Areas Act 1979. (c.46);
- Planning (Listed Buildings and Conservations Areas) Act (1990). (c.9);
- Overarching National Policy Statement (NPS) for Energy (EN-1);
- NPS for Renewable Energy Infrastructure (EN-3).
- National Planning Policy Statement (NPPF), Section 16: conserving and enhancing the historic environment (Ministry of Housing, Communities and Local Government (MHCLG), 2021);
- Planning Practice Guidance (PPG): Historic Environment (MHCLG, 2019);

- The Historic Environment in Local Plans: Historic Environment Good Practice Advice in Planning 1 (Historic England, 2015a);
- Managing Significance in Decision-Taking in the Historic Environment:
- Historic Environment Good Practice Advice in Planning 2 (Historic England, 2015b);
- The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning 3 (Historic England, 2017);
- Standard and guidance for historic environment desk-based assessment (CIfA 2020); Code of Conduct (Chartered Institute for Archaeologists (CIfA), 2022); and
- Principles of Cultural Heritage Impact Assessment in the UK (Institute of Environmental Management and Assessment (IEMA), Institute of Historic Building Conservation (IHBC) and CIfA, 2021).

1257. The assessment will be supported by a series of related technical reports, annexes and appendices. As a minimum these will include an onshore Archaeological Desk-Based Assessment (ADBA), undertaken to identify the currently recorded designated and non-designated heritage assets within defined study areas.

1258. The ADBA will include assessment of aerial photography, LiDAR analysis and review of cartographic sources. This will include a historic map regression exercise of the onshore project area and / or targeted parts of the landfalls, onshore ECC, HPF and any pipework connection to the wider distribution network or storage facility.

1259. The map regression exercise will be undertaken to identify changes in land use throughout history and will provide further information on potential heritage assets.

1260. Other technical reports to be produced which will inform the baseline environment and ultimately inform assessment (see **Table 8-20**), are:

- Priority (then full / further) geophysical survey;
- Initial targeted intrusive evaluation (trial trenching), if required, relevant and undertaken pre-application. This will be confirmed through progression of the iterative approach to survey work and ongoing consultation with the Humber Archaeology Partnership); and
- Any archaeological and geoarchaeological approaches to be applied to engineering-led ground/site investigation, if / when applicable and undertaken (to be determined by the geoarchaeological desk-based assessment) (e.g. monitoring and / or watching briefs).

1261. An initial settings assessment will also be undertaken as part of the ADBA, which will identify heritage assets and their associated heritage significance which could be affected by change in setting due to the Project. This will follow the Historic England five-step approach (Historic England, 2017).

1262. Technical consultation with Historic England and Humber Archaeology Partnership 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.

8.7.8 Scoping Questions to Consultees

1263. The following questions are posed to consultees to help them frame and focus their response to the onshore 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 onshore archaeology and cultural heritage impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the onshore 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?

8.8 Onshore Noise and Vibration

1264. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with onshore noise and vibration, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1265. The onshore noise and vibration assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation;**
- **Chapter 8.9 Traffic and Transport;** and
- **Chapter 9.2 Human Health.**

8.8.1 Study Area

1266. This section sets out how the Onshore Noise and Vibration Study Areas (hereafter referred to as ‘the study areas’) will be defined for the consideration of potential noise and vibration effects in the EIA (notably at the Preliminary Environmental Information Report (PEIR) stage). The study areas at the scoping stage have been based on the Onshore Scoping Area, as shown **Figure 1-1** and defined in **Chapter 112 Introduction**), and the nearby noise and vibration sensitive receptors (NVSR) up to a maximum distance as specified below.

1267. A list of potential NSVR types which will be considered in the noise and vibration assessment is provided in **Table 8-21**. The receptors are classified according to their sensitivity, using professional judgement based on the potential for noise and vibration level changes to cause significant disruption.

Table 8-21 Definition of the Different Noise and Vibration Sensitive Receptor Types and Sensitivity Levels

Sensitivity	Definition	Definitions and Classification Type
Very high	Receptors where noise or vibration level changes may significantly affect their usage.	Certain hospital wards (e.g. operating theatres or high dependency units), auditoria, laboratories with highly vibration sensitive equipment or buildings which are structurally unsound or identified as requiring special protection by cultural specialists (e.g. some historical / listed buildings or scheduled monuments).
High	Receptors where noise and / or vibration level changes may cause disturbance, protection is required but some tolerance is expected.	Residential accommodation, private gardens, hospital wards, care homes, schools, universities, research facilities and national parks (during the day).

Sensitivity	Definition	Definitions and Classification Type
Medium	Receptors where noise and / or vibration level changes may cause some distraction or disturbance.	Offices, shops (including cafes), outdoor amenity areas during the day (including recreation, public amenity space / play areas), long distance footpaths (including Public Rights of Way (PRoW), dog walking routes, bird watching areas, footpaths and other walking routes, visitor attractions, cycling routes including rural roads), doctor's surgeries, sports facilities and places of worship.
Low	Receptors where noise and / or vibration level changes are not expected to be detrimental.	Warehouses, light industry, car parks, and agricultural land.

1268. The Project may result in noise and vibration effects at ecological receptors. These aspects are considered in **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation**.

1269. The study areas will extend from the Onshore Development Area to the closest NVSRs within the following distances:

- Construction Noise Study Area – in accordance with the guidance in the Design Manual for Roads and Bridges (DMRB) LA111 Noise and Vibration Rev 2 (2020), construction noise impacts would only be assessed at NVSRs which are no further than 300m from the Onshore Development Area;

- Construction Vibration Study Area – in accordance with the DMRB LA111, construction vibration impacts would only be assessed at NVSRs which are no further than 100m from the Onshore Development Area;

- Blasting Vibration Study Area – blasting vibration impacts would only be assessed at NVSRs which are no further than 1km from the Onshore Development Area;

- Operation Noise Study Area - to ensure potential operational noise impacts are assessed, the proposed HPF has been assumed to have the potential to emit audible levels of operational noise. There is no applicable guidance on an appropriate study area for the assessment of operational noise impacts. This depends on the sound emission levels from the HPF, which are not known at this stage. A sufficient Operation Noise Study Area to capture all NVSRs with the potential to experience significant effects will be determined and consultation undertaken with relevant stakeholders once plant sound emissions data are available; and

- Onshore Traffic Noise Study Area – defined in relation to the assessment of impacts due to changes in road traffic noise levels. In accordance with the DMRB, it incorporates the closest NVSRs (which are no more than 50m away) to the roads on which the Project traffic is anticipated to result in noise level changes of at least 1 A-weighted decibel (dB(A)). These road links will be identified once the required traffic data are available.

1270. **Figure 8-20** shows the maximum potential size of the Construction Noise and Construction Vibration Study Areas, assuming that the onshore development is at the outer edge of the Onshore Scoping Area. These study areas will be refined for the PEIR using the available information on the locations of the onshore development.

8.8.2 Existing Environment

1271. This section provides a summary of baseline conditions in respect of noise and vibration. At this stage in the EIA process, it was not deemed necessary to identify NVSRs in the study areas, this will be done as part of the assessment provided in the PEIR.

1272. The Construction Noise Study Area has been reviewed and the following has been identified:

- Potential sources of elevated baseline noise levels;
- Road traffic Noise Important Areas (NIA) - locations where the highest 1% of road traffic noise levels have been predicted, according to the Round 3 strategic noise mapping undertaken by the Department for Environment, Food and Rural Affairs (Defra) as part of its obligations under the Environmental Noise Directive (END) (2002/49/EC) (European Parliament, 2002), implemented in England by the Environmental Noise (England) Regulations 2006 (as amended) (UK Government, 2010); and
- Areas prized for their recreational and amenity value due to tranquillity, and therefore considered to require protection from noise impacts, in accordance with the National Planning Policy Framework (NPPF) Section 15, Paragraph 185 aim (b) '*identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*'.

1273. The Construction Noise Study Area includes locations in the administrative areas of East Riding of Yorkshire Council and Hull City Council.

1274. The Construction Noise Study Area is predominantly rural, comprising largely of arable agricultural land in active use, where ambient noise levels are expected to be low.

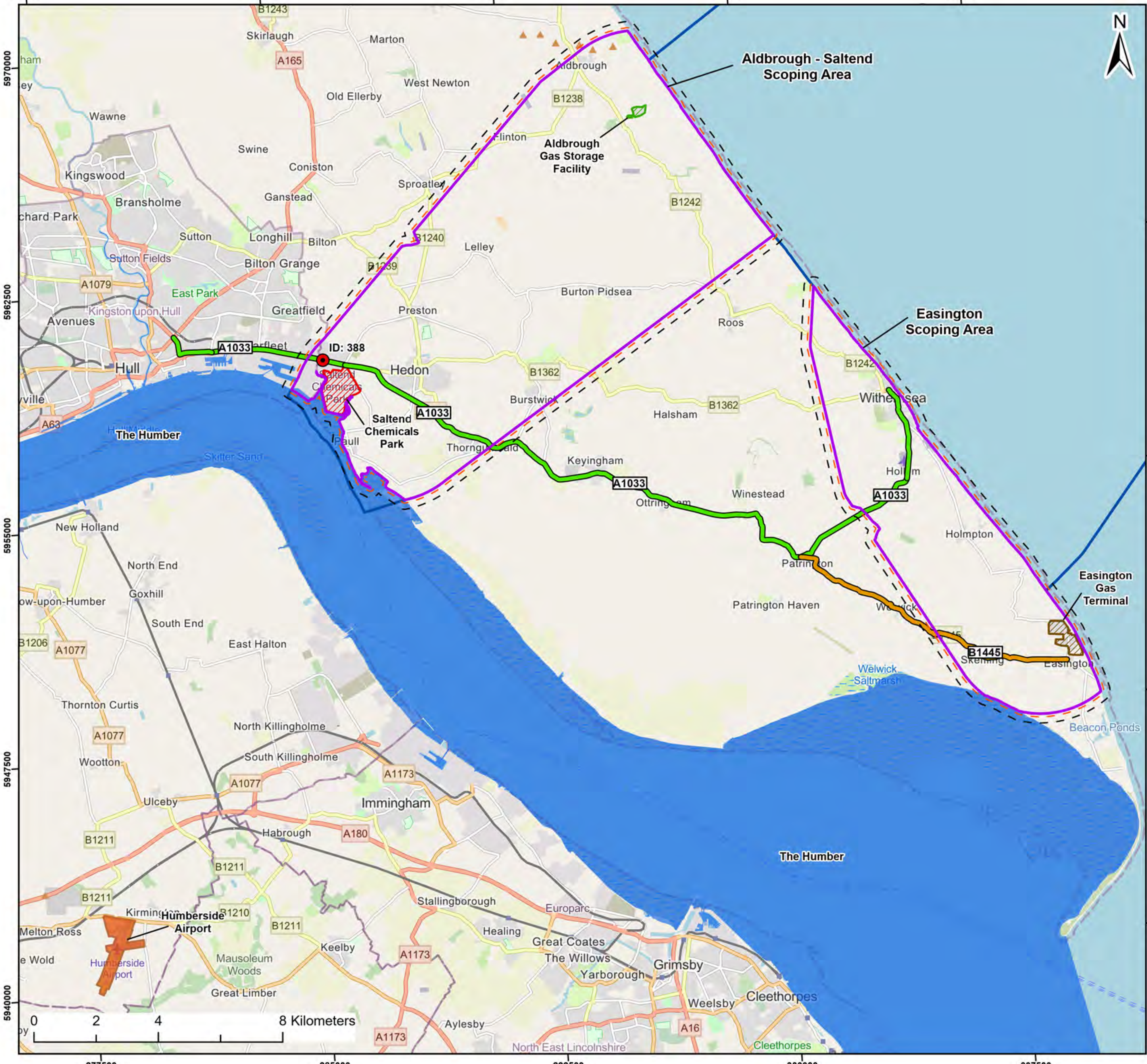
1275. Based on a review of publicly available satellite imagery for the Construction Noise Study Area, there is the potential for baseline noise levels to be elevated in proximity to the following identified sound sources, as shown in **Figure 8-20.**

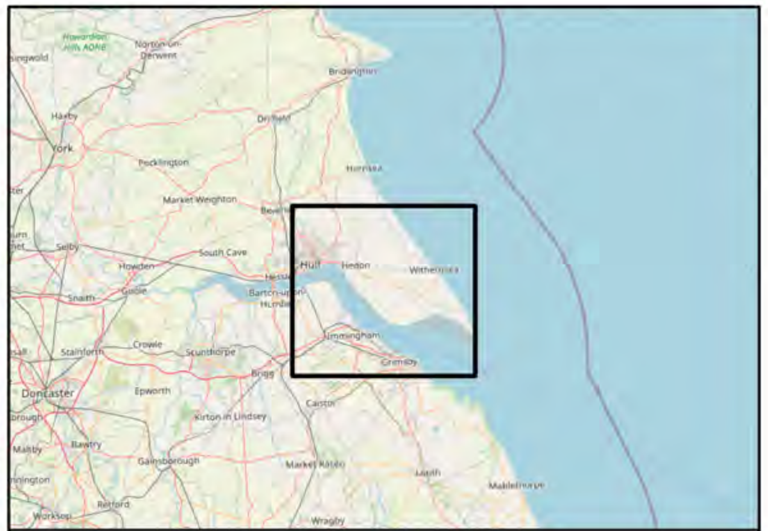
- A1033 heading west from Hull to Withersea on the east coast;
- B1445 from Patrington to Easington;
- Shipping vessels traveling down the Humber to / from Hull and into the North Sea;
- Industrial sites associated with oil and gas at Easington, chemicals in Saltend and gas storage at Aldbrough; and

- Aircraft flying into or out of Humberside Airport.

1276. Based on the strategic noise mapping data published by Defra (published on www.extrium.co.uk), one NIA has been identified in the Construction Noise Study Area, ID 388 located on the A1033, and the asset owner is National Highways. This NIA is shown on **Figure 8-20**.

1277. Based on a review of publicly available satellite imagery for the Construction Noise Study Area, no areas prized for their recreational and amenity value have been identified.





Legend:

- Offshore Scoping Area
- Onshore Scoping Area
- Potential Maximum Construction Noise Study Area Boundary (Onshore Scoping Area 300m Buffer)
- Potential Maximum Construction Vibration Study Area Boundary (Onshore Scoping Area 100m Buffer)
- Noise Important Area

Baseline Sound Sources

- Aircraft - Humberside Airport
- Shipping Vessels - The Humber

Roads

- A1033
- B1445

Industrial Sites (Oil & Gas)

- Saltend Chemicals Park
- Easington Gas Terminal
- Aldbrough Gas Storage Facility

Source: © Haskoning DHV UK Ltd, 2023; © DEFRA, 2019; © Extrium, 2023. © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Onshore Noise and Vibration Baseline Conditions

Figure: 8-20

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

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/04/2023	JR	AG	A3	1:125,000
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Co-ordinate system: British National Grid

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8.8.3 Potential Impacts

8.8.3.1 Potential Impacts during Construction

8.8.3.1.1 Construction Noise

1278. The construction phase of the Project may emit noise with the potential to result in disturbance-related impacts at NVSRs. Noise impacts are anticipated due to the following construction activities:

- Earthworks;
- Directional drilling;
- Sub-surface excavation, earth moving and landscaping;
- Piling (if required);
- Construction of above ground infrastructure at the HPF;
- Nearshore works such as cable laying; and
- Other general onshore construction activities.

1279. Construction noise impacts will be temporary and will vary both spatially and temporally in nature across the Construction Noise Study Area. The magnitude of the noise impacts is likely to depend on the ambient sound levels at the NVSRs, their proximity to the Project's construction activities and the duration and intensity of the works.

1280. Where the Project includes proposed construction activities with the potential to emit high noise levels at NVSRs inside the Construction Noise Study Area, these impacts are scoped into the EIA.

1281. Blasting has the potential to emit air overpressure (AOP) (airborne pressure waves produced by explosive detonation, containing energy over a wide range of frequencies including inaudible and audible). If blasting is required, the impacts of AOP will be scoped into the EIA.

8.8.3.1.2 Construction Vibration

1282. Potential construction vibration impacts include disturbance and structural damage. These will be assessed for all activities which are a potentially significant source of vibration, such as piling and blasting (if required), directional drilling and vibratory rollers / compactors, where proposed within 100m of NVSRs.

1283. As with construction noise, vibration impacts will be temporary and will vary both spatially and temporally. The magnitude of the vibration impacts is likely to depend on the proximity of NVSRs to the Project's construction activities and the duration and intensity of the works.

1284. Where the Project includes proposed construction activities with the potential to emit high vibration levels at NVSRs inside the Construction Vibration Study Area, these impacts are scoped into the EIA.

1285. Blasting has the potential to emit ground-borne vibration; hence, if blasting is required, the impacts of ground-borne vibration will be scoped into the EIA.

8.8.3.1.3 Construction Traffic Noise

1286. Construction of the Project may also result in increased traffic flows on nearby roads, thereby causing impacts due to increases in road traffic noise levels at NVSRs. This impact is also scoped into the EIA.

8.8.3.1.4 Construction Traffic Vibration

1287. The primary mechanism for heavy vehicles to give rise to vibrations is the movement of the vehicles over irregularities in the road surface. The DMRB states that: '*a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects.*' The highways authority has a duty to undertake regular inspection and maintenance of the local highway network. Maintenance of the local highway network is outside of the control of the Applicant, and the Construction Traffic Management Plan will include a commitment to reinstate the transport network if the road surface condition is damaged by construction traffic associated with the Project. Hence, construction traffic vibration impacts are scoped out of the EIA.

8.8.3.1.5 Offshore Construction

1288. As discussed in **Chapter 7.15 Offshore Airborne Noise**, construction activities in any part of the Offshore Scoping Area have the potential to increase noise and vibration levels in the vicinity. However, the closest distance from the nearest offshore infrastructure to shore is around 140km. At this distance, the noise and vibration emissions will not be perceptible at the onshore NVSRs; hence, these impacts are scoped out of the EIA.

8.8.3.2 Potential Impacts during Operation

8.8.3.2.1 Operational HPF Noise

1289. Operational noise from the HPF has the potential to disturb occupants of nearby NVSRs. There may also be a requirement for a backup power facility which is likely to be for periodic, short term use and for use under emergency circumstances. Depending on the design option, an assessment of short term noise impacts will be undertaken for all relevant noise generated by the HPF.

1290. The magnitude of impact will depend on baseline noise levels at the NVSRs, their proximity to the HPF and the HPF plant sound emission levels. It will also depend on the acoustic characteristics of the HPF noise emissions, particularly whether they are likely to attract corrections for tonality, intermittency or impulsivity. Operational impacts due to noise from the HPF and back-up power facility have been scoped into the EIA.

1291. There are no operational noise impacts anticipated from the buried infrastructure at the landfall site and along the onshore ECC, therefore this is scoped out of the EIA.

8.8.3.2.2 Operational Traffic Noise

1292. **Chapter 8.9 Traffic and Transport**, **Section 8.9.3.2** describes the anticipated operational traffic movements for the Project. Operation phase traffic impacts associated with the HPF are scoped into the EIA for the traffic and transport chapter; hence, operational traffic noise impacts are also scoped into the EIA.

8.8.3.2.3 Operational HPF Vibration

1293. The proposed HPF and back-up power facility may include plant with the potential to be sources of vibration. However, in accordance with good industry practice, all onshore plant with the potential to emit high levels of vibration will be isolated from the ground; hence, any vibration transmitted into the ground is likely to be negligible.

1294. It is also the case that, once the vibration attenuation due to isolation and propagation with distance is accounted for, any ground-borne vibration which could be perceptible at receptors would cause damage to the plant emitting it; hence, such vibration issues will be controlled through site maintenance. As the vibration level would be negligible at source, it would be orders of magnitude less than what would be expected to give rise to significant effects at an NVSR. Therefore, operational impacts due to vibration from the HPF have been scoped out of the EIA.

8.8.3.2.4 Operational Traffic Vibration

1295. For the reasons discussed in **Section 8.8.3.1.4,** vibration due to operation phase traffic is not anticipated to have the potential to result in significant effects and is therefore scoped out of the EIA.

8.8.3.3 Potential Impacts during Decommissioning

1296. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

1297. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 8-22**)

8.8.4 Potential Cumulative Effects

1298. Onshore cumulative effects will be considered as part of the EIA process. Any other project with the potential to result in noise and vibration impacts that may act cumulatively with the Project will be identified during consultation and following a review of available information. Therefore, cumulative effects related to onshore noise and vibration are scoped into the EIA. These projects would then be included in the Cumulative Effects Assessment (CEA). The CEA will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1299. The assessment will consider the potential for significant cumulative effects to arise due to the construction, operation and decommissioning of the Project, including the onshore ECC and HPF infrastructure, in the context of other developments that are existing, consented or at application stage.

8.8.5 Summary of Scoping Proposals

1300. **Table 8-22** outlines the onshore noise and vibration 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 8-22 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Onshore Noise and Vibration

Potential Impact	Construction	Operation	Decommissioning
Noise affecting NVSRs	✓	✓ (HPF only)	✓
Vibration affecting NVSRs	✓	X	✓
Road traffic noise affecting NVSRs	✓	✓	✓
Road traffic vibration affecting NVSRs	X	X	X
Cumulative impacts	✓	✓	✓

8.8.6 Approach to Data Gathering

1301. The approach to data gathering will be discussed and agreed as part of the EPP prior to commencement of the assessment. This will include the proposed survey locations and methodology.

1302. The existing environment will be characterised using the data sources set out in **Table 8-23.**

Table 8-23 Desk-Based Data Sources for Onshore Noise and Vibration

Data Source	Data Contents
Aerial Photography	Location of noise sources and NVSRs within the Onshore Noise and Vibration Study Areas
Local Authority Local Plans	Local policy relevant to noise and vibration and any areas designated for development which could introduce new NVSRs
Environment Agency LiDAR Data (Open Licence)	Topographical data
Ordnance Survey Mapping	Ordnance Survey data, including locations of NVSRs
Department for Environment, Food and Rural Affairs (Defra) Strategic noise mapping	Strategic mapping of baseline road traffic and railway noise levels
Local Authority Planning Portal	Baseline noise level data gathered as part of noise assessments to support other planning applications

1303. As mentioned in **Table 8-24**, baseline noise surveys are proposed at locations representative of the potentially most affected noise sensitive receptors. Receptors will be considered for baseline noise level surveys where either of the following are anticipated – construction noise impacts lasting at least one month, or long term operational noise impacts. Further details on the approach to baseline data collection for each identified impact are provided in **Section 8.8.7.**

1304. Baseline attended and unattended noise surveys, to determine existing noise levels, will be conducted in accordance with current guidance, including British Standard (BS) 7445:1991 ‘Description and measurement of environmental noise Part 2: Guide to the acquisition of data pertinent to land use’ and BS 4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’.

1305. Traceable calibrated sound level meters will be used for all measurements during the survey. Measurements will capture the following noise level parameters in 15-minute intervals: L_{Aeq}, L_{Amax}, L_{A90} and L_{A10}. Third-octave band sound levels will also be measured. The sound level meters will be calibrated before and after the survey using a portable sound pressure level calibrator.

1306. Record of the meteorological conditions during the survey will be made and measurements will not be considered valid during periods of rain or when average wind speeds exceed 5m/s.

1307. Data collection will likely comprise a combination of short term attended and longer term (up to a week) unattended measurements. A weather station would also be deployed to identify site-specific meteorological conditions during the surveys.

1308. The planning portal for the relevant local authority will be reviewed to identify baseline data contained within noise assessments undertaken to support planning applications for other developments.

1309. The criteria adopted to assess construction vibration impacts are independent of vibration levels; therefore, a baseline vibration survey is not proposed to inform the construction vibration impact assessment.

Table 8-24 Proposed Baseline Surveys for Onshore Noise and Vibration

Survey	Spatial Coverage
Baseline noise survey	Survey locations representative of nearest noise sensitive receptors closest to noise sources during construction and operation

8.8.7 Approach to Assessment

1310. The noise and vibration assessment will be undertaken in accordance with following standards and guidance (or the latest published version thereof):

- BS 61672-1:2013 Electroacoustics. Sound level meters. Specifications;
- BS 4142:2014+A1:2019 – Methods for Rating and Assessing Industrial and Commercial Sound;
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise;
- BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration;
- BS 6472-2:2008 Guide to evaluation of human exposure to vibration in buildings – Part 2: Blast-induced vibration;
- BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings;
- BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures;
- BS 7445-2:1991 Description and measurement of environmental noise. Guide to the

acquisition of data pertinent to land use;

- Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988);
- DMRB, LA111 Noise and Vibration, Revision 2 (2020);
- World Health Organisation (WHO) (1999) Guidelines for Community Noise;
- WHO (2009) Night Noise Guidelines for Europe; and
- WHO (2018) Environmental Noise Guidelines for the European Region.

1311. Onshore construction noise and vibration impacts will be assessed using the guidance contained in BS 5228:2009+A1:2014 '*Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise' and Part 2: Vibration'*. This guidance defines the accepted prediction methods and source data for various construction plant and activities.

1312. If blasting is required, AOP and vibration impacts will be assessed using the guidance in BS 6472-2:2008 '*Guide to evaluation of human exposure to vibration in buildings – Part 2: Blast-induced vibration*'. A detailed consideration of AOP is not considered appropriate for this Project. Section 5.3 of BS 6472-2:2008 states that the accurate prediction of AOP is 'almost impossible' and goes on to state that: '*…control of air overpressure should always be by its minimisation at source through appropriate blast design*'. Welsh Assembly Government publication 'Minerals Technical Advice Note (Wales) 1: Aggregates' (2004) states that: '*Because air overpressure is transmitted through the atmosphere, meteorological conditions such as wind speed and direction, cloud cover and humidity will all affect the intensity of the impact. In view of this unpredictability, planning conditions to control air overpressure are unlikely to be enforceable*'. Hence, it is considered unnecessary to carry out AOP predictions or define any assessment criteria in this respect.

1313. Construction traffic noise impacts will be calculated using the Basic Noise Level (BNL) methodology detailed in the Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1988). The assessment will compare the calculated BNLs with and without the construction traffic. Any changes in day or night-time noise BNLs due to the Project will be assessed using short term impact magnitude criteria taken from the DMRB.

1314. Operational noise impacts will be assessed using BS 4142:2014+A1:2019. This is the accepted UK standard for rating and assessing the impact of sound of an industrial and / or commercial nature. The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a residential dwelling upon which sound is incident.

1315. Following refinement of the Onshore Scoping Area, consultation with East Riding of Yorkshire Council and Hull City Council and other relevant stakeholders (where necessary) will be undertaken. Onshore noise and vibration 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.

8.8.8 Scoping Questions to Consultees

1316. The following questions are posed to consultees to help them frame and focus their response to the onshore noise and vibration scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the onshore noise and vibration impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the onshore noise and vibration 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?

8.9 Traffic and Transport

1317. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with traffic and transport, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1318. The traffic and transport assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **Chapter 8.3 Onshore Air Quality and Dust;**
- **Chapter 8.5 Soils and Land Use;**
- **Chapter 8.8 Onshore Noise and Vibration**; and
- **Chapter 9.2 Human Health.**

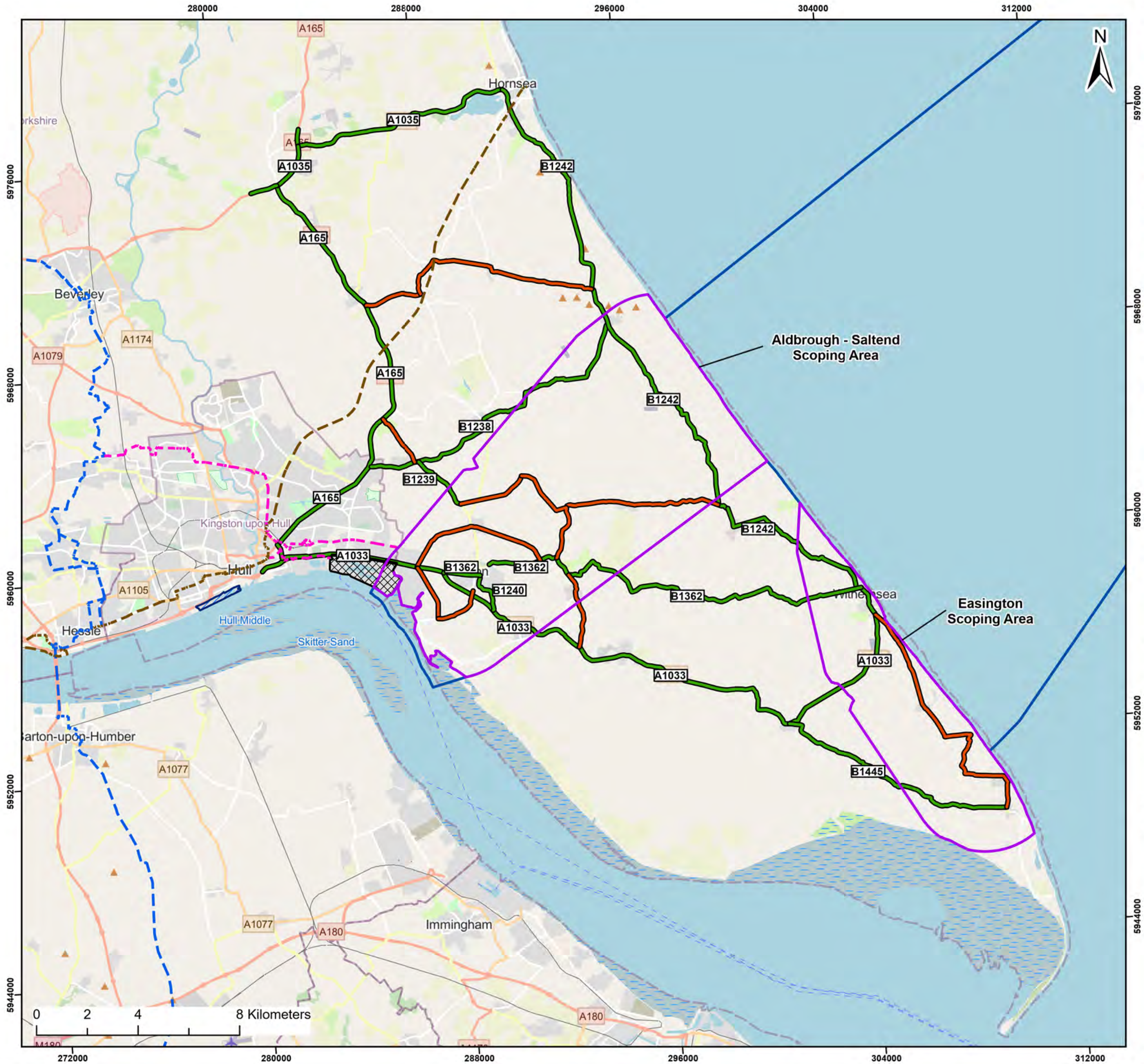
8.9.1 Study Area

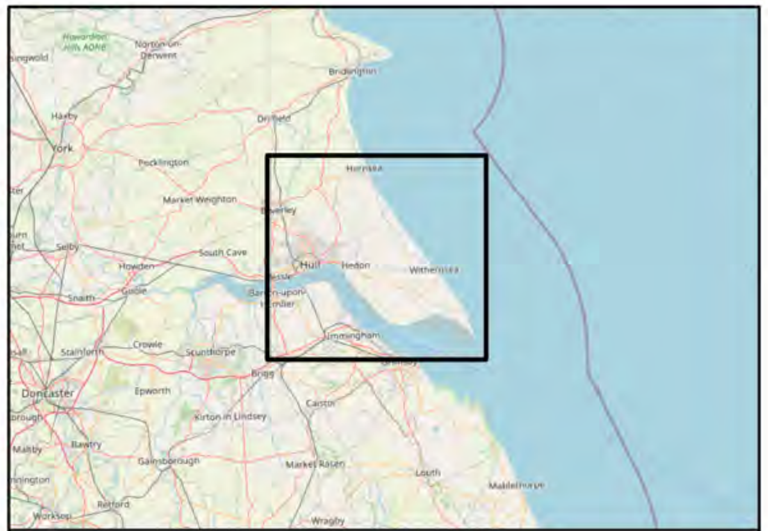
1319. At this scoping stage, two broad areas have been identified for the onshore infrastructure, as shown on **Figure 1-1**, one from Aldbrough to Saltend (the Aldbrough – Saltend Scoping Area) and a second from Withernsea towards Easington (the Easington Scoping Area).

1320. An initial Traffic and Transport Study Area (hereafter referred to as ‘the study area’) has therefore been established encompassing the two areas of the Onshore Scoping Area (and associated access locations).

1321. The initial study area is shown on **Figure 8-21**. The study area encompasses the administration of two local highway authorities (East Riding of Yorkshire Council and Hull City Council) and National Highways (who are responsible for the management of the Strategic Road Network).

1322. Further refinement of the study area will be undertaken once the location of the onshore infrastructure (and associated access locations) is finalised, and associated traffic assignment is determined. **Section 8.9.7.2** includes details of the approach that would be adopted to refine the study area.





Legend:

Offshore Scoping Area

Onshore Scoping Area

Traffic & Transport Study Area

A & B Road

C or Unclassified Road (Suitable for Two Way Traffic)

National Cycle Network

Route 1

Route 65

Route 66

Port and Rail Head Facilities

Port Facilities

Port and Rail Head Facilities

Source: © Haskoning DHV UK Ltd, 2023; © Sustrans, 2023; © OpenStreetMap (and) contributors, CC-BY-SA

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Traffic and Transport Study Area

Figure: 8-21

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0053

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	05/04/2023	JR	AG	A3	1:150,000
00	15/02/2023	JR	RE	A3	1:150,000

Co-ordinate system: British National Grid

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8.9.2 Existing Environment

1323. The following section provides a review of the existing environment in relation to the study area.

8.9.2.1 Highway Network

1324. The following sections provide a description of the strategic and local highway networks contained within the study area identified in **Figure 8-21**.

8.9.2.1.1 Strategic Road Network

1325. The Strategic Road Network within the study area comprises of the A63. The A63 could provide a key route for employees and HGV trips.

1326. The A63 provides the main route towards the city of Hull from the east (via the M62) as well as providing a strategic link between the ports of Hull and the wider region / UK. The A63 is a dual carriageway.

1327. National Highways are currently (February 2023) undertaking improvement works to the A63 known as the 'A63 Castle Street Junction Improvements'. National Highways identify that these improvements will improve access to the ports, congestion, safety and connections between the city centre and the tourist and recreational facilities. The A63 Castle Street improvements are currently scheduled to be complete by 2024 / 2025 prior to commencement of the Project's construction.

8.9.2.1.2 Local Highway Network

1328. Within the study area, there is an extensive network of A and B main distributor roads managed by the East Riding of Yorkshire Council and Hull City Council. It is considered that these routes would provide links for vehicles to directly access the onshore infrastructure.

1329. The A1033 provides a main link through the study area from the centre of Hull heading north from its junctions with the A63 and the ports of Hull towards the A1079 to the south of Beverley. The A1033 also heads east from the A63 towards Withernsea. The A1033 comprises of both single and dual carriageway.

1330. The A165 provides a route north-east from the city of Hull towards the northern extents of the study area where it intersects with the A1035 to the south of Leven. To the south of the A1035, the A165 is a single carriageway and becomes a dual carriageway to the south of the B1238 (upon entering Hull).

1331. A1035 provides a route north from Beverley towards Leven where it intersects with the A165 before heading east towards Hornsea. The majority of the A1035 is provided as a single carriageway with the exception of a short section of dual carriageway south-east of Leven.

1332. The B1242 provides a main north-south link along the east coast, linking the A1035 at Hornsea to the north with Withernsea to the south. The B1242 is provided as a single carriageway.

1333. The B1362 and B1445 provide links from the A1033 east via towards Withernsea and Easington respectively. Both roads are single carriageway roads.

8.9.2.1.2.1 Local Road Network

1334. Within the study area, there are numerous minor / unclassified highway routes serving smaller communities. The prerequisite for the construction access strategy will be to minimise the impact on the minor highway routes by routeing traffic demand via the main distributors. However, at some remote locations, it will be necessary to utilise short lengths of minor routes to access the onshore infrastructure. **Section 8.9.7.2** details the impact assessment process to assess the suitability of the minor routes to accept the Project's construction traffic.

8.9.2.1.2.2 Background Traffic Flows

1335. **Table 8-25** provides a summary of the background traffic flows on the main A road serving the study area.

Table 8-25 Background Traffic Flows

Road	Daily Traffic Flows	
	All Vehicles	Percentage of HGV
A63 (west of the A1033)	46,714	10.7%
A1033 (east of the A63)	38,808	10.8%
A1033 (south of Hedon)	8,664	3.2%
A165 (north of the A1033)	14,653	2.1%
A165 (south of the A1035)	9,461	5.4%
A1035 (south-east of Leven)	16,837	5.9%
A1035 (west of Hornsea)	7,824	2.4%
Notes: Data sourced from the Department for Transport Road Traffic Statistics (http://roadtraffic.dfc.gov.uk)		

1336. Traffic flows presented in **Table 8-25** were recorded in 2019. More recent flows from 2020 and 2021 have been discounted as these are not considered to be representative as they were undertaken during the coronavirus pandemic (COVID-19). **Section 8.9.6** provides details of further baseline data collection.

8.9.2.2 Walking and Cycling

1337. Within the study area, there is an extensive network of walking and cycling routes within Hull. In addition, there are two National Cycle Routes (NCR), these are shown on **Figure 8-21**.

1338. NCR65 runs east to west through Hull, linking to NCR1 to the west of Hull and NCR66 to the east of Hull. NCR65 also heads north-east from Hull to Hornsea.

1339. NCR66 runs from Cottingham in the west (where it intersects with NCR1) east towards the centre of Hull where it connects to NCR65 which continues towards Hornsea.

1340. NCRs are also covered within **Chapter 8.5 Soils and Land Use**.

8.9.2.3 Rail and Sea

1341. To the south of the study area, there are existing port and rail freight terminals alongside the River Humber that can be accessed from the A63 and A1033 (as shown on **Figure 8-21**). These facilities could provide the potential for the import / export of Project cargoes to the wider study area by road.

1342. No other suitable ports or rail freight facilities have been identified within the study area.

8.9.3 Potential Impacts

1343. The principal guidelines for the assessment of the environmental impacts of road traffic associated with new developments are the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) published by the Institute of Environmental Assessment in January 1993.

8.9.3.1 Potential Impacts during Construction

1344. The construction phase will result in a requirement for the import / export of materials and plant. However, at this stage, no information is available for construction traffic demand or intermodal delivery strategies. In order to consider a worst case, it would be assumed that the majority of construction traffic would be by road, albeit, potentially originating from one of the existing ports or rail freight facilities (identified in **Section 8.9.2.3**).

1345. **Table 8-26** sets out the potential construction traffic impacts and the likely user groups that would be affected.

Table 8-26 Potential Construction Traffic Impacts

Potential Impact	Potential Impact of Construction Traffic	Affected User Groups
Severance Amenity	Increases in traffic impacting upon non-motorised users of the public highway including users of the Public Rights of Way (PRoW) network, NCRs and local networks	Local communities and tourists in the area.
Road Safety	Construction traffic impacting upon sites with a record of collisions and / or the introduction of new risks associated with the formation of new construction accesses.	Commuters, visitors, and business users.
Driver Delay (Capacity)	Increases in traffic leading to delays at junctions.	Commuters, visitors, and business users.
Driver Delay (Highway Constraints)	Construction traffic using narrow roads resulting in increased delays.	Local communities and tourists in the area.
Abnormal Loads	Increases in large vehicle movements leading to delays to traffic and the suitability of the delivery routes to accommodate abnormal load deliveries	Commuters, visitors, and business users.

1346. Traffic borne impacts upon air quality and dust and noise and vibration are considered separately in **Chapter 8.3 Onshore Air Quality and Dust** and **Chapter 8.8 Onshore Noise and Vibration** respectively. The cumulative interactions of all transport effects will be considered within the **Chapter 9.2 Human Health**.

1347. The preferred base port (or ports) for the offshore construction of the Project is not known and any decision would not be expected until post-consent. Such facilities would typically be provided or brought into operation by means of one or more planning applications or as port operations with permitted development rights. It is proposed to scope out of the EIA the onshore impacts of the traffic and transport associated with offshore construction activities. However, the onshore activities of the Project are scoped into the EIA.

1348. GEART identifies that some developments may involve the transportation of dangerous or hazardous loads by road and that the Environmental Statement (ES) should clearly outline the estimated number and composition of such loads. GEART states that where the number of movements is considered to be significant, the ES should include a risk or catastrophe analysis to illustrate the potential for an accident to happen and the likely effect of such an event.

1349. It is not envisaged that there would be a significant number of movements of hazardous loads and that such loads would likely comprise of fuel (petroleum) deliveries. GEART notes that the extent of the risk analysis should reflect the nature of the product being distributed, noting that for instance, much more detail would be required for a scheme that involved the transportation of nuclear products than for one that involved the delivery of petroleum.

1350. In order to present a proportionate assessment, it is proposed that rather than undertaking a separate assessment of hazardous loads, the road safety assessment would include detailed analysis of the types of vehicles historically involved in collisions to understand if there are areas where vehicles transporting hazardous loads may be at greater risk, e.g. where there is a pattern of collisions involving HGVs. Therefore, it is proposed that a separate assessment of hazardous loads is scoped out of the EIA.

8.9.3.2 Potential Impacts during Operation

1351. Any inspections / maintenance of the onshore export cables to the HPF will be infrequent and subject to very low vehicle demand. Considering this, no significant traffic and transport effects are anticipated during the operation phase associated with the operation and maintenance (O&M) of the onshore export cables.

1352. It is however anticipated that the HPF will be permanently manned and that there may also be the potential for the export of oxygen (as a by-product of the hydrogen production process) via the road network, by tanker. In addition, smaller scale export options may be considered for a proportion of the production facility output for road transport. This may be considered in the case that there is local or national demand for hydrogen that is complementary to the local consumption. However, at this stage, no information is available for operational staffing and tanker movements at the HPF.

1353. Abnormal loads are to be included within the operational assessment due to the potential failure of super grid transformers that would need to be replaced.

1354. **Table 8-27** sets out the potential operational traffic impacts and the likely user groups that would be affected.

Table 8-27 Potential Operational Traffic Impacts

Potential Impact	Potential Impact of Operational Traffic	Affected User Groups
Severance	Increases in traffic impacting upon non-motorised users of the public highway including users of the PRoW network.	Local communities and tourists in the area.
Amenity		
Road Safety	Operational traffic impacting upon sites with a record of collisions and / or the introduction of new risks associated with the formation of new operational accesses.	Commuters, visitors, and business users.
Driver Delay (Capacity)	Increases in traffic leading to delays at junctions.	Commuters, visitors, and business users.
Abnormal Loads	Increases in large vehicle movements leading to delays to traffic and the suitability of the delivery routes to accommodate abnormal load deliveries	Commuters, visitors, and business users.

1355. It is not envisaged that there would be a significant number of HGV movements of operational hazardous loads in context to the background HGV flows and that such loads would likely comprise of potential exports of oxygen and hydrogen by tanker. It is proposed that a similar approach to that outlined for construction is adopted for the consideration of hazardous loads during the operation phase, i.e. hazardous loads are considered as part of the road safety assessment.

1356. No decision has been made on a preferred base port for the offshore O&M of the Project. Therefore, it is proposed to scope out of the EIA the onshore traffic and transport impacts of offshore O&M activities.

8.9.3.3 Potential Impacts during Decommissioning

1357. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

1358. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 8-28**)

8.9.4 Potential Cumulative Effects

1359. There is the potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect traffic and transport receptors. Therefore, cumulative effects related to onshore traffic and transport are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1360. Onshore cumulative effects will be considered as part of the EIA process. Any other project with the potential to result in impacts that may act cumulatively with the Project will be identified. Consultation with the relevant highway authorities will seek to identify any significant developments that could have a cumulative effect with the Project, e.g. major road improvement schemes, other Nationally Significant Infrastructure Projects (NSIP), etc.

1361. The assessment will consider the potential for significant cumulative effects to arise because of the construction of the Project in the context of other developments that are existing, consented or at the application stage.

1362. No decision has been made on a preferred base port for the offshore O&M of the Project. Therefore, it is proposed to scope out of the EIA the cumulative effects the onshore traffic and transport associated with offshore O&M activities.

8.9.5 Summary of Scoping Proposals

1363. **Table 8-28** outlines the traffic and transport 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 8-28 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Traffic and Transport

Potential Impact	Associated Traffic-Generating Project Activities	Construction	Operation	Decommissioning
Severance	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Amenity	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Road safety (including consideration of hazardous loads)	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Driver delay (capacity)	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Driver delay (highway constraints)	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Abnormal loads	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓

Potential Impact	Associated Traffic-Generating Project Activities	Construction	Operation	Decommissioning
Hazardous loads	Both onshore and offshore activities	X	X	X
Cumulative impacts	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
* Impacts associated with vehicles travelling to and from the selected base port(s) to construct, operate and decommission the offshore elements of the Project				

8.9.6 Approach to Data Gathering

1364. To date, the existing environment has been characterised using the following desk-based data sources set out in **Table 8-29**.

Table 8-29 Desk Based Data Sources for Traffic and Transport

Data Source	Date	Data Contents
Department for Transport's road traffic statistics (https://roadtraffic.dft.gov.uk)	2019	Annual average 2019 traffic counts for all main 'A' roads
Google Maps, Bing Maps, etc.	Various	Online mapping
Sustrans (https://www.sustrans.org.uk/nationalcycle-network)	2023	Details of NCRs

1365. To facilitate the impact assessment, the following additional data will also be obtained:

- Baseline traffic flow data for all roads within the refined study area via commissioned traffic surveys and / or existing traffic data held by Department for Transport and local authorities;
- Details of sensitive receptors (as defined within **Table 8-30**);
- Collision data for the latest five-year period for all roads within the refined study area;
- Existing pedestrian / cycle / bus routes; and
- Projects trip generation, including number and type of construction and operational vehicles and employee trips.

8.9.7 Approach to Assessment

1366. The GEART guidance provides a framework for the assessment of traffic borne environmental impacts and will be supplemented by the technical transport guidance outlined in **Table 8-30**.

Table 8-30 Supplementary Technical Transport Guidance

Document	Purpose / Application
Planning Policy Guidance (PPG) - Travel Plans, Transport Assessment and Statements (Ministry of Housing Communities and Local Government (MHCLG), 2014)	Provides overarching guidance upon the structure of transport assessments and travel plans.
Design Manual for Roads and Bridges (DMRB) CD 123 - Geometric design of at-grade priority and signal - controlled junctions (National Highways, 2021)	Provides the standards for the design of new points of access.
Manual for Streets (Department for Transport, 2007)	Guidance to inform the visibility requirements for junctions where measured speeds are below 40mph.
Manual for Streets 2 (Chartered Institute of Highways and Transportation (CIHT), 2010)	
Traffic Signs Manual Chapter 8 Traffic Safety Measures and Signs for Road Works and Temporary Situations Part 1: Design (Department for Transport, 2009)	Provides guidance upon temporary traffic management that will be used to inform the assessment of driver delay impacts related to temporary traffic management and road closures.
Strategic Road Network and the Delivery of Sustainable Development (Department for Transport, 2022)	Sets out the way in which National highways will engage with the development industry, public bodies and communities to assist the delivery of sustainable development which may result in any traffic impact on the Strategic Road Network.

1367. GEART suggests the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows, or the number of HGVs is predicted to increase by 10% or more.

1368. The above criteria applied to the Project's traffic demand will dictate the scale of the impact assessment. Changes in traffic flows below the GEART rules are assumed to result in negligible, environmental impacts and would not be assessed further.

1369. The exception to GEART Rule 1 and 2, is the consideration of the impacts upon driver delay and road safety. These impacts can be potentially significant when high baseline traffic flows are evident, and a lower change in traffic flow can be potentially significant.

8.9.7.1 Identification of Sensitive Receptors

1370. The sensitivity of a road can be defined by the type of user groups who may use it. GEART identifies that it is useful to identify particular groups or locations which may be sensitive to changes in traffic conditions and provides a checklist of sensitive locations and groups. However, the list is not exhaustive and can be added to by the assessor.

1371. Applying the GEART principles, **Table 8-31** provides broad definitions of the different sensitivity levels that would be adopted for the assessment.

Table 8-31 Example Definitions of the Different Sensitivity Levels

Sensitivity	Severance and Amenity	Road Safety	Driver Delay (Capacity)	Driver Delay (Highway Constraints)
High	• High concentrations of sensitive receptors (e.g. hospitals, schools, areas with high footfall) and limited separation provided by the highway environment; or • Low concentration of sensitive receptors and no separation from traffic provided by the highway environment.	Links with collision rates above national averages and / or collisions clusters with emerging patterns of collisions.	Junctions operating at or over capacity.	Roads less than 5.5m wide with no passing places provided.
Medium	A low concentration of sensitive receptors (e.g. residential dwellings, pedestrian desire lines, etc.) and some separation from traffic provided by the highway environment.	Links with collision rates close to national averages and / or collision clusters.	Junctions or links operating close to capacity.	Roads less than 5.5m wide but with passing places provided.
Low	Few sensitive receptors and / or highway environment can accommodate changes in volumes of traffic.	Links with collision rates lower than national averages and / or no collision clusters.	Junctions or links with spare capacity.	Roads in excess of 5.5m in width.
Negligible	Links that fall below GEART Rule 1 and 2 screening thresholds and major ‘A’ roads or motorways with no pedestrian or cycle environment.			

8.9.7.2 Impact Assessment Process

1372. Construction and operational traffic demand will be derived by way of a 'first principles' approach whereby traffic generation is calculated from an understanding of likely material demand and resourcing requirements.

1373. The Project's traffic demand would be assigned to the highway links within the study area and the increase in traffic flow to baseline conditions determined. This would facilitate refinement of the study area and an assessment of the magnitude of effect by applying the thresholds in **Table 8-32** to inform a detailed evaluation of potential effects.

Table 8-32 Magnitude of Impact Thresholds

Impact	Magnitude of Impact			
	Negligible	Low	Medium	High
Severance	Change in total traffic flow of less than 30%.	Change in total traffic flow of 30 to 60%.	Change in total traffic flow of 60 to 90%.	Change in total traffic flows of over 90%.
Amenity	Change in traffic flow (or HGV component less than 100%).		Greater than 100% increase in traffic (or HGV component) and a review based upon the quantum of vehicles, vehicle speed and pedestrian footfall.	
Road Safety	Informed by a review of existing collision records from within the study area and the forecast increase in traffic.			
Driver Delay (Capacity)	Informed by a review of the potential increase in peak hour traffic through sensitive junctions.			
Driver Delay (Highway Constraints)	Informed by a review of the potential increase in peak hour traffic through links and pinch-points on the local highway network.			
Abnormal Loads	Informed by an assessment of the suitability of the access routes to accommodate abnormal loads.			

1374. The magnitude of impact (**Table 8-32**) would then be combined with the receptor sensitivity (**Table 8-31**) to determine the determine the overall effect of the Project's traffic in accordance with the effect assessment matrix (**Chapter 5 EIA Methodology**).

8.9.8 Scoping Questions to Consultees

1375. The following questions are posed to consultees to help them frame and focus their response to the traffic and transport scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the traffic and transport impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the traffic and transport 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?

8.10 Landscape and Visual Impact

1376. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with landscape and visual impact, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the onshore export cable corridor (ECC), including the landfall area, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1377. The landscape and visual impact assessment (LVIA) will consider all landscape and visual receptors landward of Mean High Water Springs (MHWS), as well as seaward receptors where there is the potential for them to be significantly affected by the onshore works, including intertidal and nearshore works at the landfall. Impacts on offshore seascape, landscape and visual receptors from the offshore components of the Project are considered within **Chapter 7.12 Seascape, Landscape and Visual Impact**.

1378. The LVIA is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **Chapter 7.12 Seascape, Landscape and Visual Impact;**
- **Chapter 8.5 Soils and Land Use;**
- **Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation;** and
- **Chapter 8.7 Onshore Archaeology and Cultural Heritage.**

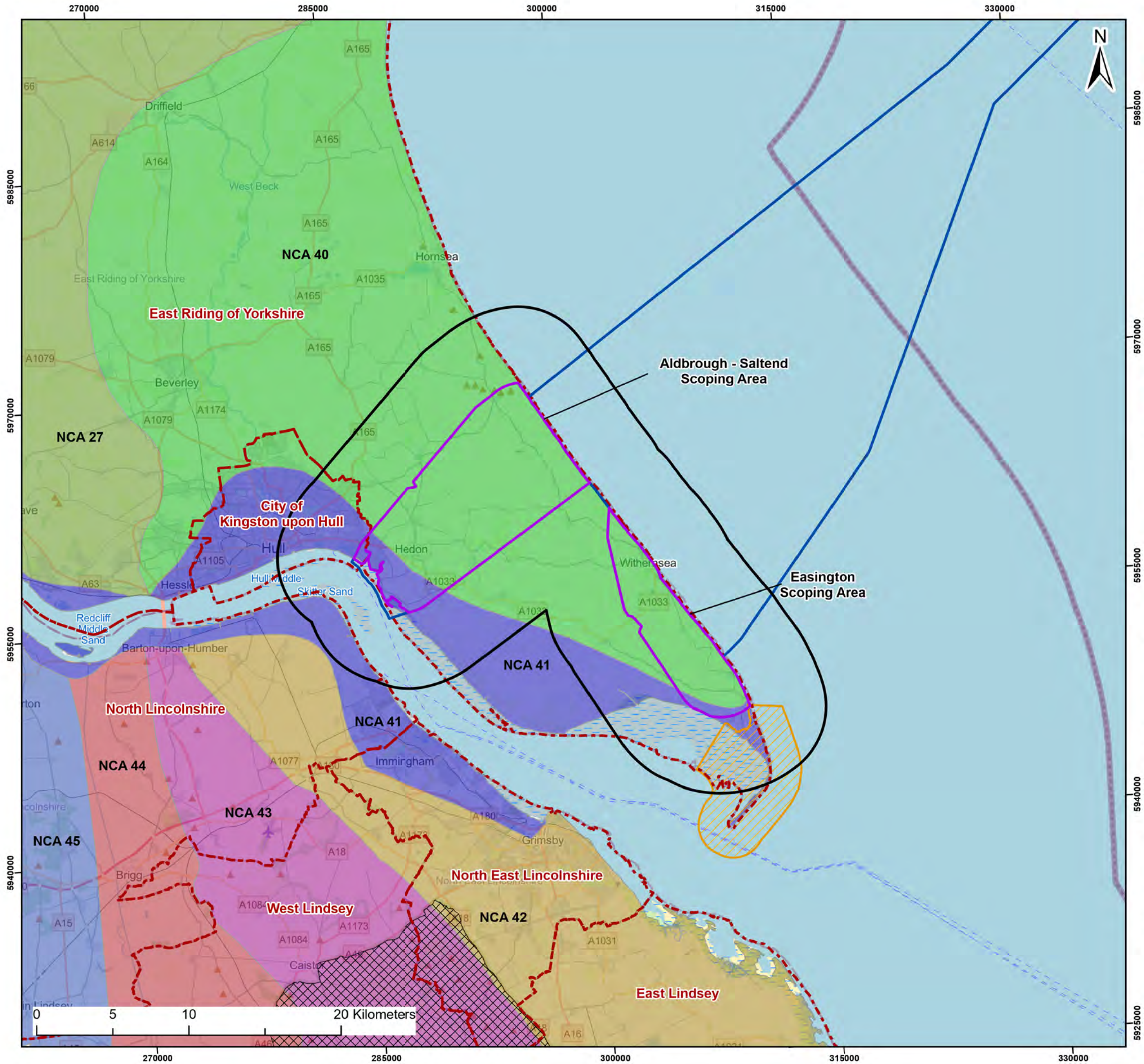
8.10.1 Study Area

1379. For the purposes of scoping, this chapter considers the Onshore Scoping Area as the Landscape and Visual Impact Study Area (hereafter referred to as ‘the study area’) as shown on **Figure 1-1**.

1380. The Onshore Scoping Area will be refined through the site selection, consultation and engineering review process, to form an Onshore Development Area for the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES). For the purposes of the LVIA, a refined study area will be defined, based on the finalised location of the proposed infrastructure, and through use of Zone of Theoretical Visibility (ZTV) mapping. It is considered that significant effects on landscape and visual receptors are unlikely to occur beyond 5km from the permanent above ground elements of the Project. Likely significant effects of buried infrastructure will be more restricted. The study area is likely to be a 5km radius around the HPF. The onshore export cables and landfall will be excluded from the study area as any effects will be temporary in nature and unlikely to be significant (as demonstrated through the PEIR for Hornsea Four (Ørsted, 2019)). The Onshore Scoping Area, with a 5km buffer indicating the likely maximum potential extent of the study area, is shown on **Figure 8-22**.

8.10.2 Existing Environment

1381. The onshore existing environment is described for the Onshore Scoping Area, which is within the East Riding of Yorkshire and Hull City local authority areas (see **Figure 8-22**). The Onshore Scoping Area extends inland from the potential landfall locations between Aldbrough and Easington, to the east of Kingston Upon Hull. The Onshore Scoping Area comprises two separate areas, the Aldbrough – Saltend Scoping Area to the north and the Easington Scoping Area to the south (see **Figure 8-22**). The site in which the onshore HPF and any pipe- or cable-work will be located, are yet to be determined.



Legend:

- Onshore Scoping Area
- Offshore Scoping Area
- LVIA Study Area Maximum Potential Extent (Onshore Scoping Area 5km Buffer)
- Local Authority Boundary
- Heritage Coast
- Area of Outstanding Natural Beauty (AONB)

National Character Area (NCA)

- NCA 27: Yorkshire Wolds
- NCA 40: Holderness
- NCA 41: Humber Estuary
- NCA 42: Lincolnshire Coast and Marshes
- NCA 43: Lincolnshire Wolds
- NCA 44: Central Lincolnshire Vale
- NCA 45: Northern Lincolnshire Edge with Coversands

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Landscape and Visual Impact Study Area

Figure: 8-22 | Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0060

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Co-ordinate system: British National Grid

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1382. The majority of the Onshore Scoping Area is in the Holderness National Character Area (NCA). A small part of the most westerly extents of the Onshore Scoping Area extends into the Humber Estuary NCA to the south-east of Kingston Upon Hull. Local landscape character is described in the East Riding of Yorkshire Landscape Character Assessment (East Riding of Yorkshire Council, 2018). The Onshore Scoping Area is located within the following landscape character types:

- 17a – Headon, Preston and Bilton Farmland;
- 19d – Central Holderness Open Farmland;
- 19e – Burstwick to Withernsea Farmland;
- 20a – Withernsea to Spurn Coast;
- 20b – Hornsea to Withernsea Coast;
- 21c – South Patringham, Ottringham and Keyingham Farmland; and
- 21d – Paull Farmland.

1383. There are no national-level designations within, or adjacent to, the Onshore Scoping Area. There is an area of Heritage Coast at Spurn Head, which is immediately adjacent to the south of the Easington Scoping Area. It is over 17km from the Aldbrough – Saltend Scoping Area.

1384. Visual receptors within the Onshore Scoping Area are primarily residential receptors within small villages and scattered properties throughout the area. Other receptors include those travelling on the A1033, B1445, B1362, B1238, B1240 and other minor roads. Public Rights of Way (PRoW) are present throughout the Onshore Scoping Area which are likely to attract recreational receptors in addition to those visiting the coast for recreational purposes.

8.10.3 Potential Impacts

8.10.3.1 Potential Impacts during Construction

8.10.3.1.1 Landscape Character and Designations

1385. During construction, the presence of construction activity and partially completed structures has the potential to locally impact landscape character and designated landscapes. Impacts on landscape receptors arising from onshore export cable installation works will be short term and localised. Construction of the HPF will involve longer term disturbance due to the greater complexity and scale of works anticipated. Established good practice measures will be applied to minimise disturbance and to ensure rapid reinstatement. The construction impacts of the HPF on landscape receptors are scoped into the LVIA.

1386. Due to the limited extent of disturbance arising from the construction of the onshore ECC, it is proposed that these construction impacts on landscape receptors are scoped out of the LVIA. In previous cases (e.g. Hornsea Four), the construction effects of the onshore ECC on landscape receptors were identified in the PEIR as being not significant (Ørsted, 2019). Subsequently, construction impacts of the onshore ECC were scoped out of the ES.

8.10.3.1.2 Visual Receptors

1387. During construction the presence of construction activity and partially completed structures has the potential to locally impact visual amenity. Impacts on visual receptors arising from onshore export cable installation works will be short term and localised. Construction of the HPF will involve longer term disturbance due to the greater complexity and scale of works anticipated. Established good practice measures will be applied to minimise disturbance and to ensure rapid reinstatement. Due to the limited extent of disturbance arising from the construction of the onshore ECC, it is proposed that these construction impacts on visual receptors are scoped out of the LVIA.

1388. In previous cases (e.g. Hornsea Four), the construction effects of the onshore ECC on visual receptors were identified in the PEIR as being not significant (Ørsted, 2019). Subsequently, construction effects of the onshore ECC were scoped out of the ES.

1389. As construction of the HPF will be larger scale and over longer timeframes, the associated construction impacts of the HPF on visual receptors within the study area are scoped into the LVIA.

8.10.3.2 Potential Impacts during Operation

8.10.3.2.1 Landscape Character and Designations

1390. Following installation and restoration of ground, below ground cables would not significantly impact landscape receptors. Operational impacts on the landscape resulting from the landfall and onshore export cables are therefore scoped out of the LVIA.

1391. The potential for the operation of the HPF to significantly impact landscape character and designated landscapes (e.g. the Spurn Heritage Coast) will vary depending on the exact siting and design of onshore development. However, it is expected that the HPF will include large structures with the potential to impact on the local landscape. Therefore, it is proposed that landscape impacts associated with operation of the HPF will be scoped into the LVIA.

8.10.3.2.2 Visual Receptors

1392. Following installation and restoration of ground, below ground cables would not significantly impact visual receptors. Operational impacts on visual receptors resulting from the landfall and onshore export cables are therefore scoped out of the LVIA.

1393. The potential for the operation of the HPF to significantly impact visual receptors (people) will vary depending on the exact siting and design of onshore development. Where visible, views of the HPF may affect visual receptors such as residents and recreational users, who are of high susceptibility to change, and road users who are of lower susceptibility to change. It is not anticipated that the HPF will include structures which are noticeably taller than the average height of buildings across the HPF site, however, one design option being considered includes a cooling tower which periodically may have a visible plume. Therefore, impacts on visual receptors resulting from operation of the HPF are proposed to be scoped into the LVIA.

1394. A list of assessment viewpoints identifying representative views towards the HPF will be developed and agreed as the basis for examination of visual effects. Where appropriate, the assessment of effects will consider opportunities for mitigation to help reduce the residual significance of landscape and visual effects. For example, mitigation may include planting of new landscape features (e.g. trees and hedgerows) or provision of bunding around the HPF. Mitigation will be further expanded on at PEIR stage and in the ES.

8.10.3.3 Potential Impacts during Decommissioning

1395. 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.

1396. It is assumed that, at decommissioning, the onshore export cables will be removed without need for re-excavation. On this basis, impacts during the temporary decommissioning of the landfall and onshore export cables will be scoped out of the LVIA. Impacts of decommissioning of the HPF will be similar to those identified at construction stage, and therefore will be scoped into the LVIA (as per **Table 8-33**).

8.10.4 Potential Cumulative Effects

1397. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect landscape and visual receptors. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1398. There is potential for cumulative impacts to arise in relation to the onshore long term above-ground infrastructure (i.e. the HPF), with other similar types of projects such as substations. The potential for other projects to give rise to cumulative effects has therefore been scoped into the LVIA at this stage. The scope of the cumulative LVIA will be agreed with stakeholders at a later date through the Evidence Plan Process (EPP).

1399. Cumulative impacts for the landfall and onshore export cables will be scoped out of the EIA, due to the impacts on landscape and visual receptors arising from the landfall and onshore export cable installation works being short term and localised.

8.10.5 Summary of Scoping Proposals

1400. **Table 8-33** outlines the landscape and visual 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 8-33 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Landscape and Visual Impact

Potential Impact	Construction	Operation	Decommissioning
Landscape character and designated landscapes (resulting from the landfall and onshore export cables)	X	X	X
Landscape character and designated landscapes (resulting from the HPF)	✓	✓	✓
Visual receptors (resulting from the landfall and onshore export cables)	X	X	X
Visual receptors (resulting from the HPF)	✓	✓	✓
Cumulative impacts (resulting from the landfall and onshore export cables)	X	X	X
Cumulative impacts (resulting from the HPF)	✓	✓	✓

8.10.6 Approach to Data Gathering

1401. **Table 8-34** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 8-34 Desk-Based Data Sources for Landscape and Visual Impact

Data Source	Date	Data Contents
Natural England	2014	NCA Profiles
East Riding of Yorkshire Council	2018	East Riding of Yorkshire Landscape Character Assessment
Ordnance Survey	2023	Mapping and digital terrain models
Various (Google, Bing, PastMap)	Various	Aerial and street-level photography available online

1402. These data sources will be augmented with field surveys across the study area (to be defined and agreed through the EPP). **Table 8-35** outlines the proposed baseline surveys to be carried out.

Table 8-35 Proposed Baseline Surveys for Landscape and Visual Impact

Survey	Timing	Spatial Coverage
Site survey for viewpoint photography	Not seasonally dependent	Agreed viewpoint locations
Site survey to understand baseline conditions	Not seasonally dependent	Entire Landscape and Visual Impact Study Area

8.10.7 Approach to Assessment

1403. The LVIA will be undertaken by experienced Chartered Landscape Architects (Chartered Members of the Landscape Institute (CMLI)), and in accordance with relevant good practice documents.

1404. The LVIA will be undertaken in accordance with Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment (IEMA), 2013). Landscape and visual effects will be considered separately. GLVIA3 states that the nature of landscape and visual receptors, commonly referred to as their sensitivity, should be assessed in terms of the susceptibility of the receptor to change and the value attached to the existing landscape or views. The nature of the effect, commonly referred to as the magnitude of change, should be assessed in terms of the size and scale, geographical extent, duration and reversibility of the effect. These aspects will all be considered together, to form a judgement regarding the overall significance of landscape and visual effects.

8.10.7.1 Approach to Assessment of Landscape Effects

1405. Predicted changes to the physical landscape of the Onshore Development Area and landscape character within the study area (as defined and agreed through the EPP) will be identified. The assessment of landscape effects will take account of the sensitivity of the landscape, and any value placed on the landscape through formal designation or other indicators. The significance of landscape effects will be determined in relation to the magnitude of change to the landscape.

8.10.7.2 Approach to Assessment of Visual Effects

1406. Visual effects are experienced by people (visual receptors) at different locations across the study area (as defined and agreed through the EPP), including at static locations (for example from settlements or promoted viewpoints) and transitional locations (such as sequential views experienced from routes, including roads, footpaths, cycle routes, etc.). Visual receptors are the people who will be affected by changes in views at these places, and they are usually grouped by what they are doing at those locations (for example residents, motorists, recreational users, etc.). Assessment viewpoints will be identified and agreed with stakeholders to represent the key groups of sensitive visual receptors that may be affected by the Project.

1407. Visual effects resulting from the Project will be considered within the context of the existing baseline conditions, including operational and under construction developments where relevant. The assessment of visual effects arising from the introduction of the onshore development will be informed by analysis of ZTVs, field studies and consideration of changes in views from representative viewpoints. Visualisations will be prepared to illustrate the potential changes in view from representative viewpoints, in accordance with guidance (Landscape Institute, 2019b).

1408. Effects on the closest residential properties may need to be considered in terms of potential to affect residential visual amenity in accordance with Landscape Institute guidance (Landscape Institute, 2019a) on Residential Visual Amenity Assessment (RVAA).

8.10.7.3 Site-Specific Surveys

1409. Site visits will be carried out to obtain photography and to undertake survey work, which will include visits to the assessment viewpoints, designated landscapes, and extensive travel around the study area (as defined and agreed through the EPP) to consider potential impacts on landscape and coastal character and on experiences of views seen from specific viewpoints, settlements and routes.

8.10.8 Scoping Questions to Consultees

1410. The following questions are posed to consultees to help them frame and focus their response to the 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 landscape and visual impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the landscape and visual 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?

9 Project-Wide Topics

9.1 Introduction

1411. This part of the Scoping Report presents the existing environment within the Onshore and Offshore Scoping Areas (**Figure 1-1**) and the potential likely project-wide effects of the construction, operation and decommissioning of the Project. 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 Environmental Impact Assessment (EIA).

1412. 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.

1413. A description of the Project’s offshore and onshore infrastructure is provided in **Chapter 3 Project Description**.

9.2 Human Health

1414. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with human health, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, the offshore export cable corridor (ECC), the onshore ECC, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1415. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

1416. The human health 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 8.3 Onshore Air Quality and Dust;**
- **Chapter 8.4 Water Resources and Flood Risk;**
- **Chapter 8.8 Onshore Noise and Vibration;**
- **Chapter 8.9 Traffic and Transport;**
- **Chapter 8.10 Landscape and Visual Impact;**
- **Chapter 9.3 Socio-Economics, Tourism and Recreation;**
- **Chapter 9.4 Climate Change;** and
- **Chapter 9.5 Major Accidents and Disasters.**

9.2.1 Study Area

1417. The human health assessment will be informed by the study areas, zones of influence and receptors impacted or potentially impacted by other EIA chapters. This will enable the effects on human health to be better understood. It is noted that the study areas for these topics do not necessarily define the boundaries of potential population health effects. As such, the human health assessment also defines Human Health Study Areas in order to characterise representative population groups. As the relevant population varies depending on the determinant of health discussed, a range of areas is required (as shown on **Figure 9-1**):

- Site-Specific Health Study Areas: Wards of South East Holderness (Aldbrough – Saltend Scoping Area) and Mid Holderness and South West Holderness (Easington Scoping Area);

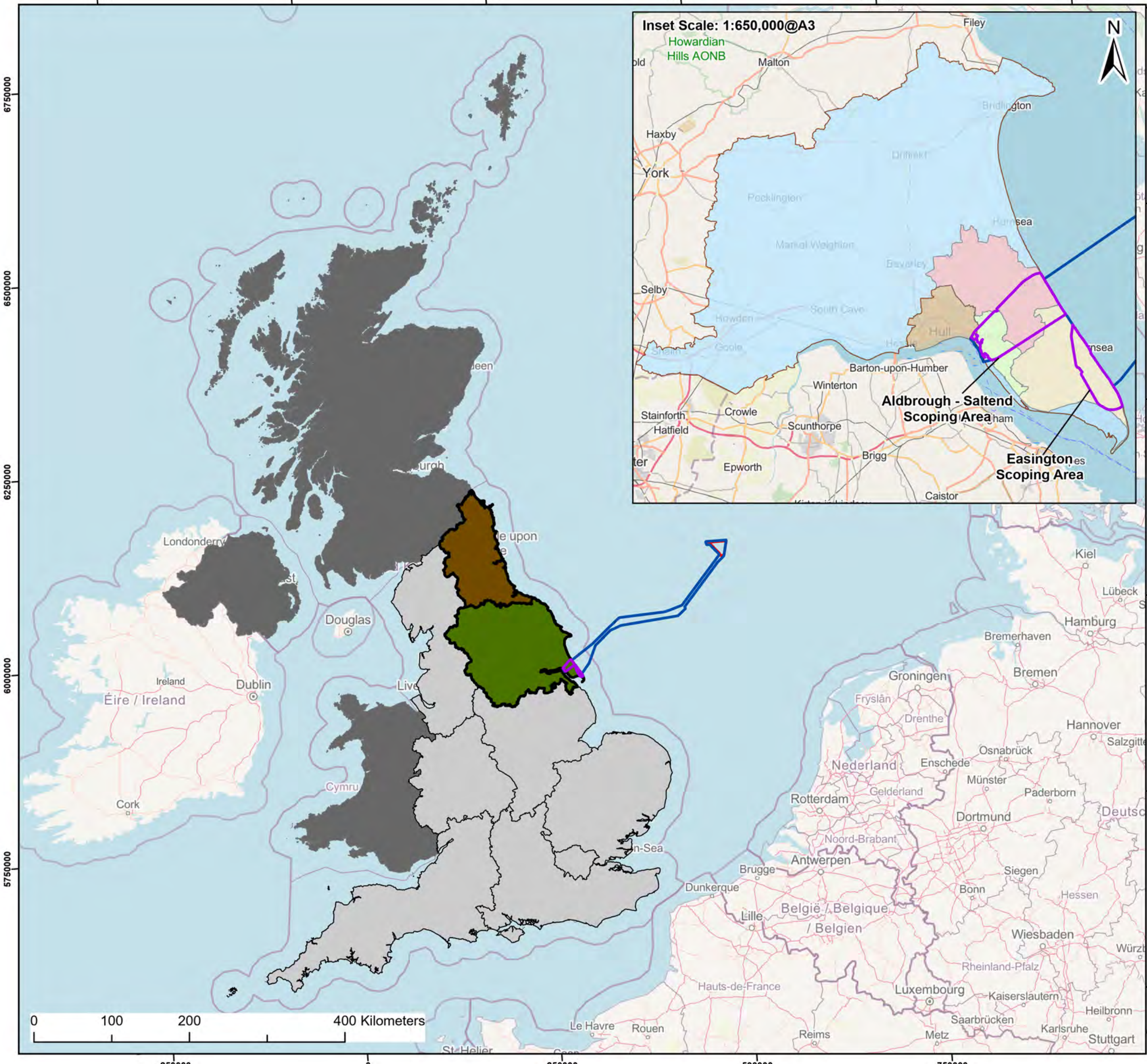
- Local Health Study Areas: East Riding of Yorkshire and City of Kingston upon Hull;
- Regional Health Study Areas: Yorkshire and Humber and the North East;
- National Health Study Areas: England and wider United Kingdom; and
- International Health Study Area: Global population.

1418. For offshore activities relating to the construction, operation and decommissioning of the wind farm infrastructure, the only likely significant population health effects relate to the port activities required to support the wider offshore activities. As a specific port location to support construction, operation and decommissioning has not currently been identified, this is indicatively the Regional Health Study Areas of Yorkshire and Humber and the North East.

1419. National and international populations are included to consider the wider climate change and renewable electricity generation implications of the Project for public health.

1420. The wider determinants of health and health inequalities are key considerations when undertaking an assessment of human health as part of EIA. The following population groups are present and will be considered:

- The ‘general population’, including residents, workers, service providers and service users; and
- The ‘vulnerable group population’, including potential vulnerability due to young age, older age, low income, poor health status, social disadvantage, restricted access or geographic proximity to proposed development’s activities.



Legend:

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

Regional Health Study Area

- Yorkshire and The Humber
- North East

National Health Study Area

- England
- Wider United Kingdom

Local Health Study Area

- City of Kingston upon Hull
- East Riding of Yorkshire

Site-Specific Health Study Area

- Mid Holderness
- South East Holderness
- South West Holderness

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Human Health Study Area

Figure: 9-1

Drawing No: PC3991-RHD-ON-ZZ-DR-Z-0076

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Co-ordinate system: British National Grid

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9.2.2 Existing Environment

1421. The following section discusses baseline data set out in **Table 9-1**. The data is from the Office for Health Improvement and Disparities (OHID) Fingertips Local Health data tool, accessed on 16th February 2023. At this stage, baseline indicators have been selected to provide a general coverage of the wider determinants of health. The Preliminary Environmental Information Report (PEIR) / Environmental Statement (ES) will report on further data.

1422. In terms of population age profile, compared to the national average, there are fewer young people, similar numbers of working age people and more older people in South West Holderness, South East Holderness and Mid Holderness. In all these areas the proportion whose ethnic group is not white or who cannot speak English is much lower than the national average.

1423. Overall health can be informed by life expectancy indicators. Compared to the national average, life expectancy at birth for men is better in South West Holderness and Mid Holderness and worse in South East Holderness. For women, life expectancy at birth is better than the national average in Mid Holderness, but worse in South West Holderness and South East Holderness.

1424. Deprivation can be used as a health resilience indicator. Compared to the national average, income deprivation is lower (better) in South West Holderness and Mid Holderness, but worse in South East Holderness.

1425. In South West Holderness, South East Holderness and Mid Holderness there is a lower percentage of people living alone and a lower population density than the national average. Compared to the national average, there are more people living in fuel poverty in South East Holderness and Mid Holderness, and fewer in South West Holderness.

1426. Unemployment is similar to the national average in South East Holderness compared, but lower in South West Holderness and Mid Holderness. Long term unemployment is also lower in South West Holderness and Mid Holderness, but much higher than the national average in South East Holderness.

1427. The proportion of the population with a limiting long term illness or disability is higher than the national average in South West Holderness, South East Holderness and Mid Holderness.

1428. Obesity is relevant to open space and active travel related outcomes. The prevalence for children of school reception age of being overweight or obese is better than the national average in South West Holderness, South East Holderness and Mid Holderness. For Year 6 children, the prevalence of being overweight or obese is similar to the national average for South West Holderness, South East Holderness and Mid Holderness.

1429. Compared to the national average, emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) (a respiratory health indicator) and self-harm (a mental health indicator) are lower (better) in South West Holderness and Mid Holderness and higher (worse) in South East Holderness.

1430. Compared to the national average, mortality rates for people under 75 years old, including for all causes, cancer, circulatory disease and all causes considered preventable, are lower (better) in South West Holderness and Mid Holderness and higher (worse) in South East Holderness.

1431. Overall, at the site-specific level (ward data) the health baseline indicates that on most measures South West Holderness and Mid Holderness have better, and South East Holderness worse, health outcomes compared to national comparators. At the local level, health outcomes are better on most measures in East Riding of Yorkshire compared to City of Hull. At the regional level, Yorkshire and Humber has similar or slightly worse health outcomes on most measures compared to national comparators. A similar trend is also apparent for the North East, though the difference in health outcomes is typically greater compared to national measures.

Table 9-1: Health Baseline (OHID, 2023)

Indicators	Site-Specific (Wards)			Local		Regional		National
	South West Holderness	South East Holderness	Mid Holderness	East Riding of Yorkshire	City of Hull	Yorkshire and Humber	North East	England
Population aged 0 to 15 years (%)	15.2	16.5	14.5	16.3	20.2	19.2	19.4	19.2
Population aged 16 to 64 years (%)	56.0	54.5	57.2	57.3	64.6	62.1	62.8	62.3
Population aged 65 years and over (%)	28.7	29	28.2	26.4	15.2	18.9	17.9	18.5
Population whose ethnic group is not 'white' (%)	0.9	1.1	0.9	1.9	5.9	11.2	1.6	14.6
Population who cannot speak English well or at all (%)	0.1	0.2	0.1	0.4	1.8	1.6	0.4	1.7
Life expectancy at birth for males (years)	80.0	78.2	82.3	80	75.6	N/A	75.5	79.5

Indicators	Site-Specific (Wards)			Local		Regional		National
	South West Holderness	South East Holderness	Mid Holderness	East Riding of Yorkshire	City of Hull	Yorkshire and Humber	North East	England
Life expectancy at birth for females (years)	82.9	81.5	87	83.6	80	N/A	79.3	83.2
Income deprivation (%)	8.2	18.2	8.1	9.6	22.7	14.6	17.6	12.9
Older people living alone (%)	25.5	27.7	24.6	27.3	36.6	32.2	30.1	31.5
Households in fuel poverty (%)	12.5	20.5	14.9	14.7	20.8	17.5	21.9	13.2
Population density (Crude rate)	266.6	78.1	62.9	142.5	3626.7	358.7	580.9	434.1
Unemployment (%)	3.1	5.3	2.7	3.3	8.0	N/A	4.8	5
Long term unemployment (Crude rate per 1000)	1.4	4.7	1.3	1.9	7.5	N/A	1.9	1.9
Limiting long term illness or disability (%)	19.2	24.6	18.5	19.1	19.7	18.8	26.5	17.6
Reception: Prevalence of overweight (including obesity) (%)	14.7	14.8	12.7	18.2	28.7	N/A	N/A	22.6
Year 6: Prevalence of overweight (including obesity) (%)	34.1	34.6	33.8	31.0	37.2	N/A	N/A	34.6
Emergency hospital admissions for COPD (Standardised admission ratio (StAR)	90.9	146.4	58.6	79.8	222.7	118.2	249.6	100

Indicators	Site-Specific (Wards)			Local		Regional		National
	South West Holderness	South East Holderness	Mid Holderness	East Riding of Yorkshire	City of Hull	Yorkshire and Humber	North East	England
Emergency hospital admissions for intentional self-harm (StAR)	68.6	114.2	55.2	83.7	132.0	103.1	154.4	100
Deaths from all causes under 75 years (Standardised mortality ratio (StMR))	94.7	121.9	70.4	89.0	146.4	110.1	143.8	100
Deaths from all cancer under 75 years (StMR)	94.1	122.1	78.5	93.6	129	106.7	124.6	100
Deaths from circulatory disease under 75 years (StMR)	86.5	137.3	67.8	90.3	156.4	113.2	139.3	100
Deaths from causes considered preventable under 75 years (StMR)	88.3	119.9	63.4	82.6	162.6	113.5	139.0	100

9.2.3 Potential Impacts

1432. Consideration has been given to how population health, including the potential for health inequalities, may be affected by changes in health-related behaviours, the social environment, the economic environment, the bio-physical environment and the institutional and built environment. Details of the determinants of health and population groups considered are set out in the Institute of Environmental Management and Assessment (IEMA) guide: *'Effective Scoping of Human Health in Environmental Impact Assessment'* (2022). In accordance with keeping a proportionate focus on the likely significant effects of the Project, any health determinants considered in the IEMA 2022 guidance on health in EIA which are not covered within this chapter are scoped out of the EIA.

9.2.3.1 Potential Impacts during Construction

1433. This section has considered the potential for likely and significant population health effects from the Project's construction activities. Construction details are set out in **Chapter 3 Project Description**, but broadly relate to:

- Offshore works in the Array Area, including wind turbine foundations, assembly and commissioning;
- Offshore electrical infrastructure, including Offshore Substation Platform (OSP) foundations, assembly and commissioning and laying of inter-array cables and offshore export cables in the construction cable corridor;
- Landfall electrical infrastructure, including Horizontal Directional Drilling (HDD) for the offshore export cables, construction of the Transition Joint Bay (TJB) and associated construction compound;
- Onshore export cables, including cables which bring electricity from the TJB at landfall to the HPF; and
- Construction and commissioning of the HPF.

9.2.3.1.1 Social Environment: Housing

1434. No new housing is proposed. The workforce will have housing requirements, but it is expected that a high proportion will be resident in the regional area or would be based aboard their vessels unless traveling to their usual place of residence. Any temporary accommodation requirements would be met through usual capacity for such activities around ports. There is not considered to be the potential for a likely significant population health effect associated with changes in the availability of housing. This issue is scoped out of the EIA.

1435. The onshore infrastructure locations and built form are considered to have limited potential for any widespread adverse effect on housing value or affordability that could affect public health. This issue is scoped out of the EIA.

9.2.3.1.2 Social Environment: Open Space, Leisure and Play

1436. Consideration has been given to the influences on nearshore recreation, leisure and play, e.g. sailing and other water sports. It is considered unlikely that shipping or port activities associated with the Project would affect such activities to an extent where there could be significant implications for public health. These issues are scoped out of the EIA.

1437. Project construction activities have the potential to cause disruption and disturbance leading to behavioural change, reducing the level of use of leisure and recreation facilities, affecting physical activity and wellbeing outcomes. This potential impact could affect coastal and inland populations of residents and visitors.

1438. Onshore works may lead to temporary disruption of public open spaces (including beaches) and Public Rights of Way (PRoW), potentially affecting recreational activities. Temporary construction disruption to green open space access (e.g. publicly accessible woods and fields) and blue open space (e.g. publicly accessible beaches or surface water bodies) is scoped into the EIA. This includes considering the need for any temporary or permanent provision for alternative space or access.

9.2.3.1.3 Social Environment: Transport Modes, Access and Connections

1439. Although a project port has not been determined, it is considered reasonable to assume that an existing major port would be selected with appropriate existing consents that have taken transport, noise and air quality impacts into account. Port expansion is not part of the Project being proposed and assessed in this Scoping Report. Environmental port impacts are scoped out of the EIA.

1440. Project activities have the potential to cause disruption and disturbance, including to PRoWs and cycle routes leading to behavioural change in levels of physical activity, driver delay and accidents and safety. This potential impact could affect coastal and inland populations of residents and visitors.

1441. There may be onshore effects to active travel due to temporary diversions of PRoWs and cycle routes during construction and this impact is scoped into the EIA. This issue will be informed by the findings of the traffic and transport assessment, for example if no such diversions are required. There is the potential that construction works may also disrupt local vehicle traffic (private and public transport). Informed by the traffic and transport assessment, the human health assessment will consider the potential for significant population health effects due to changes in routine or emergency health related journey travel times, access to health promoting goods and services, community severance or road safety.

9.2.3.1.4 Social Environment: Community Safety

1442. The offshore workforce is not expected to spend extended periods within port, or other UK, communities. The port workforces are assumed to be predominantly existing residents within the regional area, commuting to work and returning home between shifts. The HPF would require a skilled professional workforce, many of whom are expected to be existing residents within the regional area. There are not anticipated to be community safety or security issues associated with worker behaviour in ports or communities. The Project would operate appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime, or issues linked to risk taking behaviour, that could affect population health is unlikely. These issues are scoped out of the EIA.

9.2.3.1.5 Social Environment: Community Identity, Culture, Resilience and Influence

1443. Offshore visual impacts of the Project are not expected due to the distance of the wind turbines to shore being, at its closest, approximately 210km. Demographic changes that could affect community identity are not anticipated, as there would not be a large in-migration or out-migration of workers to local communities. These issues are scoped out of the EIA.

1444. Temporary construction and decommissioning of onshore infrastructure, including landfall HDD, the TJB and the HPF, are not expected to be of a scale of visual impact that could affect population health outcomes. Transient effects along the onshore ECC, including due to temporary lighting and temporary changes in views, are not expected to influence community identity or disrupt community gatherings. These issues are scoped out of the EIA.

9.2.3.1.6 Economic Environment: Education and Training

1445. Project activities have the potential for educational opportunities and support, leading to increases in socio-economic status and other outcomes influential for physical and mental health. The benefits extend to the local population, particularly young adults commencing employment.

1446. Construction of the offshore and onshore infrastructure for the Project would support sizable workforces with upskilling and career development opportunities. Such opportunities may include apprenticeships and adult learning, with transferable skills between the construction and operation phases. Such impacts are scoped into the EIA to consider how opportunities could be targeted for local and vulnerable groups to increase the public health benefit.

9.2.3.1.7 Economic Environment: Employment and Income

1447. Project activities have the potential to cause changes in direct and indirect jobs and economic activity, with good quality employment (including wage, working conditions and job stability) providing more health supporting resources. The opportunities would relate to people of working age and their dependants.

1448. Construction related to the Project's offshore and onshore infrastructure will provide opportunities for employment during construction. The human health assessment will consider the potential population health effects of direct and indirectly employment, including opportunities to enhance benefits for local and vulnerable groups, therefore this is scoped into the EIA.

1449. It is not anticipated that significant unemployment or adverse economic implications will occur during the construction phase, and this includes any potential adverse effects to commercial fisheries. Noting that consultation with key stakeholder groups will take place through best practice such as the Fisheries Liaison with Offshore Wind and Wet Renewables group (FLOWW) Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. Therefore, such issues are scoped out of the EIA.

9.2.3.1.8 Bio-Physical Environment: Climate Change and Adaptation

1450. During construction and decommissioning, the wind farm, HPF and associated infrastructures' embodied carbon and climate altering pollutant emissions are not of a scale to have the potential for population level effects associated with climate change. This issue is scoped out of the EIA.

9.2.3.1.9 Bio-Physical Environment: Water Quality or Availability

1451. Offshore pollutant spills are unlikely to affect coastal bathing water quality. All vessels will comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. A Project Environmental Management Plan (PEMP) (or similar) will be put in place to ensure all works are undertaken in line with best practice for working in the marine environment. This issue is scoped out of the EIA.

1452. A number of water impacts from onshore works are set out in **Chapter 8.4 Water Resources and Flood Risk** impacts associated with contamination of surface and groundwater are scoped out based on best practice measures in order to control pollution, therefore this is also scoped out of the health assessment within the EIA.

9.2.3.1.10 Bio-Physical Environment: Land Quality

1453. Offshore works would not affect land quality. Any mobilisation of seabed historic contaminants would be managed by standard best practice response measures discussed in the marine water and sediment quality assessment. Port activities are unlikely to result in public exposures to contaminated soils. Any new or historic contamination that may be mobilised activities will be managed by standard best practice contamination avoidance and response measures secured through management plans, including to mitigate against dust and aerosol exposure pathways. Ground condition and soil effects are scoped out of the EIA. Risks of new or historic pollutant mobilisation, including direct exposure and food contamination, are highly likely to be addressed by standard good practice mitigation measures that would be secured through management plans. This topic is scoped out of the EIA.

1454. Any mobilisation of seabed historic contaminants during construction and decommissioning would be managed by standard best practice response measures discussed in the marine water and sediment quality assessment (see **Chapter 7.3 Marine Water and Sediment Quality**). Port activities are unlikely to result in public exposures to contaminated soils. Any new or historic contamination that may be mobilised activities will be managed by standard best practice contamination avoidance and response measures secured through management plans, including to mitigate against dust and aerosol exposure pathways. These issues are scoped out of the EIA.

9.2.3.1.11 Bio-Physical Environment: Air Quality

1455. Due to the distance from a receptor population, offshore air quality effects to human health during construction and decommissioning are scoped out of the EIA, as per **Chapter 7.14 Offshore Air Quality.** Port activities would generate air pollutants, but this is not expected to be of a scale, timing or character that differs from existing consented operational port levels.

1456. Project construction activities have the potential to cause changes in air pollutants (particularly nitrogen dioxide (NO_2), particulate matter (PM), including $PM_{2.5}$ and PM_{10}), which may affect respiratory and cardio-metabolic outcomes. This potential impact could affect residents and long term occupiers of nearby properties and community buildings.

1457. The health impacts from changes to onshore air quality during the construction phase, including dust, are scoped into the EIA. The human health chapter will be informed by the air quality assessment for the Project. UK statutory limits, i.e. health protection standards, will be used as a benchmark. The potential for non-threshold health effects of some air pollutants will be discussed and taken into account.

9.2.3.1.12 Bio-Physical Environment: Noise and Vibration

1458. Due to the distance from a receptor population, offshore noise effects to human health during construction and decommissioning are scoped out of the EIA, as per **Chapter 7.15 Offshore Airborne Noise**. Port activities would generate noise, but this is not expected to be of a scale, timing or character that differs from existing consented operational port levels.

1459. Project activities have the potential to generate noise from activities and vehicle movements, which may affect mental wellbeing, sleep disturbance and educational outcomes. This potential impact could affect residents and long term occupiers of nearby properties and community buildings.

1460. Noise associated with construction of the onshore infrastructure is scoped into the EIA. The human health assessment will be informed by the noise and vibration assessment of changes to daytime and night-time noise (further information provided in **Chapter 8.8 Onshore Noise and Vibration**). Consideration will be given to population health effects, for example related to annoyance and sleep disturbance.

9.2.3.1.13 Bio-Physical Environment: Electro-Magnetic Field (EMF)

1461. Works would not include using, or making changes to, active major electrical infrastructure producing EMF. Relevant public and occupational safeguards, secured through management plans, would be followed for the temporary electrical equipment used. Electric and magnetic fields strengths reduce rapidly with distance, often requiring only a few meters separation between the source and receptor, to reach background levels. No ionising radiation sources are proposed. These issues are scoped out of the EIA.

9.2.3.1.14 Institutional and Built Environment: Health and Social Care Services

1462. The offshore project workforce is assumed to include specialist international suppliers and fabricators to the offshore renewable energy industry as well as subcontractors who are resident in the regional area. The majority of the onshore project workforce would be skilled roles from the Humber region, with a minority of specialist international suppliers and fabricators. Specialist international suppliers and fabricators are assumed to have appropriate insurances or would pay for their healthcare directly where required. The UK workforce would access healthcare under their existing National Health Services (NHS) entitlements.

1463. Offshore, the expectation is that the great majority of healthcare needs of the workforce will be met either by occupational provision aboard their vessel or by their usual healthcare provider when they return to their usual place of residence during rotation. The project programme and workforce assumptions that will be set out in the Health Chapter within the ES would support routine healthcare service planning. No large influx of workers to the local area is anticipated, nor other changes that could cause a step-change in NHS demand. The Project will operate appropriate occupation health services.

1464. Effects on health and social care services are scoped out of the EIA.

9.2.3.1.15 Institutional and Built Environment: Built Environment

1465. Offshore utilities disruption is unlikely, and any crossing of existing power or communications cables would be managed to avoid interruption. Appropriate waste management practices would be used, including regard to the MARPOL regulations on waste at sea. Significant population health implications are not anticipated. This issue is scoped out of the EIA.

1466. Onshore, the potential for the Project to affect existing features of the built environment, such as utilities, that are supportive of population health has been considered and scoped out.

9.2.3.2 Potential Impacts during Operation

1467. This section has considered the potential for likely and significant population health effects from the Project's operation and maintenance (O&M) activities. Details are set out in **Chapter 3 Project Description**, but broadly relate to:

- Offshore maintenance of the wind turbines and of the offshore electrical infrastructure, including the OSP;
- Offshore renewable electricity generation from the wind turbines;
- Onshore O&M activities associated with the HPF and onshore electrical infrastructure; and
- Onshore production of green hydrogen as a renewable societal resource.

9.2.3.2.1 Social Environment: Housing

1468. During operation, the impacts associated with housing are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.1**.

9.2.3.2.2 Social Environment: Open Space, Leisure and Play

1469. During operation, the impacts associated with nearshore recreation, leisure and play, e.g. sailing and other water sports are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.2**.

1470. Land take for onshore infrastructure, (including the TJB, Onshore Converter Station and / or Onshore Substation and the HPF) are not anticipated to be within, or adjoining, land that is publicly accessible and used for recreation, leisure or play. Therefore, the Project is unlikely to significantly affect physical, mental or social health aspects of community recreation. This issue is scoped out of the EIA.

9.2.3.2.3 Social Environment: Transport Modes, Access and Connections

1471. During operation, port impacts are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.3**.

1472. It is anticipated that the HPF would be permanently staffed and there may be the requirement for export of oxygen via the road network (as well as hydrogen via a pipeline). Road transport implications for population health are scoped into the EIA and will consider the outcomes of the traffic and transport assessment.

9.2.3.2.4 Social Environment: Community Safety

1473. During operation, the impacts associated with community safety are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.4**.

9.2.3.2.5 Social Environment: Community Identity, Culture, Resilience and Influence

1474. During operation, the impacts associated with offshore visual impacts and community identity are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.5**.

1475. Project activities have the potential to cause visual change influencing community identity, this can lead to changes in behaviour and a sense of identity, affecting mental wellbeing. Receptors are residents in the local communities.

1476. Onshore, there is the potential that the design and context of the HPF could result in a change to the character and identity of local communities, affecting mental health. This impact is scoped into the EIA and will be informed by the landscape and visual impact assessment (LVIA).

9.2.3.2.6 Economic Environment: Education and Training

1477. O&M activities associated with the offshore infrastructure for the Project would support sizable workforces with upskilling and career development opportunities. This may include apprenticeships and adult learning, with transferable skills between construction and operation and maintenance phases. Such impacts are scoped into the EIA to consider how opportunities could be targeted for local and vulnerable groups to increase the public health benefit.

1478. Onshore, operation of the HPF will involve long term good quality green economy upskilling and career development opportunities. The opportunity to target these to the local community will be explored to enhance the population health benefit, including for dependants, therefore this is scoped into the EIA.

9.2.3.2.7 Economic Environment: Employment and Income

1479. O&M activities associated with the offshore infrastructure for the Project will provide opportunities for good quality employment (including wage, working conditions and job stability). The human health assessment will consider the potential population health effects of direct and indirect employment, including opportunities to enhance benefits for local and vulnerable groups, therefore this impact is scoped into the EIA.

1480. The operation of the HPF will involve long term good quality green economy jobs. This includes direct, indirect and induced employment. The opportunity to target these to the local community will be explored to enhance the population health benefit, including for dependants, therefore this is scoped into the EIA.

1481. It is not anticipated that significant unemployment or adverse economic implications will occur during the operation phase, and this includes any potential adverse effects to commercial fisheries. Noting that consultation with key stakeholder groups will take place through best practice such as the FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. Therefore, such issues are scoped out of the EIA.

1482. During operation, the impacts associated unemployment or adverse economic implications are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.7.**

9.2.3.2.8 Bio-Physical Environment: Climate Change and Adaptation

1483. The Project would produce renewable energy during the operation of the wind farms, which contributes to a reduction in climate-altering pollutants associated with climate change. Population health is influenced by temperature, crop yields, productivity and disease prevalence. The effects would extend to the international global population, particularly deprived populations in low- and middle-income countries.

1484. The Project would be a part of a wider energy sector transition that reduces the severity of climate change. The offshore electrical generation, dependent on the development option taken forward for construction (as discussed in **Chapter 1 Introduction**), would allow for renewable electricity provision to the UK grid or green hydrogen production at the proposed onshore HPF for various end uses, both with wider decarbonisation benefits. The benefits to population health will be discussed, including reducing adverse physical and mental health effects of climate change for deprived populations, particularly in low- and middle-income countries globally. This will be informed by the outcome of the climate change assessments (further information provided within **Chapter 9.4 Climate Change**). Therefore, health benefits associated with climate change and adaptation are scoped into the EIA.

9.2.3.2.9 Bio-Physical Environment: Air Quality

1485. During operation, the impacts associated with offshore air quality are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.11**.

1486. Potential onshore operational air quality emissions from the HPF associated with emissions from the back-up power facility are scoped into the EIA. The human health chapter will be informed by the Project's air quality assessment, including in relation to emissions from plant and vehicles. The scope also includes considering the public health implications of potential large scale oxygen emissions as a by-product of hydrogen production. Being a relatively new technology, the literature on this issue will be considered and commentary provided.

9.2.3.2.10 Bio-Physical Environment: Water Quality or Availability

1487. During operation, the impacts associated with offshore pollutant spills affecting coastal bathing water are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.9**.

1488. Project activities have the potential to affect water utilisation, which may affect the availability of potable water for drinking and other purposes, influencing physical and mental health. This potential impact could affect local residents.

1489. The HPF will require large quantities of water as an input material. The effect on availability of public water supplies is scoped into the EIA. It is likely that water abstraction and / or water treatment will be required. However, full details of water source(s) are not available at this stage in the Project, and the source(s) of water will be confirmed later in the EIA process.

1490. At this stage the potential for water discharge(s) from the HPF are scoped into the EIA, for example discharge of treated wastewater could adversely affect water quality in receiving surface water catchments, and if desalination is required, wastewater (potentially warm brine) would be discharged to the marine environment. The human health assessment will be informed by the findings of the marine water and sediment quality assessment and the water resources and flood risk assessments (further information provided in **Chapter 7.3 Marine Water and Sediment Quality** and **Chapter 8.4 Water Resources and Flood Risk**).

9.2.3.2.11 Bio-Physical Environment: Land Quality

1491. During operation, the impacts associated with land quality are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.10**.

9.2.3.2.12 Bio-Physical Environment: Noise and Vibration

1492. During operation, the impacts associated with offshore noise are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.12**.

1493. The potential operational noise impacts of the HPF are scoped into the EIA to consider the potential for a population health effect.

9.2.3.2.13 Bio-Physical Environment: Electro-Magnetic Field

1494. Offshore electrical infrastructure, including the OSP, are not located in proximity to communities. Relevant occupational safeguards would be followed. No EMF risk is therefore likely for offshore aspects of the Project. For onshore electrical infrastructure, including the TJB, onshore converter station and/or onshore substation, and any electrical infrastructure within the HPF, the 'actual EMF' risks are scoped out of the EIA on the basis that the Project would adopt the International Commission on Non-ionizing Radiation Protection (ICNIRP) guidelines and Government Voluntary Code of Practice on EMF public exposure. Such considerations are inherent to the detailed engineering considerations of cable specification and routeing. Relevant public EMF exposure guideline limits are noted in National Policy Statement (NPS) for Electricity Networks Infrastructure (EN-5) and would be complied with by the Project. These guidelines are long standing and have a high safety margin. The levels of exposure that they require would not pose a risk to public health. In addition, no ionising radiation sources are proposed. Actual physical health risks of non-ionising EMF effects are scoped out of the EIA.

1495. In addition to the actual physical health risk, project activities would introduce electrical equipment, which may lead to concern about field strength affecting mental health for some residents in the local community, particularly those living in close proximity to new electrical infrastructure. The project will engage with the local community surrounding the HPF providing information on the EMF generated during the operation of the facility, along with the controls put in place to limit these through the health protection standard, through provisions of timely and non-technical information on how actual health risks are mitigated. Therefore public understanding of the risk in relation to operational EMF is proposed to be scoped out of the EIA.

9.2.3.2.14 Institutional and Built Environment: Health and Social Care Services

1496. During operation, the impacts associated with health and social care services are considered to be scoped out for the same reasoning as that set out for the construction phase, see **Section 9.2.3.1.14**.

9.2.3.2.15 Institutional and Built Environment: Built Environment

1497. The distance offshore means there is very limited direct impacts on human receptors from marine infrastructure. Offshore operational activities are not considered to have waste management, land use or infrastructure use implications on a scale that could affect population health. Therefore, offshore effects on the built environment during operation are scoped out of the EIA.

1498. As a built environment change, the Project would produce hydrogen (as part of the Hydrogen Option), which could lead to concern about fire or explosion risk, affecting mental health and wellbeing for some residents in the local community.

1499. Onshore, in line with good practice, public understanding of risk in relation to the operational HPF are scoped into the EIA. Being a relatively new technology, the assessment will explain how the risks of fugitive gases and accident risk are appropriately responded to in order to avoid / reduce any widespread community concern that could affect mental health. For example, how the Project responds to oxygen venting and hydrogen production that could pose fire risk, including exacerbating back-up battery storage fire risk. The human health assessment will consider the potential for mental health effects and how these can be avoided or reduced through provisions of timely and non-technical information on how actual health risks are mitigated.

9.2.3.3 Potential Impacts during Decommissioning

1500. 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.

1501. The same potential impacts identified for construction are therefore expected to be scoped in (and out) of the EIA for decommissioning (as per **Table 9-2**).

9.2.4 Potential Cumulative Effects

1502. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect population health. Therefore, cumulative effects related to human health are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1503. Combined effects of the Project with other reasonably foreseeable schemes will be considered. This will include other wind farms and other offshore works that may affect transport, visual impacts, employment and energy generation. It will also include onshore projects that strongly influence the demographics of the Site-Specific Study Areas, such as large new residential developments. Consideration will also be given to projects that due to their scale, timing and location may cumulatively affect access to services or amenities, e.g. due to increased vehicle transport. To support consistency and avoid duplication, the human health assessment will be informed by cumulative assessments undertaken by other EIA topic chapters.

1504. There will also be a consideration of the intra-related effects of the Project. The latter will consider how the same population may be affected by change in more than one health determinant, for example the combined effects of changes in air quality and noise on a population’s health outcomes.

1505. Where proportionate, the need for further mitigation and / or monitoring will be considered, including relevant governance.

9.2.5 Potential Transboundary Effects

1506. There is not considered to be the potential for likely significant transboundary population health effects due to the Project's construction, operation or decommissioning activities. For example, although there will be international elements to the supply chain of each phase and potentially also the workforces, these changes, including use of ports in other jurisdictions, would be small and diffuse effects in the context of those national level markets. International ports, if used, can reasonably be assumed to be operating within their own consented levels of activity and associated permits. Any activity outside of such existing consents would be subject to separate applications that are not within the scope of the EIA.

1507. In relation to direct and indirect employment through the Project's supply chain, the Project would operate appropriate policies in accordance with current regulation and good practice, including in relation to general employment and avoiding issues of discrimination. Appropriate policies and standards are expected for contractors, including in transboundary contexts. On this basis there are unlikely to be likely significant transboundary population health effects.

1508. The international scope of climate change impacts on the health of global populations is noted within the assessment of operational impacts, and this will not be discussed as a separate transboundary issue. Therefore, transboundary effects related to human health are scoped out of the EIA.

9.2.6 Summary of Scoping Proposals

1509. **Table 9-2** outlines the human health 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.

1510. In **Table 9-2**, 'Offshore' relates to effects associated with the wind farm and nearshore / port activities, while 'Onshore' relates to the HPF and associated infrastructure. The list of potential impacts aligns with the determinants of health set out in IEMA guide: Effective Scoping of Human Health in Environmental Impact Assessment (Pyper *et al.,* 2022a).

Table 9-2 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Human Health

Potential Impact	Project Element	Construction	Operation	Decommissioning
Social Environment				
Housing	Offshore and Onshore	X	X	X
	Offshore	X	X	X

Potential Impact	Project Element	Construction	Operation	Decommissioning
Open space, leisure and play	Onshore	✓	X	✓
Transport modes, access and connections	Offshore	X	X	X
	Onshore	✓	✓	✓
Community safety	Offshore and Onshore	X	X	X
Community identity, culture, resilience and influence	Offshore	X	X	X
	Onshore	X	✓	X
Economic Environment				
Education and training	Offshore and Onshore	✓	✓	✓
Employment and income	Offshore and Onshore	✓	✓	✓
Unemployment or Adverse Economic Implications	Offshore and Onshore	X	X	X
Bio-Physical Environment				
Climate change and adaptation	Offshore	X	✓	X
	Onshore	X	✓	X
Air quality	Offshore	X	X	X
	Onshore	✓	✓	✓
Water quality or availability	Offshore	X	✓ (nearshore only if desalination is required)	X
	Onshore	X	✓	X
Land quality	Offshore and Onshore	X	X	X
Noise and vibration	Offshore	X	X	X
	Onshore	✓	✓	✓

Potential Impact	Project Element	Construction	Operation	Decommissioning
Radiation (EMF)	Offshore and Onshore	X	X	X
Institutional and Built Environment				
Health and social care services	Offshore and Onshore	X	X	X
Built environment (hydrogen production)	Offshore	X	X	X
	Onshore	X	✓	X
Cumulative and Transboundary Impacts				
Cumulative impacts	Offshore and Onshore	✓	✓	✓
Transboundary impacts	Offshore and Onshore	X	X	X

9.2.7 Approach to Data Gathering

1511. 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 into the EIA process.

1512. The health receptors for the assessment are populations based onshore. The assessment will focus on the onshore elements of the Project and on the local population within the Human Health Study Areas most likely to be affected.

1513. At PEIR, additional data on health-related statistics will be sought to highlight key sensitivities at the local authority level and for representative wards. The health baseline will be used to characterise the sensitivity of the relevant populations rather than to delineate the extent of particular effects. This is appropriate given that, for example, mental health effects may extend well beyond the actual area of environmental change or socio-economic benefit.

1514. Key data sources for the PEIR / ES human health assessment are set out in **Table 9-3**. Relevant Local Joint Strategic Needs Assessment and Health and Wellbeing Strategy data will also be reviewed.

Table 9-3 Desk-Based Data Sources for Human Health

Data Source	Date	Data Contents
OHID Fingertip’s resource	2011 to 2022	Public Health Outcomes Framework, England
Ministry for Housing, Communities and Local Government (MHCLG)	2019	Lower layer super output area (LSOA) resolution data on community deprivation)
Office of National Statistics (ONS) and official labour market statistics (NOMIS) statistics.	2011 to 2021	Census data (2021 used where released at time of baseline work).

1515. No baseline human health surveys are proposed to be undertaken as part of the assessment. The human health assessment will bring together the conclusions of the assessments made in other relevant chapters of the EIA and explain their implications for public health.

9.2.8 Approach to Assessment

1516. The assessment will have regard to the following standards and guidance:

- IEMA 2022 guidance on Health in EIA Series: Effective Scoping of Human Health in Environmental Impact Assessment (Pyper *et al.,* 2022a) and Determining Significance for Human Health in Environmental Impact Assessment (Pyper *et al.,* 2022b);
- Institute of Public Health (IPH), Guidance, Standalone Health Impact Assessment and Health in Environmental Assessment 2021 (Institute of Public Health, 2021);
- International Association for Impact Assessment (IAIA) and European Public Health Association. A reference paper on addressing Human Health in EIA (IAIA, 2020) and academic discussion of the same (Cave, Pyper, Fischer-Bonde, Humboldt-Dachroeden, & Martin-Olmedo, Lessons from an International Initiative to Set and Share Good Practice on Human Health in Environmental Impact Assessment, 2021);
- Public Health England, Advice on the content of Environmental Statements accompanying an application under the Nationally Significant Infrastructure Planning (NSIP) Regime 2021. (Public Health England, 2021);
- Public Health England, Health Impact Assessment in Spatial Planning 2020 (Public Health England, 2020); and
- World Health Organisation (WHO) guidelines on air quality and noise (Berglund, Lindval, Schwela, and Organization, 1999; WHO, 2009; WHO, 2018; WHO, 2021).

1517. The chapter will use the WHO’s definition of health, which states that health is a: ‘state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity’ (WHO, 1948).

1518. The chapter will also use the WHO's definition for mental health, which states that mental health is a: 'state in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community' (WHO, 2007).

1519. The human health assessment steps and method will align with the IEMA 2022 guidance on Determining Significance for Human Health in Environmental Impact Assessment. (Pyper *et al.,* 2022b)

1520. Human health 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 scope and the specific assessment methods of the human health chapter.

9.2.9 Scoping Questions to Consultees

1521. The following questions are posed to consultees to help them frame and focus their response to the human health scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the likely and potentially significant impacts on population health resulting from the Project been identified in the Scoping Report?
- Do you agree with the determinants of health and population groups 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?

9.3 Socio-Economics, Tourism and Recreation

1522. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with socio-economics, tourism and recreation, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, the offshore export cable corridor (ECC), the onshore ECC, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1523. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

1524. The socio-economics, tourism and recreation assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the Environmental Impact Assessment (EIA):

- **Chapter 7.8 Commercial Fisheries;**
- **Chapter 7.9 Shipping and Navigation;**
- **Chapter 7.12 Seascape, Landscape and Visual Impact;**
- **Chapter 7.13 Other Marine Users;**
- **Chapter 8.5 Soils and Land Use;**
- **Chapter 8.7 Onshore Archaeology and Cultural Heritage;**
- **Chapter 8.8 Onshore Noise and Vibration;**
- **Chapter 8.9 Traffic and Transport;**
- **Chapter 8.10 Landscape and Visual Impact;** and
- **Chapter 9.2 Human Health.**

9.3.1 Study Area

1525. Socio-economic impacts, including employment supported and any potential tourism and recreation effects, are less constrained by geography than other environmental impacts, such as noise or ecology.

1526. The study areas for the assessment of socio-economic impacts have been defined in line with the guidance on identification of 'local areas' for offshore developments published by the Scottish Government (2022). Although this guidance will not apply in England, the principles for identifying the areas are universal and can be applied anywhere. The core principle of this guidance is that the 'local areas' identified should be specific to the socio-economic impact identified. Therefore, the study areas used for the assessment of economic impacts, such as employment and Gross Value Added (GVA), are different from those used to assess the impacts on tourism and recreational assets.

1527. The Socio-Economic Study Areas are defined based on the following six principles:

- Principle 1 (Dual Geographies) - The local area for the supply chain and investment impacts should be separate from the local area(s) for wider socio-economic impacts, including tourism and recreation;
- Principle 2 (Appropriate Impacts) - The appropriate impacts to be considered for assessment should be identified before defining the local areas;
- Principle 3 (Epicentres) - The local areas should include all the epicentres of the appropriate impacts, where an epicentre is defined as an onshore location where major activities occur such as a port, supply chain cluster or the location of onshore infrastructure;
- Principle 4 (Accountability) - The local areas used in the assessment should comprise of pre-existing economic or political geographies (community councils, local authorities, development agencies) to enhance accountability;
- Principle 5 (Understandable) - The local areas should be defined in such a way that they are understandable to the communities they describe; and
- Principle 6 (Connected Geography) - The local area for the supply chain and investment impacts should consist of connected (including coastal) pre-existing economic or political geographies.

1528. The ports that will be used during the construction and operation phases have not been decided yet, however the location of the Onshore Scoping Area for siting of the HPF is known and this has been used to define the study areas. To ensure that the geographies for the socio-economic impact assessment are accountable through their elected representatives and understandable, local authorities have been used as the building blocks of the Socio-Economic Study Areas. It is proposed three study areas are included within the assessment of economic impacts to capture local, regional and national impacts.

1529. Based on the guidance on local areas for offshore developments, the following study areas will be considered with respects to socio-economic impacts (**Plate 9-1**):

- the Local Socio-Economic Study Area, including:
    - East Riding of Yorkshire; and
    - Kingston upon Hull.

- the Regional Study Area, including:
    - East Midlands;
    - North East of England; and
    - Yorkshire and the Humber.
- the UK.

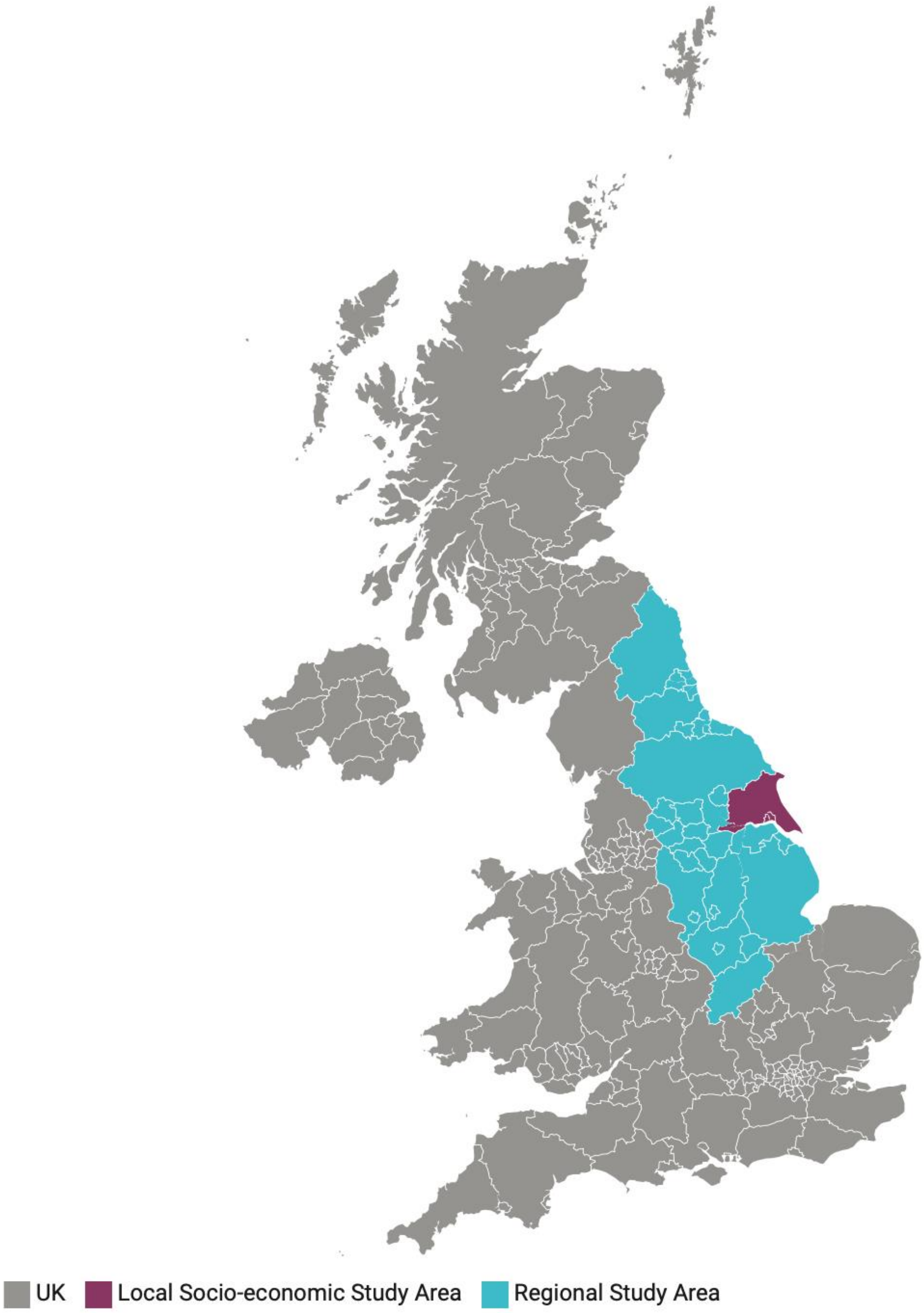

Plate 9-1 Socio-Economic Study Areas

1530. Note that all impacts will be considered inclusively, for example the impacts in the UK will include those within the Regional Study Area.

1531. The Regional Study Area will allow consideration of wider impacts from construction activity. Including the UK as a study area makes it possible to appraise the full scope of the economic impacts associated with the Project and will align the assessment with future economic analysis of the Project, such as potential Contracts for Difference (CfD) Supply Chain Plans.

1532. Were the construction port location not to be within the Regional Study Area, the study areas will be redefined to take this into account.

1533. For the purposes of the tourism and recreation assessment, the study area identified is more localised and has been defined by aggregating the electoral wards within which the three site options (Aldbrough, Saltend and Easington) fall. On this basis, the Tourism and Recreation Study Area includes:

- Bridlington Central and Old Town;
- Bridlington North;
- Bridlington South;
- East Wolds and Coastal;
- North Holderness;
- Mid Holderness;
- South West Holderness; and
- South East Holderness.

9.3.2 Existing Environment

9.3.2.1 Tourism and Recreation Study Area

1534. The Tourism and Recreation Study Area has a population of 106,984 people and is within East Riding of Yorkshire.

1535. Of the population in the Tourism and Recreation Study Area, 54% are aged between 16 and 64 (compared to the UK average of 62%) and the number of working age people in the area has decreased by 9% since 2011 (Office of National Statistics (ONS), 2022c). The largest employment sectors are manufacturing, which accounts for 20% of the workforce, wholesale, and retail trade, accommodation and food service activities and human health and social work activities all account for 14% of employment.

9.3.2.2 Socio-Economic Study Areas

1536. The Local Socio-Economic Study Area has a population of 602,300 people, or around 5% of the total population of the Regional Study Area.

1537. Of the population living in the Local Socio-Economic Study Area, 60% are aged between 16 and 64 years of age. This is a lower share than across the Regional Study Area (62%) and the UK (62%). The share of the working age population that is economically active in the Local Socio-Economic Study Area is 78% and the unemployment rate is 4% (compared to the UK average of 77% and 5%) (ONS, 2022a).

1538. Based on their share of total employment among people of working age, the largest sectors in the Local Socio-Economic Study Area are manufacturing (16%), human health and social work activities (14%), and wholesale and retail trade (14%). While employment in wholesale and retail is similar across the UK, the relative share of employment in manufacturing across the Local Socio-Economic Study Area is more than double the UK average (7%) (ONS, 2022b).

9.3.3 Potential Impacts

9.3.3.1 Potential Impacts during Construction

1539. The construction of offshore wind farm projects can have beneficial socio-economic effects in terms of providing employment and continuing to develop the wind energy market at a national level (i.e. encouraging wind energy manufacturers to be based in the UK). However, there are potential adverse impacts on social infrastructure where the Project's components and activities to construct it have an impact on specific receptors, unless they are identified and avoided through micro-siting and mitigation measures.

1540. Construction activity on the offshore wind farm and the onshore HPF is associated with the following potential impacts:

- Direct economic benefit (supply chain);
- Increased employment;
- Loss of, disruption to or pressure on local infrastructure and services;
- Disturbance (noise, air, visual and traffic) to social infrastructure;
- Disruption to recreational activities; and
- Disruption to the tourism industry.

1541. The Project is expected to generate direct economic benefit through its supply chain, including spending on goods and services in the Socio-Economic Study Areas.

1542. The Project is also expected to have an impact through increased employment as well as potential changes to demographics due to national migration and immigration. Employment impacts and considerations surrounding temporary migration will likely influence recruitment strategies.

1543. Effects on onshore and offshore activities which contribute to the existing social and economic characteristics of the study area for tourism and recreation will also be considered and assessed. This may include disturbance from potential air quality, noise, visual and traffic impacts on social infrastructure.

1544. Construction of the Project could also have potential impacts on tourism and recreation assets. This may include activity near the construction port as well as impacts on recreational marine activities.

1545. All potential construction impacts identified above are scoped into the EIA.

9.3.3.2 Potential Impacts during Operation

1546. The impacts assessed for the operation phase of the Project will be as described above for construction. However, it is anticipated that any impacts to the local economy will be more marked during the construction phase, with fewer adverse impacts being predicted on the local economy during the operation phase. There will be ongoing operational impacts associated with the HPF and these will be scoped into the EIA.

1547. The impact of economic benefits and increased employment during the operation phase associated with both onshore and offshore infrastructure are scoped into the EIA.

1548. Impacts on tourism and recreation assets and social infrastructure as a result of the presence of the Project will be scoped into the EIA for the onshore infrastructure. The offshore infrastructure is more than 100km from the coast and therefore it is proposed that impacts associated with tourism and recreation and social infrastructure are scoped out of the EIA for the offshore infrastructure.

1549. The impacts associated with the loss of, disruption to or pressure on local infrastructure and services during the operation phase will be negligible and are therefore scoped out of the EIA. This is because of the lower level of employment supported throughout operations resulting in lower levels of migration.

9.3.3.3 Potential Impacts during Decommissioning

1550. 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.

1551. The same potential impacts identified for construction are therefore expected to be scoped in (and out) for decommissioning (as per **Table 9-4**).

9.3.4 Potential Cumulative Effects

1552. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect socio-economics, tourism and recreation receptors. Therefore, cumulative effects related to socio-economics, tourism and recreation are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1553. Potential cumulative impacts related to socio-economics include clustering effects with other offshore wind developments in the region to potentially boost the local skill-base. Conversely, there is also potential to cumulatively impact on other industries negatively due to displacement of workers currently employed in those industries. This will be considered further in the EIA.

1554. The assessment will also consider any potential cumulative impacts on tourism and recreation assets.

9.3.5 Potential Transboundary Effects

1555. The potential transboundary effects from the Project are likely limited to supply chain opportunities for businesses based outside of the UK. Since such impacts would be beneficial in nature, transboundary effects associated with socio-economics, tourism and recreation are scoped out of the EIA.

9.3.6 Summary of Scoping Proposals

1556. **Table 9-4** outlines the socio-economics, tourism and recreation 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 9-4 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Socio-Economics, Tourism and Recreation

Potential Impact	Construction	Operation	Decommissioning
Direct economic benefit (supply chain)	✓	✓	✓
Increased employment	✓	✓	✓
Loss of, disruption to or pressure on local infrastructure and services	✓	X	✓
Disturbance (noise, air, visual and traffic) to social infrastructure	✓	✓ (Related to onshore infrastructure only)	✓
Disruption to recreational activities	✓	✓ (Related to onshore infrastructure only)	✓
Disruption to the tourism industry	✓	✓ (Related to onshore infrastructure only)	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	X	X	X

9.3.7 Approach to Data Gathering

1557. As part of the EIA process, the existing environment with respect to socio-economics will be described, including, but not limited to the following:

- Regional and local labour market and trends;
- Overview of temporary and rented accommodation supply and trends;
- Current workforce;
- Local and regional population and trends;
- Local and regional employment and trends;
- Education (including special educational needs and school standards); and
- Skills within the Socio-Economic Study Areas.

1558. The data gathering exercise will also include consideration of social infrastructure, including housing and education provision. This will inform the assessment of relative sensitivity of the different study areas to changes in their population with the potential to affect public service provision.

1559. Identification of potential sensitive receptors will be undertaken through a desktop review of tourism and recreational assets within the Tourism and Recreation Study Area.

1560. **Table 9-5** identifies the desk-based sources that will be accessed to inform the characterisation of the existing environment.

Table 9-5 Desk-Based Data Sources for Socio-Economics, Tourism and Recreation

Data Source	Date	Data Contents
ONS Business Register and Employment Survey	2021	Data on sectoral employment
ONS, Annual Business Survey	2022	Data on sectoral turnover and GVA
Offshore Wind Industry Council, People Skills Survey 2021 - 2026	2021	Available skills to fulfil offshore wind contracts
Offshore Wind Industry Council, Collaborating for Growth: Strategies for Expanding the UK Offshore Wind Supply Chain	2020	Approaches to maximising opportunities from the offshore wind supply chain
Oxford Brookes University, Guidance on assessing the socio-economic impacts of offshore wind farms	2020	Guidance on the socio-economic impacts from offshore wind farms
ORE Catapult, Offshore Wind Operations and Maintenance a £9 billion per year opportunity by 2030 for the UK to seize	2020	Evidence on operations and maintenance contracts and opportunities from them
BVG Associates, Guide to an Offshore Wind Farm	2019	Data on offshore wind supply chain
ONS, House Price Statistics for Small Areas (HPSSA)	2021	Data on house prices
ONS, Private rental affordability, England	2021	Data on rental affordability from private sector providers
ONS, Annual Population Survey	2021	Data on economic activity and unemployment rates
ONS, Population Estimates	2021	Population estimates, inclusive of breakdown by year of age

9.3.8 Approach to Assessment

1561. The Overarching National Policy Statement (NPS) for Energy (EN-1) states that where a project is likely to have an impact on socio-economics at a local or national scale the assessment should consider all relevant impacts.

9.3.8.1 Economic Impacts

1562. The economic impacts which will be considered in the assessment will be reported in terms of:

- GVA - this is a measure of economic value added by an organisation or industry and is typically estimated by subtracting the non-staff operational costs from the revenues of an organisation;
- Years of Employment - this is a measure of employment which is equivalent to one person being employed for an entire year and is typically used when considering short term employment impacts, such as those associated with the construction phase of a project; and
- Jobs - this is a measure of employment which considers the headcount employment in an organisation or industry. This measure is used when considering long term impacts such as the jobs supported during the operation phase of a project.

1563. The economic impacts associated with the supply chain will be assessed in line with the approach considered in the UK Offshore Wind Sector Deal (UK Government, 2019). The focus of the assessments will be the direct and indirect (supply chain) effects. In addition to this, the assessment shall consider the effects of staff spending and the economic impact that this subsequent increase in demand stimulates (the induced effect).

1564. It is acknowledged that at the time of writing, the exact levels of expenditure are unknown by the Applicant. This expenditure is what shall drive the positive economic impacts. The socio-economic assessment shall therefore consider the worst case scenario of the lowest, realistic levels of expenditure associated with the Project. This value may change between the production of the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) to reflect any agreements reached between the Applicant and potential suppliers and any changes in the market that will impact on prices.

1565. The analysis will cover the three stages of the Project, namely:

- the construction stage;
- the operation stage; and
- the decommissioning stage.

1566. The impacts during the construction phase will be based on the actual expenditure on development that has occurred to date as well as the planned expenditure associated with construction activity. In addition to the total impact over the period, the assessment will consider the timings of impacts during these stages to understand the peaks and troughs of this activity.

1567. The impacts during the operation phase of the Project will be based on projected operational expenditure.

1568. In instances where impacts are expected to occur over several years, such as the operation phase, a discount rate will be applied. This allows impacts that occur sooner to be valued more highly than impacts that occur in the future, a concept known as time preference. In this instance a discount rate of 3.5% will be chosen, which is in line with the UK Government's Green Book (UK Government, 2020).

9.3.8.2 Tourism and Recreation Impacts

1569. There is no formal legislation or guidance on the methods that should be used to assess the effects that wind farm developments may have on tourism. The link between wind energy developments and the tourism sector is a well-researched subject and the most recent research has not found any link between the performance of the general tourism economy and wind energy developments.

1570. The tourism assessment shall consider the baseline assessment of the tourism economy in the Tourism and Recreation Study Area. This will consider the key drivers of the tourism economy in this area and consider how the development of the Project will affect these drivers.

1571. The assessment will consider the potential effects that the development could have on specific tourism attractions, recreational assets and local accommodation providers within the Tourism and Recreation Study Area. The assessment of the magnitude of impacts, both positive and negative, will build on the evidence available on behavioural changes from similar developments.

1572. The assessment of marine recreational boating / sailing and recreational fishing will also comply with the following guidance documents where they are specific to this topic:

- Department for Levelling Up, Housing and Communities guidance notes; and
- The Planning Inspectorate Advice Notes.

9.3.8.3 Demographic and Social Impacts

1573. The demographic and social impacts assessment shall follow on from the economic impact assessment, which shall identify the number of workers that are likely to travel into the area to work.

1574. This will then consider the capacity of the Socio-Economic Study Areas and the UK, and the service provision within, to accommodate this temporary increase in population. In particular, it shall consider:

- the likely demand for accommodation and the ability of the market to meet this demand; and
- the demand on services such as education and the ability of the local providers to meet this demand.

1575. The change in demand as a result of the Project will be assessed against the baseline demand for these services in the study areas. This will allow the magnitude of impact and sensitivity of each receptor to be identified. The significance of each impact will then be assessed in line with the general approach outlined in **Chapter 5 EIA Methodology**.

1576. The impact on community infrastructure because of environmental factors, such as noise or transport, shall be considered within the relevant PEIR / ES chapters.

1577. The assessment will only consider the development and construction phase, as the activity during the operation phase will be a smaller magnitude.

1578. Socio-economics, tourism and recreation will be included within the EPP (as set out in **Chapter 6 Consultation)** and is 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.

9.3.9 Scoping Questions to Consultees

1579. The following questions are posed to consultees to help them frame and focus their response to the socio-economics, tourism and recreation scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the socio-economics, tourism and recreation impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the socio-economics, tourism and recreation 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?

9.4 Climate Change

1580. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with climate change, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, the offshore export cable corridor (ECC), the onshore ECC, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1581. One of the principal aims of the Project is to make a contribution to tackling climate change by generating secure, low carbon and renewable electricity (National Grid Option) or providing a supply of green hydrogen for a range of end uses (Hydrogen Option), therefore helping decarbonise a number of sectors in the UK.

1582. Climate change was included as a required topic as part of the Environmental Impact Assessment (EIA) Directive 2014/52/EU, which was transposed into the UK EIA Regulations in 2017. The climate change chapter of the Environmental Statement (ES) will include consideration of both the Project's impacts on climate change, and the impacts of climate change to the Project. Therefore, the climate change chapter will comprise two separate assessments, which will be both presented within the chapter:

- A whole-life greenhouse gas (GHG) assessment, which quantifies the GHG savings as a result of the Project, accounting for emissions released during its lifecycle; and
- A climate change resilience (CCR) assessment, which evaluates future trends in regional climate change impacts and the Project's vulnerability to such changes.

1583. As noted in **Paragraph 13** (within **Chapter 1 Introduction**), the structure of the GHG assessment scoping exercise differs from other EIA topics within the Scoping Report, which adopts a worst case scenario approach based on the Hydrogen Option. This is mainly because the GHG assessment is not limited to a defined geographical area and the fundamental differences between the National Grid Option and the Hydrogen Option. The two development options under consideration would entail separate sets of associated activities, infrastructure components and end uses, namely renewable electricity generation versus green hydrogen production, which requires a tailored assessment approach. Therefore, for clarity, the GHG assessment is presented separately for the National Grid Option and the Hydrogen Option within the Scoping Report.

1584. In comparison, the nature of the CCR assessment does not differ greatly between the two options, given that the assessment would rely on regional climate projections which cover the same geographical area and include similar offshore receptors. Therefore, the Hydrogen Option is considered to represent the worst case scenario for the CCR assessment, consistent with other EIA topics within the Scoping Report.

1585. No inter-relationships are identified for the GHG assessment, as the only receptor for GHG emissions is the global atmosphere, and no other environmental effects arising from the Project has the potential to influence the Earth's climate.

1586. The CCR assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 8.2 Geology and Ground Conditions;**
- **Chapter 8.4 Water Resources and Flood Risk;**
- **Chapter 8.10 Landscape and Visual Impact;**
- **Chapter 9.2 Human Health;** and
- **Chapter 9.5 Major Accidents and Disasters.**

9.4.1 Greenhouse Gas Assessment

1587. The outcome of the GHG assessment will allow the determination of the net effect of the Project and how this contributes to the UK's decarbonisation targets through:

- the generation and provision of renewable energy to the UK grid for the National Grid Option; or
- production of green hydrogen and provision to the potential end users such as heavy transport, industry, power generation and domestic dwellings for the Hydrogen Option.

9.4.1.1 Study Area

1588. Given that GHG emissions impacts and the resulting effects are global, rather than affecting one localised area, the approach to impact assessment with respect to GHG emissions differs from other EIA topics (Institute of Environmental Management and Assessment (IEMA), 2022). All GHG emissions and sinks share the same receptor, the global atmosphere.

9.4.1.1.1 National Grid Option

1589. As the National Grid Option includes the possibility of supplying renewable energy to the UK grid, the GHG assessment will account for emissions savings as a result of displacing grid-based electricity generated by non-renewable sources such as natural gas. This is known as the GHG payback period, or the amount of time it will take for the National Grid Option to offset GHG emitted as a result of its construction over its operational lifetime.

1590. In addition, emissions arising from activities associated with the National Grid Option will be quantified across its full lifespan, encompassing all key emission sources (and removals). This will include the following project phases: construction (including upstream emissions associated with the sourcing, manufacturing and transport of construction materials), operation and decommissioning where information is available.

1591. Therefore, the GHG Assessment Study Area for the National Grid Option is defined by an assessment boundary encompassing all associated GHG emitting or sequestering activities, including carbon benefits beyond the infrastructure system such as avoided emissions from renewable energy provision.

1592. The temporal boundaries of the GHG assessment will be defined based on the National Grid Option's indicative construction and decommissioning programme, and its operational lifetime.

9.4.1.1.2 Hydrogen Option

1593. The Hydrogen Option includes the possibility of supplying green hydrogen to end users in the wider Humber hydrogen value chain or a separate storage facility. The end users of the hydrogen are not confirmed at this stage; however, it is anticipated that they may include the following users: transport, industry, power and buildings, in alignment with the UK Hydrogen Strategy (Department for Business, Energy and Industrial Strategy (BEIS), 2021). Therefore, where applicable, the GHG assessment will account for emissions savings as a result of displacing grid-based electricity generated from non-renewable sources such as natural gas, displacing fuels used in transportation (e.g. diesel) and domestic natural gas used for heating.

1594. In addition, emissions arising from activities associated with the Hydrogen Option will be quantified across its full lifespan, encompassing all key emission sources (and removals). This will include the following project phases: construction (including upstream emissions associated with the sourcing, manufacturing and transport of construction materials), operation and decommissioning where information is available.

1595. Therefore, the GHG Assessment Study Area for the Hydrogen Option is defined by an assessment boundary encompassing all associated GHG emitting or sequestering activities, including carbon benefits beyond the infrastructure system such as avoided emissions from green hydrogen provision.

1596. The temporal boundaries of the GHG assessment will be defined based on the Hydrogen Option's indicative construction and decommissioning programme, and its operational lifetime.

9.4.1.2 Existing Environment

1597. The Climate Change Act 2008 provides a framework for the UK to decarbonise and meet its long term goals of achieving net zero emissions. This target was introduced by the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which superseded the previous 2050 target of an 80% reduction in GHG emissions compared to 1990 levels. To facilitate GHG emission reductions, the UK Government sets a series of legally-binding carbon budgets, which establish a limit on the total amount of GHG emitted in the UK over five-year periods until 2050. Six carbon budgets have been approved so far, as shown in **Table 9-6** (Climate Change Committee (CCC), 2023), which cover the time period between 2008 and 2037. The UK is currently in the fourth carbon budget period.

Table 9-6 UK Carbon Budgets (2008 to 2037)

Budget Period	Carbon Budget (Mt of carbon dioxide equivalents (CO_2e))	Reduction Relative to 1990 Levels
First carbon budget (2008 to 2012)	3,018	25%
Second carbon budget (2013 to 2017)	2,782	31%
Third carbon budget (2018 to 2022)	2,544	37% by 2020
Fourth carbon budget (2023 to 2027)	1,950	51% by 2025
Fifth carbon budget (2028 to 2032)	1,725	57% by 2030
Sixth carbon budget (2033 to 2037)	965	78% by 2035
Net zero target	At least 100% by 2050	

9.4.1.2.1 National Grid Option

1598. The UK Government has set out its intention to decarbonise all sectors of the UK economy throughout the 2020s within the Clean Growth Strategy (Department for Business, Energy and Industrial Strategy (BEIS), 2017), including within the energy sector. Reaffirmation of this ambition was provided as a commitment within the Offshore Wind Sector Deal (BEIS, 2019a) published several years after the Clean Growth Strategy. Specifically, the Offshore Wind Sector Deal reinforces the aims of the UK Government's Industrial Strategy to advance offshore wind generation as an integral part of a future low-cost, low carbon, flexible grid system.

1599. In light of recent progress, the commitment to 30GW of energy generation from offshore wind as set out within the Offshore Wind Sector Deal (BEIS, 2019a) was superseded, with a target of 40GW contribution from offshore wind by 2030, as set out in 'The Ten Point Plan for a Green Industrial Revolution' (HM Government, 2020b) and reiterated within the Net Zero Strategy: Build Back Greener (HM Government, 2021a). The Government has since increased the offshore wind capacity targets to 50GW by 2030 (HM Government, 2022), which would provide more than enough energy to power every home in the UK (The Crown Estate, 2022)

1600. The crux of the GHG assessment for the National Grid Option will therefore be to determine its contribution towards sectoral and national emission reduction targets. This will be achieved by comparing a 'do nothing' scenario to the potential emissions saved from the implementation of the National Grid Option, accounting for the release of GHG emissions during construction, operation and decommissioning.

1601. The current baseline for the GHG assessment will be a 'do nothing' scenario under which the National Grid Option does not proceed, and assumes that the energy produced by the wind farm would be produced instead using natural gas, as this is the most common form of new plant in terms of fossil fuel combustion (BEIS, 2022).

1602. An alternative approach would be to use the future electricity emission factors of the UK grid, for which projections are available from BEIS (2021). However, these projections will account for renewable energy projects such as the National Grid Option becoming operational and decarbonising the UK electricity grid. Therefore, the use of the future projection of the UK grid is not considered to be reasonable approach when determining the 'do nothing' scenario.

9.4.1.2.2 Hydrogen Option

1603. The UK initially set a target for 5GW of low carbon hydrogen (green and blue) production capacity in 2030 in the UK Hydrogen Strategy (BEIS, 2021), this target has since been doubled to 10GW by 2030 (with at least half from green hydrogen) (BEIS, 2022d). The UK government is committed to the development of the UK's low carbon hydrogen capacity to help meet the broader targets within the UK government's sixth Carbon Budget and commitments within the Climate Change Act 2008, Energy Act 2013 and the 2015 Paris Agreement.

1604. The current production and use of hydrogen in the UK is heavily concentrated in chemical and refinery facilities (Fuel Cells and Hydrogen Observatory (FCHO), 2022), and is largely produced from natural gas. Hydrogen is also used as fuel source in smaller volumes in the UK in hydrogen cars, trucks, buses and marine vessels (BEIS, 2022d).

1605. Carbon dioxide (CO_2) emissions from power stations have already decreased by 73.4% in 2021 compared to 1990 levels, the majority of which have happened in the last decade due to a transition away from coal towards natural gas and renewable sources (BEIS, 2022a). The total CO_2 emissions from the transport sector in 2021 was 107.5 million tonnes, a 10% increase from the 2020 emissions, however, a 11.2% reduction compared with 2019 emissions. The transport sector accounted for 31.5% of all UK territorial CO_2 emissions in 2021. The UK's hydrogen strategy is committed to utilising low carbon electricity to support green hydrogen production as part of its hydrogen strategy.

1606. The crux of the GHG assessment for the Hydrogen Option will therefore be to determine its contribution towards sectoral and national emission reduction targets. This will be achieved by comparing a 'do nothing' scenario to the potential emissions saved from the implementation of the Hydrogen Option, accounting for the release of GHG emissions during construction, operation and decommissioning

1607. The current baseline for the GHG assessment will be the 'do nothing' under which the Hydrogen Option does not proceed. This scenario would assume that fossil fuel sources will be used instead of the end use hydrogen, which will be fully defined once this is understood.

9.4.1.3 Potential Impacts

9.4.1.3.1 National Grid Option

1608. The GHG assessment will determine the impact of the National Grid Option to climate change, and calculate the emission savings and benefit associated with its development. This considers the replacement of electricity from fossil fuel sources with renewable offshore wind. The emissions savings will be contextualised to determine its contribution towards the UK's net zero and emission reduction targets.

1609. GHG emissions will be released from project-related activities during the construction, operation and decommissioning phases. To determine the net effect and carbon benefit of the National Grid Option, these emissions will be quantified and considered to determine total GHG emission savings (per year and over its operational lifetime), the carbon intensity of electricity generated and the associated carbon payback period.

1610. The GHG assessment will identify key emission sources (and removals) in line with the assessment and temporal boundaries described in **Section 9.4.1.1.1**. Potential key GHG emission sources associated with the National Grid Option across its full lifespan are identified in **Table 9-7**.

1611. Key emission sources included / excluded from the GHG assessment will be revisited at the Preliminary Environmental Information Report (PEIR) and ES stage to align with the most up-to-date project design, subject to information availability.

Table 9-7 Key Greenhouse Gas Emission Sources over the National Grid Option's Lifespan

Project Phase	PAS 2080 Lifecycle Module	GHG Lifecycle Stage	Potential Sources of Emissions
Construction	A1 to A3	Product stage	Embodied emissions in materials used for offshore infrastructure components such as wind turbines, foundations and other offshore electrical infrastructure
	A4 and A5	Transport of materials to site / waste from site	Fuel and energy consumption associated with the movement of materials to / excavated materials and other waste from the offshore construction site using road vehicles and marine vessels
	A5	Plant and equipment use during construction	Fuel and energy consumption associated with offshore construction activities such as the transport of construction personnel and the use of scour layer vessels

Project Phase	PAS 2080 Lifecycle Module	GHG Lifecycle Stage	Potential Sources of Emissions
Operation	B2 and B3	Plant and equipment use during maintenance and repair	Fuel and energy consumption associated with offshore operation and maintenance (O&M) activities such as the use of cable maintenance vessels and serviced operation vessels
	B4 and B5	Refurbishment and replacement	Embodied emissions in spare parts for offshore infrastructure components

1612. The nature and timeline of decommissioning activities associated with the National Grid Option are not yet known and will be developed at a later stage to take account of emerging best practice, technologies and regulatory requirements. Potential decommissioning emission sources include fuel and energy consumption associated with deconstruction and demolition works and the transport of materials to waste disposal or recovery sites.

1613. It is anticipated that decommissioning impacts would be similar in nature to those of construction, although the magnitude of emissions is likely to be lower. In the absence of detailed information, it is proposed that decommissioning emissions is calculated using findings from previous offshore wind studies (Thomson and Harrison, 2015), which conclude that decommissioning emissions would contribute to approximately 1.2% of the GHG footprint.

1614. As previously stated, it is expected that the National Grid Option will result in a net beneficial effect on the UK's ability to meet the targets set out in the Climate Change Act 2008 (as amended) and its associated carbon budgets. This will be demonstrated through the GHG assessment via the GHG payback period and the GHG intensity of electricity generated.

9.4.1.3.2 Hydrogen Option

1615. The GHG assessment will determine the impact of the Hydrogen Option to climate change, and calculate the emission savings and benefit associated with its development. This considers the replacement of fossil fuel-based electricity, heating fuel or transport fuel with green hydrogen. The emissions savings will be contextualised to determine its contribution towards the UK's net zero and emission reduction targets.

1616. GHG emissions will be released from project-related activities during the construction, operation and decommissioning phases. To determine the net effect and carbon benefit of the Hydrogen Option, these emissions will be quantified and considered to determine total emission savings (per year and over its operational lifetime).

1617. The GHG assessment will identify key emission sources (and removals) in line with the assessment and temporal boundaries described in **Section 9.4.1.1.2**. As the HPF will be powered by renewable energy from offshore wind, the production of hydrogen will be considered to be green. However, consideration will be given to the potential for use of non-renewable generated electricity for power optimisation purposes and fugitive and process gas emissions. Other anticipated sources of GHG emissions during the operation phase of the Project are from plant and equipment use, refurbishment and replacement, water consumption, waste disposal and land use change as detailed in **Table 9-8**.

1618. Key emission sources included / excluded from the GHG assessment will be revisited at the PEIR and ES stage to align with the most up-to-date project design, subject to information availability.

Table 9-8 Key Greenhouse Gas Emission Sources over the Hydrogen Option's Lifespan

Project Phase	PAS 2080 Lifecycle Module	GHG Lifecycle Stage	Potential Sources of Emissions
Construction	A1 to A3	Product stage	Embodied emissions in materials used for: • Offshore infrastructure components such as wind turbines, foundations and other offshore electrical infrastructure; and • Onshore infrastructure components such as concrete and steel structures for the HPF and the onshore ECC.
	A4 and A5	Transport of materials to site / waste from site	Fuel and energy consumption associated with the movement of materials to / excavated materials and other waste from the offshore and onshore construction site using road vehicles and marine vessels
	A5	Plant and equipment use during construction	Fuel and energy consumption associated with offshore and onshore construction activities such as the transport of construction personnel, the use of scour layer vessels and welding activities
	A5	Land use, land use change and forestry (LULUCF)	Land use change due to activities such as land clearance and habitat reinstatement, resulting in impacts to the site's carbon sequestration potential
Operation	B2 and B3	Plant and equipment use during maintenance and repair	Fuel and energy consumption associated with offshore and onshore O&M activities such as the use of serviced operation vessels and vehicles

Project Phase	PAS 2080 Lifecycle Module	GHG Lifecycle Stage	Potential Sources of Emissions
	B6	Operational energy use from back-up power equipment and auxiliary power systems for electrical stabilisation	Periodic energy consumption during operation of the HPF from non-renewable sources such as fuel powered backup generators and UK grid electricity generated by non-renewable sources. Limited to when the power system at the HPF needs to account for the intermittency of power generated by the Array Area.
	B6	Operational energy use from other energy consumers at the HPF not powered by the wind farm	As the design of the HPF is still being refined, there is potential for other energy consumers on-site that may not be powered by the wind farm. As a precaution, and until the design has been confirmed, this emission source has been scoped in for further consideration.
	B4 and B5	Refurbishment and replacement	Embodied emissions in spare parts for offshore and onshore infrastructure components, including electrolysis stacks for the HPF
	B8	Fugitive and process gas emissions	Abnormal emissions from possible leakages or accidental losses and routine emissions such as venting during operation of the HPF
	B7	Water consumption	Emissions from the provision and treatment of water during operation of the HPF
	B8	Waste disposal	Emissions from the disposal of waste generated during operation of the HPF such as the disposal of solid waste generated from the water treatment process
	B8	LULUCF	Land use change due to the existence of the onshore infrastructure over the its operational lifetime, resulting in impacts to the site's carbon sequestration potential

1619. The nature and timeline of decommissioning activities associated with the Hydrogen Option are not yet known and will be developed at a later stage to take account of emerging best practice, technologies and regulatory requirements. Potential decommissioning emission sources include fuel and energy consumption associated with deconstruction and demolition works and the transport of materials to waste disposal or recovery sites.

1620. It is anticipated that decommissioning impacts would be similar in nature to those of construction, although the magnitude of emissions is likely to be lower. The assessment will quantify emissions from decommissioning using project-specific information if it is available.

1621. As previously stated, it is expected that the Hydrogen Option will result in a net beneficial effect on the UK's ability to meet the targets set out in the Climate Change Act 2008 (as amended) and its associated carbon budgets. This will be demonstrated through the GHG assessment.

9.4.1.4 Potential Cumulative Effects

1622. As the receptor for the GHG assessment is the global atmosphere, it is not relevant to individually assess the cumulative effects of emissions arising from other projects or plans. There is no basis for selecting any particular cumulative project or plan with a GHG footprint for assessment over another, as all global GHG emission sources and sinks contribute collectively to climate change. In line with guidance (IEMA, 2022), it is proposed that cumulative effects should be scoped out of the GHG assessment for both the National Grid Option and the Hydrogen Option.

9.4.1.5 Potential Transboundary Effects

1623. All GHG emission sources and sinks are not confined to a geographical area and are thus by definition transboundary. The effects of climate change are also experienced globally, irrespective of where or when GHG emissions occur.

1624. To proportionately frame the GHG assessment, emissions from the National Grid Option and the Hydrogen Option will be contextualised using the relevant UK carbon budgets and sectoral decarbonisation pathways where applicable (IEMA, 2022) within their respective GHG assessment. Further context will also be provided as to how the Option will contribute to a reduction in GHG emissions at a global scale and international efforts on climate change. Therefore, transboundary effects are scoped into the GHG assessment for both the National Grid Option and the Hydrogen Option.

9.4.1.6 Approach to Data Gathering

1625. The desk-based sources used to characterise the existing environment and inform the GHG assessment for both the National Grid Option and the Hydrogen Option will consist primarily of publicly available datasets and reports from government and industry data sources. **Table 9-9** identifies potential desk-based sources for the GHG assessment, which will be updated throughout the EIA process.

Table 9-9 Desk-Based Data Sources for the GHG Assessment

Data Source	Year	Data Contents
Both the National Grid Option and Hydrogen Option		
BEIS' Conversion Factors for Reporting of GHG emissions	2022 (or latest at time of assessment)	Current UK grid-average GHG intensity and various emission factors
Inventory of Carbon and Energy (ICE)	2019	Emission factors for embodied carbon in construction materials
BEIS Updated Energy and Emissions Projections 2021 to 2040	2022 (or latest at time of assessment)	Projections of future energy use and GHG emissions in the UK
National Grid Future Energy Scenarios	2022 (or latest at time of assessment)	Projections of future energy scenarios
CCC's UK Carbon Budgets	Various, most recent publication in 2020	National carbon budgets used to contextualise the Project's emissions
BEIS' UK GHG Emissions National Statistics	2022 (or latest at time of assessment)	Annual estimates of national, regional and sectoral GHG emissions in the UK
National Grid Option Only		
Life Cycle GHG Emissions of Utility Scale Wind Power	2012	Benchmarks for results from the GHG assessment
Life Cycle Costs and Carbon Emissions of Offshore Wind Power	2015	Benchmarks for results from the GHG assessment and the likely contribution of decommissioning activities to the National Grid Option's total GHG footprint
Hydrogen Option Only		
BEIS' UK Low Carbon Hydrogen Standard: Data Table Annex and Annexes to Guidance	2022	Data required to calculate GHG emissions under the UK Low Carbon Hydrogen Standard such as emission factors and default factors
Hydrogen Council's Hydrogen Decarbonisation Pathways: A Life-Cycle Assessment	2021	Studies on lifecycle GHG emissions associated with various hydrogen end uses
Zemo Partnership's Examining Hydrogen Production Pathways and Use in Vehicles publications	Various	Studies on the carbon intensity and energy demand of various low carbon hydrogen production pathways and consumption data in the transport sector

Data Source	Year	Data Contents
BEIS' UK Hydrogen Strategy, H2 Emission Potential Literature Review and associated publications	Various	Policy context and actions on developing the UK low carbon hydrogen sector
International Energy Agency's The Future of Hydrogen	2019	Global assessment of the current state of the hydrogen sector and its potential role in decarbonisation

1626. No baseline surveys are proposed for the GHG assessment. However, cross-disciplinary engagement with the engineering team will help refine the assessment and identify mitigation measures associated with energy and resource efficiency and emission reduction.

9.4.1.7 Approach to Assessment

1627. The GHG assessment will be taken in accordance with emerging best practices and industry standards. Potential guidance documents that will be considered in developing the assessment methodology include:

- Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022);
- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), 2015); and
- PAS 2080 Carbon Management in Infrastructure (Green Construction Board (GCB), 2023).

1628. GHG emissions will be calculated using a standard calculation-based methodology, which involves multiplying activity data with the relevant emission factors, and where applicable, calorific and global warming potential (GWP) factors. Industry benchmarks and assumptions based on expert judgment will be used where information gaps exist.

1629. GHG emission values (both in terms of emissions saved and released) will be expressed as tonnes of carbon dioxide equivalents (CO_2e) to account for the differences in GWP between GHGs. GWP factors will be obtained from the most recent Intergovernmental Panel on Climate Change's (IPCC) Assessment Report 100-year estimates.

1630. The receptor for the GHG assessment is defined as the global atmosphere. The receptor's sensitivity will be characterised as high, given that any net reduction of GHG emissions will support decarbonisation efforts in line with the Paris Agreement temperature goals (IEMA, 2022).

1631. Significance criteria for the assessment will be adapted from IEMA guidance '*Assessing Greenhouse Gas Emissions and Evaluating their Significance*' (IEMA, 2022). The guidance recognises that: '*when evaluating significance, all new GHG emissions contribute to a negative environmental effect. However, some projects will replace existing development or baseline activity that have higher GHG profiles. The significance of a project's emissions should therefore be based on its net impact, which may be positive, negative or negligible*'.

1632. The IEMA guidance provides relative significance descriptions to assist assessments, specifically in the EIA context. Section VI of the updated IEMA guidance (IEMA, 2022) describes five distinct levels of significance which are not solely based on whether a project emits GHG emissions alone, but how the project makes a relative contribution towards achieving a science-based 1.5°C aligned transition towards net zero. These are presented in **Table 9-10**.

Table 9-10 GHG Assessment Significance Criteria

Significance of Effect	Description
Major adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Minor adverse	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

1633. For the purposes of the EIA, 'Major' and 'Moderate' and 'Beneficial' effects will be considered to be significant.

9.4.1.7.1 National Grid Option

1634. One of the principal aims of the National Grid Option is to contribute to the provision of secure, low carbon and renewable electricity which will contribute to the decarbonisation of the UK energy sector. Therefore, its implementation is expected to make a positive contribution when compared to the existing baseline activity.

1635. The GHG assessment will consider the net change in emissions across the National Grid Option's lifespan compared to the baseline or 'do nothing' scenario, which assumes that the electricity generated by the wind farm would have been generated using natural gas, as this is the most common form of electricity generation in the UK.

1636. To demonstrate the net beneficial effect from the provision of renewable energy during the National Grid Option's operation, the GHG payback period will be calculated, as well as total emission savings, and reductions in GHG intensity of electricity generated compared to other forms of generation.

1637. The GHG assessment for the National Grid Option will also take into account the definitions provided by RenewableUK's Wind Energy Statistics Explained (2023).

9.4.1.7.2 Hydrogen Option

1638. As stated in **Section 9.4.1.2.2**, baseline for the GHG assessment will be the 'do nothing' scenario, where GHG emissions arise from the generation of electricity using natural gas (the most common form of electricity generation in the UK), the combustion of fossil fuels in transport vehicles or fuel consumption in domestic dwellings for heating.

1639. The GHG assessment would assess the GHG emissions resulting from the Hydrogen Option, assessing the impact in relation to the relevant UK's carbon budget and the emission savings as a result of displacing grid-based electricity generated from non-renewable sources such as natural gas, fossil fuels used in transportation (e.g. diesel) and domestic natural gas used for heating. The appropriate scenario to evaluate the differences in GHG emissions will be determined once further information on the potential end use of the hydrogen is known.

1640. The GHG assessment for the Hydrogen Option will also take into account the recommendations of BEIS' UK Low Carbon Hydrogen Standard: Guidance on the Greenhouse Gas Emissions and Sustainability Criteria (2022e) and associated emission calculators.

9.4.2 Climate Change Resilience Assessment

9.4.2.1 Study Area

1641. The CCR Assessment Study Area is the Project itself and its immediate surrounding area, as the assessment focusses on the Project's vulnerability to external climate hazards. This is defined by the Offshore Scoping Area and the Onshore Scoping Area. The temporal boundaries of the CCR assessment will be defined to include the Project's construction and operation phase up until the end of its design lifetime.

1642. The CCR assessment will be informed by historical records and future projections of various climatic variables, which will be obtained from the Met Office's UK Climate Projections (UKCP) at the regional scale. For context, the Offshore Scoping Area lies off the coast of the Yorkshire and Humber region, while the Onshore Scoping Area is situated within the Yorkshire and Humber region.

9.4.2.2 Existing Environment

1643. The current baseline for the CCR assessment will be defined using historical climate data and meteorological records maintained by the Met Office (The Met Office, 2023a). Data recorded by Hull weather station for the 1991 to 2020 period indicates the following:

- An average annual maximum temperature of 14.5°C and minimum temperature of 6.85°C;
- Warmest month, on average, in July at 22°C and coldest month, on average, in January at 2.2°C;
- An average annual precipitation level of 693.5mm; and
- Wettest month, on average, in June with 69.7mm of rainfall and driest month, on average, in March with 43.3mm of rainfall.

1644. The Met Office also provides summaries of the climate characteristics of 11 regions of the UK using historical climate records averaged across the 30-year period between 1981 to 2010. The Offshore Scoping Area and the Onshore Scoping Area lie closest to Eastern England. The region currently experiences a maritime and temperate climate, which is typical of the UK. In general, Eastern England tends to be drier, warmer, sunnier and less windy than regions further west and north (The Met Office, 2023b).

9.4.2.3 Potential Impacts

1645. The Project may be exposed to a range of climate hazards, defined as extreme weather events and chronic climatic changes with the potential to harm on human, environmental or infrastructure receptors (IEMA, 2020). Potential climate hazards include:

- Droughts;

- Extreme precipitation events;
- Floods;
- Heatwaves and wildfires;
- Storms and other high wind events;
- Rising sea levels; and
- Rising global temperatures.

1646. Exposure to climate hazards may lead to climate change impacts to the Project such as physical damages to buildings and other infrastructure components. Climate change impacts are defined as the potential impacts of climate hazards on the ability of a receptor to maintain its function or purpose, which may result in adverse ecological or human consequences (IEMA, 2020).

1647. It is worth noting that the inherent design of offshore wind farms is robust to the projected changes to the climate for both the offshore and onshore components. Offshore structures are resilient to flooding and water ingress, and are designed to withstand severe storm conditions, including accounting for future climate change. The onshore elements are also inherently robust to future climatic changes such as flooding and heatwaves. These embedded mitigation measures will be considered as part of the assessment of effects.

1648. As the construction phase is anticipated to occur within the next ten years, it is considered that the only climate hazards with potential to pose as climate change impacts to the Project are extreme weather events in the short term such as heatwaves and storm surges (2010 to 2039). Chronic hazards that involve gradual changes to climate averages and extremes over the medium (2040 to 2069) to long term (2070 to 2099) such as rising sea levels and global temperatures are scoped out for the construction aspect of the CCR assessment. Key receptors that may be impacted during the construction phase include the offshore and onshore construction site, including construction plant and equipment on-site, and construction workers.

1649. The operation phase up until the end of the Project's design lifetime would coincide with medium term (2040 to 2069) climate change, therefore both extreme weather events and chronic climatic changes will be considered in the operation aspect of the CCR assessment. Key receptors that may be impacted during the operation phase include the built infrastructure assets and buildings, operation and maintenance (O&M) personnel and plant and equipment used for O&M activities.

1650. The approach to decommissioning and specific nature of activities required for the Project are not yet known and will be developed at a later stage. In addition, there are uncertainties in longer term climate projections (beyond 2050s) due to differences in emission scenarios and natural variability in the Earth's climate system (IPCC, 2021).

1651. As such, it is proposed that the decommissioning aspect of the CCR assessment should be scoped out of the CCR assessment at this stage. It is expected that suitable climate change adaptation measures would be developed in the future once it becomes clear how long term climate change would affect the Project, which aligns with IEMA's approach to adaptive management (IEMA, 2020).

9.4.2.4 Potential Cumulative Effects

1652. There is potential for cumulative effects to arise in which other projects or plans could act collectively to increase the Project's vulnerability to climate change impacts and exacerbate their consequences. For instance, other projects may give rise to increased flood risk or water scarcity within the region. Likewise, the potential for the Project to increase the vulnerability of other projects will also be reviewed. These cumulative effects will be considered in the relevant EIA topic such as water resources and flood risk and summarised within the climate change chapter. Therefore, cumulative impacts are scoped into the CCR assessment for further consideration, for the construction and operation phases only.

9.4.2.5 Potential Transboundary Effects

1653. It is not relevant to assess transboundary effects relating to CCR, since the assessment focuses on the effects of climate change on the Project itself. Therefore, transboundary impacts are scoped out of the CCR assessment.

9.4.2.6 Approach to Data Gathering

1654. The desk-based sources used to characterise the existing environment and inform the CCR assessment for the Project will consist primarily of publicly available datasets and reports from government and industry data sources. **Table 9-11** identifies potential desk-based sources for the CCR assessment, which will be updated throughout the EIA process.

Table 9-11 Desk-Based Data Sources for the CCR Assessment

Data Source	Year	Data Contents
The Met Office's UK Regional Climates, and UKCP	Various	Historical climate records and climate projections for the UK and by region
Department for Environment, Food and Rural Affairs' (Defra) UK Climate Change Risk Assessment 2022	2022	Key climate change risks and opportunities across the UK
IPCC Sixth Assessment Report (AR6)	Various	Current state of knowledge on climate science and possible future emission scenarios
East Riding of Yorkshire Council, including Climate Change Strategy 2022 – 2030	Various	Climate change strategy and climate change adaptation actions being undertaken by the East Riding of Yorkshire Council

1655. No baseline surveys are proposed for the CCR assessment. However, cross-disciplinary engagement with the engineering team and other relevant EIA topics will help refine the assessment and identify mitigation measures associated with climate adaptation and resilience and adaptive management measures.

9.4.2.7 Approach to Assessment

1656. The CCR assessment will be undertaken in accordance with the '*Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation*' (IEMA, 2020). Moreover, the assessment will rely on outputs of other EIA topics such as the flood risk assessment to determine the Project's vulnerability to climate change impacts.

1657. The current and future baseline will be defined using national and regional historic climate records and climate projections respectively. Potential climate hazards and impacts will be identified by using the UKCP climate database and other sector-specific guidance and literature. Examples of climate variables that will be considered include mean annual temperatures and annual precipitation levels and wind patterns.

1658. The sensitivity of receptors in relation to potential climate change impacts will be defined by their susceptibility and vulnerability, defined as the ability to be affected by change and the level of exposure to change respectively. The magnitude of a climate change impact will be determined based on a combination of likelihood and consequence, defined as how likely the impact would occur over a relevant time period and the nature and severity of harm to the relevant receptor respectively (IEMA, 2020).

1659. As there are no established significance criteria for the CCR assessment, the conclusion of whether an effect is significant will depend on expert judgment and the project context (IEMA, 2020). A significance matrix consistent with the approach set out in **Chapter 5 EIA Methodology** will be adopted for the CCR assessment.

9.4.3 Summary of Scoping Proposals

1660. **Table 9-12** outlines the climate change impacts which are proposed to be scoped in or out of the EIA. These may be refined through targeted consultation activities and as additional project information and site-specific data become available.

Table 9-12 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Climate Change

Potential Impact	Construction	Operation	Decommissioning
GHG Assessment (for both the National Grid Option and Hydrogen Option)			
Net change in GHG emissions and contribution to the UK's decarbonisation targets	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Cumulative impacts	X	X	X
Transboundary impacts	✓	✓	✓
CCR Assessment			
Project's vulnerability to climate change impacts	✓	✓	X
Cumulative impacts	✓	✓	X
Transboundary impacts	X	X	X

9.4.4 Scoping Questions to Consultees

1661. The following questions are posed to consultees to help them frame and focus their response to the climate change scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all key GHG emission sources associated with the National Grid Option and the Hydrogen Option been identified in the Scoping Report?
- Have all climate change impacts with potential to affect the Project been identified in the Scoping Report?
- Do you agree with the climate change 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?

9.5 Major Accidents and Disasters

1662. This chapter of the Scoping Report considers the potential likely effects of Dogger Bank D (DBD) associated with major accidents and disasters, specifically in relation to the construction, operation and decommissioning of the Project. This includes all infrastructure within the Array Area, the offshore export cable corridor (ECC), the onshore ECC, the Hydrogen Production Facility (HPF) and any onward pipework connection.

1663. Noting that the Project is progressing two offtake options (see **Chapter 3 Project Description**) and that spatially the Hydrogen Option is a continuation of the National Grid Option footprint (**Figure 1-1**), the Project has defined the worst case scenario across the two options. Therefore, this chapter of the Scoping Report is based upon the combined worst case scenario as set out in **Paragraph 12** and **Table 3-2**.

1664. Following guidance published by the Institute of Environmental Management and Assessment (IEMA) on Major Accidents and Disasters in Environmental Impact Assessment (EIA) (IEMA, 2020), it is proposed that consideration of major accidents and disasters within the EIA process is based on assessments conducted within individual technical chapters where this can be adequately covered by the scope of these chapters. The exception to this approach relates to the HPF where the specific nature of this industrial facility will form the basis of the major accidents and disasters assessment. The HPF is therefore the focus of the rest of this chapter.

1665. With regards to the Offshore Scoping Area, in-line with the IEMA guidance (IEMA, 2020), the following potential accident / disasters will be considered within in their respective topic chapters, and no separate major accidents and disasters assessment will be considered in the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) with regards to offshore infrastructure. These topic chapters include:

- Vessel collision and allision is considered within **Chapter 7.9 Shipping and Navigation**;
- Aviation safety is considered within **Chapter 7.10 Aviation, Radar and Military**;
- Exposed cables leading to vessel snagging is considered within **Chapter 7.8 Commercial Fisheries** and **Chapter 7.9 Shipping and Navigation**;
- Accident pollution is considered within **Chapter 7.3 Marine Water and Sediment Quality**; and
- Coastal erosion and flood risk is considered within **Chapter 7.2 Marine Physical Processes, Chapter 8.4 Water Resources and Flood Risk and Chapter 9.4 Climate Change**.

1666. The major accidents and disasters assessment is likely to have key inter-relationships with the following topics, which will be considered appropriately where relevant in the EIA:

- **Chapter 8.2 Geology and Ground Conditions**;
- **Chapter 8.3 Onshore Air Quality and Dust;**
- **Chapter 8.4 Water Resources and Flood Risk;**
- **Chapter 8.9 Traffic and Transport; and**
- **Chapter 9.4 Climate Change**.

9.5.1 Study Area

1667. The Major Accidents and Disasters Study Area (hereafter referred to as 'the study area') includes the Onshore Scoping Area, which notably includes the HPF and any connection to the wider distribution network or storage facility (**Figure 1-1**). Any major incidents, accidents or disasters which may arise have the potential to cause serious consequences within and beyond the boundaries of the infrastructure locations.

1668. The HPF, will be located within the East Riding of Yorkshire or possibly the far south east part of Hull City Council area. Therefore, the study area will consider potential infrastructure, human and sensitive ecological receptors within this area, and in particular those existing major accident hazard installations and properties in closest proximity to the HPF.

9.5.2 Existing Environment

1669. The baseline in respect of major accidents and disasters primarily comprises major accident hazard risks presented by existing operational installations, and external natural and anthropogenic factors (such as the vulnerability of the Project to natural disasters or to future climate change) which may give rise to effects on the Project.

1670. There are a number of facilities within the East Riding of Yorkshire which are regulated under the Control of Major Accident Hazards (COMAH) regime, as either 'Upper' or 'Lower Tier' Establishments.

1671. The sites are defined as such under Directive 2012/18/EU (the 'Seveso III' Directive), as transposed in the UK by the Control of Major Accident Hazards (COMAH) Regulations 2015. The regulations apply where there is a controlled quantity of a substance stored and / or used, and requirements include the preparation of a COMAH Safety Report, which must include a Major Accident Prevention Policy (MAPP), preparation and testing an on-site emergency plan, and making available relevant information to authorities and the public.

1672. The storage capacity of these establishments also usually requires that a Hazardous Substances Consent (HZSC) is in place, which is granted by the Hazardous Substances Authority. In some cases, the same and other installations are also regulated under the Environmental Permitting regulatory regime and operate a prescribed activity according to permit conditions which, inter alia, require the application of 'best available techniques' (BAT) in the design technology and management systems, so as to prevent or minimise emissions.

1673. The potential risks to the Project associated with the operation of these existing regulated industries will be reviewed.

1674. The Project will not be located within an area generally known for natural disasters such as hurricanes, tornadoes, volcanic eruptions, earthquakes or tsunamis. The risk of flooding is most relevant, and such incidents and flooding and climate change trends will be identified from the flood risk assessment and climate change resilience (CCR) assessment, and applied appropriately to the HPF.

9.5.3 Potential Impacts

9.5.3.1 Potential Impacts during Construction

1675. Health and safety during the construction phase within the study area will be subject to relevant legislation (e.g. the Construction Design and Management (CDM) Regulations), and best practice. This will require a formal Construction Phase Plan, comprising technology design specifications, site inductions, risk assessment and method statements and will be implemented by the appointed principal contractor and designer. Environmental aspects and impacts of construction will be managed through a Construction Environmental Management Plan (CEMP). Therefore, potential environmental consequences associated with a major accident or disaster during construction will be assessed and mitigated, subsequently there is no additional requirement for major accidents and hazards to be assessed during the construction stage within the EIA. Once constructed, the HPF will enter a commissioning phase when the plant will be tested and a live hydrogen inventory will be present, and for the purposes of the EIA, these activities will be considered as part of the operation phase assessment.

1676. Impacts of major accidents and disasters during the construction phase of the Project is therefore proposed to be scoped out of the EIA.

9.5.3.2 Potential Impacts during Operation

1677. Potential accidents and environmental effects associated with the HPF commissioning and operation phases may arise either from incidents on-site, incidents at other off-site installations which affect the site, or from the vulnerability of the Project to the potential risks related to natural disasters. Accident or incident consequences could include damage to the HPF plant itself, or to compression, pipelines and storage vessels, the release of hydrogen and thereby fire and explosion hazards. Other water treatment chemicals stored on the site may be released and impact soils and groundwater if suitable containment and drainage infrastructure is not adequate. Off-site incidents may cause consequential damage to the HPF, although this risk will depend on distance separation of the preferred HPF site to any other major hazard installations in the vicinity. The regulatory regime which will cover the HPF design, operation and management is summarised in the following paragraphs.

1678. An HZSC aims to prevent major accidents and limit their consequences by imposing controls for storage and use of hazardous substances which could, in quantities at or above specified limits, present a major off-site risk. Decisions and enforcement are by the Hazardous Substances Authority (in this case East Riding of Yorkshire Council or possibly Hull City Council), on advice from the COMAH Competent Authority (CA), (jointly the Health and Safety Executive (HSE) and the Environment Agency). The requirement is triggered by the storage at or above a ‘controlled quantity’. In the case of hydrogen, the controlled quantity is two tonnes. Depending on the electrolyser design, storage of a concentrated (alkaline) electrolyte may also be covered.

1679. The HZSC also sets a Consultation Distance (CoD) around a major hazard site or pipeline; HSE then becomes a statutory consultee for any development within the CoD. In assessing the application for consent, HSE will produce a map with three risk contours (or zones), representing defined levels of risk, within which HSE must be consulted over any relevant future planning applications.

1680. The HZSC regime aligns with the consideration of major accidents and the requirements of the COMAH Regulations. Schedule 1 of the Regulations lists the dangerous substances or the categories of dangerous substances which cause the duties to apply and the quantities which set the two thresholds for application – at ‘Lower Tier’ and ‘Upper Tier’, and different requirements apply. For hydrogen, these thresholds are currently five tonnes and 50 tonnes respectively.

1681. For the Project, a COMAH notification must be submitted ‘within a reasonable time’ prior to start of construction, which guidance suggests would normally be three to four months.

1682. In addition, it is anticipated that the Pipelines Safety Regulations (1996) (PSFR) will apply. The requirements will overlap with the COMAH procedures in terms of the preparation of an MAPD and emergency planning. In this case, there is a requirement to notify six months ahead of the pipeline construction, and guidance states that the suitable point would be the ‘end of concept design’. The Project will be designed, constructed, operated and maintained in line with the PSFR and relevant Code(s) of Practice for pipelines.

1683. Hydrogen production is a prescribed activity under the Environmental Permitting Regulations (EPR), and the HPF will also require an operational Environmental Permit.

1684. A future Permit application will need to include an environmental risk assessment, management plans / procedures and a demonstration of the application of BAT. BAT guidance for green hydrogen production is currently being developed, and the HPF will align with industry best practice in its design, management, monitoring and future site closure planning.

1685. All of the HZSC, COMAH, PSFR and EPR duties will be mandatory, and design and management systems will need to be proven in the application stages, with all permits and consents needing to be in place in advance of commissioning. Therefore, the risk of environmental impacts due to major accidents and disasters are anticipated to be very low. Further details will be provided as the location, design and offtake options for the HPF are advanced and agreed.

1686. Potential operational risks from major accidents and disasters to / from the HPF will be scoped into the EIA for further consideration.

9.5.3.3 Potential Impacts during Decommissioning

1687. 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. Decommissioning of the HPF and associated hydrogen-carrying pipelines and storage infrastructure will require the prior full removal of the hydrogen inventory. As stated above for the construction phase of the Project, relevant prevailing statutory health and safety requirements will be applied.

1688. As an installation covered by an operational Environmental Permit, a site closure plan will need to be submitted and approved by the Environment Agency before the Permit can be revoked. This procedure will require detailed consideration of environmental controls and management during decommissioning and demonstration that the activities have not caused pollution during the lifetime operation of the HPF and that the closed site will present no future environmental risk to the land.

1689. Impacts of major accidents and disasters during Project’s decommissioning are therefore proposed to be scoped out of the EIA.

9.5.4 Potential Cumulative Effects

1690. There is potential for cumulative effects to arise in which other projects or plans could act collectively with the Project to affect major accidents and disaster receptors. Therefore, cumulative effects related to major accidents and disasters are scoped into the EIA. The Cumulative Effects Assessment (CEA) will follow the standard approach outlined in **Chapter 5 EIA Methodology**.

1691. Where there are other existing major hazard installations in the same vicinity as the HPF, potential ‘domino effects’ of incidents are also considered within the COMAH regulatory procedures. Where required, the CEA will define a ‘Domino Group’, and these establishments will apply special consideration in terms of emergency planning and the testing of the off-site response. Cumulative effects with regard to existing major accident hazards will therefore be a fundamental tenet of the Project’s regulatory regime.

9.5.5 Potential Transboundary Effects

1692. The study area for this topic will adequately consider relevant off-site impacts and environmental effects, and any potential incidents are likely to affect only the surrounding commercial and residential community and sensitive ecological sites. The likelihood of effects beyond the jurisdiction of East Riding of Yorkshire and Hull City Council and therefore the UK is negligible.

1693. Therefore, there is no potential for transboundary effects upon major accidents and disaster receptors due to the Project’s construction, operation and maintenance (O&M) and decommissioning activities, and all transboundary impacts are scoped out of the EIA.

9.5.6 Summary of Scoping Proposals

1694. **Table 9-13** outlines the major accidents and disaster 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 9-13 Summary of Impacts Proposed to be Scoped In (✓) and Out (X) for Major Accidents and Disasters

Potential Impact	Construction	Operation	Decommissioning
Major accident or disaster impact arising from the HPF upon the Project site, human or ecological receptors	X	✓ (Including commissioning activities)	X
Impact of an incident associated with an existing major accident hazard risk on the HPF	X	✓ (Including commissioning activities)	X
Impact of natural hazards on the HPF	X	✓ (Including commissioning activities)	X

Potential Impact	Construction	Operation	Decommissioning
Cumulative impacts	X	✓ (Including commissioning activities)	X
Transboundary impacts	X	X	X

9.5.7 Approach to Data Gathering

1695. Identification of potential sensitive receptors will be undertaken and will comprise existing major accident hazard facilities, residential settlements and sensitive ecological sites. The consideration of natural events, and evidence that the development of the Project itself will be resilient to climate change and flooding, will largely be drawn from conclusions of other relevant ES chapters as previously set out.

1696. Information will be sourced from the COMAH 2015 Public Information Search (HSE, 2023). Other relevant information will be available from the National Risk Register (2020), aerial photography and publicly available mapping websites.

9.5.8 Approach to Assessment

1697. The main procedural guidelines of IEMA's '*Major Accidents and Disasters in EIA*' Primer will be followed (IEMA, 2020). Where safety is scoped into an EIA, the Guidance states that: '*even in circumstances when the topic is scoped into the assessment, it is likely that it can be limited to specific elements of the development or the baseline environment and therefore remain limited in scope'*.

1698. Major accidents and disasters will be included within the EPP (as set out in **Chapter 6 Consultation**) and further liaison with key stakeholders, including the HSE, 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.

9.5.9 Scoping Questions to Consultees

1699. The following questions are posed to consultees to help them frame and focus their response to the major accidents and disasters scoping exercise, which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the major accidents and disasters impacts resulting from the Project been identified in the Scoping Report?
- Do you agree with the major accidents and disasters 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?

10 Inter-Relationships

1700. The Environmental Impact Assessment (EIA) will identify and assess inter-relationships that are likely to arise from the construction, operation and decommissioning of the Project. Inter-relationships relevant to the Project are outlined in **Table 10-1**, which will be considered further in the relevant EIA topic chapter as the assessment is undertaken.

Table 10-1 Summary of Inter-Relationships

EIA Topic	Inter-Relationships
Offshore Topics	
Marine Physical Processes	• Chapter 7.3 Marine Water and Sediment Quality; • Chapter 7.4 Benthic and Intertidal Ecology; and • Chapter 7.11 Offshore Archaeology and Cultural Heritage.
Marine Water and Sediment Quality	• 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.
Benthic and Intertidal Ecology	• Chapter 7.2 Marine Physical Processes; • Chapter 7.3 Marine Water and Sediment Quality; and • Chapter 7.5 Fish and Shellfish Ecology.
Fish and Shellfish Ecology	• 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.

EIA Topic	Inter-Relationships
Marine Mammals	• 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; and • Chapter 7.8 Commercial Fisheries.
Intertidal and Offshore Ornithology	• 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; and • Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation.
Commercial Fisheries	• Chapter 7.5 Fish and Shellfish Ecology; • Chapter 7.9 Shipping and Navigation; and • Chapter 7.13 Other Marine Users.
Shipping and Navigation	• Chapter 7.8 Commercial Fisheries; and • Chapter 7.13 Other Marine Users.
Aviation, Radar and Military	• 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.
Offshore Archaeology and Cultural Heritage	• Chapter 7.2 Marine Physical Processes.
Seascape, Landscape and Visual Impact	• Chapter 7.11 Offshore Archaeology and Cultural Heritage; • Chapter 7.13 Other Marine Users; and • Chapter 8.10 Landscape and Visual Impact.

EIA Topic	Inter-Relationships
Other Marine Users	• Chapter 7.8 Commercial Fisheries; • Chapter 7.9 Shipping and Navigation; and • Chapter 7.10 Aviation, Radar and Military.
Offshore Air Quality	All offshore air quality impacts associated with the Project, including inter-relationships, are scoped out of the EIA.
Offshore Airborne Noise	All offshore airborne impacts associated with the Project, including inter-relationships, are scoped out of the EIA.
Onshore Topics	
Geology and Ground Conditions	• 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.
Onshore Air Quality and Dust	• Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation; • Chapter 8.9 Traffic and Transport; and • Chapter 9.2 Human Health.
Water Resources and Flood Risk	• Chapter 8.2 Geology and Ground Conditions; • Chapter 8.5 Soils and Land Use; and • Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation.
Soils and Land Use	• Chapter 8.2 Geology and Ground Conditions; • Chapter 8.4 Water Resources and Flood Risk; • Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation; • Chapter 8.9 Traffic and Transport; and • Chapter 9.3 Socio-Economics, Tourism and Recreation.

EIA Topic	Inter-Relationships
Onshore Ecology, Ornithology and Nature Conservation	• 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; and • Chapter 8.8 Onshore Noise and Vibration.
Onshore Archaeology and Cultural Heritage	• Chapter 7.11 Offshore Archaeology and Cultural Heritage; • Chapter 8.4 Water Resources and Flood Risk; • Chapter 8.8 Onshore Noise and Vibration; • Chapter 8.9 Traffic and Transport; and • Chapter 8.10 Landscape and Visual Impact.
Onshore Noise and Vibration	• Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation; • Chapter 8.9 Traffic and Transport; and • Chapter 9.2 Human Health.
Traffic and Transport	• Chapter 8.3 Onshore Air Quality and Dust; • Chapter 8.5 Soils and Land Use; • Chapter 8.8 Onshore Noise and Vibration; and • Chapter 9.2 Human Health.
Landscape and Visual Impact	• Chapter 7.12 Seascape, Landscape and Visual Impact; • Chapter 8.5 Soils and Land Use; • Chapter 8.6 Onshore Ecology, Ornithology and Nature Conservation; and • Chapter 8.7 Onshore Archaeology and Cultural Heritage.

EIA Topic	Inter-Relationships
Project-Wide Topics	
Human Health	• Chapter 7.3 Marine Water and Sediment Quality; • Chapter 8.3 Onshore Air Quality and Dust; • Chapter 8.4 Water Resources and Flood Risk; • Chapter 8.8 Onshore Noise and Vibration; • Chapter 8.9 Traffic and Transport; • Chapter 8.10 Landscape and Visual Impact; • Chapter 9.3 Socio-Economics, Tourism and Recreation; • Chapter 9.4 Climate Change; and • Chapter 9.5 Major Accidents and Disasters.
Socio-Economics, Tourism and Recreation	• Chapter 7.8 Commercial Fisheries; • Chapter 7.9 Shipping and Navigation; • Chapter 7.12 Seascape, Landscape and Visual Impact; • Chapter 7.13 Other Marine Users; • Chapter 8.5 Soils and Land Use; • Chapter 8.7 Onshore Archaeology and Cultural Heritage; • Chapter 8.8 Onshore Noise and Vibration; • Chapter 8.9 Traffic and Transport; • Chapter 8.10 Landscape and Visual Impact; and • Chapter 9.2 Human Health.

EIA Topic	Inter-Relationships
Climate Change	No inter-relationships have been identified for the greenhouse gas (GHG) assessment. For the climate change resilience (CCR) assessment, the following inter-relationship applies: • Chapter 8.2 Geology and Ground Conditions; • Chapter 8.4 Water Resources and Flood Risk; • Chapter 8.10 Landscape and Visual Impact; • Chapter 9.2 Human Health; and • Chapter 9.5 Major Accidents and Disasters.
Major Accidents and Disasters	• Chapter 8.2 Geology and Ground Conditions; • Chapter 8.3 Onshore Air Quality and Dust; • Chapter 8.4 Water Resources and Flood Risk; • Chapter 8.9 Traffic and Transport; and • Chapter 9.4 Climate Change.

11 Transboundary Impacts

1701. The Environmental Impact Assessment (EIA) will identify and assess transboundary effects that are likely to arise from the construction, operation and decommissioning of the Project. **Table 11-1** outlines the EIA topics in which transboundary impacts have been scoped in for / out from further consideration within the EIA.

Table 11-1 Summary of Transboundary Impacts Proposed to be Scoped In (✓) and Out (X)

EIA Topic	Construction	Operation	Decommissioning
Offshore Topics			
Marine Physical Processes	X	X	X
Marine Water and Sediment Quality	X	X	X
Benthic and Intertidal Ecology	✓	✓	✓
Fish and Shellfish Ecology	✓	✓	✓
Marine Mammals	✓	✓	✓
Intertidal and Offshore Ornithology	✓	✓	✓
Commercial Fisheries	✓	✓	✓
Shipping and Navigation	✓	✓	✓
Aviation, Radar and Military	✓	✓	✓
Offshore Archaeology and Cultural Heritage	✓	✓	✓
Seascape, Landscape and Visual Impact	X	X	X
Other Marine Users	X	X	X
Offshore Air Quality	X	X	X
Offshore Airborne Noise	X	X	X

EIA Topic	Construction	Operation	Decommissioning
Onshore Topics			
Transboundary effects are not considered to be relevant to onshore environmental topics, due to the distance of the impact source from the international boundaries of other European Economic Area (EEA) Member States.			
Project-Wide Topics			
Human Health	X	X	X
Socio-Economics, Tourism and Recreation	X	X	X
Climate Change	✓ (for contextualisation of greenhouse gases (GHG) assessment only)	✓ (for contextualisation of GHG assessment only)	✓ (for contextualisation of GHG assessment only)
Major Accidents and Disasters	X	X	X

12 Summary and Conclusions

1702. The information set out in this Scoping Report identifies the potential impacts that are likely to arise from the construction, operation and decommissioning of the Project. The scoping exercise undertaken is based on an understanding of the environmental conditions likely to be encountered within the relevant study areas and the anticipated nature of potential impacts, utilising publicly available data sources and expert judgment.

1703. **Table 12-1** summarises the potential impacts related to the Project that have been scoped in and out from further consideration within the EIA. All impacts that have been scoped in are considered to represent potential likely significant effects under Regulation 10 of the Infrastructure Planning (EIA) Regulations 2017. Where potential impacts have been scoped out, justification has been provided within the relevant chapter.

1704. Consultees are invited to consider all of the information provided in the Scoping Report and provide comments on the proposed scope and approach for each EIA topic related to the Project. Guiding questions for consultees are provided at the end of each topic chapter, which have been designed to focus the review on the key elements of each topic and seek agreement on their conclusions.

Table 12-1 Summary of Potential Impacts Associated with the Project

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Offshore Topics			
Marine Physical Processes			
Impacts on waves and tidal currents	X	✓	X
Impacts on bedload sediment transport and seabed morphological change	✓	✓	✓
Impacts on suspended sediment concentrations	✓	✓	✓
Indentations on the seabed due to installation vessels	✓	✓	✓
Impacts on coastal and nearshore sediment transport due to marine outfalls and intakes for the Hydrogen Production Facility (HPF)	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts	X	X	X

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Marine Water and Sediment Quality			
Localised temporary increases in suspended sediments.	✓ (HPF and inshore export cable corridor (ECC) only)	X	✓ (HPF and inshore ECC only)
Remobilisation of existing contaminated sediments.	✓ (HPF and inshore ECC only)	X	✓ (HPF and inshore ECC only)
Accidental pollution	X	X	X
Reduction in marine water quality during operation of the HPF	X	✓	X
Cumulative impacts	✓ (HPF and inshore ECC only)	✓ (HPF only)	✓ (HPF and inshore ECC only)
Transboundary impacts	X	X	X
Benthic and Intertidal Ecology			
Temporary habitat loss / physical disturbance	✓	X	✓
Long term habitat loss	X	✓	X

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Increased suspended sediment concentrations	✓ (HPF and inshore ECC only)	X	✓ (HPF and inshore ECC only)
Remobilisation of contaminated sediments	✓ (HPF and inshore ECC only)	X	✓ (HPF and inshore ECC only)
Reduction in marine water quality during operation of the HPF in the intertidal area	X	✓	X
Pollution events resulting from the accidental release of pollutants.	X	X	X
Underwater noise and vibration	✓	X	✓
Interactions of electro-magnetic field (EMF), including potential cumulative EMF effects	X	X	X
Introduction of marine invasive non-native (INNS) from vessel traffic	X	X	X
Colonisation of introduced substrate	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Fish and Shellfish Ecology			
Temporary habitat loss / physical disturbance	✓	X	✓
Long term habitat loss	X	✓	X
Increased suspended sediment and sediment-redeposition	✓	X	✓
Remobilisation of contaminated sediments if present (cable and foundation installation)	X	X	X
Remobilisation of contaminated sediments if present (HPF intake / outfalls)	✓	✓	✓
Underwater noise and vibration	✓	X	✓
Changes in fishing pressure	✓	✓	✓
EMF effects	X	✓	X
Introduction of hard substrate	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Marine Mammals			
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 activities (such as dredging and rock placement) and vessel noise	X	X	X
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)	X	X	X

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Changes to prey resource		✓	✓	✓
Changes to water quality		✓ (HPF only)	✓ (HPF only)	✓ (HPF only)
Physical barrier effect		X	X	X
Effects from EMF		X	X	X
Cumulative impacts		✓	✓	✓
Transboundary impacts		✓	✓	✓
Intertidal and Offshore Ornithology				
Direct habitat loss	Offshore ornithology receptors	X	X	X
	Intertidal ornithology receptors	✓	✓	✓

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Direct disturbance and displacement due to work activity in the Array Area (e.g. presence and movements of vessels and other plant, lighting of work activity)	Offshore ornithology receptors only	✓	✓	✓
Direct disturbance and displacement due to work activity in the offshore ECC	Offshore ornithology receptors only	✓	X	✓
Direct disturbance and displacement due to nearshore vessel movements	Intertidal ornithology receptors only (Offshore receptors considered within 'work activity' in offshore areas above)	X	X	X
Direct disturbance and displacement due to work activity at landfall and within the intertidal area	Intertidal ornithology receptors plus red-throated diver (offshore ornithology receptor)	✓	✓	✓

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Direct disturbance and displacement due to presence of wind turbines and other offshore infrastructure	Offshore ornithology receptors only (red-throated diver, gannet, auks)	X	✓	X
Barrier effect due to presence of wind turbines and other offshore infrastructure	Offshore and intertidal ornithology receptors (including migratory waterbirds)	X	X	X
Accidental pollution	Offshore and intertidal receptors	X	X	X
Changes to prey availability	Offshore and intertidal receptors	✓	✓	✓
Collision risk	Offshore ornithology receptors (gulls, skuas, gannet) and intertidal ornithology receptors (including migratory waterbirds).	X	✓	X
Entrapment and / or entrainment of Prey at marine outfall / intake locations for the HPF	Offshore ornithology receptors only	X	✓	X

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Cumulative impacts	Offshore and intertidal receptors	✓	✓	✓
Transboundary impacts	Offshore ornithology receptors only	✓	✓	✓
Commercial Fisheries				
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	✓	✓	✓

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
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	✓	✓	✓
Shipping and Navigation				
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		✓	✓	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Vessel to vessel collision between a third-party vessel and a project vessel	✓	✓	✓
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, cable crossings or intakes / outfalls.	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 Search and Rescue (S&R) responders	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Aviation, Radar and Military			
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 onshore infrastructure on airfield operations	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Offshore Archaeology and Cultural Heritage			
Direct impacts to heritage assets (offshore ECC only)	✓	✓	✓
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

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Change to character which could affect perceptions of the historic seascape character	X	✓	X
Cumulative impacts	✓	✓	✓
Transboundary impacts (direct and indirect)	✓	✓	✓
Seascape, Landscape and Visual Impact			
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
Other Marine Users			
Potential interference with other wind farms	✓	X	✓
Potential interference with oil and gas operations and decommissioning activities	✓	X	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Physical impacts on sub-sea cables and pipelines	✓	X	✓
Impacts on carbon capture storage (CCS) sites	✓	X	✓
Impacts on aggregate dredging activities	X	X	X
Impacts on disposal sites	X	X	X
Impacts of Ministry of Defence (MoD) activities	X	X	X
Cumulative impacts	X	X	X
Transboundary impacts	X	X	X
Offshore Air Quality			
Impacts on human receptors	X	X	X
Impacts on ecological receptors	X	X	X
Cumulative impacts	X	X	X
Transboundary impacts	X	X	X

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Offshore Airborne Noise			
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
Onshore Topics			
Geology and Ground Conditions			
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	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Impacts to the built environment	✓	✓	✓
Impacts to agricultural land	✓	✓	✓
Cumulative impacts	✓	✓	✓
Onshore Air Quality and Dust			
Impacts of emissions of dust on human and ecological receptors	✓	X	✓
Impacts of emissions from plant and machinery on human health and ecological sites	✓	X	✓
Impacts of emissions from road traffic on human health and ecological sites	✓	X	✓
Impact from visible plume (from cooling towers) on human receptors	X	✓ (if cooling tower option is taken forward for the HPF)	X
Impacts of emissions associated with the HPF (only from backup power on human and ecological sites)	X	✓	X
Cumulative impacts	✓	X	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Water Resources and Flood Risk			
Direct disturbance of surface water bodies	✓	X	✓
Increased sediment supply	✓	X	✓
Supply of contaminants to surface and groundwater	X	X	X
Changes to surface and groundwater flows and flood risk	✓	✓	✓
Water abstraction and effluent discharge	X	✓	X
Cumulative impacts	✓	✓	✓
Soils and Land Use			
Agricultural drainage	✓	✓	✓
Disruption to farming practices (in general)	✓	✓ (buried infrastructure may be scoped out once cable burial depths are confirmed)	✓
Disruption to farming practices (soil heating)	X	X	X

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Soil degradation and erosion	✓	X	✓
Stewardship and land management schemes	✓	✓ (from the HPF only)	✓
Existing utilities	✓	X	✓
Public Rights of Way (PRoW) and cycle routes	✓	✓ (for PRoWs and in relation to the HPF only)	✓
Cumulative impacts	✓	✓	✓
Onshore Ecology, Ornithology and Nature Conservation			
Direct and indirect impacts to designated sites	✓	✓	✓
Direct impacts to habitats (long term and temporary loss and fragmentation)	✓	✓	✓
Direct and indirect impacts on legally protected species (noise, emissions and lighting)	✓	✓	✓
Spread of INNS	✓	X	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Impacts from ongoing maintenance	X	✓	X
Cumulative impacts	✓	✓	✓
Onshore Archaeology and Cultural Heritage			
Direct, physical, impacts, to designated heritage assets	✓	X	✓
Direct, physical, impacts to known and unknown non-designated heritage assets	✓	X	✓
Indirect, physical, impacts to designated heritage assets.	✓	X	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	X	✓
Changes to the setting of designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Changes to the setting of non- designated heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to the setting of historic landscapes, which could affect their heritage significance.	X	✓	X
Cumulative impacts	✓	✓	✓

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Onshore Noise and Vibration				
Noise affecting noise and vibration sensitive receptors (NVSR)		✓	✓ (HPF only)	✓
Vibration affecting NVSRs		✓	X	✓
Road traffic noise affecting NVSRs		✓	✓	✓
Road traffic vibration affecting NVSRs		X	X	X
Cumulative impacts		✓	✓	✓
Traffic and Transport				
Severance	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Amenity	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Road safety (including consideration of hazardous loads)	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Driver delay (capacity)	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Driver delay (highway constraints)	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Abnormal loads	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Hazardous loads	Both onshore and offshore activities	X	X	X

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Cumulative impacts	Onshore activities only All impacts associated with offshore activities scoped out*	✓	✓	✓
Landscape and Visual Impact				
Landscape character and designated landscapes (resulting from the landfall and onshore export cables)		X	X	X
Landscape character and designated landscapes (resulting from the HPF)		✓	✓	✓
Visual receptors (resulting from the landfall and onshore export cables)		X	X	X
Visual receptors (resulting from the HPF)		✓	✓	✓
Cumulative impacts (resulting from the landfall and onshore export cables)		X	X	X
Cumulative impacts (resulting from the HPF)		✓	✓	✓

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Project-Wide Topics				
Human Health				
Social Environment				
Housing	Offshore and Onshore	X	X	X
Open space, leisure and play	Offshore	X	X	X
	Onshore	✓	X	✓
Transport modes, access and connections	Offshore	X	X	X
	Onshore	✓	✓	✓
Community safety	Offshore and Onshore	X	X	X
Community identity, culture, resilience and influence	Offshore	X	X	X
	Onshore	X	✓	X
Economic Environment				
Education and training	Offshore and Onshore	✓	✓	✓

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
Employment and income	Offshore and Onshore	✓	✓	✓
Unemployment or Adverse Economic Implications	Offshore and Onshore	X	X	X
Bio-Physical Environment				
Climate change and adaptation	Offshore	X	✓	X
	Onshore	X	✓	X
Air quality	Offshore	X	X	X
	Onshore	✓	✓	✓
Water quality or availability	Offshore	X	✓ (nearshore only if desalination is required)	X
	Onshore	X	✓	X
Land quality	Offshore and Onshore	X	X	X
Noise and vibration	Offshore	X	X	X

Potential Impact		Scoped In (✓) / Out (X)		
		Construction	Operation	Decommissioning
	Onshore	✓	✓	✓
Radiation ((EMF)	Offshore and Onshore	X	X	X
Institutional and Built Environment				
Health and social care services	Offshore and Onshore	X	X	X
Built environment (hydrogen production)	Offshore	X	X	X
	Onshore	X	✓	X
Cumulative and Transboundary Impacts				
Cumulative impacts	Offshore and Onshore	✓	✓	✓
Transboundary impacts	Offshore and Onshore	X	X	X
Socio-Economics, Tourism and Recreation				
Direct economic benefit (supply chain)		✓	✓	✓
Increased employment		✓	✓	✓

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Loss of, disruption to or pressure on local infrastructure and services	✓	X	✓
Disturbance (noise, air, visual and traffic) to social infrastructure	✓	✓ (Related to onshore infrastructure only)	✓
Disruption to recreational activities	✓	✓ (Related to onshore infrastructure only)	✓
Disruption to the tourism industry	✓	✓ (Related to onshore infrastructure only)	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	X	X	X
Climate Change			
Greenhouse Gas (GHG) Assessment (for both the National Grid Option and Hydrogen Option)			
Net change in GHG emissions and contribution to the UK's decarbonisation targets	✓	✓	✓
Cumulative impacts	X	X	X

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Transboundary impacts	✓	✓	✓
Climate Change Resilience (CCR) Assessment			
Project's vulnerability to climate change impacts	✓	✓	X
Cumulative impacts	✓	✓	X
Transboundary impacts	X	X	X
Major Accidents and Disasters			
Major accident or disaster impact arising from the HPF upon the Project site, human or ecological receptors	X	✓ (Including commissioning activities)	X
Impact of an incident associated with an existing major accident hazard risk on the HPF	X	✓ (Including commissioning activities)	X
Impact of natural hazards on the HPF	X	✓ (Including commissioning activities)	X
Cumulative impacts	X	✓ (Including commissioning activities)	X

Potential Impact	Scoped In (✓) / Out (X)		
	Construction	Operation	Decommissioning
Transboundary impacts	X	X	X

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Appendix A List of Tables, Figures and Plates

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Appendix B List of Abbreviations

Abbreviation	Definition
AARA	Air-to-Air Refuelling Area
AD	Air Defence
ADBA	Archaeological Desk-Based Assessment
AEL	Alkaline Electrolysis
AEoI	Adverse Effect on Integrity
AEZ	Archaeological Exclusion Zone
AIP	Aeronautical Information Publication
AIS	Automatic Information System
ALARP	As Low as Reasonably Practicable
ALC	Agricultural Land Classification
ALL	Approximate Latitude Longitude
AMSL	Above Mean Sea Level
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AOP	Air Overpressure
AoS	Area of Search
AP	Annual Probability
APIS	Air Pollution Information System
AQEG	Air Quality Expert Group
AQMA	Air Quality Management Area
AR6	Sixth Assessment Report
ARN	Affected Road Network

Abbreviation	Definition
AtoN	Aids to Navigation
ATS	Air Traffic Service
BAP	Biodiversity Action Plan
BAS	Burial Assessment Study
BAT	Best Available Technique
BDMPS	Biologically Defined Minimum Population Scale
BEIS	Department for Business, Energy and Industrial Strategy
BERR	Business, Enterprise and Regulatory Reform
BESS	British Energy Security Strategy
BGS	British Geological Survey
BMV	Best and Most Versatile
BNG	Biodiversity Net Gain
BNL	Basic Noise Level
BOD	Biological Oxygen Demand
BP	Before Present
BRAG	Black, Red, Amber Green
BS	British Standard
BTO	British Trust for Ornithology
BWM	The International Convention for the Control and Management of Ships' Ballast Water and Sediments
CA	Competent Authority
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication

Abbreviation	Definition
CBD	The Convention of Biological Diversity
CBRA	Cable Burial Risk Assessment
CCA	Civil Aviation Authority
CCC	Climate Change Committee
CCR	Climate Change Resilience
CCS	Carbon Capture Storage
CD	Chart Datum
CDM	The Construction Design and Management Regulations
CEA	Cumulative Effect Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CfD	Contracts for Difference
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologist
CIHT	Chartered Institute of Highways and Transportation
CIRIA	Construction Industry Research and Information Association
CMLI	Chartered Members of the Landscape Institute
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CoD	Consultation Distance
COLREG	The International Regulation for Prevention of Collision at Sea
COMAH	The Control of Major Accident Hazards Regulations
COPD	Chronic Obstructive Pulmonary Disease

Abbreviation	Definition
COVID-19	Coronavirus Pandemic 2019
COWRIE	Collaborative Offshore Windfarm Research into the Environment
CPA	The Coast Protection Act
CPUE	Catch per Unit Effort
CRA	Chemical Risk Assessment
CRoW	Countryside Right of Way
CRTN	Calculation of Road Traffic Noise
CSS	Countryside Stewardship Scheme
dB	Decibel
DBA	Dogger Bank A Offshore Wind Farm
DBB	Dogger Bank B Offshore Wind Farm
DBC	Dogger Bank C Offshore Wind Farm
DBD	Dogger Bank D Offshore Wind Farm
DBS	Dogger Bank South
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DLUHC	Department of Levelling Up, Housing and Communities
DML	Deemed Marine Licence
DMRB	Design Manual for Roads and Bridges
DPD	Development Plan Document
DSEAR	The Dangerous Substances and Explosive Atmospheres Regulations

Abbreviation	Definition
DTI	Department of Trade and Industry
DWPA	Drinking Water Protected Area
EC	European Commission
ECA	Emission Control Area
ECC	Export Cable Corridor
EcIA	Ecological Impact Assessment
eDNA	Environmental Deoxyribonucleic Acid
EEA	European Economic Area
EEZ	Economic Exclusion Zone
EIA	Environmental Impact Assessment
ELMS	Environmental Land Management Scheme
EMAP	Environmental Monitoring and Assessment Programme
EMF	Electro-Magnetic Field
EMODnet	European Marine Observation Network
EMP	Ecological Management Plan
EMSA	European Maritime Safety Agency
END	The Environmental Noise Directive
EPS	European Protected Species
EPP	Evidence Plan Process
EPR	The Environmental Permitting Regulations
EPUK	Environmental protection United Kingdom
ES	Environmental Statement
ESS	Environmental Stewardship Scheme

Abbreviation	Definition
ETG	Expert Topic Group
EU	European Union
EU DCF	European Union Data Collection Framework
EUMOFA	European Union Market Observatory for Fisheries and Aquaculture
EUNIS	The European Nature Information System
FCHO	Fuel Cells and Hydrogen Observatory
FEPA	The Food and Environmental Protection Act
FIR	Flight Information Region
FL	Flight Level
FLO	Fisheries Liaison Officer
FLOWW	Fisheries Liaison with Offshore Wind and Wet Renewables Group
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GCB	Green Construction Board
GEART	Guidelines for the Environmental Assessment of Road Traffic
GHG	Greenhouse Gas
GI	Ground Investigation
GIS	Geospatial Information System
GLVIA3	Guidelines for Landscape and Visual Impact Assessment Third Edition
GPP	Guidance for Pollution Prevention
GT	Gross Tonnage
GVA	Gross Value Added
GW	Gigawatt

Abbreviation	Definition
GWDTE	Groundwater Dependent Terrestrial Ecosystem
GWP	Global Warming Potential
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HER	Historic Environment Record
HFIG	Holderness Fishing Industry Group
HGV	Heavy Goods Vehicle
HMPA	Highly Protected Marine Area
HMRI	Helicopter Main Routeing Indicator
HPF	Hydrogen Production Facility
HPSSA	House Price Statistics for Small Area
HRA	Habitats Regulations Assessment
HSC	Historic Seascape Characterisation
HSE	Health and Safety Executive
HSI	Habitat Suitability Index
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
HZSC	Hazardous Substances Consent
IAIA	International Association for Impact Assessment
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
IBTS	International Bottom Trawl Survey

Abbreviation	Definition
IBTSWG	International Bottom Trawl Survey Working Group
ICAO	International Civil Aviation Organisation
ICE	Inventory of Carbon and Energy
ICES	International Council for the Exploration of the Sea
ICNIRP	International Commission on Non-Ionising Radiation Protection
IDB	Internal Drainage Board
IDD	Internal Drainage District
IEMA	Institute of Environmental Management and Assessment
IFCA	Inshore Fisheries and Conservation Authorities
IHBC	Institute of Historic Building Conservation
IHLS	International Herring Larvae Survey
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
IPCC	Intergovernmental Panel on Climate Change
IPH	Institute of Public Health
IPPC	Integrated Pollution Prevention and Control
IROPI	Imperative Reasons of Overriding Public Interest
IUCN	International Union for Conservation of Nature
JCP	Joint Cetacean Protocol
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
KIS-ORCA	Kingfisher Information Service – Offshore Renewable and Cable Awareness Project
LAQM	Local Air Quality Management

Abbreviation	Definition
LAT	Lowest Astronomical Tide
LDF	Local Development Framework
LDP	Local Development Plan
LGM	Last Glacial Maximum
LGS	Local Geological Site
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LSE	Likely Significant Effect
LSO	Long Sea Outfall
LULUCF	Land Use, Land Use Change and Forestry
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
mag.	Magnetometer
MAGIC	Multi Agency Government Information for the Countryside
MAPD	Major Accident Prevention Document
MAPP	Major Accident Prevention Policy
MarESA	Marine Evidence-Based Sensitivity Assessment
MarLIN	The Marine Life Information Network
MARPOL	The International Convention for the Prevention of pollution from Ships
MBES	Multibeam Echosounder
MCA	Maritime and Coastguard Agency
MCAA	The Marine and Coastal Access Act
MCEU	Marine Consents and Environment Unit

Abbreviation	Definition
MCZ	Marine Conservation Zone
MDA	Managed Danger Area
MEDIN	Marine Environmental Data and Information Network
MGN	Marine Guidance Note
MHCLG	Ministry for Housing, Communities and Local Government
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MoD	Ministry of Defence
MP	Member of Parliament
MPA	Marine Protected Area
MPS	Marine Policy Statement
MRCA	Marine Character Area
MSA	Mineral Safeguarding Area
MU	Management Unit
MW	Megawatts
NAEI	National Atmospheric Emissions Inventory
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NCA	National Character Area
NCN	National Cycle Network
NCR	National Cycle Route
NEIFCA	North Eastern Inshore Fisheries Conservation Authority
NERC	The Natural Environment and Rural Communities Act

Abbreviation	Definition
NEYEDC	North and East Yorkshire Ecological Data Centre
NFFO	National Federation of Fishermen's Organisations
NGET	National Grid Electricity Transmission
NHLE	National Heritage List of England
NHS	National Health Services
NIA	Noise Important Area
nm	Nautical Miles
NMP	National Mapping Project
NNR	National Nature Reserve
NO_x	Nitrogen Oxide
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
NSTA	North Sea Transition Authority
NVSR	Noise and Vibration Sensitive Receptor
NVZ	Nitrate Vulnerable Zone
O&M	Operation and Maintenance
OBIS	Ocean Biodiversity Information System
OCNS	Offshore Chemical Notification Scheme
OHID	Office of Health Improvement and Disparities
ONS	Office for National Statistics

Abbreviation	Definition
ONTR	Offshore Network Transmission Review
ORE	Offshore Renewable Energy
OREI	Offshore Renewable Energy Installation
OS	Ordnance Survey
OSP	Offshore Substation Platform
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	Offshore Wind Farm
PAD	Protocol for Archaeological Discoveries
PAH	Polycyclic Aromatic Hydrocarbon
PAS	Publicly Available Specification
PBDE	Polybrominated Diphenyl Ether
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report
PEM	Proton Exchange Membrane
PEMP	Project Environmental Management Plan
PEXA	Practice and Exercise Area
PFOS	Perfluorooctane Sulphonate
PM	Particulate Matter
PPG	Planning Policy Guidance
PPS	Planning Policy Statement
PRA	Preliminary Risk Assessment

Abbreviation	Definition
PRoW	Public Right of Way
PSFR	The Pipelines Safety Regulations
PSR	Primary Surveillance Radar
PTS	Permanent Threshold Shift
QSR	Quality Status Report
RAF	Royal Airforce
RAM	Restricted in Her Ability to Manoeuvre
RBMP	River Basin Management Plan
REZ	Renewable Energy Zone
RIAA	Report to Inform Appropriate Assessment
RLoS	Radar Line of Sight
RNAG	Reasons for Not Achieving Good Status
ROV	Remote Operated Vehicle
RSPB	The Royal Society for the Protection of Birds
RVAA	Residential Visual Amenity Assessment
RYA	Royal Yachting Association
S&R	Search and Rescue
SAC	Special Area of Conservation
SAR	Swept Area Ratio
SBP	Sub-Bottom Profiler
SCANS	Small Cetaceans in European Atlantic Waters and the North Sea
SCOS	Special Committee on Seals
SD	Standard Deviation

Abbreviation	Definition
SEA	Strategic Environmental Assessment
SeaMaST	Seabird Mapping and Sensitivity Tool
SELss	Single-Strike Sound Exposure Level
SF_6	Sulphur Hexafluoride
SFF	Scottish Fishermen's Federation
SFRA	Strategic Flood Risk Assessment
SI	Site Investigation
SICG	Scallop Industry Consultation Group
SLVIA	Seascape, Landscape and Visual Impact Assessment
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage
SNS	Southern North Sea
SO_2	Sulphur Dioxide
SoCC	Statement of Community Consultation
SOEC	Solid Oxide Electrolyser Cell
SOLAS	The International Convention for the Safety of Life at Sea
SOSS-MAT	Strategic Ornithological Support Services – Migration Assessment Tool
SOx	Sulphur Oxide
SPA	Special Protected Area
SPM	Suspended Particulate Matter
S-P-R	Source – Pathway – Receptor
SPZ	Source Protection Zone
SSS	Side Scan Sonar

Abbreviation	Definition
SSSI	Site of Special Scientific Interest
StAR	Standardised Admission Ratio
StMR	Standardised Mortality Ratio
SWF	Sea Watch Foundation
TAC	Total Allowable Catch
TBT	Tributyltin
TCA	Trade and Cooperation Agreement
TCPA	The Town and Country Planning Act
TEL	Threshold Effect Level
THC	Total Hydrocarbon
TJB	Transition Joint Bay
TTS	Temporary Threshold Shift
UK	United Kingdom
UKCEH	United Kingdom Centre for Ecology and Hydrology
UKCP	United Kingdom Climate Projection
UKFEN	United Kingdom Fisheries Economic Network
UKHO	United Kingdom Hydrographic Office
UNFCC	United Nations Framework Convention on Climate Change
US	United States
UXO	Unexploded Ordnance
VHF	Very High Frequency
VMP	Vessel Management Plan
VMS	Vessel Monitoring System

Abbreviation	Definition
WBCSD	World Business Council for Sustainable Development
WeBS	Wetland Birds Survey
WER	The Water Environment Regulations
WFD	The Water Framework Directive
WHO	World Health Organisation
WRI	World Resources Institute
WSI	Written Scheme of Investigation
WWI	World War I
WWII	World War II
YWT	Yorkshire Wildlife Trust
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility