RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Environmental Impact Assessment Scoping Report

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

26/07/2022

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Project:	**Dogger Bank South Offshore Wind Farms**	Sub Project/Package:	**Consents**
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Unrestricted

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Contents

Figures

Tables

Glossary

Term	Definition
Array areas	The two distinct offshore wind farm areas (DBS East and DBS West) which are collectively known as the Dogger Bank South Offshore Wind Farms.
Array cables	Cables which link the wind turbines to the offshore substation platforms.
Construction compound	Area set aside to facilitate construction. To be located adjacent to the onshore export cable route, with access to the highway (locations not yet determined).
EIA Regulations	Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to EIA and information to support a Habitats Regulations Assessment.
Habitats Regulations	Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended).
Haul roads	The temporary track alongside the onshore export cable route used by construction traffic to access different sections of the onshore export cable route.
Horizontal Directional Drilling (HDD)	A method of cable installation where a cable is pulled into a small-bore tunnel drilled beneath a feature without the need for trenching.
Jointing bay	Underground structures constructed at regular intervals along the onshore export cable route to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	The location where the offshore export cables come ashore.

Term	Definition
Landfall Area of Search	The area considered within which the offshore export cables would make landfall.
Offshore export cables	The cables which bring electricity from the offshore substation platforms to the Transition Joint Bays.
Offshore Study Area	The area encompassing the array areas and potential locations for the offshore transmission infrastructure.
Onshore export cables	The cables which take the electricity from the Transition Joint Bays to the onshore substations.
Onshore grid connection points	The electricity transmission network connection locations for the Projects.
Onshore Study Areas	Areas encompassing the potential landfall locations and the potential locations for onshore transmission works.
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Projects so that it can be connected to the electricity transmission network. There will be one onshore substation for each Project.
Onshore substation site	The proposed location of the onshore substations.
Reactive compensation platform	An offshore structure housing electrical reactors for the purpose of limiting electrical losses in the course of HVAC transmission by providing reactive compensation.
RWE	RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited.
Safety zones	A rolling safety zone around offshore infrastructure during its installation.

Term	Definition
Scour protection	Protective materials used to avoid sediment being eroded away from the base of foundations and cables as a result of the water flow.
Transition Joint Bay (TJB)	An underground structure at the landfall that houses the joint between the offshore export cables and the onshore export cables.
Transmission Infrastructure	The structures and equipment required to convey electricity.
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms)

Acronyms

Term	Definition
ADBA	Archaeological Desk-Based Assessment
AEP	Annual Exceedance Probability
AIP	Aeronautical Information Publication
AIS	Automatic Identification System
ALC	Agricultural Land Classification
AMSL	Above Mean Sea Level
AONB	Area of Outstanding National Beauty
AQMA	Air Quality Management Area
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Survey
BMV	Best and Most Versatile
BRAG	Black-Red-Amber-Green
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CCC	Committee for Climate Change
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
DBS	Dogger Bank South
DCO	Development Consent Order

Term	Definition
DECC	Department of Energy and Climate Change
DMRB	Design Manual for Roads and Bridges
DTI	Department of Trade and Industry
EcIA	Ecological Impact Assessment
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMODnet	European Marine Observation and Data Network
EPP	Evidence Plan Process
EPUK	Environmental Protection UK
ES	Environmental Statement
ESO	Electricity System Operator
ETG	Expert Topic Group
EU	European Union
EUNIS	European Nature Information System
FIR	Flight Information Region
FL	Flight Level
FRA	Flood Risk Assessment
FSA	Formal Safety Assessment
GEART	Guidelines for the Environmental Assessment of Road Traffic

Term	Definition
GHG	Greenhouse Gases
GIS	Geographical Information Systems
HDD	Horizontal Direction Drill
HER	Historic Environment Record
HGVs	Heavy Goods Vehicles
HIA	Health Impact Assessment
HMRI	Helicopter Main Routeing Indicator
HND	Holistic Network Design
HRA	Habitats Regulations Assessment
HSC	Historic Seascape Character
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAMMWG	Inter-Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
ICES	International Council for the Exploration of the Sea
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organization

Term	Definition
IPC	Infrastructure Planning Commission (now the Planning Inspectorate)
IPH	Institute of Public Health
JCP	Joint Cetacean Protocol
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LSOA	Lower Layer Super Output Area
LVIA	Landscape and Visual Impact Assessment
MAGIC	Multi-Agency Geographic Information for the Countryside
MAIB	Marine Accident Investigation Branch
MarLIN	Marine Life Information Network
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MGN	Marine Guidance Note
MHCLG	Ministry of Housing, Communities and Local Government (now the Department for Levelling Up, Housing and Communities)
MHWS	Mean High Water Spring
MMO	Marine Management Organisation

Term	Definition
MPS	Marine Policy Statement
NATS	National Air Traffic Service
NBN	National Biodiversity Network
NCA	National Character Area
NCR	National Cycle Route
NEIFCA	North Eastern Inshore Fisheries and Conservation Authority
NERC	Natural Environment and Rural Communities
NHLE	National Heritage List of England
NHS	National Health Service
NM	Nautical Miles
NNR	National Nature Reserve
NO_2	Nitrogen Dioxide
NPS	National Policy Statement
NRA	Navigation Risk Assessment
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project
OCP	Offshore Converter Platform
OFTO	Offshore Transmission Owner
OHID	Office for Health Improvement and Disparities
ONS	Office for National Statistics
OREIs	Offshore Renewable Energy Installations

Term	Definition
OS	Ordnance Survey
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
PEXA	Practice and Exercise Areas
PHE	Public Health England
PPG	Planning Practice Guidance
PRA	Preliminary Risk Assessment
PRoW	Public Rights of Way
pSPAs	Proposed Special Protection Areas
RIAA	Report to Inform an Appropriate Assessment
RNLI	Royal National Lifeboat Institution
RRH	Remote Radar Head
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SCADA	System Control and Data Acquisition
SCANS	Small Cetaceans in the European Atlantic and North Sea
SCI	Site of Community Importance
SCOS	Special Committee on Seals
SLVIA	Seascape, Landscape and Visual Impact Assessment
SPA	Special Protection Area

Term	Definition
SPZ	Source Protection Zone
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay
UKCP18	United Kingdom Climate Projections 2018
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
VMS	Vessel Monitoring Systems
WFD	Water Framework Directive
WHO	World Health Organization
ZTV	Zone of Theoretical Visibility

1. Introduction

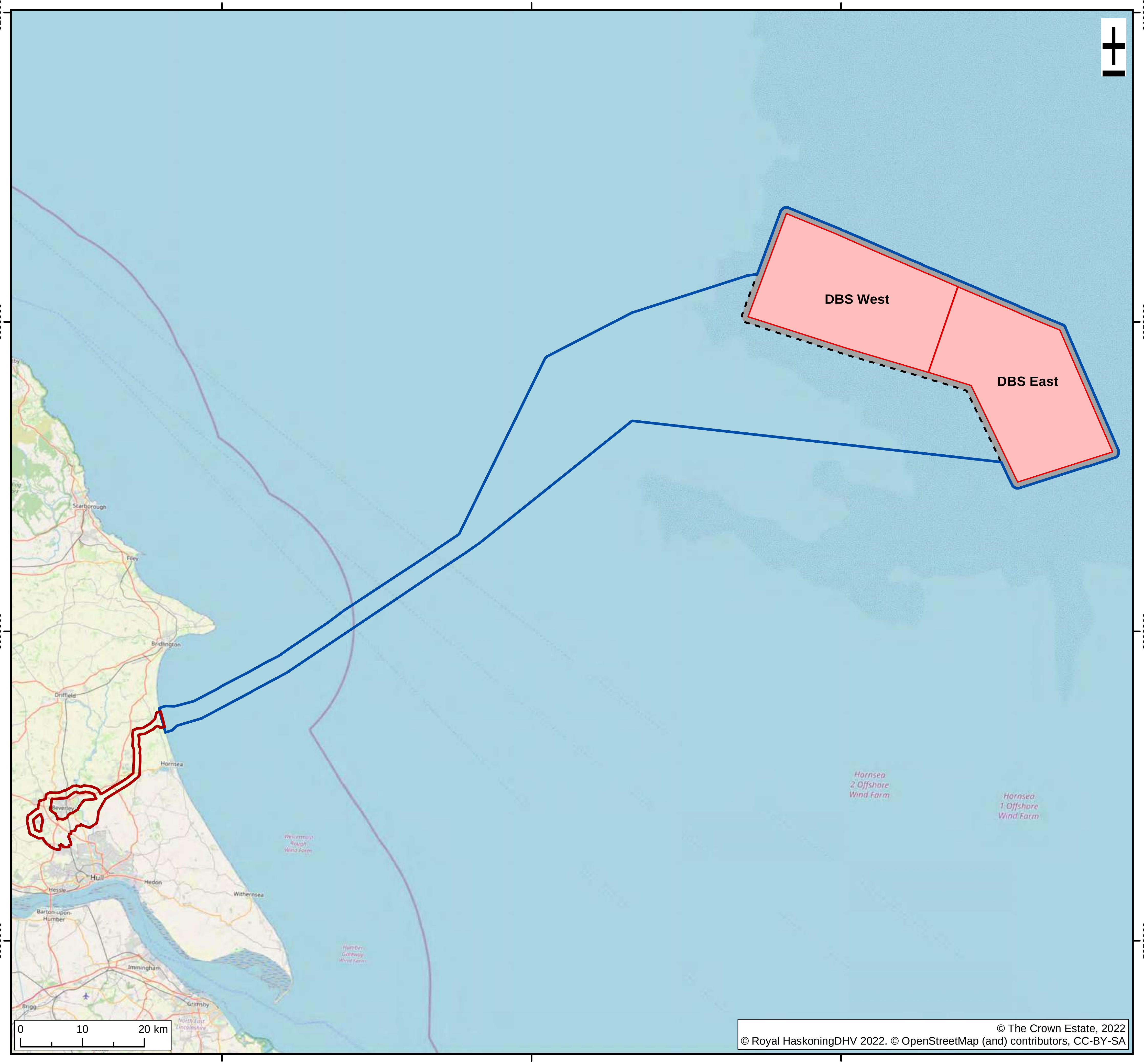
1.1. Project Background

1. In November 2017, The Crown Estate announced a new round of offshore wind leasing. In September 2019, the final bidding areas were announced and the Offshore Wind Leasing Round 4 was launched. As part of the Round 4 process, developers were able to identify preferred sites within bidding areas defined by The Crown Estate. Applications were then submitted by developers under a competitive bidding process, culminating in an auction held in February 2021. RWE was successful in this auction process, securing preferred bidder status on two adjacent projects, Dogger Bank South (DBS) East and DBS West, collectively known as the DBS Offshore Wind Farms (hereafter 'the Projects'). The Projects have been subject to a plan-level Habitats Regulations Assessment (HRA), undertaken by The Crown Estate. The Crown Estate gave notice to the UK and Welsh Governments of its intent to proceed with the Round 4 Plan on the basis of a derogation in April 2022. The Secretary of State for Business Energy and Industrial Strategy has agreed that The Crown Estate can proceed with plan. The Projects will now proceed to the Agreements for Lease stage.

2. The array areas are located more than 100km offshore on the Dogger Bank in the southern North Sea and each covers approximately 500km^2.

3. The onshore grid connection points have been identified through the National Grid Electricity System Operator (ESO)'s Holistic Network Design (HND) process. The HND was published by National Grid ESO on 7th July 2022 and allows for interconnectivity between multiple offshore projects on the east coast of Scotland and England. As the delivery mechanisms for the wider HND are yet to be determined, this Scoping Report only includes the infrastructure required for the Projects' grid connections at a new National Grid substation to be located near to the existing Creyke Beck substation in the East Riding region of Yorkshire.

4. This location has informed the basis of the Onshore Study Area, and corresponding Offshore Study Area for the purposes of scoping (**Figure 1-1**).



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Array Temporary Construction Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	LB	JF	HC
S3	P01	29/04/2022	Suitable for Review & Comment	JR	JF	HC

Title:

Onshore and Offshore Study Areas

Figure: 1-1	Drawing No: PB2340-RHD-ZZ-ZZ-DR-Z-0213		
Co-ordinate system: WGS 1984 UTM Zone 31N	Page Size: A3	Scale: 1:625,000	
Project: Dogger Bank South Offshore Wind Farms	Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report		

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5. Alongside a conventional connection to the electricity transmission network, other possible connection options that may be considered include connection to an offshore multi-purpose interconnector, private offtake, integration with future hydrogen infrastructure or a combination thereof. As the Projects progress these options will be the subject of ongoing discussions between RWE, National Grid ESO and other relevant parties. Should any such development be included in the DCO application further requests for a Scoping Opinion or other targeted consultation may be undertaken by RWE.

1.2. Purpose of this Document

6. As the Projects are offshore generating stations each exceeding 100MW installed capacity they are classified as Nationally Significant Infrastructure Projects (NSIPs). As such a Development Consent Order (DCO) is required for their development under the Planning Act 2008. In order to support the DCO application an Environmental Impact Assessment (EIA) is required.

7. This document supports a request for a Scoping Opinion from the Planning Inspectorate for the Projects in accordance with Regulation 10 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (hereafter the 'EIA Regulations'). The EIA Regulations enable an applicant to request a Scoping Opinion from the Secretary of State on the information to be included in an EIA.

8. The Scoping Report outlines the receptors that will be considered during the EIA and the proposed approach to data gathering. It also provides information on the assessment methodology in order to characterise the existing environment, assess potential impacts and develop mitigation measures. This will be refined during a programme of consultation with technical stakeholders throughout the EIA process. The Scoping Report and resulting Scoping Opinion will play a key part in achieving a proportionate and focused EIA.

9. This Scoping Report builds on the information presented in a withdrawn Scoping Report for the Projects which was submitted to the Planning Inspectorate on 9th November 2021. RWE withdrew the request for a Scoping Opinion on 14th December 2021, which was confirmed by the Planning Inspectorate on 16th December 2021. Stakeholder responses provided to the Planning Inspectorate to inform their Scoping Opinion on the withdrawn Scoping Report have been collated by RWE and this Scoping Report has been updated in light of those comments.

10. The Preliminary Environmental Information Report (PEIR) will provide further detail on the interim findings of the site characterisation and impact assessment. An Environmental Statement (ES) containing the results of the EIA will be submitted with the DCO application. Within this Scoping Report receptors and impacts have been proposed to be scoped in or out using existing evidence and expert analysis including lessons learned from a wide range of EIAs for offshore wind farms, recognising that a number of issues cannot be scoped out until further information is known about the Projects and the existing environment. Any further refinement of the impacts scoped out will be justified and agreed with the relevant stakeholders as the EIA progresses beyond Scoping (see section 1.7).

1.3. Consenting Strategy

11. DBS East and DBS West are separate projects and separate commercial entities. However, the Scoping Report assumes that the Projects will form the basis of a single DCO application. This approach, based on a single planning process and DCO application, allows for consistency across the Projects on approach to assessments, consultation and examination. RWE will engage with the Planning Inspectorate and other relevant stakeholders regarding whether single or multiple DCO applications are the most appropriate consenting strategy throughout the pre-consent phase.

12. Should a single DCO application be made for both Projects separate Deemed Marine Licences will be requested as schedules to the DCO to cover the array areas and associated transmission infrastructure for each of the Projects. This approach allows each Project to retain rights to their own particular assets should ownership of each Project change over time.

13. Whilst the Projects will form the basis of a single DCO application (with a combined EIA process and associated submissions), each Project will be assessed individually so that mitigation, where appropriate, is project specific. As such, the assessment will consider the possibility that the projects are developed concurrently or sequentially.

14. The EIA will consider the appropriate realistic worst-case scenarios based on the above and present the results on a topic by topic basis.

1.4. The Applicant

15. RWE is one of the world's leading renewable energy companies and is a key player in the offshore wind market. RWE has been involved in offshore wind energy in the UK since the very start, having installed the first full scale offshore turbines in Blyth in 2000 and commissioned the UK's first commercial wind farm in 2003, the 60MW North Hoyle Offshore Wind Farm.

16. RWE has committed to invest around £15 billion into green technologies and infrastructure in the UK by 2030 as part of its Growing Green strategy to grow its renewable portfolio and to become carbon neutral by 2040. As a driver of the energy transition, the company also focuses on innovative projects such as floating offshore as well as the generation and use of hydrogen.

17. RWE is the UK's second largest power producer, supplying around 12% of the UK's electricity and is the third largest renewable generator in the UK. With a diverse portfolio of renewable technologies, RWE's total installed capacity (pro rata) from renewables amounts to over 2.5 GW in the UK alone. In total, RWE operates 33 onshore wind farms, ten offshore wind farms, 21 hydro plants and one biomass plant.

18. With partners, RWE's offshore portfolio continues to expand in the UK with a further six projects in the development phase. This is one of the largest offshore wind pipelines in the country. Triton Knoll Offshore Wind Farm completed turbine commissioning in January 2022 and is on track to generate enough green electricity to power 800,000 typical UK homes per year. Construction is now underway on Sofia Offshore Wind Farm.

19. For further information visit: www.rwe.com/rwe-renewables-uk.

1.5. Project Description

20. At this early stage in the development of the Projects, the project description is indicative, based on RWE's experience of developing and operating offshore wind farms.

21. The Projects' EIA will be based on a design envelope approach in accordance with National Policy Statement (NPS) EN-3 (paragraph 2.6.42) which recognises that: *"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* (sic)*, 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."*

22. NPS EN-3 (paragraph 2.6.43) continues: "*The IPC (sic) should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until sometime after any consent has been granted. Where some details have not been included in the application to the IPC (sic), 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 to ensure that the project as it may be constructed has been properly assessed (the Rochdale [Design] Envelope)*" (Department of Energy and Climate Change (DECC) 2011).

23. The design envelope will therefore provide maximum and minimum parameters, where appropriate, to ensure the worst case scenario can be quantified and assessed in the EIA. 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"*.

24. The project description, including the design envelope, will be further defined in the PEIR and ES. The following sections provide an overview of the current understanding of the potential infrastructure required for the Projects. This will be developed by RWE, taking into account the Scoping Opinion, the outcomes of The Crown Estate plan-level HRA, other technical work and consultation undertaken prior to submission of the DCO application.

25. Key components of an offshore wind farm are illustrated in **Plate 1-1**. Similar wind farm and wind farm transmission components will be required for each project.

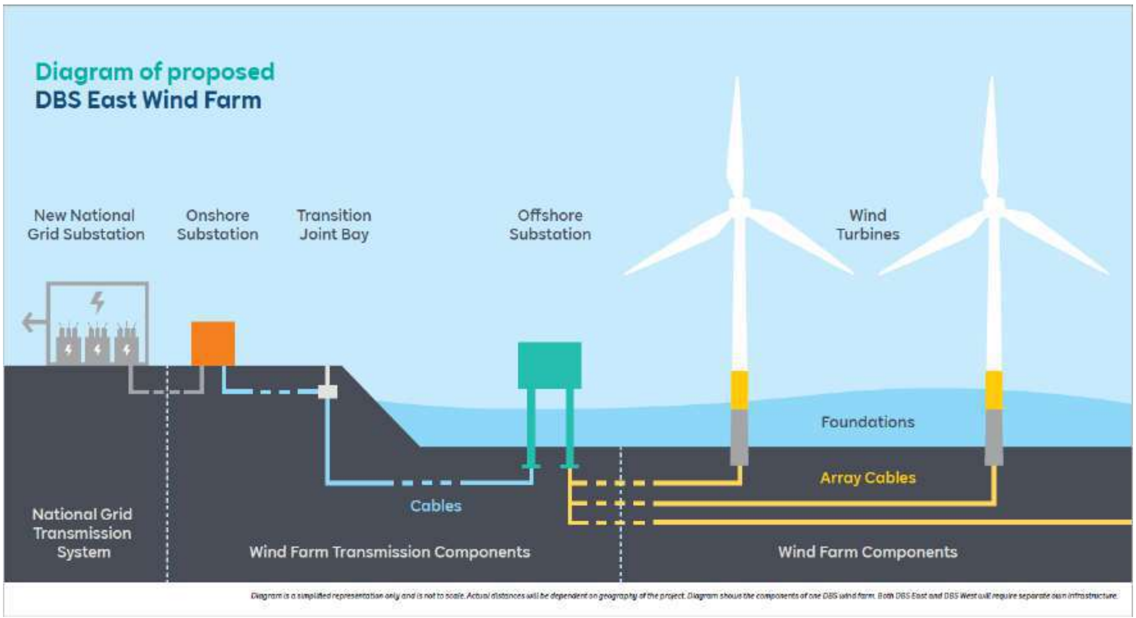


Plate 1-1 Overview of Infrastructure (not to scale)

1.5.1. Offshore

1.5.1.1. Description of the Offshore Study Area

26. The Offshore Study Area lies in the southern North Sea. The Projects' array areas will include wind turbines, array cables and offshore platforms.

27. The DBS East array area is approximately 494km^2 and the DBS West array area is approximately 495km^2. The DBS East array boundary lies approximately 100km from shore and the DBS West boundary is approximately 118km from shore at their closest points (Flamborough Head).

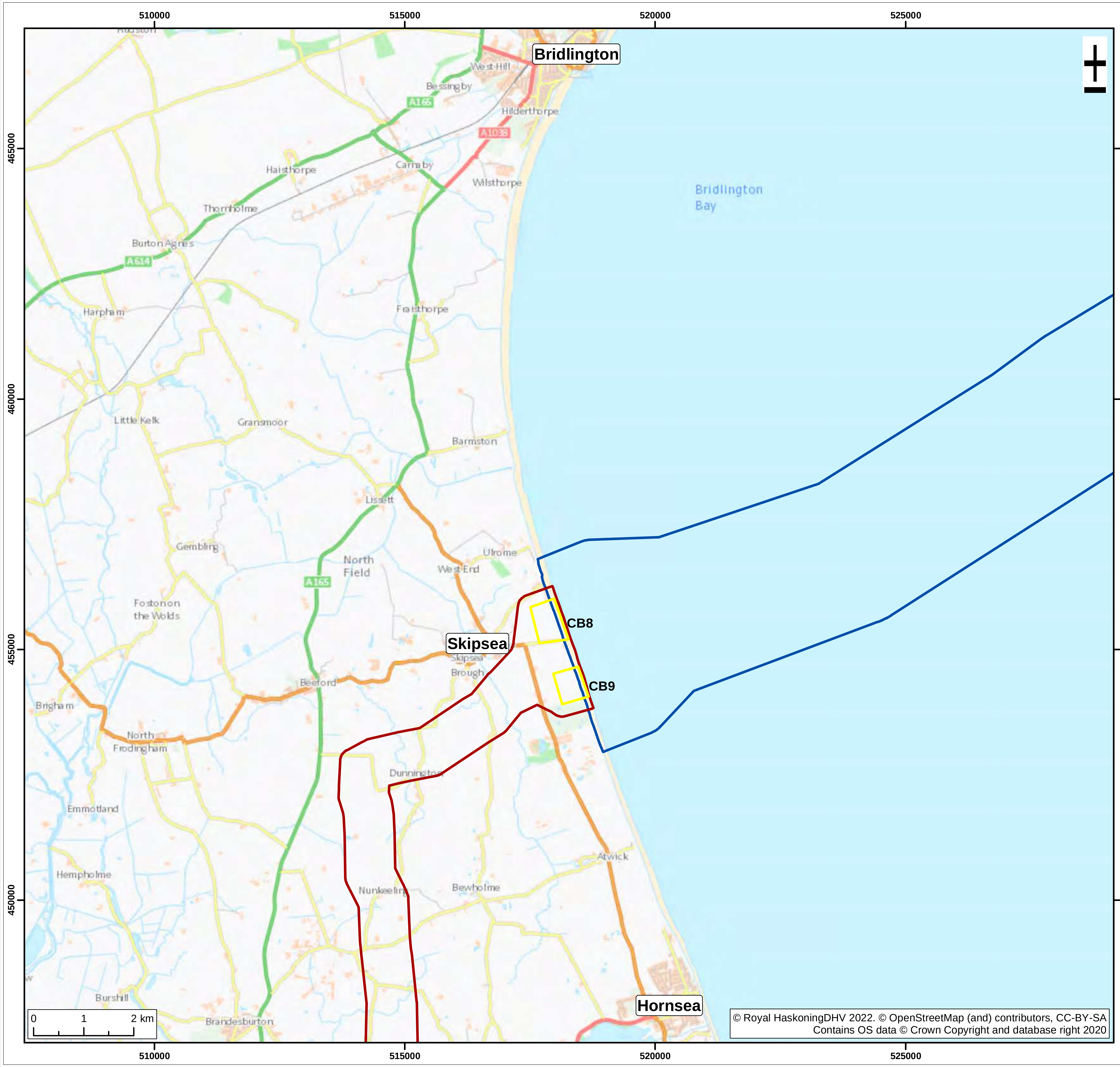
28. As indicated by EMODnet bathymetry data, the seabed in the offshore array areas is between approximately 8m and 40m below sea level and the substrate is predominantly sand and gravel. Geophysical site investigations are currently underway. The outputs will promote an understanding of the water depths and the character of the seabed and sub-seafloor geological conditions.

29. The electricity generated by the Projects will be transmitted to the onshore electricity transmission network by export cables located within an offshore export cable corridor from the array areas to the coast. Based on the potential onshore grid connection points and site selection work undertaken by RWE two possible landfall locations have been selected close to Skipsea (see **Figure 1-2**).

30. The preferred landfall locations will be based on further site selection work considering relevant consultation feedback and initial survey data.

31. The Projects' array areas and offshore export cable corridor(s) are collectively referred to as the 'Offshore Study Area'. The Offshore Study Area is shown in **Figure 1-1**. There may be a requirement for additional works to take place outside the array areas / offshore export cable corridor(s) to facilitate any temporary construction works (for example anchor spreads). It is anticipated that this would be in the region of a 1km buffer around the array areas and a 500m buffer each side of the offshore export cable corridor, the extents of these areas will be confirmed during the project design process.

32. Further information on characteristics of the site and existing use of the Offshore Study Area is provided in section 2 of this Scoping Report.



Legend:

- Offshore Study Area
- Onshore Study Area
- Proposed Landfall Location

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	LB	JF	HC
S3	P01	18/05/2022	Suitable for Review & Comment	LB	JF	HC

Title:

Proposed Landfall Locations

Figure: 1-2 Drawing No: PB2340-RHD-ON-LF-DR-Z-0246

Co-ordinate system: British National Grid
Page Size: A3
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1.5.1.2. Wind turbines

33. The minimum rating of the wind turbines which could be installed on the Projects is 10MW however 15MW wind turbines are now in production and are expected to represent the lower end of the design envelope. Based on industry developments to date, wind turbine capacity is likely to increase between the time of scoping and construction (see section 1.5.5). Therefore, in order to futureproof the EIA and DCO, maximum parameters for larger capacity wind turbines than are currently in existence will be estimated and the EIA will be undertaken on a range of rated capacities and assumed rotor diameters. The Projects' design envelope allows for up to 300 10MW wind turbines (up to 150 for each Project). Turbine numbers will reduce if higher capacity wind turbines are installed. It is possible that more than one wind turbine model could be used across the two array areas.

34. Wind turbines typically incorporate tapered tubular towers and three blades attached to a nacelle housing mechanical and electrical generating equipment. As a result of the embedded mitigation to reduce potential for bird collision risk included in the Plan Level HRA, the minimum clearance above Mean Sea Level (MSL) of the turbine blades will be 34m.

35. The overall layout of the wind turbines within the wind farm sites will be informed by site investigation works and wind resource modelling. They will comply with relevant best practice for offshore wind farms in relation to shipping and navigation, fishing interests, offshore health and safety and any relevant aviation interests.

1.5.1.3. Wind Turbine Foundations

36. Foundation designs will be informed by a number of factors including environmental characteristics such as ground conditions, water depths and metocean conditions, techno-economic parameters including the size of wind turbines selected, and supply chain constraints. The findings of the EIA and HRA will also be used to refine the foundation designs. It is possible that more than one type of foundation could be used across the array areas. The following foundation design options are currently being considered for wind turbines:

- Monopiles;
- Jackets on pin piles; and
- Jackets on suction buckets.

37. In accordance with the embedded mitigation in the Plan Level HRA, the use of suction bucket foundations (mono bucket) and gravity-based foundations has been removed from the design envelope for wind turbines to mitigate potential impacts on the Dogger Bank Special Area of Conservation (SAC). Indicative dimensions and construction materials are outlined in **Table 1-1**.

Table 1-1 Wind Turbine Foundation Descriptions

Foundation type	**Indicative Details**
Monopile	Cylindrical steel pile with conical transition – indicative diameter of 15m for a wind turbine or offshore substation.
Jackets on pin piles	A number of tubular legs supported by braces and fixed to the seabed with up to four steel pin piles for wind turbine jackets and up to eight steel pin piles for offshore substation jackets. Steel pin pile diameter is approximately 4m. Spacing between legs is approximately 34m at the seabed and approximately 24m at the water surface.
Jackets on suction buckets	Steel suction buckets – up to four suction buckets for wind turbine jackets and up to eight suction buckets for offshore substation jackets. Indicative diameter of 20m each. Spacing between legs of approximately 34m at the seabed and approximately 24m at the water surface.

38. Scour of seabed sediment could occur around the base of wind turbine foundations as a result of the flow of water around structures. The following methods of protection may be used around the base of the wind turbine foundations to mitigate for potential scour effects:

- Rock or gravel placement (bagged and/or loose);
- Concrete mattresses;
- Flow energy dissipation devices (e.g. frond mats, mats of large linked hoops, and structures covered with long protrusions); and
- Protective aprons or coverings (solid structures of varying shapes, typically prefabricated in concrete or high-density plastics).

39. Scour protection installation may involve some seabed preparation (such as levelling of the seabed and installation of a gravel bed layer). The scour protection requirements and need for seabed preparation will develop as the Projects progress and will be based on detailed engineering studies.

1.5.1.4. Offshore electrical infrastructure

40. Offshore electrical infrastructure will include the following components:

- Array cabling;
- Offshore Substation Platforms (OSPs) and/or Offshore Converter Platforms (OCP) with an offshore switching station platform and interconnecting marine cables; and
- Export cabling to bring the electricity to the landfall from the offshore platforms within the array areas.

41. Array cables will be used to connect the wind turbines to the OSPs/OCPs. The maximum length of the array cabling for the Projects is estimated to be 610km. The location and length of the array cabling will be determined post consent, subject to the final layout of the wind turbines.

42. The export cables could be either High Voltage Alternating Current (HVAC) and/or High Voltage Direct Current (HVDC). If HVAC is chosen for a Project there could be up to four HVAC cables for that Project, with a diameter of approximately 250mm. For HVDC there could be up to two HVDC cables per Project, with a diameter of approximately 150mm. Up to eight OSPs/OCPs may be required and foundation types (and required scour protection) will be determined during detailed design. A combination of HVDC and HVAC export cables could be considered, with either one Project utilising HVAC and the other HVDC, or both Projects having HVDC cables.

43. If HVAC is chosen for one of the Projects, there may be a requirement for a reactive compensation platform along the offshore export cable route. If required, this platform will be similar to the substation within the offshore wind farm.

44. In addition, two other platforms maybe required for the Projects for accommodation and electrical switching equipment.

45. Rock protection as secondary cable protection within the Dogger Bank SAC will be minimised.

46. Fibre optic communications cables (either inside the electrical transmission cables or laid alongside) will be installed to allow for System Control and Data Acquisition (SCADA).

47. As per the current rules under the Offshore Transmission Owner (OFTO) regime, it is expected that the offshore transmission assets will be sold to an OFTO.

1.5.2. Landfall

1.5.2.1. Possible landfall locations

48. National Grid Electricity Transmission has provided information that the location for the onshore grid connection points for the Projects is near to National Grid's existing Creyke Beck substation, East Riding of Yorkshire.

49. Based on site selection undertaken to date, this Scoping Report includes two possible landfall locations (CB8 and CB9) in the vicinity of Skipsea (see **Figure 1-2**).

1.5.2.2. Cable landfall

50. Trenchless solutions are currently being considered for landfall. Such solutions include horizontal directional drilling (HDD) which involves 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 placed through the channels created. An estimated seven HDD profiles may be required for the Projects based on a maximum of six cables for the Projects plus a spare HDD in case of refusal.

51. Each HDD will be undertaken from the onshore Transition Joint Bay (TJB) construction compound. The size and location of the compound will be confirmed during the project design process, but will be temporary in nature and reinstated after completion of the Projects. The HDD will extend underground and exit the seabed in an offshore exit pit (size and location to be determined). The length of the HDD will depend on the landfall location selected and may be influenced by factors such as geology, soil conditions, environmental constraints, water depth and seabed topography.

52. Alternative trenchless techniques will also be considered such as microtunneling and/or using a tunnel boring machine to create a segmented tunnel system.

53. Each offshore and onshore export cable will be jointed in an onshore TJB (one per cable). The TJBs are an underground structure that house the joint between the offshore and onshore export cables together with a fibre optic link box.

54. The key landfall construction parameters known at this stage are set out in **Table 1-2**.

1.5.3. Onshore

1.5.3.1. Description of the Onshore Study Area

55. The Onshore Study Area covers approximately 80km² of land located within the East Riding of Yorkshire. It has been dictated by the potential location of the onshore grid connection points provided by National Grid ESO and site selection work undertaken to date for the Projects. Further detail on how the Onshore Study Area has been defined is provided in section 1.6.

56. The Onshore Study Area is shown in **Figure 1-1**.

1.5.3.2. Onshore export cables

57. The onshore export cable will connect the landfall to the onshore substations and will be installed underground.

58. The Onshore Study Area for the Scoping Report includes a 1,000m wide area of search within which the onshore export cable corridor would be sited. This area will be refined as studies progress to avoid key constraints, such as residential areas and protected sites, where possible.

59. The working width for the onshore export cable corridor within the Onshore Study Area, to accommodate both Projects, will be approximately 100m wide, but may exceed this width where necessary. The standard working width accounts for the required construction footprint, including cable trenches, haul roads, spoil storage, drainage etc. There will also be a requirement for temporary construction compounds along the onshore export cable corridor to host parking, welfare and storage facilities. The size and location of these compounds will be confirmed during the project design process. There may also be a requirement for additional construction access points outside of the Onshore Study Area. The onshore export cables will generally be installed in trenches which are then backfilled. There will be a maximum of six trenches required for the Projects.

60. There will be a requirement for onshore HDDs or other trenchless installation methods in some locations to avoid specific constraints such as rivers. Where alternative methods such as HDD are used, the onshore export cable corridor will be widened to facilitate the work.

61. Jointing bays will be used to pull the cables into ducts and/or to join 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 subsurface structures, whilst link boxes will require access (for inspections) from the surface during operation and therefore will be located at or above ground level. At the jointing locations there will be one link box per circuit. The frequency of jointing bays and link boxes will be approximately every 0.75 to 1.5km. The key indicative construction parameters for the onshore export cables known at this stage are set out in **Table 1-2**.

1.5.3.3. Onshore substations

62. Onshore substations are required to accommodate the connection of the Projects to the transmission grid. Up to two onshore substations may be required, which will operate HVAC and/or HVDC technology. The onshore substations will be located in proximity to the onshore grid connection points. The onshore substations will contain the necessary electrical and auxiliary equipment and components for transforming the power from the wind farm to 400kV to meet the UK Grid Code for connection to the transmission grid. The maximum design scenario will be set out in the PEIR (e.g. maximum height, footprint, number and type of buildings). The key indicative construction parameters for the onshore substations known at this stage are set out in **Table 1-2**. The need, location and extent of landscaping will be identified and agreed with relevant stakeholders during the Projects' design process.

63. Additional electrical infrastructure will also be required at the onshore grid connection points once identified, to connect the onshore substations to the transmission grid. The additional infrastructure is likely to include, for example, National Grid Electricity Transmission's electrical switchgear into which the Projects will connect. At this stage, the details of the onshore grid connection points have not been finalised by National Grid Electricity Transmission and therefore details of this infrastructure are not yet known. Further details will be provided as the Projects' design process progresses.

1.5.4. Indicative Project Parameters

64. **Table 1-2** provides an overview of the indicative parameters for the Projects. Unless otherwise stated **Table 1-2** provides the combined parameters for both Projects

Table 1-2 Key Indicative Parameters for the Projects (DBS East and DBS West Combined)

Feature	Indicative Parameters
Offshore	
DBS East Array area	494km²
DBS West Array area	495km²
Offshore temporary construction works area	1km buffer around array areas + 500m buffer around export cable corridors
Distance to shore from array areas (closest distance, Flamborough Head)	100km
Water depth in the array areas Mean Sea Level (indicative and to be confirmed by ongoing site investigations)	8m to 40m
Maximum number of wind turbines	300
Minimum blade clearance above Mean Sea Level (MSL)	34m
Number of Offshore Substation Platforms (OSPs) / Offshore Converter Platforms (OCPs)	8
Number of other offshore platforms (reactive compensation platform, offshore switching station platform and accommodation platform)	3
Approximate array cable length	600km
Maximum number of offshore export cables	6

Feature	Indicative Parameters
Cable burial	The target is for 100% burial apart from crossings of other infrastructure
Target minimum cable burial depth	1m
Landfall	
Maximum number of Transition Joint Bays (TJBs)	6
Approximate TJB excavation area (per TJB)	405m^2
Approximate TJB construction area	5,625m^2
Approximate Landfall HDD compound	23,500m^2
Onshore	
Electrical connection type	HVAC or HVDC
Maximum number of onshore export cable corridors	1 main corridor however this corridor will need to split into two at certain pinch points and on substation approaches
Maximum number of onshore cable trenches	6
Approximate onshore export cable route length	30km (subject to routeing)
Jointing bay interval	Every 0.75 – 1.5km
Approximate standard onshore export cable corridor construction width	100m
Proposed cable installation method	Trenching and HDD or other trenchless solutions

Feature	Indicative Parameters
Number of main cable construction compounds	2
Main cable construction compound dimensions	100 x 100m
Number of satellite cable construction compounds	At approximately 4km intervals along route. Final number to be determined based on vehicular access points, trenchless crossing points and jointing locations.
Satellite cable construction compound dimensions	75 x 75m
Construction access points	To be determined once refined route is selected.
Maximum number of onshore substations	2
Maximum onshore substation footprints. This excludes any site specific requirements for landscaping / screening / drainage / earthworks due to ground levels.	450m x 300m (HVAC) plus 250m x 265m (HVDC) substations
Maximum number of construction compounds per onshore substation	2
Maximum onshore substation construction compound footprint in total	75,000m^2

1.5.5. Indicative Programme

65. The following indicative programme sets out a number of expected milestones for the Projects. This is subject to change and will be updated during the pre-application stage of the Projects:

- Submission of the Scoping Report to the Planning Inspectorate – July 2022;
- Statutory consultation on PEIR – Q2 2023; and
- DCO application submission – Q1 2024.

66. Construction of the Projects is expected to begin no earlier than 2026. The programme for construction and operation of the Projects will depend on the final confirmation of the grid connection date. With the onshore grid connection confirmed at Creyke Beck for both Projects, RWE may seek an integrated approach to installation of transmission assets. This approach could particularly benefit the planning and construction of the electrical infrastructure and reduce the overall environmental impact.

67. The Scoping Report considers both the Projects being built concurrently and sequentially. A sequential option allows for a phased approach, which would bring one Project into operation earlier than the other. Therefore, the worst case scenario presented by the construction programme will be determined by the receptor and impact in question (which will be identified in the EIA and assessed accordingly).

68. It is anticipated that the assets would have an operational life of 30 years. As part of Offshore Wind Leasing Round 4 the developers will enter into a seabed lease for up to 60 years, this allows sufficient time for two complete asset lifecycles. At the end of the operational 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 Projects are decommissioned.

1.6. Site Selection

1.6.1. Site Selection Process Overview and Current Status

69. The overall aim of the site selection process is to understand the relevant constraints (environmental, engineering and economic) to ensure that the final project design is robust and deliverable. The site selection process also aims to minimise impacts on the environment from the final project design whilst ensuring that the lowest cost of energy is passed to consumers. Due to the timescales involved in developing the Projects, RWE is requesting a Scoping Opinion whilst site selection relating to export cable corridors and onshore substation locations is still ongoing. The reason for this is to allow the EIA and DCO application to progress in a timescale which will enable the Projects to contribute to the UK greenhouse gas (GHG) emission reduction target of reducing emissions by 68% by 2030 (HM Government 2020a) and to security of energy supply. This includes contributing to an offshore wind generating capacity of 50GW by 2030 (HM Government 2022).

70. The offshore array areas were defined as part of the Offshore Wind Leasing Round 4 process (The Crown Estate 2021). The array areas will be confirmed following the conclusion of Leasing Round 4 in 2022.

71. National Grid ESO has indicated that the location for the onshore grid connection points for the Projects would be at Creyke Beck, close to Beverley in the East Riding of Yorkshire.

72. Site selection work has progressed based on grid connection points at Creyke Beck to define potential onshore substation locations and an export cable route. This has been used to defined the Onshore and Offshore Study Areas for the Scoping Report. Further site selection work in relation to an onward connection to the National Grid substation is necessarily limited until National Grid Electricity Transmission notify RWE of the location of the onshore grid connection points.

73. When National Grid ESO has confirmed the onshore grid connection points, the final detailed site selection process can be concluded, including definition and refinement of potential cable routes and the Projects' substation locations.

74. Feedback from the scoping consultation will help to inform the ongoing site selection, as well as informing the EIA.

1.6.2. Offshore Export Cable Corridor

1.6.2.1. Defining the offshore export cable corridor area of search

75. The offshore export cable corridor area of search for site selection stretched along the coastline from south of Bridlington to north of the Dimlington Gas terminal and from there connected to the northern and southern most points of the Projects' array areas.

76. Operational wind farms (such as Westermost Rough and Humber Gateway) within the area were excluded from the offshore export cable corridor area of search.

1.6.2.2. Identification of long-list options

77. Using the following design principles, a set of offshore export cable corridors were drawn to connect the array areas to the landfall options within the offshore area of search:

- Connect to viable landfall locations;
- Minimise cable length where possible;
- Minimise number of crossings of existing offshore export cables and pipelines, where crossing is required, cables and pipelines to be crossed at approximately 90˚;
- Maintain required separation distances with other offshore cables and pipelines;
- Maintain sufficient space for offshore export cable installation (including anchor spread of installation vessels whilst maintaining an appropriate safety buffer with existing subsea cables and pipelines);
- Avoid designated sites as far as possible;
- Avoid known historic wrecks as far as possible; and
- Minimise sterilisation of aggregate dredging areas and other lease areas.

78. Following consideration of these principles in conjunction with environmental and engineering Black-Red-Amber-Green (BRAG) ranking assessments conducted for potential offshore export cable routes, 21 offshore export cable routes were taken forward for further assessment.

1.6.2.3. Identification of short list options

79. Following a review of the long-list of options for the offshore export cable routes and the landfalls, offshore export cable routes were removed for a number of reasons including, but not limited to:

- There no longer being a viable landfall location to connect into;
- Their close proximity to foul ground; and
- Preliminary survey information revealing the unfavourable character of some options.

80. The remaining offshore export cable route options left in the process have helped define the Offshore Study Area.

1.6.3. Landfall

1.6.3.1. Defining the landfall area of search

81. The landfall area of search identified where the offshore export cables could be brought onshore. It was defined based on the location of the DBS East and DBS West array areas and the potential grid connection points at Creyke Beck.

82. The landfall area of search extended from the southern edge of Bridlington to north of the Dimlington Gas Terminal. This was due to the area north of Bridlington not being practicable from an engineering perspective as the average cliff height is between 20 and 30m. There were also environmental benefits to avoiding the area north of Bridlington, including avoiding the Flamborough Head and Filey Coast Special Protection Area (SPA) and the Flamborough Head SAC. The area south of the Dimlington Gas Terminal was ruled out due to a high number of pipeline crossings.

1.6.3.2. Identification of long-list options

83. Potential landfalls were identified based on the following:

- Avoidance of areas with substantial infrastructure or urban land use e.g. areas of housing, coastal defences, other energy infrastructure; and
- Avoidance of areas with a cliff height over 20m.

84. Following consideration of these principles in conjunction with environmental and engineering BRAG assessments conducted for the potential landfall options, 18 landfall options were taken forward for further assessment.

1.6.3.3. Identification of short list options

85. Additional technical and environmental reviews of the 18 landfalls led to the removal of 16 landfalls due to:

- Coastal erosion concerns;
- Requirement for cable/pipeline crossings;
- Flood zones and space constraints for HDD works, for example;
- Prescence of other infrastructure, or possible infrastructure, such as Dogger Bank A & B and Hornsea Four cables and the SSE Aldbrough Gas Storage Facility; and
- The requirement to cross Smithic Bank for one of the landfall options.

86. This resulted in two closely located proposed landfall locations being selected, which have defined the Onshore and Offshore Study Area for scoping.

1.6.4. Onshore Export Cable Corridor

1.6.4.1. Defining the onshore export cable corridor area of search

87. The onshore export cable corridor area of search was drawn by connecting the onshore substation area of search to the corresponding landfall area of search. This area was then refined in the south to avoid urban areas including Hull, Hedon, Preston and Bilton in line with the design principle of avoiding residential properties where possible. It was also refined to the west to allow more room to route the cable corridor west of Hornsea Four if necessary.

1.6.4.2. Identification of long list options

88. Using the following design principles, a set of onshore export cable corridors were drawn to connect the landfall options to the refined substation area of search:

- Cable corridors should be kept as straight and as short as practicable – avoiding tight bends;
- Avoid residential titles (including whole gardens) where possible;
- Avoid areas identified in local plans for housing development where possible;
- Avoid direct significant impacts to internationally and nationally designated areas (e.g. SACs, SPAs, and Sites of Special Scientific Interest (SSSIs), etc.) where possible;
- Avoid direct significant impacts to mature woodland and historic woodland;
- Minimise the number of crossings;
- Minimise the number of crossings of assets (e.g. utilities);
- Minimise the number of road and rail crossings;
- Minimise the number of hedgerow crossings; and
- Minimise the number of watercourse crossings.

89. Initially 1km wide cable corridors were drawn to allow flexibility to refine the options at a later stage to avoid potential engineering and environmental considerations.

90. Following consideration of these principles in conjunction with environmental and engineering BRAG assessments conducted for the potential onshore export cable corridor options, 42 potential variations for onshore export cable corridor routes were taken forward for further assessment.

1.6.4.3. Identification of short list options

91. Following further review of engineering and environmental considerations for the remaining routes, a number of onshore export cable corridor options were removed from further consideration for reasons such as corresponding landfalls being removed from the process, presence of gas pipelines and the presence of an aquifer leading to potential difficulties in being able to HDD under ponds in the area.

92. As a result, five onshore export cable corridor variations remain in the process, and have helped define the Onshore Study Area for scoping.

1.6.5. Onshore Substations

1.6.5.1. Defining the onshore substation area of search

93. The onshore substation area of search was defined using a 3km radius from coordinates provided by National Grid ESO as a centre point for an area of search for the onshore connection points at Creyke Beck.

94. The 3km radius was set to minimise the length of the connection between the onshore substations and onshore grid connection points. Minimising this distance is necessary to reduce cable reactive power issues, mitigate transmission losses, and minimise adverse effects on economic efficiency.

1.6.5.2. Identification of long list options

95. The onshore substation area of search was refined to:

- Avoid residential properties (including whole gardens) where possible;
- Avoid housing land allocations identified in adopted local plans where possible;
- Avoid direct impacts to internationally and nationally designated areas (e.g. SACs, SPAs and SSSI etc.) where possible;
- Avoid mature woodland and ancient woodland; and
- Preference was given to locating infrastructure in Flood Zone 1.

96. Following consideration of these principles in conjunction with environmental and engineering BRAG assessments conducted for the potential onshore substation zones, eight substation zones for Creyke Beck were taken forward for further assessment.

1.6.5.3. Identification of short list options

97. Following additional studies including site visits to consider the potential landscape impacts, engineering site visits and other potential developments in the area, five substation zones were removed. This left a total of three onshore substation zones comprising the short list of options. These have helped define the Onshore Study Area for scoping.

1.7. Consultation

1.7.1. Technical Consultation

98. Consultation is a key element of the EIA process. Consultation with technical consultees is crucial to the development of the assessment and site selection work. The detailed methodologies for data collection and understanding the impact assessment have been or will be agreed with the relevant stakeholders.

99. An Evidence Plan Process (EPP) has been set up and will be followed during the EIA to structure the technical stakeholder consultation where there are multiple interested parties. The EPP is a voluntary mechanism to help agree the information required by the Planning Inspectorate as part of DCO application to help ensure compliance with the EIA Regulations and Habitats Regulations. The EPP aims to give greater certainty to all parties on the nature, amount and range of evidence RWE should collect and present to support the application.

100. As the Projects develop and additional data and information become available, including mitigation measures, further impacts may be able to be scoped out. If so, this will be documented through agreement logs with stakeholders.

101. The EPP will include Expert Topic Group (ETG) meetings that provide a platform to discuss and, where possible, agree the evidence requirements for each topic, between multiple stakeholders. This process was initiated in September and October 2021 with ETG meetings held with all groups.

102. For topics not included in the EPP direct consultation will occur with stakeholders. This will apply to topics such as fishing, aviation and radar, and shipping and navigation. For these, meetings with relevant stakeholders would be held at key points in the programme e.g. prior to scoping, PEIR and DCO submission.

103. **Table 1-3** provides an overview of the likely stakeholders that will be engaged throughout the EIA and the environmental topic areas to be discussed.

Table 1-3 Consultation Groups

Consultation	Purpose of topics included	Stakeholders
Expert Topic Group (ETG)	The following ETGs have been established: • Seabed o Marine physical processes o Marine water and sediment quality o Benthic and intertidal ecology o Fish and shellfish ecology • Marine mammal ecology and underwater noise • Offshore ornithology • Terrestrial ecology (including onshore ornithology) • Seascape, Landscape and Visual Impact (SLVIA) • Traffic and transport, onshore noise and air quality • Water resource and flood risk (including land use and geology where relevant) • Historic environment (onshore and offshore) Where there is sufficient overlap in technical expertise, topics may be combined to provide efficiency for all parties.	• Natural England • Marine Management Organisation (MMO) • JNCC • Cefas • Environment Agency • Historic England • National Highways • Royal Society for the Protection of Birds (RSPB) • The Wildlife Trusts • Yorkshire Wildlife Trust • East Riding of Yorkshire Council • Humber Archaeological Partnership • North Eastern • Inshore Fisheries and Conservation Association (NEIFCA) • Water companies • York Consortium of Drainage Boards

Consultation	Purpose of topics included	Stakeholders
Fisheries	This topic typically sits outside the framework of the EPP. Local fisheries organisations and individual fishermen will be contacted at an early stage in the EIA process to provide information about the Projects and to seek information on fishing activity in order to inform the assessment.	• UK fisheries • Foreign fisheries
Aviation and radar	This topic typically sits outside the framework of the EPP. Consultation with aviation stakeholders will be undertaken during the EIA process to provide information about the Projects and to seek information on potential issues with regard to aviation and radar in order to inform the assessment.	• Civil Aviation Authority • Ministry of Defence • National Air Traffic Services (NATS) En Route
Shipping and navigation	The topic typically sits outside the framework of the EPP. Consultation with shipping and navigation stakeholders will be undertaken at an early stage in the EIA process to provide information about the Projects and to seek information on potential issues with regard to shipping and navigation in order to inform the navigation risk assessment.	• Maritime and Coastguard Agency (MCA) • Trinity House • Royal Yachting Association • Chamber of Shipping • Port authorities • Shipping companies

1.7.1.1. Consultation meetings

104. A number of meetings have been held with stakeholders to date. These meetings are detailed in **Table 1-4**.

Table 1-4 Meetings Held With Stakeholders (correct at time of writing)

Meeting and date held	Attendees	Subject
Traffic and Transport, Onshore Noise and Air Quality ETG 10/09/2021	National Highways Lincolnshire County Council (Highways)* East Riding of Yorkshire Council (Environmental Control)	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Traffic and Transport, Onshore Noise and Air Quality topics.
Onshore Ecology and Ornithology ETG 14/09/2021	Natural England Environment Agency RSPB Durham Wildlife Trust* Yorkshire Wildlife Trust Durham County Council* East Riding of Yorkshire Council	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Onshore Ecology and Ornithology topics.
Historic Environment ETG 15/09/2021	Historic England East Riding of Yorkshire Council Lincolnshire County Council* East Lindsey District Council*	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Historic Environment topic.

Meeting and date held	Attendees	Subject
Marine Mammal Ecology ETG 17/09/21	Natural England The Wildlife Trusts MMO	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Marine Mammal Ecology topic.
Water Resources ETG 17/09/21	Environment Agency East Riding of Yorkshire Council Yorkshire and Humber Drainage Board* York Consortium of Drainage Boards	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Water Resources topic.
UK Chamber of Shipping Introduction to DBS 21/09/21	UK Chamber of Shipping	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Shipping and Navigation topic.
SLVIA ETG 23/09/21	Natural England Durham County Council* Lincolnshire County Council* The Wildlife Trusts East Riding of Yorkshire Council	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the SLVIA topic.
MCA and Trinity House Introduction to DBS 27/09/21	MCA Trinity House	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Shipping and Navigation topic.

Meeting and date held	Attendees	Subject
Seabed ETG 28/09/21	Natural England The Wildlife Trusts NEIFCA MMO	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for Seabed topics.
Offshore Ornithology ETG 13/10/21	Natural England RSPB MMO	Call to introduce the Projects to stakeholders and detail the approach to scoping and EIA for the Offshore Ornithology topic.
Site Selection ETG 04/05/2022	East Riding of Yorkshire Council Environment Agency MMO NEIFCA RSPB Yorkshire Wildlife Trust York Consortium of Drainage Boards	Provide an overview of progress on site selection, short list of option and obtain views on these.
Site Selection ETG 23/05/2022	Natural England MMO	Provide an overview of progress on site selection, short list of option and obtain views on these.
Seabed ETG 26/05/2022	Natural England MMO The Wildlife Trusts NEIFCA	Call to discuss the Benthic Ecology and Marine Physical Processes Method Statements.

Meeting and date held	Attendees	Subject
Traffic and Transport ETG	East Riding of Yorkshire Council	Call to discuss access the short listed substation zones and potential accesses.

Notes

* In 2021, RWE was initially considering multiple possible onshore grid connection points in County Durham, East Riding of Yorkshire and Lincolnshire. Following confirmation from National Grid ESO that the onshore grid connection would be at Creyke Beck a number of stakeholders have been removed from the ETGs as their geographical coverage no longer overlaps with the Onshore and Offshore Study Areas.

1.7.2. Public Engagement

105. Pre-application consultation will be the main opportunity for stakeholders to review the plans, provide comments, submit feedback and to have an influence on elements of the process and shape the development.

106. Stakeholders affected by the proposals will be consulted and engaged in the development of the Projects. This includes the opportunity to comment on the development of the proposals during each consultation exercise.

107. The development of the Projects will be an iterative process with opportunity for the public to input throughout the process, however, there will be specific consultation periods where RWE will ask for comments related to defined elements of the proposal including the statutory consultation on the PEIR. How consultation and engagement on the Projects will be undertaken during the statutory consultation will be set out in a Statement of Community Consultation and will be timed to allow RWE to effectively gather opinions and feedback.

108. RWE will investigate the use of both traditional and online consultation methodologies including:

- Virtual and digital consultation via the Projects' website;
- Community / public events;
- Newsletter (online and hard copy);
- Direct mail (letters, invitations and information materials) to those within the consultation area;
- Advertising in local newspapers;
- Establishment of community liaison groups as applicable;
- Meetings with local representatives including parish, district and county councillors;
- Project specific website (https://uk-ireland.rwe.com/project-proposals/dogger-bank-south)
- Social media; and
- Project-specific email address (dbs@rwe.com).

1.8. Environmental Impact Assessment Methodology

1.8.1. Characterisation of the Existing Environment

109. The characterisation (description) of the existing environment will be undertaken in order to determine the baseline conditions in the areas with potential to be affected by the Projects. This will require the following steps:

- Study areas defined for each receptor based on the zone of influence and relevant characteristics of the receptor (e.g. mobility / range);
- Review available information;
- Review likely or potential impacts that might be expected to arise from the development;
- Determine if the available data are adequate to make the EIA judgement with sufficient confidence;
- If further data are required, ensure data gathered are targeted and directed at answering the key questions and filling important data gaps; and
- Review information gathered to ensure the environment can be characterised in sufficient detail.

110. Existing data from research, government and industry, will be used alongside data collected by RWE specifically for the Projects. The proposed data and information sources are outlined in the Existing Environment subsections within sections 2, 3 and 4.

111. Consideration will also be given to the evolution of the baseline in the absence of the Projects. This will take account of wider issues such as climate change and biodiversity loss (in line with Schedule 4 of the EIA Regulations).

112. The approach to establishing a robust baseline is summarised under each topic within this Scoping Report (see sections 2 to 4), and RWE will seek to agree this via consultation e.g. from the views expressed in the Scoping Opinion and additional consultation for example through the EPP.

1.8.2. Assessment of Impacts

113. The EIA team will make balanced assessments with the guidance of EIA and technical specialists. A combination of existing and new data, experience and expert judgement will be applied. In order to provide a consistent framework and system of common tools and terms, where appropriate, a matrix approach will be used to frame and present the judgements made (see **Table 1-5** for an example). However, it should be noted that for each EIA topic the latest guidance or best practice will be used and therefore definitions of sensitivity and magnitude of impact will be tailored to each receptor. The impact assessment will consider the potential for, and significance of, impacts during the construction, operation and decommissioning of the Projects.

1.8.2.1. Determining receptor sensitivity and value

114. 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 receptors tolerance could relate to displacement effects and therefore impacts upon economics or safety. It also follows that the times required for recovery will be a key consideration in determining receptor sensitivity.

115. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national or international scale, and in the case of biological receptors whether the receptor performs a key role in the ecosystem function.

116. The overall receptor sensitivity is determined by considering a combination of value, adaptability, tolerance and recoverability as well as applying professional judgement and / or past experience. Expert judgement is particularly important when determining the sensitivity of receptors. For instance, an Annex II species (under the Habitats Directive) could have high value, but if it was highly tolerant of an effect or had high recoverability it would follow that its sensitivity should reflect the ecology of the species rather than default to the protected status alone.

1.8.2.2. Predicting the magnitude of impacts

117. In order to predict the significance of an impact it is fundamental to establish the magnitude and probability of the impact occurring through a consideration of:

- Scale or spatial extent (small scale to large scale or most of the population or a few individuals);
- Duration (short-term to long-term);
- Frequency; and
- Nature of change relative to the baseline.

1.8.2.3. Evaluation of significance

118. Subsequent to establishing the receptor sensitivity and magnitude of effect, the impact significance will be predicted by using quantitative or qualitative criteria, as appropriate to ensure a robust assessment. Where possible a matrix such as the one presented in **Table 1-5** will be used to aid assessment of impact significance based on expert judgement, latest guidance and any specific input from consultations. A description of the approach to impact assessment and the interpretation of significance levels will be provided within each section of the ES. This approach will ensure that the definition of impacts is transparent and relevant to each topic under consideration.

119. For the purpose of the EIA, major and moderate adverse impacts are deemed to be significant and, as such, may require mitigation. Whilst minor impacts are not significant in their own right, these may contribute to significant impacts cumulatively or through interaction.

Table 1-5 Example of the Significance of an Impact Resulting From Each Combination of Receptor Sensitivity and the Magnitude of the Effect Upon It

Sensitivity	Negative Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

1.8.2.4. Embedded and Additional Mitigation, Impact Significance and Residual Impact

120. 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. Where possible, embedded mitigation, i.e. mitigation identified at an early stage (often using experience from operational projects) can include:

- The design elements aimed at reducing impacts;
- Commitment to specific best practice;
- Commitment to pre-construction surveys; and
- Commitment to consultation.

121. Embedded mitigation will be incorporated into the Projects' design and listed where relevant for each topic. Impacts will then be assessed with this mitigation in place. Where impacts are significant and additional mitigation is required, impacts may be reassessed and the post-mitigation or 'residual impact' identified. If the impact does not require additional mitigation (or none is possible) the residual impact will remain the same.

122. In some circumstances it may be necessary to detail monitoring requirements as part of mitigation measures identified. Monitoring may be required to confirm an assumption that an assessment is reliant upon (e.g. continue to monitor baseline conditions) and / or to confirm efficacy of mitigation measures implemented. Monitoring should be proportionate and directly relevant to the findings of the impact assessment and/or relate to uncertainties within the assessment, i.e. it should not be monitoring for the sake of monitoring.

1.8.2.5. Confidence

123. Where relevant, once an assessment of a potential impact has been made, a confidence value is assigned to the assessment to assist in the understanding of the judgement. This is undertaken on a simple scale of high-medium-low, where high confidence assessments are made on the basis of robust evidence, with lower confidence assessment being based, for example, on extrapolation and use of proxies.

1.8.2.6. Inter-relationships

124. The impact assessment will consider the inter-relationship of impacts on individual receptors. The objective will be to identify where the accumulation of residual impacts on a single receptor and the relationship between those impacts, gives rise to a need for additional mitigation. When considering the potential for impacts to inter-relate it is assumed that any residual effect determined as having no impact will not result in a significant inter-relationship when combined with other effects on receptors. However, where a series of negligible or greater residual impacts are identified, they will be considered further.

1.8.2.7. Cumulative and Transboundary Impacts

125. Cumulative Impact Assessment (CIA) forms part of the EIA process. The Planning Inspectorate Advice Note Nine (The Planning Inspectorate 2018) and seventeen (The Planning Inspectorate 2019) provide guidance on plans and projects that should be considered in the CIA including:

- Projects that are under construction;
- Permitted applications not yet implemented;
- Submitted applications not yet determined;
- Projects on the Planning Inspectorate's Programme of Projects;
- Development identified in relevant Development Plans, (and emerging Development Plans, with weight being given as they move close to adoption) recognising that information on any relevant proposals is likely to be limited; and
- Sites identified in other policy documents as their development is reasonably likely to come forward.

126. Only projects which are reasonably well defined and sufficiently advanced to provide information on which to base a meaningful and robust assessment will be included in the CIA. Projects which are sufficiently implemented during the site characterisation for the Projects will be considered as part of the baseline for the EIA. Where possible RWE will use as-built project parameter information (if available) as opposed to consented parameters to reduce over-precaution (inaccuracies) in the cumulative assessment.

127. For some topics (where for example the receptors include highly mobile or migratory species, fishing or shipping) the CIA will have a large geographic scale and involve many plans and projects. For others where receptors (or impact ranges) are more spatially fixed the CIA will be narrower. The scope of the CIA will therefore be established on a topic-by-topic basis with the relevant consultees as the EIA progresses.

128. Offshore cumulative impacts may come from interactions with the following activities and industries:

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

129. Onshore plans or projects that may be considered include (but are not limited to):

- Other offshore wind farm infrastructure;
- Other energy generation infrastructure;
- Building and / or housing developments;
- Installation or upgrade of roads;
- Installation or upgrade of cables and pipelines; and
- Coastal protection works.

130. Regulation 32 of the EIA Regulations sets procedures to address issues associated with a development that might have a significant impact on the environment in another European Economic Area (EEA) member state.

131. The procedures involve providing information on the member state and for the Planning Inspectorate to enter into consultation with that state regarding the significant impacts of the development and the associated mitigation measures. Further advice on transboundary issues, in particular with regard to consultation is given in the Planning Inspectorate Advice Note Twelve (Planning Inspectorate 2020).

132. Transboundary impacts, like cumulative impacts, are considered on a topic-by-topic basis for offshore subjects and are not expected to be relevant to onshore topics.

133. It is intended that screening of plans and projects to include in the CIA and Transboundary assessment will be undertaken for the Projects in 2022 and will be consulted upon with the relevant stakeholders through the EPP (section 1.7).

1.9. Policy and Legislative Context

1.9.1. Need for the Projects

134. The Government and the offshore wind sector adopted the Offshore Wind Sector Deal in 2019 to build on the United Kingdom's global leadership in offshore wind, maximising the advantages for UK industry from the global shift to clean growth. The Sector Deal provided a target of delivering 30GW of energy from offshore wind by 2030. Subsequently, the Energy White Paper (HM Government 2020b) committed to increase this target to 40GW. Building up to 40GW of offshore wind by 2030 could account for over £50 billion of infrastructure spending in the next decade.

135. In April 2022, the British Energy Security Strategy (HM Government 2022) was published, which increases the target for offshore wind again from 40GW by 2030 to 50GW. This means that the offshore wind sector could grow to support around 90,000 jobs by 2030.

136. There are four drivers for the development of offshore wind energy, which the Project will contribute to:

- Reduce GHG emissions;
- Energy security;
- Maximise economic opportunities from energy infrastructure investment for the UK; and
- Produce affordable energy.

1.9.2. Summary of Climate Change and Renewable Energy Policy and Legislation

137. Climate change policy has been established at an international and national level. Key aspects are presented in **Table 1-6**.

Table 1-6 Summary of Relevant Climate Change Policies

Policy	Summary
United Nations Framework Convention on Climate Change (Paris climate agreement)	Limit global temperature increase to below 2°C, while pursuing efforts to limit the increase to 1.5°C; Commitments by all parties to prepare, communicate and maintain a Nationally Determined Contribution; and In 2023 and every five years thereafter, a global stocktake will assess collective progress toward meeting the purpose of the Agreement.
The UK Climate Change Act 2008	A reduction of 34% in GHGs by 2020 (below 1990 levels); and A reduction of 80% in GHGs by 2050 (below 1990 levels).
Climate Change Act 2008 (2050 Target Amendment) Order 2019	Introduces a target for at least a 100% reduction of GHG emissions (compared to 1990 levels) in the UK by 2050. Supersedes the Climate Change Act 80% target.
The UK Energy Act 2013	Introduction of provisions to enable a statutory 2030 decarbonisation target range for Great Britain's electricity sector; and Electricity Market Reform including introduction of the Contract for Difference support mechanism.

Policy	Summary
Net Zero Strategy: Build Back Greener 2021 (Presented to Parliament pursuant to Section 14 of the Climate Change Act 2008)	Net zero emissions by 2050. 40GW of offshore wind by 2030.
British Energy Security Strategy April 2022	50GW of offshore wind by 2030.

1.9.3. Planning Policy and Legislation

138. The Planning Act (2008) (as amended) is the primary legislation that established the legal framework for applying for, examining and determining applications for NSIPs.

1.9.3.1. National Policy Statements (NPS)

139. NPSs are produced by the UK Government and set out national policy against which proposals for NSIPs are determined. NPSs include the Government's objectives for the development of nationally significant infrastructure. The three NPSs of relevance to the Projects are:

- EN-1 Overarching Energy (DECC 2011a);
- EN-3 Renewable Energy Infrastructure (DECC 2011b), which covers nationally significant renewable energy infrastructure (including offshore generating stations in excess of 100MW); and
- EN-5 Electricity Networks infrastructure (DECC 2011c), which covers the electrical infrastructure associated with an NSIP.

140. At the time of writing, revisions to the current energy NPSs are under consultation. It appears that the review process may conclude in 2022 or at some point prior to the DCO application for the Projects, in which case the 2011 NPSs will be formally superseded. The revised NPSs, even if in draft form, will be taken into consideration in relation to the DCO application for the Projects and the PEIR, ES and other application documents, together with the 2011 NPSs while they are still in force.

141. The Marine Policy Statement (MPS) adopted by all UK administrations in March 2011 provides the policy framework for the preparation of marine plans and establishes how decisions affecting the marine area should be made in order to enable sustainable development.

1.9.3.2. The EIA Directive

142. EIA was introduced under the European Union (EU) EIA Directive 85/337/EEC (as amended by Directives 97/11/EC, 2003/35/EC and 2009/31/EC). The EIA Directive was transposed into English law for the NSIPs by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the EIA Regulations). In 2011, the original EIA Directive and amendment were codified by EIA Directive 2011/92/EU (as amended by Directive 2014/52/EU).

143. Amendments were made by EIA Directive 2014/52/EU and have been transposed into English law for NSIPs by the EIA Regulations. These are the relevant EIA regulations for the Projects.

1.9.4. Environmental Legislation

144. **Table 1-7** provides an overview of the key environmental legislation that will be of relevance to the Projects.

Table 1-7 Key Relevant Environmental Legislation

Level	Legislation	Summary
International	The OSPAR Convention	Establishes a network of Marine Protected Areas (MPAs).
	The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	Establishes Ramsar sites to protect important areas for waterfowl.

Level	Legislation	Summary
UK Legislation	The Wildlife and Countryside Act 1981	Enables the designation of SSSIs to provide protection for flora, fauna, geological and physio-geological features. Enables designation of sites which are considered to be of national importance as National Nature Reserves (NNRs). Makes it an offence to intentionally kill, injure or take wild birds and to take, damage or destroy the nest of any wild bird while that nest is in use or being built. Makes it an offence to intentionally kill, injure or take any animal listed in Schedule 5 of the Act and protects occupied and unoccupied places used for shelter or protection. Makes it an offence to intentionally pick, uproot or destroy any wild plant listed in Schedule 8 and to plant or otherwise cause to grow any non-native, invasive species listed under Schedule 9 of the Act.
	Countryside and Rights of Way Act 2000	Gives Natural England the power to designate AONBs.
	Water Environment (Water Framework Directive) (England and Wales) Regulations 2003	Ensures a 'good ecological status' of inland, estuarine and groundwater bodies including coastal surface waters up to one nautical mile offshore.
	Natural Environment and Rural Communities (NERC) Act 2006	Requires the relevant Secretary of State to compile a list of habitats and species of principal importance for the conservation of biodiversity.
	The Commons Act 2006	Protects areas of common land, in a sustainable manner delivering benefits for farming, public access and biodiversity.

Level	Legislation	Summary
	Marine Coastal and Access Act 2009	Enables the designation of MPAs in England, Wales and UK offshore waters, including Marine Conservation Zones (MCZs) and Highly Protected Marine Areas. 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.
	Marine Strategy Regulations 2010	Establishes measures to maintain or achieve 'good environmental status' in the marine environment.
	Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 and Conservation of Offshore Marine Habitats and Species (Amendment) (EU Exit) Regulations 2019 (together referred to as the 'Habitats Regulations')	Provides a framework for the conservation and management of wild fauna and flora, including protection for specific habitats listed in Annex I and species listed in Annex II of the Directive. Provides for the establishment of a Europe wide network of protected sites, known as Natura 2000 (the definition of which includes SAC and SPA). Makes it an offence to kill, injure, capture or disturb European Protected Species (EPS). Note that these two sets of regulations are currently being consolidated by the Government.
	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017	Details the requirements for a Water Framework Directive (WFD) Compliance Assessment potentially required for the onshore/offshore assessment reporting. The WFD Compliance Assessment would initially consist of three stages (screening, scoping and impact assessment).

1.9.4.1. Habitats Regulations Assessment

145. Under the Habitats Regulations the Secretary of State must 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 (i.e. a SAC, SPA, candidate SAC or Site of Community Importance (SCI)). This process is known as HRA. Under the Habitats Regulations, 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 and is not directly connected with or necessary for the management of the site.

146. It is intended that the HRA Screening will be undertaken for the Projects in 2022 and will be consulted upon with the relevant stakeholders through the EPP (section 1.7).

147. Further assessment will be undertaken as required and presented with the DCO application in the Report to Inform Appropriate Assessment (RIAA). A draft RIAA will be provided for consultation with the PEIR.

148. The requirement for Stage 3 and 4 (i.e. the derogation case and identification of possible compensation) will be subject to the findings of the RIAA and consultation through the EPP. Any outputs from these stages will be reported in the DCO application as required.

2. Offshore

149. This section presents the main baseline characteristics of the offshore environment within the Offshore Study Area (**Figure 1-1**). This includes all receptors below Mean High Water Springs (MHWS), including those within the intertidal zone. Unless otherwise stated, the potential impacts of the Projects during construction, operation and decommissioning are considered in line with the methodology presented in section 1.8. Each section outlines which impacts are proposed to be scoped in to the EIA and which will be scoped out.

2.1. Marine Physical Processes

150. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on marine physical processes.

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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on the marine physical processes resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.1.1. Existing Environment

2.1.1.1. Bathymetry

151. The minimum and maximum depths across the Projects' array areas are approximately 8m below Lowest Astronomical Tide (LAT) and 35m below LAT, respectively (**Figure 2-1**). Across the Offshore Study Area, water depths are variable from 70m below LAT in the deepest areas to less than 5m below LAT in the nearshore landfall area of search (EMODnet 2020).

2.1.1.2. Tidal currents

152. Dogger Bank is influenced by cool Atlantic water masses arriving from the north and warmer inflow from the English Channel to the south, resulting in the creation of a front (Flamborough Front) where these two masses meet. Therefore, Dogger Bank is subject to a relatively complex regime of low velocity tidal currents and eddies. Department for Business, Enterprise and Regulatory Reform (BERR) (2008) modelled peak flows for mean spring tides of between approximately 0.3m/s and 0.5m/s (**Figure 2-2**). Peak flows increase gradually across the Offshore Study Area, from 0.6m/s furthest offshore at the array areas, to up to 1.4m/s closer to the coast.

2.1.1.3. Waves

153. Given its open sea location Dogger Bank is exposed to relatively high levels of wave energy. The most frequent waves across the Projects are from the north to north-northwest. BERR (2008) described annual mean significant wave heights of 1.7m to 1.8m (**Figure 2-3**). Wave heights decrease gradually across the Offshore Study Area, to less than 1.0m closer to the coast.

2.1.1.4. Bedload sediment and transport

154. Mapping of sediment types completed by British Geological Survey (BGS) (1987) is shown in **Figure 2-4**. The data shows that the Projects' array areas are dominated by slightly gravelly sand, sand, and gravelly sand with a small patch of sandy gravel in the west. Across the Offshore Study Area, a large part of the southern North Sea is sand, before coarser sediments (gravelly sand and sandy gravel) return nearer to the coast.

2.1.1.5. Suspended sediment concentrations

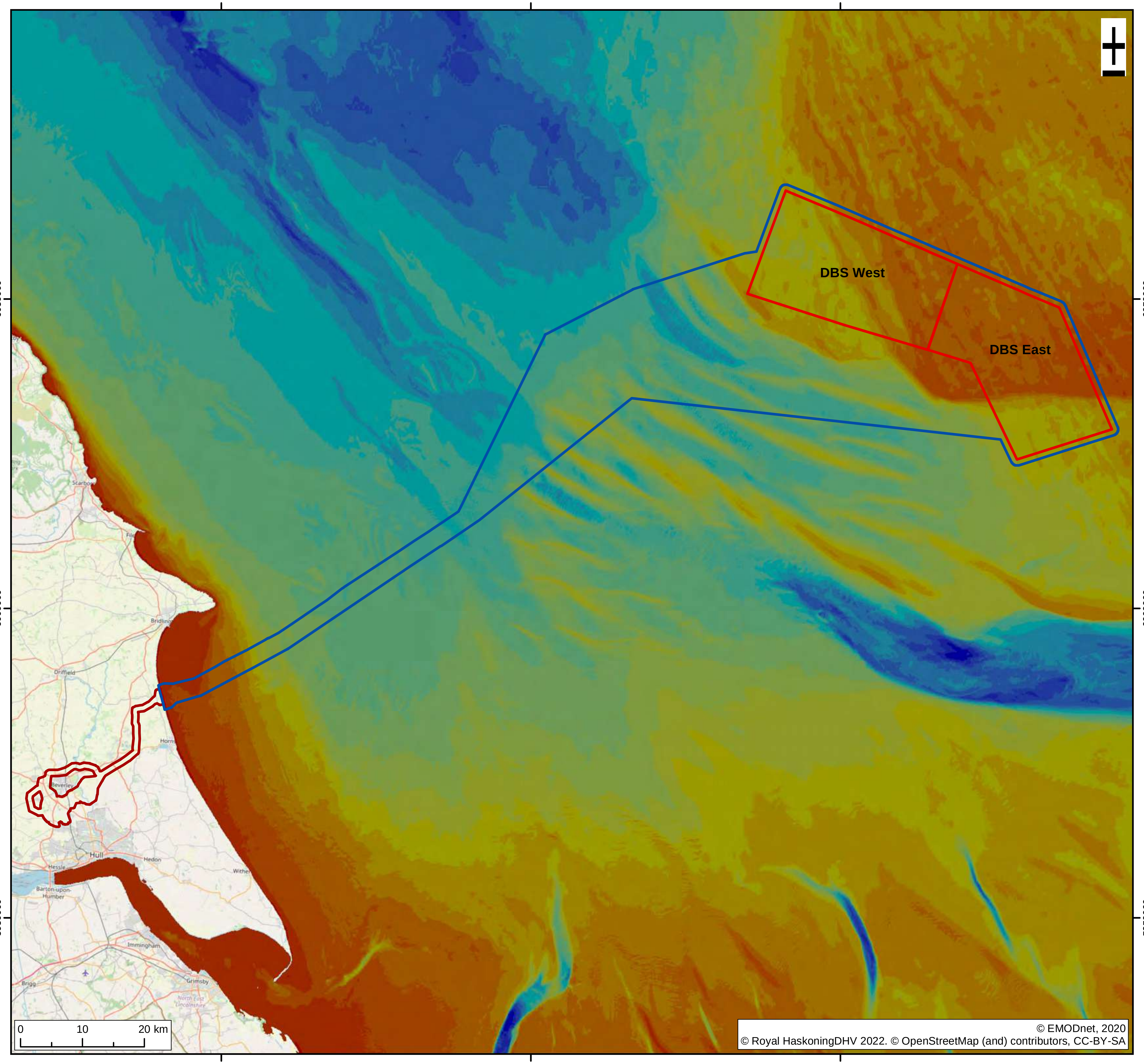
155. Cefas (2016) mapped the spatial distribution of average annual suspended sediment concentrations across the UK continental shelf between 1998 and 2015 and found that Dogger Bank is characterised by values lower than 3mg/l (**Figure 2-5**). Large areas of the southern North Sea are characterised by similar suspended sediment concentrations, with values becoming greater in shallower water towards the coast.

2.1.1.6. Coastal processes

156. The proposed landfall locations are close to Skipsea on the East Yorkshire coast of England. This part of the Holderness coast is shaped by waves approaching from the northeast with regional net sediment transport predominantly to the south. A local reversal in transport direction may occur in the lee of the significant change in coastal orientation caused by Flamborough Head. The coast is predominantly cliffs of till fronted by coarse sand beaches or shore platform where the beach is absent.

2.1.1.7. Coastal erosion

157. The Holderness coast is comprised of low cliffs and a cohesive shore platform composed predominantly of glacial tills of differing ages and character. The coast of Holderness has been eroding since Roman times, predominantly by cliff slumping. The thickness of the tills varies both alongshore and cross-shore, with the result that erosion exposes a slightly different sequence at any one time. Average long-term rates of erosion vary from about 1m/year to 2m/year. If these rates are linearly extrapolated into the future it would mean that the Holderness cliffs would retreat landward by approximately 60-120m over the next 60 years. However, the future rates may be higher due to climate-change induced sea-level rise. Also, the average longer-term rates have great short-term spatial and temporal variability. Periods of rapid erosion (10s of metres per year) may be followed by years when little or no erosion of the cliff occurs. Related to cliff erosion is downcutting of the shore platform which extends from the foot of the cliff into deeper water.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

Bathymetry (LAT)

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

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	06/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	JR	DB	HC

Title:

Offshore Bathymetry

Figure: 2-1 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0216

Co-ordinate system:	Page Size:	Scale:
WGS 1984 UTM Zone 31N	A3	1:625,000

Project:

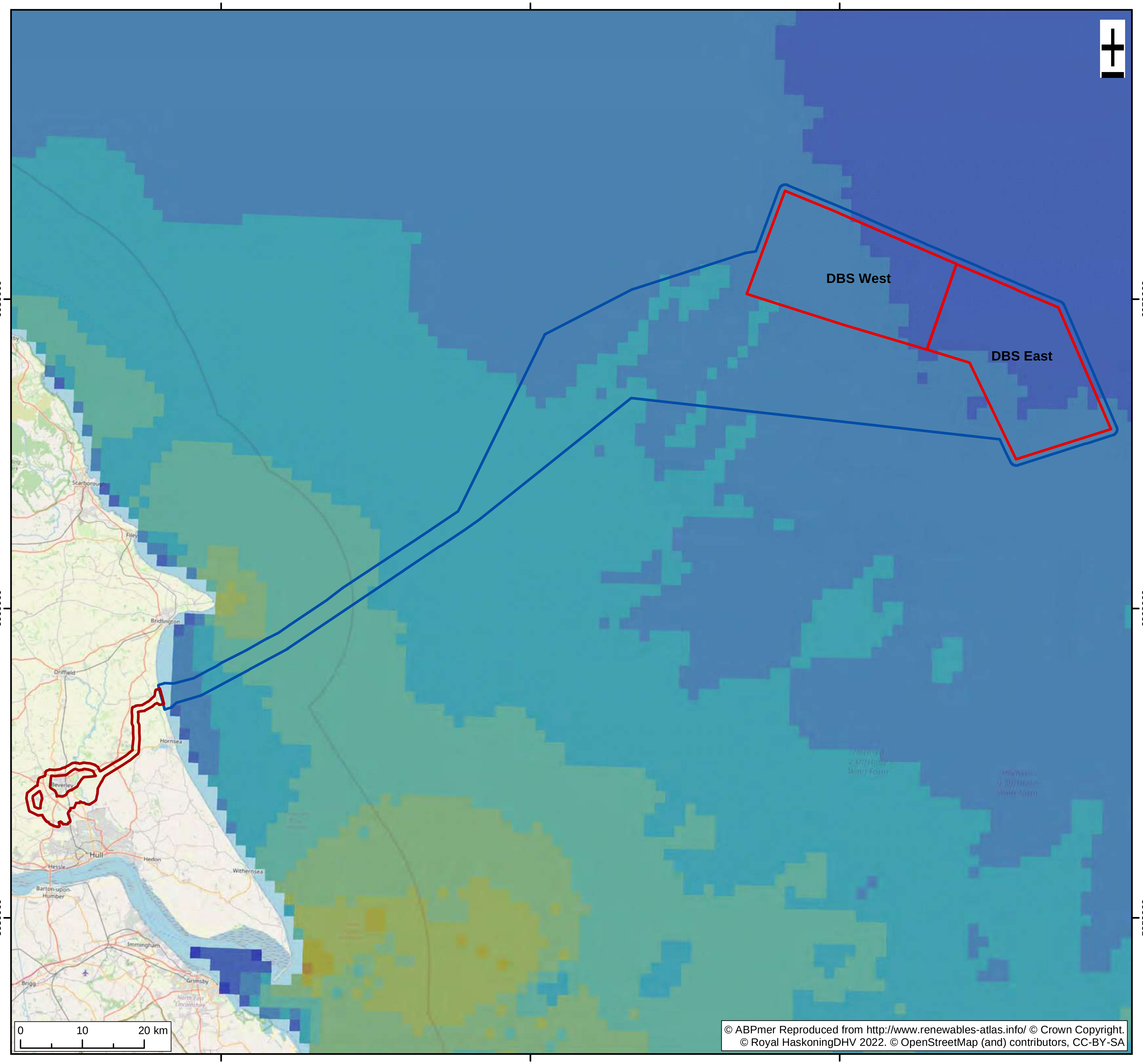
Dogger Bank South Offshore Wind Farms

Report:

Dogger Bank South Offshore Wind Farms EIA Scoping Report

Royal HaskoningDHV Enhancing Society Together

RWE



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study 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
- > 2.00

A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	06/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	JR	DB	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Peak Flow for a Mean Spring Tide across the Offshore Study Area

Figure: 2-2 | Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0217

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:625,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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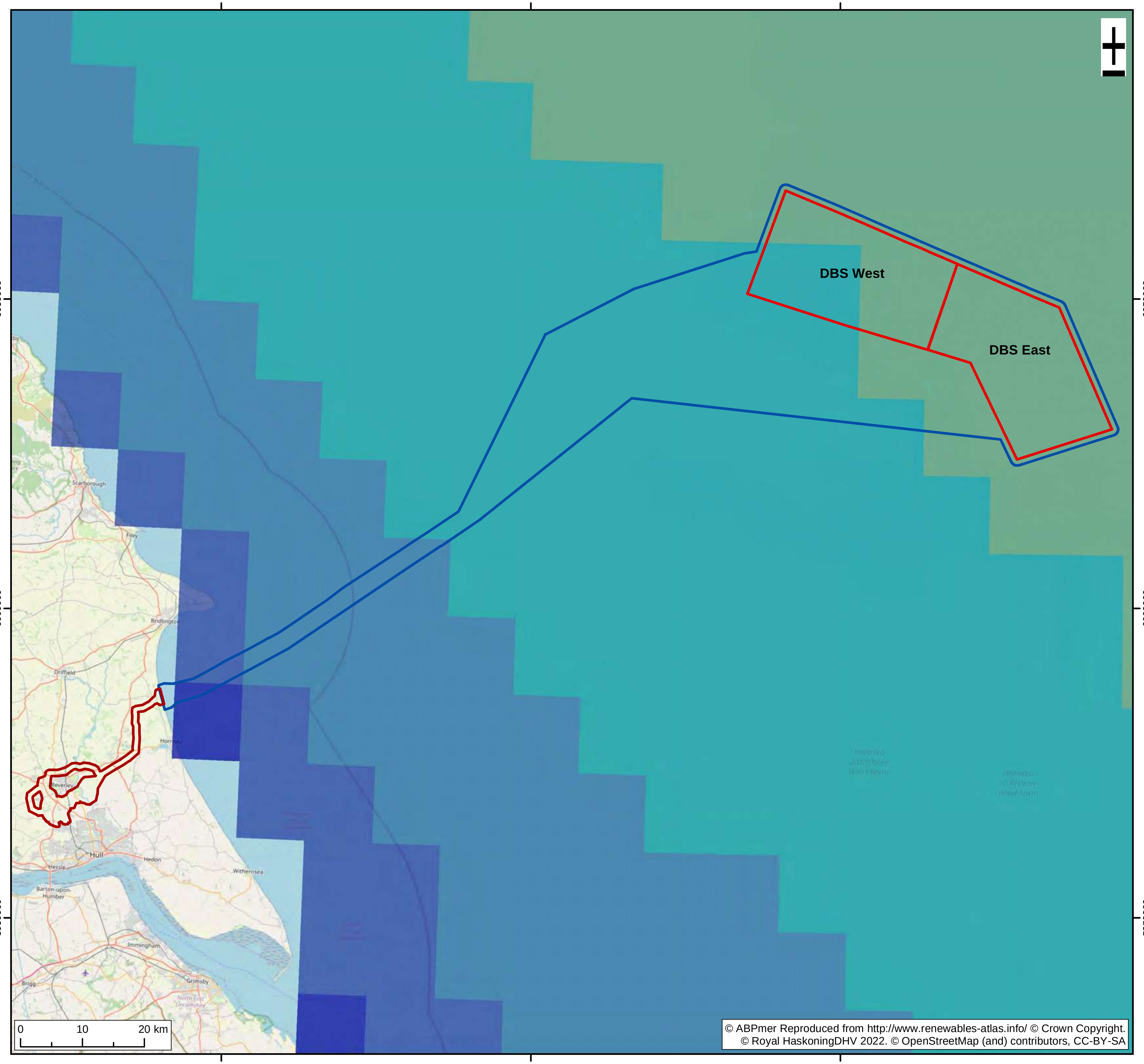

Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study 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

A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	JR	DB	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Annual Mean Significant Wave Height across the Offshore Study Area

Figure: 2-3 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0218

Co-ordinate system: WGS 1984 UTM Zone 31N Page Size: A3 Scale: 1:625,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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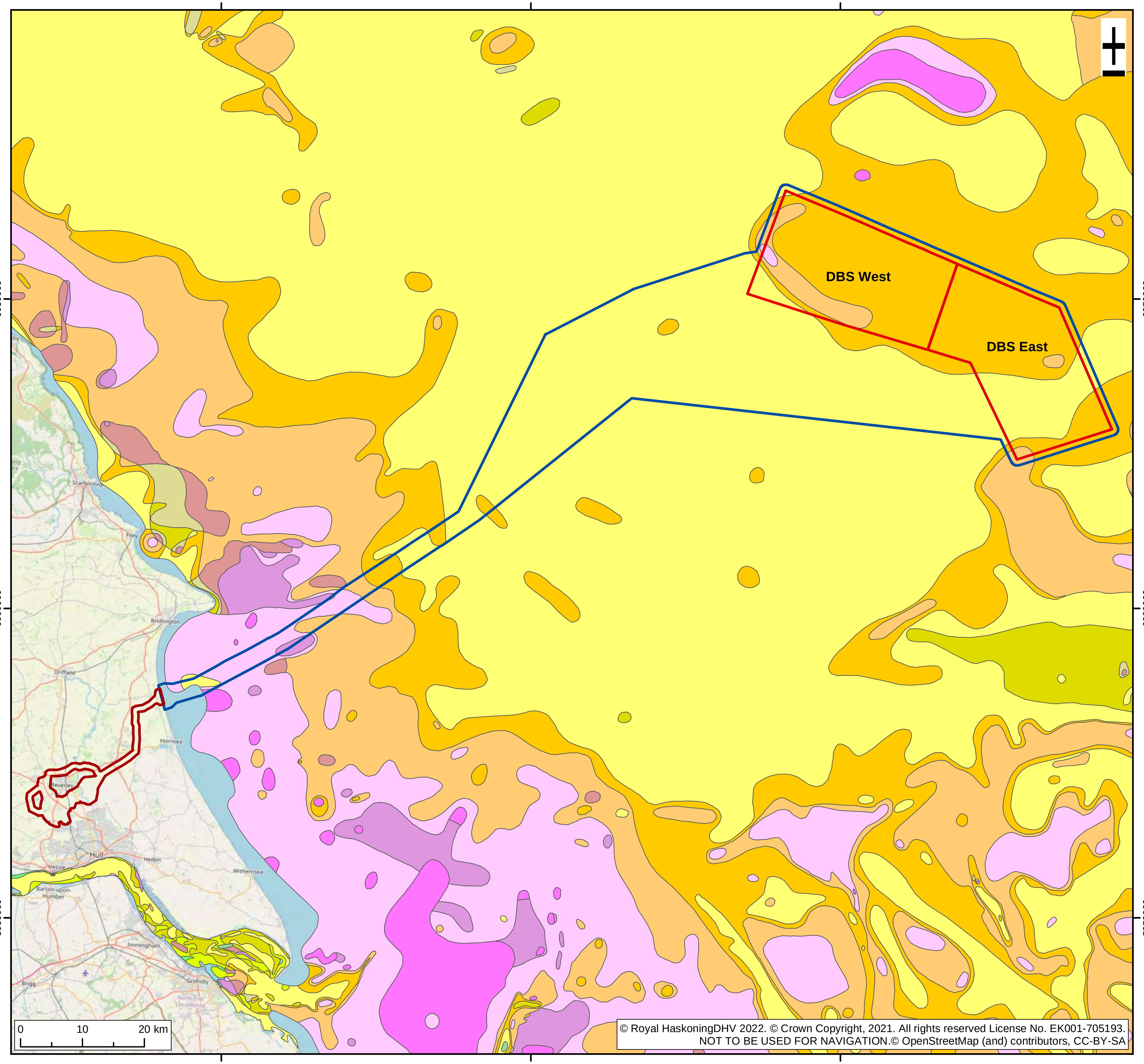
RWE



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

Seabed Sediment

- GRAVEL
- GRAVEL, MUDDY, SANDY
- GRAVELLY MUD
- GRAVELLY MUDDY SAND
- GRAVELLY SAND
- MUD
- MUDDY GRAVEL
- MUDDY SAND
- SAND
- SANDY GRAVEL
- SANDY MUD
- SLIGHTLY GRAVELLY MUD
- SLIGHTLY GRAVELLY MUDDY SAND
- SLIGHTLY GRAVELLY SAND
- SLIGHTLY GRAVELLY SANDY MUD
- UNDIFFERENTIATED BEDROCK

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	JR	DB	HC

Title:

Seabed Sediment

Figure: 2-4 | Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0219

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:625,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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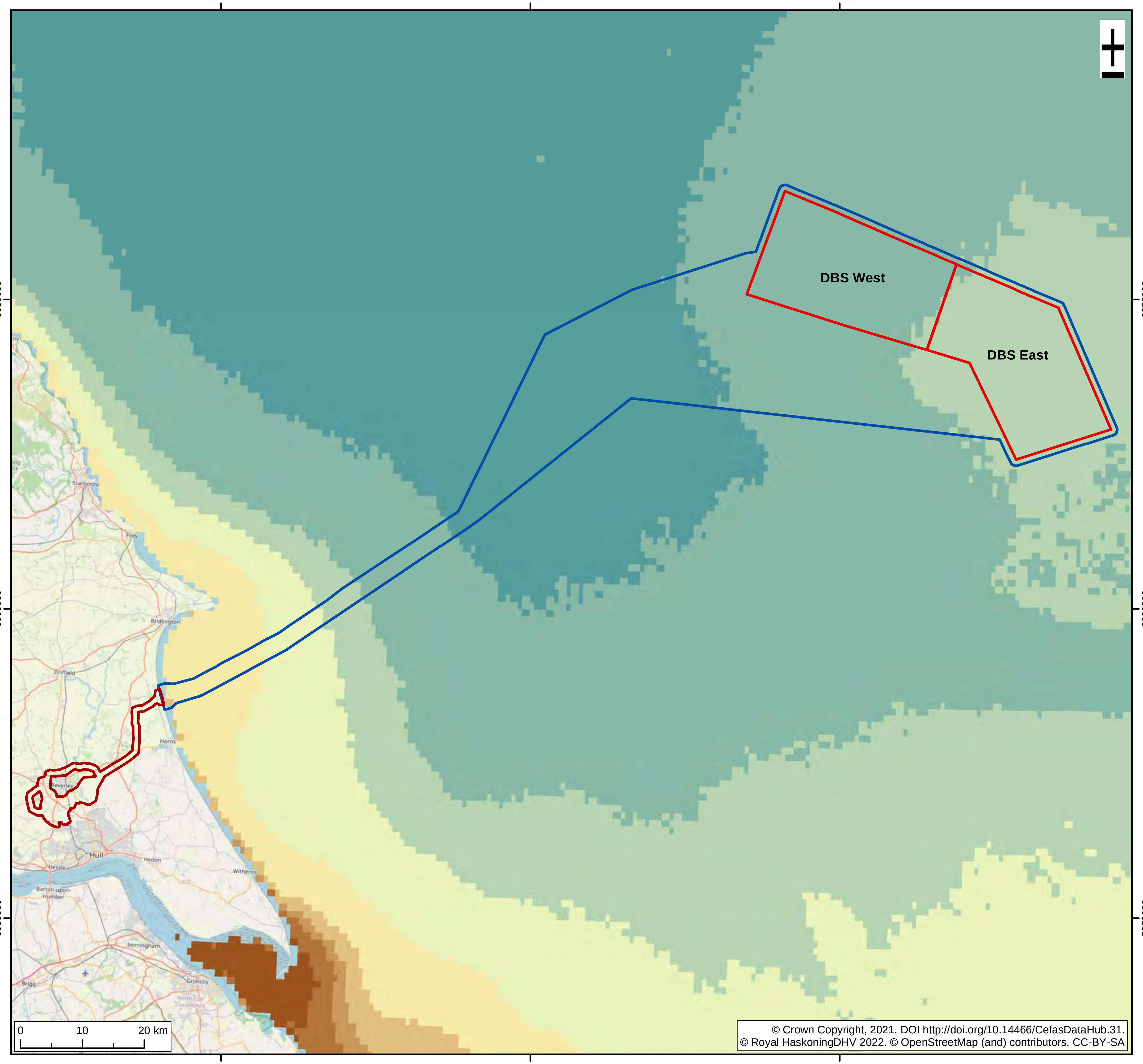
RWE



Legend:
- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

SPM 1998-2015 (mg/l)
- 1
- 2
- 3
- 5
- 10
- 15
- 20
- 30
- >30

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	06/05/2022	Suitable for Review & Comment	LB	DB	HC

Title:

Average Suspended Particulate Matter (SPM) 1998-2015

Figure: 2-5 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0220

Co-ordinate system: WGS 1984 UTM Zone 31N
Page Size: A3
Scale: 1:625,000

Project:
Dogger Bank South Offshore Wind Farms

Report:
Dogger Bank South Offshore Wind Farms EIA Scoping Report

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2.1.2. Data Sources

158. **Table 2-1** outlines existing primary data that has been used to inform this section and will also be used to inform the EIA.

Table 2-1 Existing Datasets

Dataset	Spatial Coverage	Survey Year / Timings
EMODnet bathymetry	DBS array areas and offshore export cable corridor	2020
BERR Atlas tidal currents	DBS array areas and offshore export cable corridor	2007
BERR Atlas waves	DBS array areas and offshore export cable corridor	2001-2008
BGS seabed sediments	DBS array areas and offshore export cable corridor	Pre-1987
Cefas suspended sediment concentrations	DBS array areas and offshore export cable corridor	1998-2015
Physical and sedimentary processes data including numerical modelling	Dogger Bank Zone, Dogger Bank A, B and C, and Sofia Offshore Wind Farms.	2011-2014

159. In addition to the data in **Table 2-1**, **Table 2-2** describes the surveys that will be undertaken to support the assessment.

Table 2-2 Site-Specific Survey Data

Survey	Spatial Coverage	Survey Year / Timings
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	DBS array areas and offshore export cable corridors	To be completed in 2022
Grab sampling and particle size analysis	DBS array areas and offshore export cable corridors	To be completed in 2022
Metocean survey (wave and currents)	DBS array areas	To be completed in 2022

160. Other data and information available 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);
- British Geological Survey 1:250,000 seabed sediment, Quaternary geology and bedrock geology mapping;
- Admiralty Charts and UKHO bathymetry data; and
- Projects including Futurecoast, Shoreline Management Plans, the Humber Regional Environmental Characterisation, Humber Marine Aggregate Regional Environmental Assessment, and the Environment Agency's Flood and Coastal Erosion Risk Management Research programme investigating future cliff erosion related to sea-level rise.

2.1.3. Potential Impacts

2.1.3.1. Potential impacts during construction

2.1.3.1.1. Impacts on wave and tidal currents

161. Whilst there is potential for the physical presence of construction plant and offshore infrastructure to impact upon the wave and tidal current regimes, these impacts would increase incrementally as the wind farms are constructed with the greatest potential impacts resulting from the completed wind farms including the inshore and intertidal areas. These impacts are therefore considered under section 2.1.3.2.1 'Potential impacts during operation' and are scoped out of further consideration in relation to the construction phase.

2.1.3.1.2. Impacts on bedload sediment transport and seabed and coastal morphological change

162. Construction of the wind farms will not change the geology of the site other than in the case of localised effects associated with foundation and cable installation. However, there is the potential for changes in seabed and coastal morphology due to offshore and landfall construction activities (e.g. cable installation and seabed preparation). Hence, these potential impacts will be assessed as part of the EIA and are therefore scoped in.

2.1.3.1.3. Impacts on suspended sediment concentrations and transport

163. Potential impacts during construction include temporary disturbance of the seabed due to the installation activities for cables and foundations (including seabed preparation, ploughing/trenching, cable burial and HDD) which release sediment into the water column resulting in increased suspended sediments and changes to seabed levels. Nearshore cable installation could result in changes to shoreline levels due to deposition or erosion. These potential impacts will be assessed as part of the EIA and are therefore scoped in. The impacts will be considered separately for the array areas and for the offshore export cable corridors, and potential interactions between the two will also be taken into account.

2.1.3.1.4. Impacts on seabed morphology due to indentations on the seabed from installation vessels

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

2.1.3.2. Potential impacts during operation

2.1.3.2.1. Impacts on waves and tidal currents

165. Potential impacts during operation could occur due to the physical presence of infrastructure (i.e. foundations and any cable protection above the seabed), 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. These impacts will be assessed as part of the EIA and are therefore scoped in.

2.1.3.2.2. Impacts on bedload sediment transport and seabed and coastal morphological change

166. 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). Impacts on sediment transport are expected 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. Scour at each foundation will be assessed as part of the EIA using well-established empirical methods applied to offshore wind farms elsewhere.

167. 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 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 will be assessed as part of the EIA and are therefore scoped in.

2.1.3.2.3. Impacts on suspended sediment concentrations and transport

168. There is potential for sediments to be re-suspended by scouring. Consideration will be given to likely changes in suspended sediment concentrations due to scour during the operational phase within the EIA and are therefore scoped in.

2.1.3.2.4. Impacts on water circulation (Flamborough Front)

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

2.1.3.3. Potential impacts during decommissioning

170. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

171. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.1.3.4. Potential cumulative impacts

172. The CIA will be based on a zone of influence identified during the Projects alone impact assessment, which will define the geographical extent within which effects of the wind farms are expected to occur. Recognising that the DBS arrays are in close proximity to the Dogger Bank A, B and C, and Sofia Offshore Wind Farms, the CIA will consider cumulative impacts with the existing wind farms and any other projects and marine users within the zone of influence including the Humber Estuary (aggregate extraction and dredging, subsea cables and oil and gas activity).

2.1.3.5. Potential transboundary impacts

173. Based on the findings of the Dogger Bank A, B and C, and Sofia Offshore Wind Farms transboundary assessments, which found no potential for significant transboundary effects, it is proposed to scope out transboundary effects on marine physical processes, recognising that the Projects are further from the Exclusive Economic Zone (EEZ) boundary than the existing projects. Given that the likely marine physical processes impacts of the Projects will be restricted to near-field change, coupled with their location 40km from the EEZ boundary, there would be no pathway for transboundary impacts.

2.1.3.6. Summary of scoping proposals

174. **Table 2-3** outlines the potential effects which are proposed to be scoped in to, or out of, the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-3 Summary of Impacts Proposed to be Scoped In (✓) and Out (✗) for the Marine Physical Processes Assessment

Potential Impact	Construction	Operation	Decommissioning
Impacts on waves and tidal currents	✗ The impact arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase	✓	✗ The impact arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase
Impacts on bedload sediment transport and seabed and coastal morphological change	✓	✓	✓
Impacts on suspended sediment concentrations and transport	✓	✓	✓

Potential Impact	Construction	Operation	Decommissioning
Impacts on water circulation (Flamborough Front)	× The impact arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase	✓	× The impact arises as a result of the presence of large foundations on the seabed and so is assessed in the operational phase
Indentations on the seabed due to installation and decommissioning vessels	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	× The Projects are located 40km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.1.4. Approach to Impact Assessment

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

- Bathymetry;
- Geology;
- Water levels;
- Tidal currents;
- Waves;
- Climate change;
- Seabed sediment distribution;
- Bedload sediment transport;
- Suspended sediment transport;
- Morphological change;
- Coastal processes at the landfall; and
- Anticipated trends in baseline conditions.

176. The assessment of effects on the 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, 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).

177. Previous numerical modelling work has been undertaken for Dogger Bank A, B and C, and Sofia Offshore Wind Farms. The Projects are located in close proximity to these previous wind farms and the results of the modelling will be used as part of the conceptual evidence-based assessment of potential construction and operational effects or impacts of the Projects. The physical basis for using the previous modelling results is that the marine physical processes at the previous Dogger Bank sites are comparable to those in the array areas and therefore provide suitable evidence (and are suitable analogues) to support the assessment of effects in the Offshore Study Area. There is an extensive and robust evidence base from the previous Dogger Bank wind farms work to negate the need for additional numerical modelling to support the assessment of the Projects.

178. For effects on the 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 receptors proposed for inclusion in the assessment are listed in **Table 2-4**. 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 a significance of impact.

Table 2-4 Marine Physical Processes Receptors

Receptor Group	Receptor	Closest Distance from the Projects
Designated sites and features	Dogger Bank SAC	The array areas are located in the SAC and the offshore export cable corridor would pass through it
	Southern North Sea SAC	The array areas are located in the SAC and the offshore export cable corridor would pass through it
Holderness coast	Flamborough Head SAC and SSSI	Offshore export cable corridor would pass through, or close to, the SAC and SSSI
	Flamborough and Filey Coast SPA	Offshore export cable corridor would pass through, or close to, the SPA
	Greater Wash SPA	Offshore export cable corridor may pass through the northern end of the SPA
	Holderness Offshore MCZ	Offshore export cable corridor may pass through the northern end of the MCZ
	Holderness Inshore MCZ	Offshore export cable corridor may pass through the northern end of the MCZ, and the landfall maybe located within it
Other	Smithic Bank (potential Annex I subtidal sandbank habitat)	Offshore export cable corridor may pass close to the southern extent of this sandbank

179. 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 effect is determined in a similar manner to the first assessment method but the significance of impacts on other receptors is made within the relevant chapters of the ES pertaining to those receptors.

180. 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 2001);
- 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 2008); and
- Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment (COWRIE 2009).

2.2. Marine Sediment and Water Quality

181. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on marine sediment and water quality. The potential impacts on onshore water quality are assessed in section 3.3.

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

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on marine sediment and water quality resulting from the Projects been identified in the Scoping Report?
- Do you agree that marine sediment and water quality impacts can be scoped out of the EIA?

2.2.1. Existing Environment

2.2.1.1. Sediment – physical properties

182. Sediment grain size is important to inform assessment of the risk of contamination 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 (Cefas 2001). For example, particles of various types and sizes, notably the silt/clay fraction, can absorb petroleum hydrocarbons from sea water and, through this pathway, hydrocarbons can become incorporated into the sediment system. Sediment grain size also assists in predicting the extent of any sediment plume, should the material be disturbed given that coarser material is likely to settle out quickly rather than give rise to significant sediment plumes.

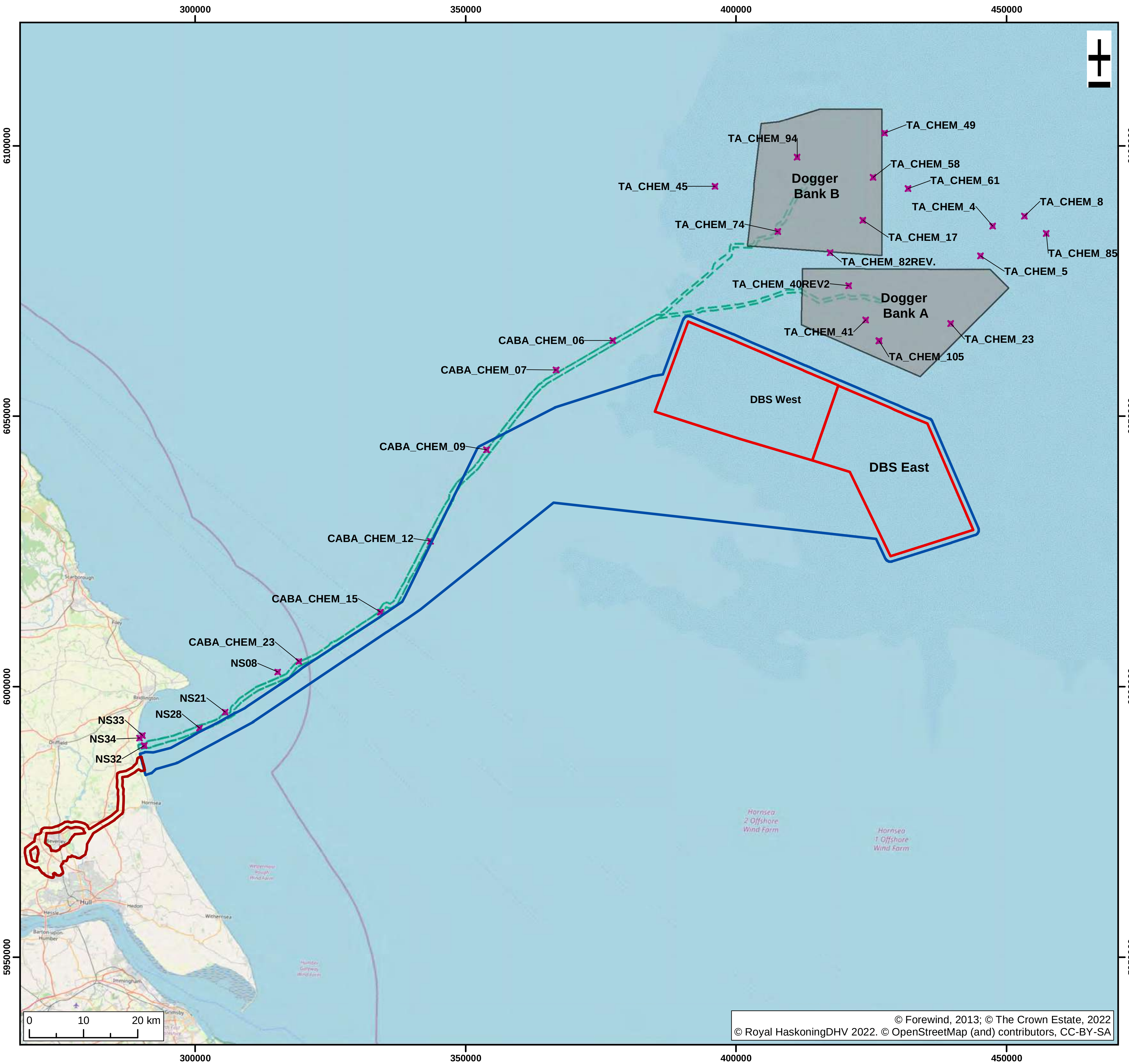
183. Mapping of sediment types completed by British Geological Survey (BGS) (1987) is shown in **Figure 2-6**. As detailed in section 2.1 the data shows that the Projects' array areas are dominated by slightly gravelly sand, sand, and gravelly sand with a small patch of sandy gravel in the west. Across the Offshore Study Area, a large part of the southern North Sea is sand, before coarser sediments (gravelly sand and sandy gravel) return nearer to the coast.

2.2.1.2. Sediment quality

184. Studies undertaken as part of the Dogger Bank A & B (formerly Creyke Beck A & B) in 2011 and 2012 and Dogger Bank C and Sofia (formerly Teesside A and B) Offshore Wind Farms revealed low levels of contamination in the sediments. **Table 2-5** presents the data collected at Dogger Bank A & B along their export cable corridor, which runs alongside the proposed cable corridor for the Projects (see **Figure 2-6** showing the cable corridors and sediment contaminant sample sites) and **Table 2-6** presents the data collected in the array area. This 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).

185. Very few sites exceeded Cefas Action Level 1. Within the Dogger Bank A and B export cable corridor, site 23 appears to have generally higher levels of metals of which arsenic, chromium, copper and lead exceeded Action Level 1. All nearshore sites (34, 33, 32, 28, 21and 8) appear to contain elevated levels of one or more metals; however, concentrations of contaminants did not exceed the Cefas Action Level 2. It was therefore concluded that sediment contamination is low, therefore baseline water quality for the marine and coastal waters surrounding the Dogger Bank A & B study area is generally good (Forewind, 2013).

186. The comparable nature of the seabed sediments within the two array areas and coarser material in the export cable corridors, significantly reduces the potential for contaminants to accumulate. This is reflected in the historical data already collected for Dogger Bank A & B as described above. As a result, it is not proposed to collect site specific sediment contaminant information for the Projects to inform the EIA.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Dogger Bank A & B Offshore Wind Farms
- Dogger Bank A & B Offshore Wind Farm Export Cable Corridors
- Dogger Bank A & B Sediment Contaminant Sample

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C02	25/07/2022	Authorized	JR	JF	HC
A01	C01	20/07/2022	Authorized	LB	JF	HC
S3	P01	15/07/2022	Suitable for Review & Comment	LB	CC	HC

Title:

Dogger Bank A and B Contaminant Sample Sites

Figure: 2-6

Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0262

Co-ordinate system: WGS 1984 UTM Zone 31N

Page Size: A3

Scale: 1:700,000

Project: Dogger Bank South Offshore Wind Farms

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Table 2-5 Sediment contaminant sample analysis results compared to the Cefas Action Levels for the Dogger Bank A & B export cable corridor. Yellow indicates an exceedance of Action Level 1. There were no exceedances of Action Level 2 (Forewind, 2013).

Contaminant	Site reference (export cable corridor)												Cefas Action Levels	
	23	15	12	9	6	7	34	33	32	28	21	8	Action Level 1	Action Level 2
Arsenic (mg/kg)	20.2	4.21	1.61	1.76	2.46	34.8	8.83	9.23	13.12	<0.4	2.84	41.7	20	100
Cadmium (mg/kg)	0.127	<0.03	<0.03	<0.03	<0.03	<0.03	0.234	0.827	0.827	0.476	0.585	0.077	0.4	5
Chromium (mg/kg)	158	11.4	8.81	12.3	11.9	10.7	142	135	104	64.3	138	77.9	40	400
Copper (mg/kg)	39.1	2.65	2.31	2.23	3.37	2.03	45.9	47.7	83	56.5	106	76.4	40	400
Mercury (mg/kg)	0.123	<0.002	0.002	0.002	0.002	0.003	0.016	0.012	0.025	0.047	0.107	0.018	0.3	3
Lead (mg/kg)	81.3	19.3	11.7	11.3	10.3	14.2	11.2	25	80.8	52.4	66.9	144	50	500
Nickel (mg/kg)	90.8	5.58	3.76	4.78	4.54	4.14	89.4	68	49.2	23.4	78	34.7	20	200
Polychlorinated biphenyls (PCBs) (sum ICES 7) (mg/kg)	Below level of detection where sampled (23, 15, 12, 9, 6, 7)													

Contaminant	Site reference (export cable corridor)												Cefas Action Levels	
	23	**15**	**12**	**9**	**6**	**7**	**34**	**33**	**32**	**28**	**21**	**8**	**Action Level 1**	**Action Level 2**
Acenaphthene (µg/kg)	2.71	<2	<2	<2	<2	<2	2.22	15.2	11.1	12.6	10.9	<2	100	-
Acenaphthylene (µg/kg)	<2	<2	<2	<2	<2	<2	<2	<2	<3	3.85	7.74	<2	100	-
Anthracene (µg/kg)	5.76	2.21	<2	<2	<2	<2	<2	6.84	14.4	43.2	21.1	<2	100	-
Benzo(a)anthracene (µg/kg)	11.2	<2	<2	<2	<2	3.28	2.43	22.4	31.7	140	55.5	4.34	100	-
Benzo(a)pyrene (µg/kg)	<2	<2	<2	<2	<2	2.88	<2	34.2	31.1	105	48.9	3.62	100	-
Chrysene (µg/kg)	11.3	>3	>3	>3	>3	3.74	4.89	28.9	61.2	128	65.3	8.41	100	-
Dibenz(a,h)anthracene (µg/kg)	<5	<5	<5	<5	<5	<5	<5	5.99	7.26	16.3	9.34	<5	10	
Fluoranthene (µg/kg)	26.2	10.7	<2	6.83	<2	4.83	5.22	26.8	59.5	228	89.3	9.59	100	-
Fluorene (µg/kg)	10.8	<10	<10	<10	<10	<10	<10	13.8	46.7	20.7	28.2	<10	100	-

Contaminant	Site reference (export cable corridor)												Cefas Action Levels	
	23	**15**	**12**	**9**	**6**	**7**	**34**	**33**	**32**	**28**	**21**	**8**	**Action Level 1**	**Action Level 2**
Naphthalene (µg/kg)	<30	<30	<30	<30	<30	<30	<30	<30	152	45.4	118	<30	100	-
Phenanthrene (µg/kg)	47	18.6	<10	12.7	<10	<10	15.2	40.6	182	160	129	17.1	100	-
Pyrene (µg/kg)	26.1	8.91	<3	6.05	<3	3.76	4.81	43.9	65	183	79.9	7.85	100	-

Table 2-6 Sediment contaminant sample analysis results compared to the Cefas Action Levels for the Tranche A windfarm array area. Yellow indicates an exceedance of Action Level 1. There were no exceedances of Action Level 2 (Forewind, 2013).

Contaminant	**Site reference (array area – Tranche A)**															**Cefas Action Levels**	
	85	**8**	**4**	**5**	**23**	**41**	**49**	**94**	**45**	**74**	**58**	**61**	**17**	**82**	**40**	**Action Level 1**	**Action Level 2**
Arsenic (mg/kg)	1.64	1.13	2.69	1.86	0.85	0.72	3.22	1.37	3.36	<0.4	13.6	1.91	0.76	1.49	4.43	20	100
Cadmium (mg/kg)	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.035	<0.03	<0.03	<0.03	0.131	0.032	<0.03	<0.03	<0.03	0.4	5
Chromium (mg/kg)	15.5	14.8	25.4	28.9	9.31	7.93	22.4	9.00	8.04	19.9	119	2.61	9.44	8.25	12.7	40	400
Copper (mg/kg)	4.12	3.86	3.32	3.54	2.7	2.04	3.26	1.39	2.07	2.14	36.3	3.55	2.19	2.5	2.83	40	400
Mercury (mg/kg)	<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	<0.002	0.3	3
Lead (mg/kg)	8.18	6.38	6.6	5.89	8.17	5.79	6.52	3.99	4.44	3.56	23.6	7.72	5.45	6.36	6.80	50	500

Contaminant	Site reference (array area – Tranche A)															Cefas Action Levels	
	85	8	4	5	23	41	49	94	45	74	58	61	17	82	40	Action Level 1	Action Level 2
Nickel (mg/kg)	3.7	3.07	2.96	2.95	4.30	2.74	2.69	1.45	1.78	2.31	50.90	3.3	3.00	3.62	7.17	20	200
PCBs (sum ICES 7) (mg/kg)	Below level of detection																
Acenaphthene (µg/kg)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	100	-
Acenaphthylene (µg/kg)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	100	-
Anthracene (µg/kg)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	100	-
Benzo(a)anthracene (µg/kg)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	6.36	<2	<2	<2	<2	100	-
Benzo(a)pyrene (µg/kg)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	6.22	<2	<2	<2	<2	100	-

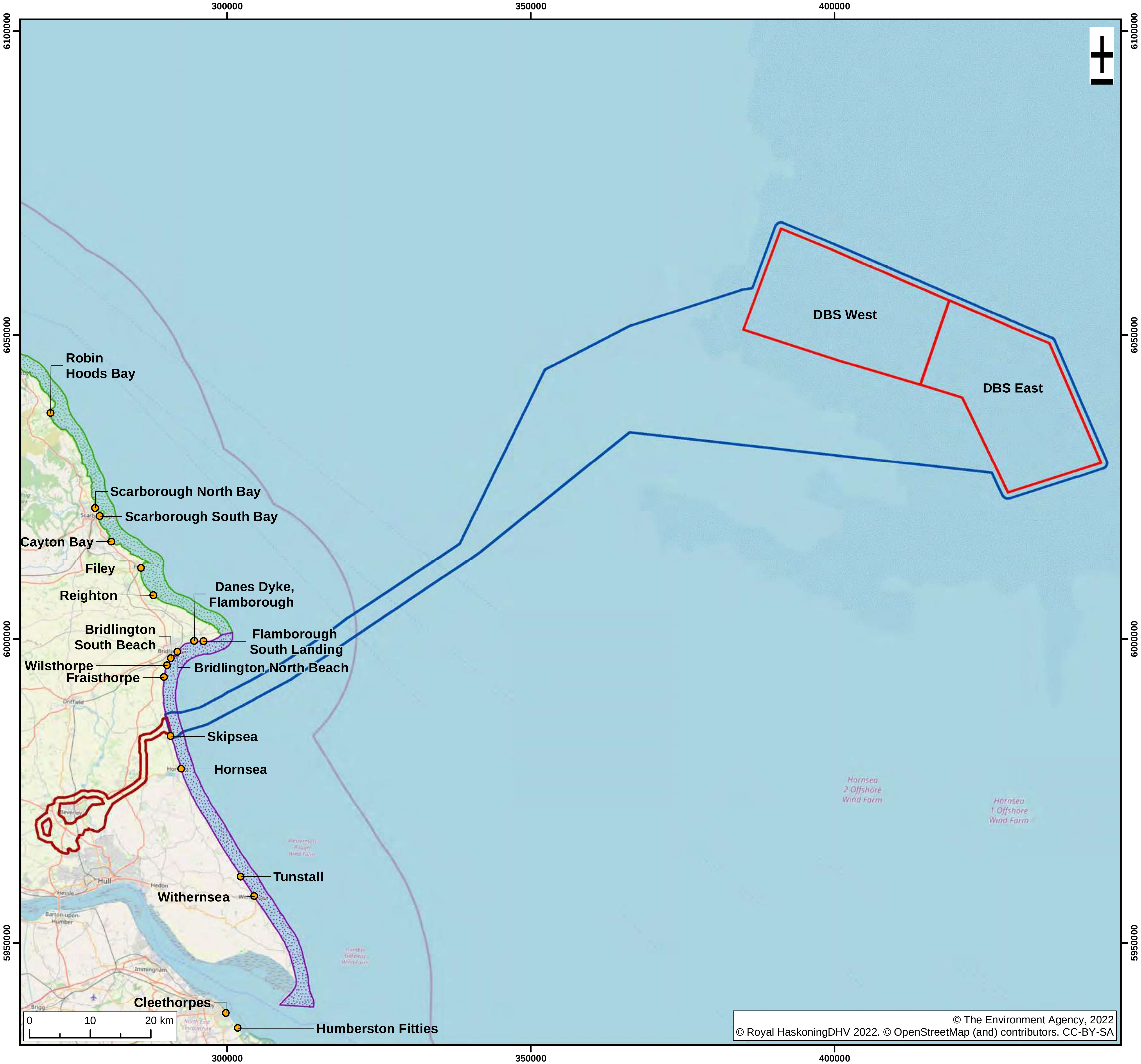
Contaminant	Site reference (array area – Tranche A)															Cefas Action Levels	
	85	**8**	**4**	**5**	**23**	**41**	**49**	**94**	**45**	**74**	**58**	**61**	**17**	**82**	**40**	**Action Level 1**	**Action Level 2**
Chrysene (µg/kg)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	16.8	<3	<3	<3	<3	100	-
Dibenz(a,h)anthracene (µg/kg)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	10	
Fluoranthene (µg/kg)	<2	3.25	<2	<2	<2	<2	<2	<2	<2	<2	7.17	<2	<2	<2	<2	100	-
Fluorene (µg/kg)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	-
Naphthalene (µg/kg)	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	100	-
Phenanthrene (µg/kg)	11.3	16.7	<10	13.1	10.2	<10	<10	<10	<10	<10	31.2	<10	<10	<10	<10	100	-
Pyrene (µg/kg)	5.28	3.97	<3	3.34	<3	<3	<3	<3	<3	<3	12.8	<3	<3	<3	<3	100	-

2.2.1.3. Water quality - suspended solid concentrations

187. 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 in investigation works conducted for the Dogger Bank A, B and C and Sofia Offshore Wind Farms, which found that suspended sediment concentrations across the Dogger Bank Zone are typically around 1-2mg/l (Forewind 2013, 2014).

2.2.1.4. Water quality - chemical and physico-chemical parameters

188. 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. Water quality is an important component for compliance with the requirements of this Directive and therefore the information collected for the transitional and coastal water bodies is relevant to this section. The Offshore Study Area, in the nearshore area (i.e. 1 nm from the coast), passes through the Yorkshire South coastal WFD water body and within 8.5km of the Yorkshire North coastal WFD water body as shown in **Figure 2-7**. **Table 2-7** presents the details of current water quality status classification for these two coastal waterbodies.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

WFD Transitional & Coastal Water Bodies

- Yorkshire North
- Yorkshire South

Protected Areas

- Designated Bathing Waters

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C02	25/07/2022	Suitable for Approval	JR	JF	HC
A01	C01	20/07/2022	Suitable for Approval	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P02	12/05/2022	Suitable for Review & Comment	LB	CP	HC
S3	P01	29/04/2022	Suitable for Review & Comment	LB	CP	HC

Title:

WFD Water Bodies (Transitional & Coastal) and Protected Areas

Figure: 2-7

Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0221

Co-ordinate system: WGS 1984 UTM Zone 31N

Page Size: A3

Scale: 1:625,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

Table 2-7 WFD Water Bodies (Environment Agency 2021)

WFD Water Body	Water Body Type	Physico-Chemical Information (latest data from 2019)	Chemical Status (latest data from 2019)
Yorkshire South - **GB640402491000**	Coastal Water Body	**High**	**Fail** (Polybrominated diphenyl ethers (PBDE), Benzo(g-h-i) perylene, mercury and its compounds and tributyltin compounds)
Yorkshire North - **GB650401500004**	Coastal Water Body	**High**	**Fail** (PBDE, Benzo(g-h-i) perylene, mercury and its compounds

189. The following bathing waters are located on the coast close to the Offshore Study Area (these are also protected areas designated under the WFD). 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 2021 were:

- Bridlington North – Good;
- Bridlington South – Sufficient;
- Wilsthorpe – Good;
- Danes Dyke, Flamborough – Excellent;
- Flamborough South Landing – Excellent;
- Skipsea – Good; and
- Fraisthorpe – Good.

190. Other data and information available is summarised in **Table 2-8**.

Table 2-8 Summary of Other Data Sources

Baseline data source	Summary of findings
Coordinated Environmental Monitoring Programmes (CEMP) data 2021 available at Ospar Contaminants App (ices.dk)	The data collected under the OSPAR Coordinated Environmental Monitoring Programmes (CEMP) for North-East Atlantic contaminants in biota, sediment and water are quality controlled and hosted at ICES. These data are assessed annually by the OSPAR working group on Monitoring and on Trends and Effects of Substances in the Marine Environment (MIME). The latest data indicates elevated contaminant levels within sediments at the monitoring sites offshore of the Humber.
OSPAR Commission Quality Status Report 2010 (OSPAR 2010)	These is the most recent full assessment available online. The next is due in 2023. The QSR 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 is in Region II 'Greater North Sea' and for this region, the report concludes that concentrations of metals, PAHs and PCBs 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.
OSPAR Intermediate Assessment 2017 (OSPAR 2017)	Since the QSR 2010, contaminant concentrations have continued to decrease in the majority of areas assessed, especially for PCBs. 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). Concerns remain in some localised areas with respect to high levels of mercury, lead, and one of the most toxic PCB congeners and locally increasing concentrations of polyaromatic hydrocarbons (PAHs) and cadmium in open waters.

2.2.2. Potential Impacts

2.2.2.1. Potential impacts during construction

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

- Localised temporary increases in suspended sediments;
- Remobilisation of existing contaminated sediments; and
- Release of accidental pollution from construction vessels.

192. However, it is proposed to scope these impacts out of the EIA for the following reasons:

- Any chemicals used during construction would be listed on the Offshore Chemical Notification Scheme (OCNS) and a Chemical Risk Assessment would be required as part of the Project Environmental Management and Monitoring Plan.
- All vessels must comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. A Project Environmental Management and Monitoring Plan (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.
- Sediments are coarse in nature thus significantly reducing the likelihood that large volumes of sediment will be suspended during construction of both the array and installation of the export cable. Additionally, disturbance is short term and would cease following completion of the Projects. Modelling of sediment suspension for Dogger Bank A & B confirms this assertion and concluded that maximum concentrations of suspended solids were noted within the vicinity of the foundations and dispersed to background levels within 65km of Tranche A and within several meters of the cable corridor (Forewind 2013).
- Contamination data collected in the vicinity of the Projects does not indicate significant levels of chemicals within the sediments that could potentially be disturbed (Forewind 2013). The coarse nature of the material in the Offshore Study Area further reduces this risk.

2.2.2.2. Potential impacts during operation and maintenance

193. Potential impacts during operation and maintenance could arise as a result of disturbance to the seabed but these would be limited in terms of timeframe and scale and cease following completion of the works. In relation to scour, the assessment undertaken to inform the EIA for Dogger Bank A & B concluded that operational scour volumes were five times lower than naturally occurring releases of sediment (Forewind 2013).

194. As for construction, sediments in the vicinity of the works are likely to be coarse in nature and unlikely to harbour significant levels of contaminants. Chemicals to be discharged would be listed on the OCNS and included in the Project Environmental Management and Monitoring Plan. Additionally, vessels would comply with MARPOL. It is therefore proposed to scope operational impacts out of the EIA.

2.2.2.3. Potential impacts during decommissioning

195. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

196. As a result, impacts associated with decommissioning are scoped out of the EIA.

2.2.2.4. Potential cumulative impacts

197. Given that all impacts are scoped out of the EIA for this topic, it is proposed to scope out cumulative impacts.

2.2.2.5. Potential transboundary impacts

198. Given that all impacts are scoped out of the EIA for this topic, there is no potential for transboundary impacts.

2.2.2.6. Summary of scoping proposals

199. **Table 2-9** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-9 Summary of Impacts Proposed to be Scoped In (✓) and Out (✗) for the Marine Water and Sediment Assessment

Potential Impact	Construction	Operation	Decommissioning
Localised temporary increases in suspended sediments	✗	✗	✗
Remobilisation of existing contaminated sediments	✗	✗	✗
Pollution events resulting from the accidental release of pollutants	✗	✗	✗
Cumulative impacts	✗	✗	✗
Transboundary impacts	✗ Given all impacts are scoped out, there is no pathway for transboundary impacts.		

2.3. Offshore Air Quality

200. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on offshore air quality. The potential impacts on onshore air quality are assessed in section 3.9.

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 potential impacts on offshore air quality resulting from the Projects been identified in the Scoping Report?
- Do you agree that offshore air quality impacts can be scoped out of the EIA?

2.3.1. Existing Environment

201. The primary source of offshore atmospheric emissions is likely to be from vessels emitting nitrogen oxides (NO_x), particulate matter (PM) and sulphur dioxide (SO_2).

202. 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). The North Sea is a designated Emission Control Area under MARPOL, with sulphur content of fuel oil being limited to 0.5%. Furthermore, as of 1 January 2021, vessels operating within the North Sea must comply with the most stringent NO_x emission limits to comply with the Emission Control Area requirements.

203. Pollutant concentrations should only be compared to the relevant air quality objectives where there is representative exposure. There are no offshore human receptors which are sensitive to air quality, and marine-based ecological designations are unlikely to be sensitive to air pollution impacts (Centre for Ecology and Hydrology 2021). Receptors may only be affected where there are isolated locations of relevant human exposure (e.g. residences) close to the shoreline, and land-based designated ecological sites.

2.3.2. Potential Impacts

2.3.2.1. Potential impacts during construction, operation and decommissioning

204. Vessels utilised by the Projects during construction, operation and decommissioning may contribute to emissions offshore and give rise to potential effects on human and ecological receptors. However, in the context of the existing vessel traffic within the North Sea the Projects' contributions would be small. Most construction and operation and maintenance works would be carried out at a distance from the shore and therefore would be unlikely to impact upon landside human or ecological receptors.

205. As there would be a relatively low number of vessels utilised as part of the Projects and given the considerable distances to sensitive receptors and that the MARPOL emissions regulations that will be applied, it is considered that there is no pathway for a significant impact. As such, it is proposed to scope offshore air quality impacts out of the EIA. This is in line with other recent EIA scoping opinions such as for North Falls Offshore Wind Farm (Planning Inspectorate 2021).

2.3.2.2. Potential cumulative impacts

206. As described in section 2.3.2.1, most offshore works will be undertaken at a significant distance from any sensitive receptors. As such, it is considered that there is no pathway for any significant cumulative effects to occur with other offshore emission sources (e.g. vessels) used for any other plans or projects within the area.

2.3.2.3. Potential transboundary impacts

207. Given that all impacts are scoped out of the EIA for this topic, there is no potential for transboundary impacts.

2.3.2.4. Summary of scoping proposals

208. **Table 2-10** outlines the impacts which are proposed to be scoped out of the EIA for Offshore Air Quality.

Table 2-10 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Offshore Air Quality Assessment

Potential Impact	Construction	Operation	Decommissioning
Impacts on human receptors as a result of emissions from vessels	×	×	×
Impacts on ecological receptors as a result of emissions from vessels	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	× Given all impacts are scoped out, there is no pathway for transboundary impacts.		

2.4. Offshore Airborne Noise

209. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on offshore airborne noise. The potential impacts on onshore noise and vibration are assessed in section 3.8.

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 potential impacts on offshore airborne noise resulting from the Projects been identified in the Scoping Report?
- Do you agree that offshore airborne noise can be scoped out of the EIA?

2.4.1. Existing Environment

210. Existing offshore airborne noise is likely to be generated by a mix of anthropogenic and natural sources. Noise emitted by vessel traffic is expected to be the main source of anthropogenic noise in the Offshore Study Area.

211. Wind, wave and precipitation activity offshore would be the primary sources of natural airborne noise.

2.4.2. Potential Impacts

2.4.2.1. Potential impacts during construction

212. Construction activities have the potential to increase airborne noise within the array areas and offshore export cable corridors. The main sources of noise would be from increased vessel activity and from pile driving (if utilised).

213. The Projects are approximately 100km from shore at their nearest point (Flamborough Head). It is therefore highly unlikely that onshore receptors (i.e. coastal recreation users, coastal ecological designated sites and coastal settlements) will be affected by increases in noise in the array areas, in the context of the existing noise sources outlined in section 2.4.1.

214. Nearshore construction activities that will generate airborne noise will be limited to installation of the offshore export cables, which may involve HDD works or require ploughing, trenching or jetting of the cables. The impact of nearshore works on onshore receptors will be assessed in the onshore noise and vibration assessment (see section 3.8). Disturbance of biological receptors (including fish and marine mammals) will be assessed in section 2.6 and 2.7. Therefore, it is considered that the effects on human and ecological receptors as a result of airborne noise from construction are scoped out of further assessment.

2.4.2.2. Potential impacts during operation

215. During operation, increases in offshore airborne noise would be expected to be limited to generator, cranage and transport noise which cause low levels of airborne noise; however, given the distance between the array areas and the shore it is considered that turbine noise will not be audible to onshore receptors.

216. Potential impacts to offshore receptors (i.e. commercial or recreational vessels) are unlikely to be significantly greater than baseline offshore noise levels. Disturbance of biological receptors (including fish and marine mammals) from underwater noise will be considered within the relevant sections for these topics. Therefore, it is considered that the effects on human and ecological receptors as a result of operational airborne noise from offshore infrastructure is scoped out of further assessment.

2.4.2.3. Potential impacts during decommissioning

217. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

2.4.2.4. Potential cumulative impacts

218. Given that all impacts are scoped out of the EIA for this topic, it is proposed to scope out cumulative impacts.

2.4.2.5. Potential transboundary impacts

219. Given that all impacts are scoped out of the EIA for this topic, there is no potential for transboundary impacts.

2.4.2.6. Summary of scoping proposals

220. Due to the limited pathway for offshore airborne noise to impact receptors it is proposed that offshore airborne noise is scoped out of further consideration within the EIA. This is in line with other recent EIA scoping opinions such as for North Falls and Norfolk Vanguard Offshore Wind Farms (Planning Inspectorate 2021 and 2016 respectively).

221. **Table 2-11** outlines the impacts which are proposed to be scoped out of the EIA for offshore airborne noise**.**

Table 2-11 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Offshore Airborne Noise Assessment

Potential Impact	Construction	Operation	Decommissioning
Impacts on human receptors as a result of airborne noise emissions	×	×	×
Impacts on ecological receptors as a result of airborne noise emissions	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	× Given all impacts are scoped out, there is no pathway for transboundary impacts.		

2.5. Benthic and Intertidal Ecology

222. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on benthic habitats and species.

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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on benthic and intertidal ecology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.5.1. Existing Environment

2.5.1.1. Intertidal

223. The intertidal area of the Offshore Study Area is characterised by wide sandy beaches with eroding cliffs. Previous studies in the region found that the intertidal biotopes were characterised by barren littoral sand (Joint Nature Conservation Committee (JNCC) Habitat Code LS.LSa.MoSa.BarSa) in addition to small areas of coarse sediment (LS.LCS) at the upper shore (Ørsted 2018). In addition, there exists the potential for man-made concrete structures to be present at the offshore export cable landfall locations. A previous JNCC study reported that the area features highly mobile sediments subject to high degrees of drying between tides, typical of the wider region (Connor *et al*. 2004).

224. An intertidal survey will be undertaken in 2022 to record the habitat types present at the proposed landfall locations and, in turn, to characterise the ecological interest within the intertidal area.

2.5.1.2. Offshore

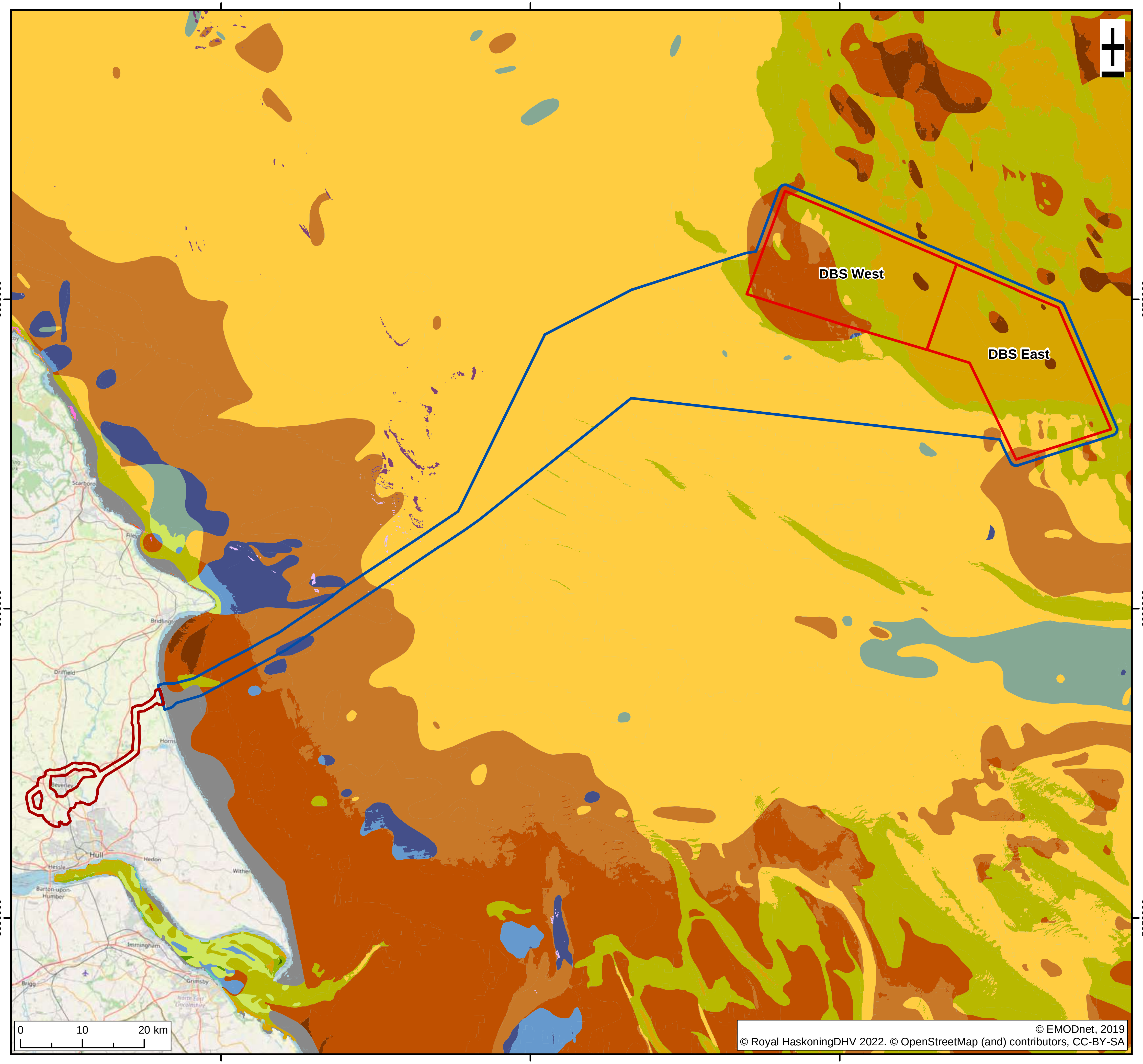
225. The EUSeaMap (2019) project predicts habitats within the North Sea based on known environmental characteristics which are cross-checked with extant survey data. The EUSeaMap predictions, shown in **Figure 2-8**, have been used to determine the predicted European Nature Information System (EUNIS) habitat types within the Offshore Study Area. For characterisation purposes this information will be supplemented with data from the benthic baseline characterisation survey that will be undertaken in summer 2022 to inform any assessment undertaken at the EIA stage.

226. The majority of the Offshore Study Area for the offshore export cable corridor is predicted to comprise of deep circalittoral sand (A5.27), as shown in **Figure 2-8**. The benthic habitats within the array areas are predicted to be predominately infralittoral fine sand (A5.23) or infralittoral muddy sand (A5.24) with areas of deep circalittoral sand (A5.27), circalittoral fine sand (A5.25), circalittoral muddy sand (A5.26) and circalittoral coarse sediment (A5.14).

227. The benthic habitats closer to the nearshore areas of the Offshore Study Area are more heterogeneous than the wider Offshore Study Area, with more coarse and mixed sediments predicted. The predicted EUNIS habitat types are deep circalittoral coarse sediment (A5.15), circalittoral coarse sediments (A5.14) with smaller areas of deep circalittoral mixed sediments (A5.45) and infralittoral coarse sediments (A5.13) (**Figure 2-8**).

228. Close to shore, the habitats (where assigned) are predicted to be predominately circalittoral coarse sediments with areas of circalittoral fine sand (A5.25) and circalittoral muddy sand (A5.26).

229. It is expected that the dominant benthic communities will be those associated with these predicted sediments, as described by EUNIS (2019).



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area

EUSeaMap 2019 EUNIS Classification Group

- A3: Infralittoral rock and other hard substrata
- A3.1: Atlantic and Mediterranean high energy infralittoral rock
- A3.2: Atlantic and Mediterranean moderate energy infralittoral rock
- A3.3: Atlantic and Mediterranean low energy infralittoral rock
- A4.1: Atlantic and Mediterranean high energy circalittoral rock
- A4.2: Atlantic and Mediterranean moderate energy circalittoral rock
- A4.27: Faunal communities on deep 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
- No EUNIS habitat assigned

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	JR	LB	HC

Title:

Seabed Habitat

Figure: 2-8 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0223

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:625,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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RWE

2.5.1.3. Protected species and habitats (offshore)

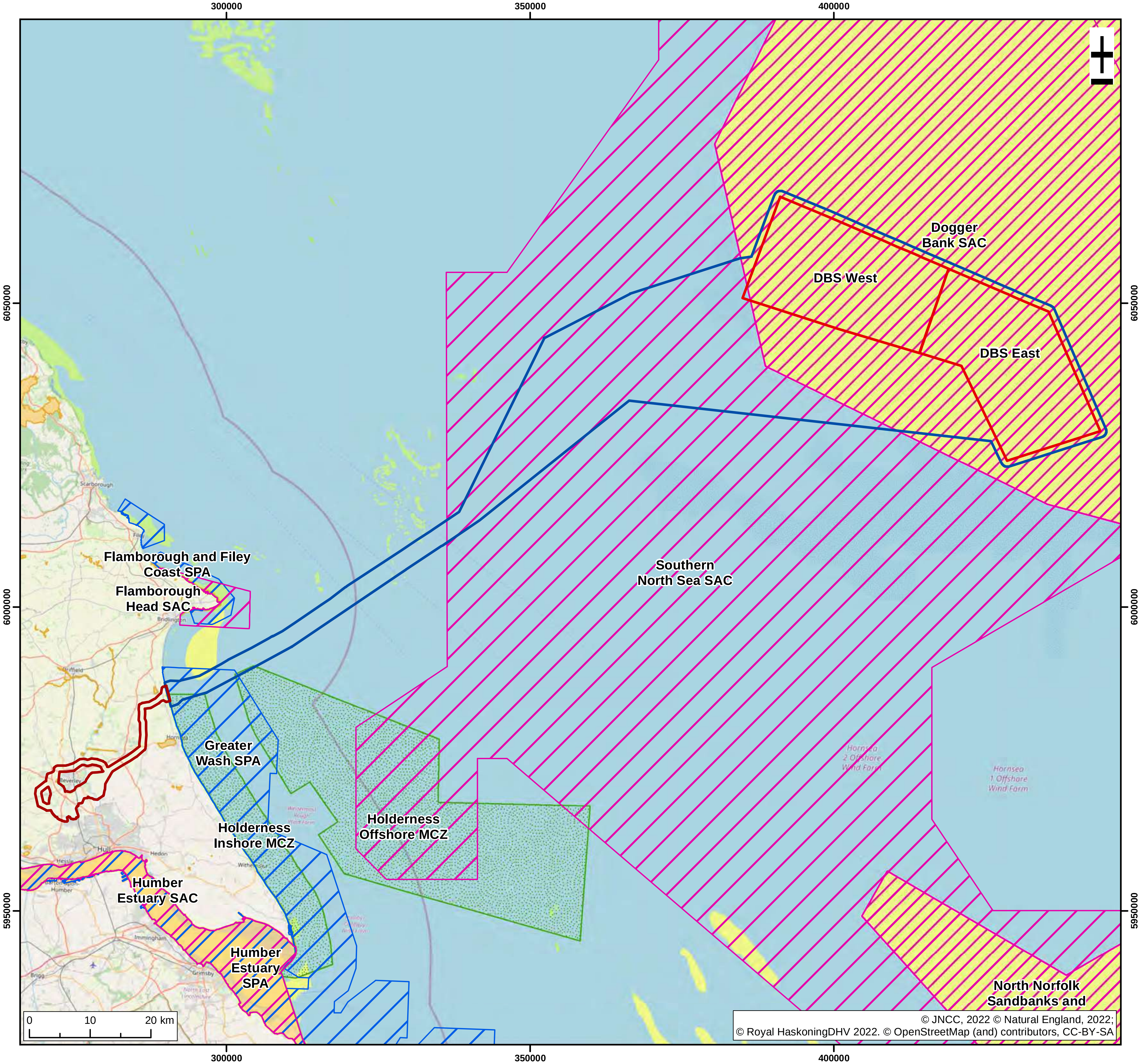
230. Sandbanks slightly covered by seawater all the time (a habitat type protected by Annex I of the Habitats Directive) occur where areas of sand form distinct elevated bathymetric features which are predominantly surrounded by deeper water and where the top of the sandbank covered by less than 20m water depth. As shown in **Figure 2-9**, instances of this feature occur throughout the Offshore Study Area, both within designated sites and outside of them.

231. Reefs are protected under Annex I of the Habitats Directive, these can be either biogenic (created by living organisms) or of geogenic (formed by non-biogenic substrata) origin. As shown in **Figure 2-9**, Annex I reef is found within the Flamborough Head SAC (geogenic chalk and boulder reefs). There are also patches of biogenic reef identified in areas outside of designated sites along the coastline itself, particularly along the coastline towards the north of the Offshore Study Area and just outside the Southern North Sea SAC, approximately 40km due east of Scarborough.

232. **Table 2-12** sets out the designated sites for protected habitats within the Offshore Study Area.

233. The Offshore Study Area also contains several UK Biodiversity Action Plan habitats, which whilst not afforded a Protected status are valuable ecological receptors. These habitats are predicted to mainly be composed of coarse and mixed sediments with moderate to high infaunal diversity and scour tolerant epibenthic communities, sandy sediments with low infaunal diversity and sparse epibenthic communities and fine muddy sands with moderate species diversity, characterised by bivalves in areas of moderate to high wave exposure, with coarse littoral barren sand occurring within the intertidal area.

234. The benthic survey due to be undertaken in late summer 2022 will identify and characterise habitats and species that may be present for the purpose of informing the assessment.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Marine Conservation Zone
- Special Areas of Conservation
- Special Protection Area
- Sites of Special Scientific Interest
- Annex I Sandbank
- Annex I Reef

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	JR	LB	HC

Title:

Designated Sites and Protected Benthic Habitats

Figure: 2-9 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0222

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:625,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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2.5.1.4. Designations

235. The Offshore Study Area contains a number of protected areas designated as a result of the habitats they contain. These sites, and their designated features, are detailed in **Table 2-12**. **Figure 2-9** shows these sites in relation to the Offshore Study Area. As site selection progresses, the Offshore Study Area will be refined further and the designated sites within this area will be considered through the EIA and the HRA and MCZ Screening.

Table 2-12 Designated Sites for Benthic Features Within the Offshore Study Area

Site	Designated features
Dogger Bank SAC	Annex I Sandbanks which are slightly covered by sea water all the time
Holderness Offshore MCZ	Broad scale habitat: • Subtidal coarse sediment • Subtidal sand • Subtidal mixed sediments Species feature of conservation importance: Ocean quahog (*Arctica islandica*)
Holderness Inshore MCZ	EUNIS Habitat Features • Intertidal sand and muddy sand (A2.2) • High energy circalittoral rock (A4.1) • Moderate energy circalittoral rock (A4.2) • Subtidal coarse sediment (A5.1) • Subtidal sand (A5.2) • Subtidal mud (A5.3) • Subtidal mixed sediments (A5.4)

2.5.2. Data Sources

236. **Table 2-13** outlines existing primary data that has been used to inform this section and will also be used to inform the EIA.

Table 2-13 Existing Datasets

Source	Summary	Coverage of Offshore Study Area
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap) (EMODnet 2019[1])	EUSeaMap 2019 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 Offshore Study Area.
Technical reports for Strategic Environmental Assessment (SEA) Areas 2 and 3 (Department of Trade and Industry (DTI) 2001a; DTI 2001b)	Description of survey data published in the SEA for Areas 2 (northern North Sea) and 3 (southern North Sea).	Broadscale data with regional coverage.

[1] http://ww.emodnet-sea bedhabitats.eu/access-data/launch-map-viewer/

Source	Summary	Coverage of Offshore Study Area
Joint Nature Conservation Committee (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 Offshore Study Area.
JNCC resources and Natural England Open Data	Details of SSSIs, SACs, SPAs and MCZs.	Available for the full Offshore Study Area.
The Marine Life Information Network (MarLIN)	Details of marine species, biotopes and sensitivity assessments.	Broadscale data not specific to the Offshore Study Area.
OneBenthic	Database of benthic datasets (e.g. seabed macrofauna, sediment particle size).	Available for the full Offshore Study Area.
Dogger Bank A, B, C , Sofia and Hornsea Four Offshore Wind Farms	Benthic survey data	Available for parts of the Offshore Study Area.

237. In addition to the existing data in **Table 2-13** the data presented in **Table 2-14** will be collected to inform the baseline for assessment.

Table 2-14 Site-Specific Survey Data

Dataset	Spatial Coverage	Survey Year
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	Array areas and offshore export cable corridor	2022
Grab sampling, epibenthic trawls and drop-down video	Array areas and offshore export cable corridor	2022
Intertidal walkover surveys	Landfall location	2022

2.5.3. Potential Impacts

2.5.3.1. Potential impacts during construction

238. Potential impacts during construction will result from disturbance of the seabed due to the installation activities (including seabed preparation) in both the offshore and intertidal areas. These have potential to cause:

- Temporary physical disturbance (including sediment deposition and smothering);
- Increased suspended sediment concentrations;
- The remobilisation of contaminated sediments; and
- Disturbance from noise and vibration.

239. It should be noted that impacts from noise and vibration during construction are scoped in only in relation to the effects of piling and UXO clearance, as other underwater noise sources during construction (e.g. vessel traffic) are unlikely to cause significant effects on benthic receptors, and have therefore been scoped out of the EIA.

240. Construction vessel traffic may result in the introduction of marine non-native species to the area. Regulations are in place to manage the spread of non-native species by vessels such as the International Convention for the Control and Management of Ships' Ballast Water and Sediments, which will limit the potential impact of this. A Project Environmental Management and Monitoring Plan (or similar) will also be put in place for the Projects to ensure all works are undertaken in line with best practice for working in the marine environment. As a result, it is proposed that effects relating to the introduction of marine non-native species due to construction vessels are scoped out of the EIA. The colonisation of introduced substrate by non-native species is considered under operation and maintenance.

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

242. Effects 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 an Environmental Management and Monitoring Plan (or similar) for the Projects which will include details on marine pollution and associated contingency plans. Chemicals to be used during offshore operations will be approved under the Offshore Chemical Regulations 2002. In addition, all vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. Should a spill occur it is likely that pollutants would disperse rapidly, and quickly undergo degradation, leading to a subsequent reduction in potential impact. As a result of these mitigation measures, it is considered that there is no likely risk of pollutant release, and it is proposed that this impact be scoped out of the EIA.

243. Contamination data collected in the vicinity of the Projects does not indicate significant levels of chemicals within the sediments that could potentially be disturbed (Forewind 2013). The coarse nature of the material in the Offshore Study Area further reduces this risk. As such, the impacts from the remobilisation of contaminated sediments is proposed to be scoped out of the EIA.

244. As such, during construction the following potential impacts are scoped in for further assessment:

- Temporary habitat loss;
- Temporary increases in suspended sediment concentrations;
- Disturbance from noise and vibration (from piling and UXO clearance only).

2.5.3.2. Potential impacts during operation and maintenance

245. Potential impacts during operation will mostly result from the physical presence of infrastructure on the seabed (i.e. foundations and any cable protection above the seabed) which will result in long term habitat loss.

246. Any potential instances of increased suspended sediment concentrations will be negligible in impact due to the low potential for such events to occur during maintenance activities and have therefore been scoped out.

247. Potential impacts from Electromagnetic Fields (EMF) from operational cables are not considered to result in significant effects on benthic subtidal and intertidal receptors. 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. This area of water in which EMF impacts are present is also reduced via cable protection measures including burial. Any impacts 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). Bochert & Zettler (2006) report that brown shrimp *Crangon crangon*, common starfish *Asterias rubens* and polychaete worm *Nereis diversicolor* (also known as *Hediste diversicolor*) do not react when exposed to EMF. Gibb *et al.* (2014) state there is no evidence of EMF impacting *Sabellaria spinulosa*. There is emerging evidence of the potential effects of EMF on shellfish species (crustaceans) as discussed further in section 2.6.3. Based on the evidence provided above, and outcomes of ESs for other offshore wind farms it is expected that EMF will be assessed as having negligible or minor impacts on benthic subtidal and intertidal receptors. However, it was discussed with stakeholders at the Seabed ETG who advised that this impact should be scoped in for further assessment, therefore, this impact has been scoped in at this stage. As refinement of the project design envelope occurs, further discussions will take place with the ETG to consider scoping out EMF impacts.

248. Potential impacts arising from heat generated by array cabling and the export cable are scoped out of further assessment, with recent evidence indicating that the surface temperature difference of operational power cables in comparison to inert sections of the same cable was negligible at a sensitivity level of 0.06°C (Taormina *et al*. 2020).

249. There exists the potential for the foundation and turbine structures to be colonised by other species. As such, the colonisation of introduced substrate, including by non-native species, has been scoped in for further assessment.

250. Operation and maintenance vessel traffic may result in the introduction of marine non-native species to the area. Regulations are in place to manage the spread of non-native species by vessels such as the International Convention for the Control and Management of Ships' Ballast Water and Sediments, which will limit the potential impact of this. A Project Environmental Management and Monitoring Plan (or similar) will also be put in place for the Projects to ensure all works are undertaken in line with best practice for working in the marine environment. As a result, it is proposed that effects relating to the introduction of marine non-native species due to operation and maintenance vessels are scoped out of the EIA.

251. During operation and maintenance the following potential impacts are therefore scoped in for further assessment:

- Temporary physical disturbance (including sediment deposition and smothering);
- Long term habitat loss;
- Interactions of EMF (including potential cumulative EMF effects); and
- Colonisation of introduced substrate, including non-native species.

2.5.3.3. Potential impacts during decommissioning

252. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

253. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.5.3.4. Potential cumulative impacts

254. The CIA will consider impacts that are likely to overlap temporally and spatially in conjunction with adjacent projects and will be informed by the results of the marine physical processes assessment (see section 2.1.3). It is anticipated that impacts will be localised and temporary.

2.5.3.5. Potential transboundary impacts

255. Given that the likely impacts of the Projects will be localised and small scale, and that the Projects are located 40km at their closest point to the EEZ boundary, transboundary impacts are unlikely to occur or to be significant. In relation to the spread of non-native species, appropriate mitigation and biosecurity precautions will be described in the ES to manage and prevent the spread of non-native species. It is therefore proposed that transboundary effects are scoped out.

2.5.3.6. Summary of scoping proposals

256. **Table 2-15** outlines the impacts which are proposed to be scoped into the EIA. This may be refined by agreement through the EPP as additional information and data become available.

Table 2-15 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Benthic Habitats Assessment.

Potential Impact	Construction	Operation	Decommissioning
Temporary physical disturbance (including sediment deposition and smothering)	✓	✓	✓
Long term habitat loss	×	✓	×
Increased suspended sediment concentrations	✓	×	✓
Remobilisation of contaminated sediments	×	×	×
Pollution events resulting from the accidental release of pollutants	×	×	×
Underwater noise and vibration (from piling and UXO clearance only)	✓	×	✓
Interactions of EMF (including potential cumulative EMF effects)	×	✓	×

Potential Impact	Construction	Operation	Decommissioning
Interactions of heat generated by cables	×	×	×
Introduction of marine non-native species due to vessel traffic	×	×	×
Colonisation of introduced substrate, including non-native species	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	× The Projects are located 40km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.5.4. Approach to Impact Assessment

257. The assessment of the potential impacts upon the benthos will be cross-referenced where relevant to the assessments for marine physical processes and 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.

258. Sensitivity of features will be based upon the Marine Evidence-based Sensitivity Assessment framework where available (MarLIN 2021). Guidance on data analysis and presentation from Natural England's Best Practice Advice for Evidence and Data Standards (Natural England 2022) will be considered in the assessment also.

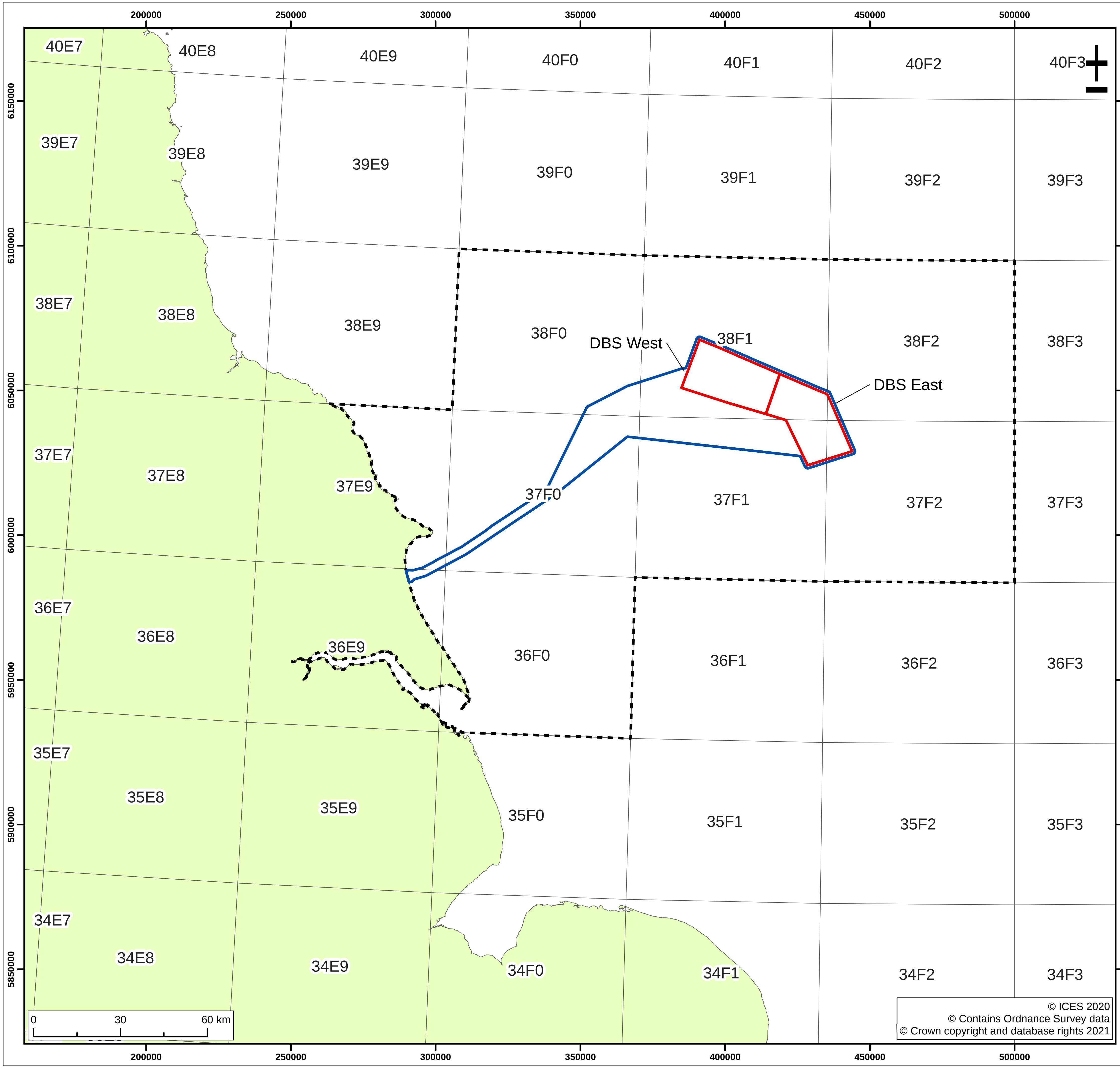
2.6. Fish and Shellfish Ecology

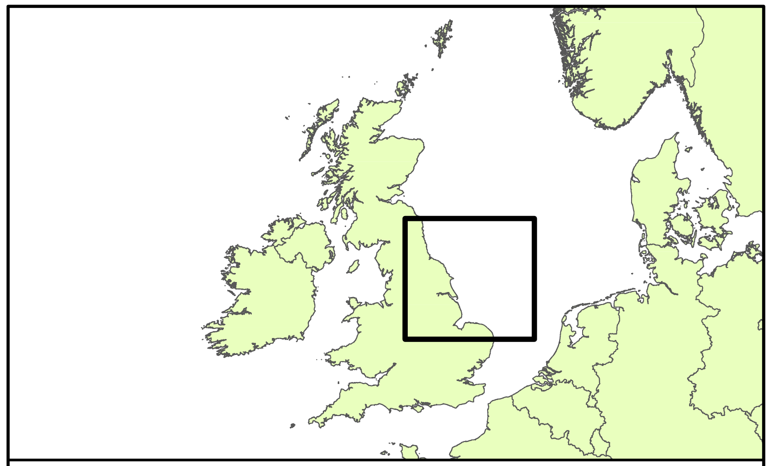
259. This section considers the potential impacts of the construction, operation and maintenance, and decommissioning of the Projects on the ecology of fish and shellfish.

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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on fish and shellfish ecology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

260. The Fish and Shellfish study area for the Projects is defined as International Council for the Exploration of the Sea (ICES) Rectangles 36E9; 36F0; 37E9; 37F0; 37F1; 37F2; 38F0; 38F1; and 38F2. The Fish and Shellfish study area covers a total of 26,858km^2, and includes the Offshore Study Area with a minimum buffer distance of 7km. This Fish and Shellfish study area provides wider regional context to the local fish and shellfish assemblage, whilst also providing coverage for any effects that may occur both within and outside of the Offshore Study Area. The Fish and Shellfish study area is shown in **Figure 2-10**.





Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology Study Area
- ICES Rectangles

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0001	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0001	BO	IW	TM

Title:

Fish and Shellfish Ecology study area

Figure: 2-10 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0001

Co-ordinate system:	Page Size:	Scale:
WGS 1984 UTM Zone 31N	A3	1:1,300,000

Project:	Report:
Dogger Bank South Offshore Wind Farms	Dogger Bank South Offshore Wind Farms EIA Scoping Report

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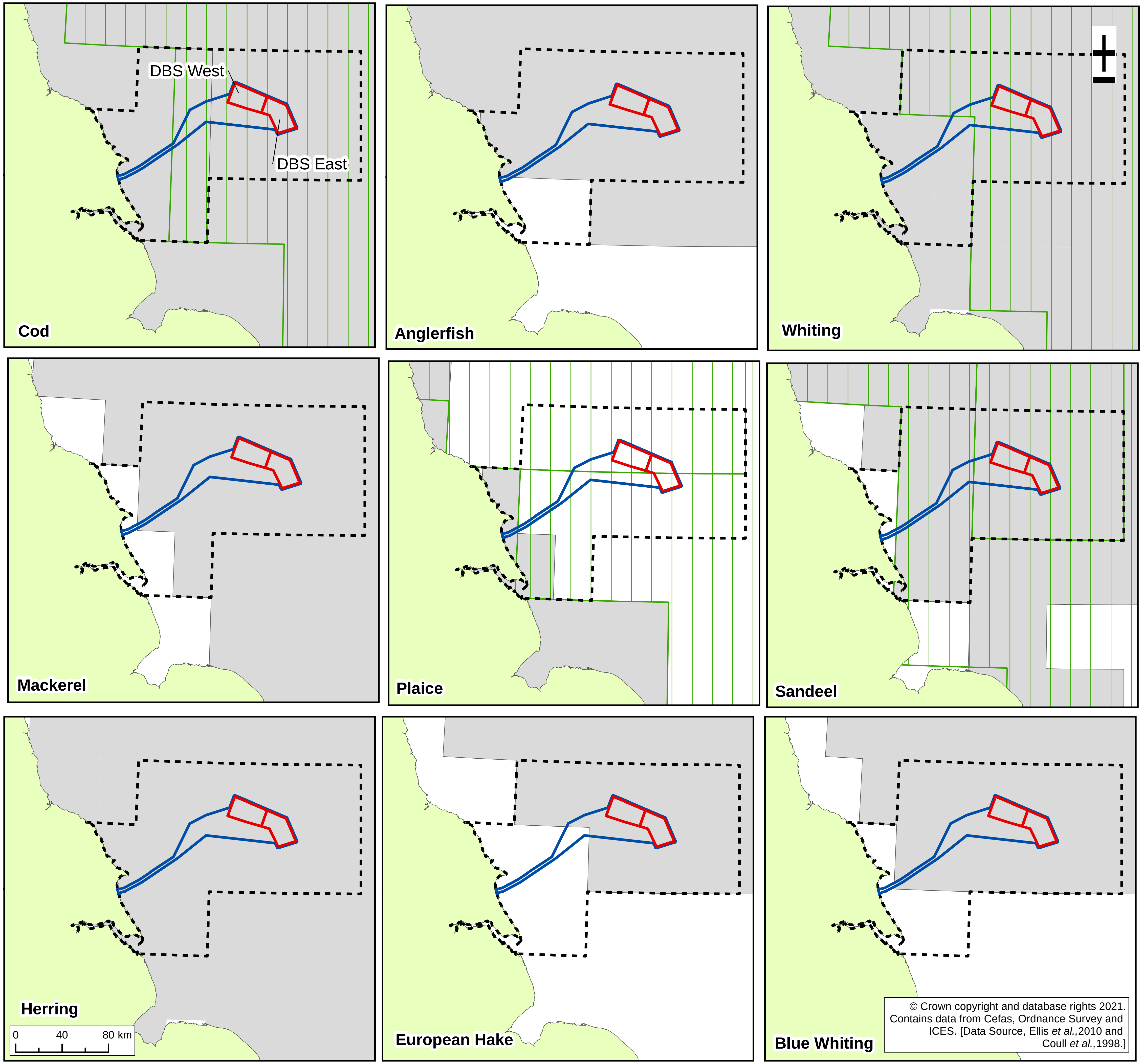
2.6.1. Existing Environment

261. Dogger Bank supports a wide range of fish and shellfish species, many of which have high commercial importance, with the region supporting significant fisheries for over 300 years (Plumeridge and Roberts 2017). A number of fish species have been identified as having spawning and nursery grounds both within the Fish and Shellfish study area, and within the Offshore Study Area. Nursery grounds for Atlantic cod *Gadus morhua*, anglerfish *Lophius piscatorius*, whiting *Merlangius merlangius*, Atlantic mackerel *Scomber scrombrus,* plaice *Pleuronectes platessa*, sandeel Ammmodytidae, Atlantic herring *Clupea harengus*, European hake *Merluccius merluccius*, blue whiting *Micromesistiusmoutassou*, ling *Molva molva*, Dover sole *Solea solea*, spurdog *Squalus acanthias*, tope *Galeorhinus galeus*, and Norway lobster *Nephrops norvegicus* are present within the Fish and Shellfish study area. Of these species, cod, whiting, plaice, sandeel and sole also have known spawning grounds within the Fish and Shellfish study area (**Figure 2-11**; **Figure 2-12**).



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology Study Area
- Spawning grounds
- Nursery grounds

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0002	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0002	BO	IW	TM

Title:

Fish spawning and nursery areas

Figure: 2-11 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0002

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:3,300,000

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Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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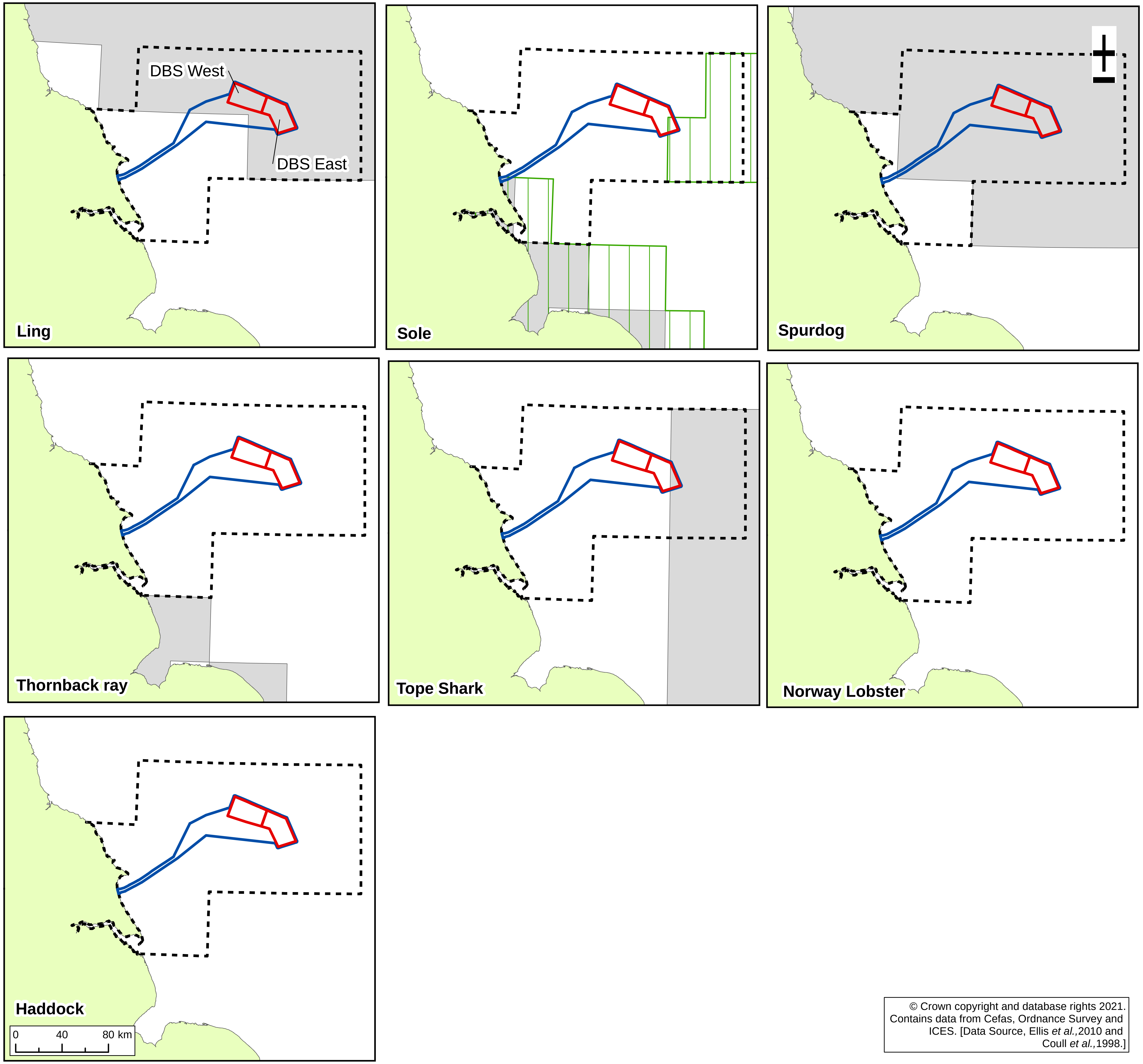

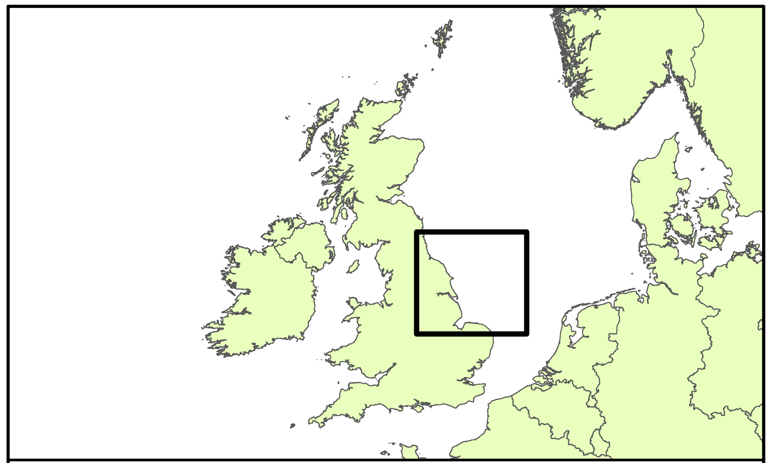

Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology Study Area
- Spawning grounds
- Nursery grounds

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0003	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0003	BO	IW	TM

Title:

Fish spawning and nursery areas

Figure: 2-12 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0003

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:3,300,000

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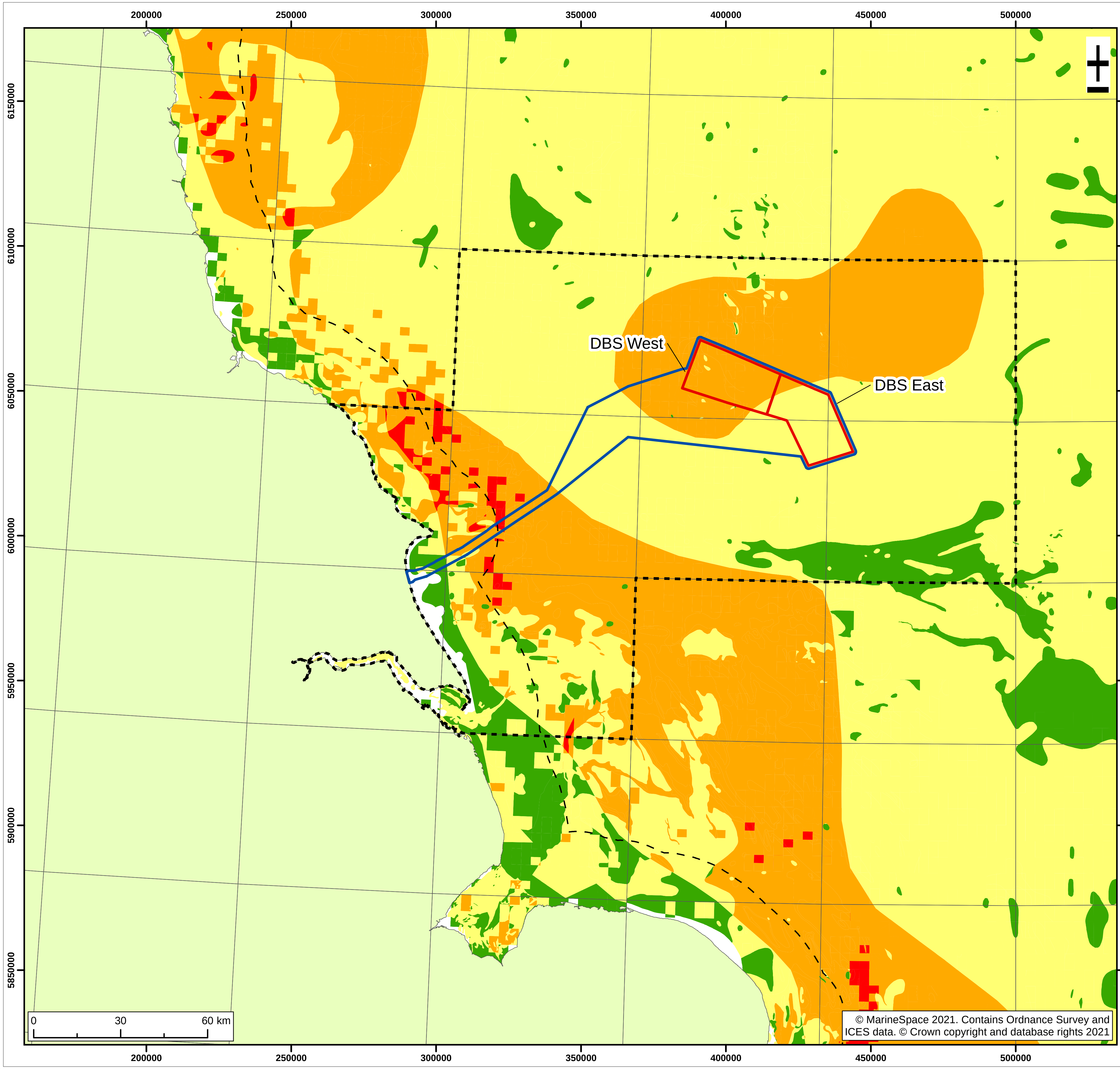
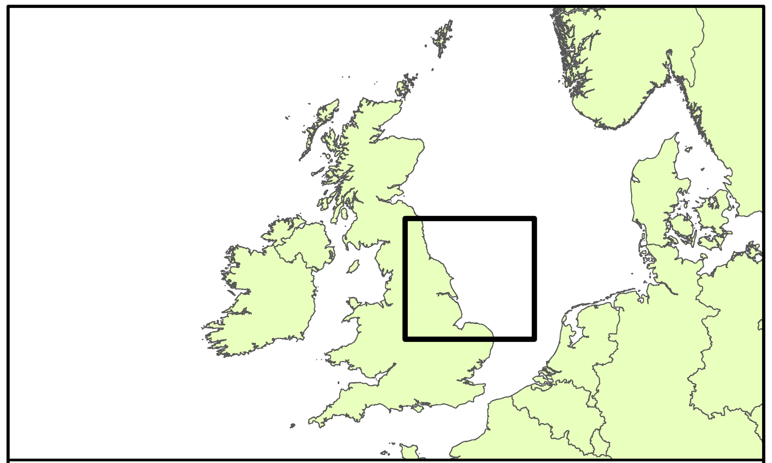
262. Both Atlantic mackerel and Atlantic cod have known populations across the region. Atlantic cod are known to use regions within both the proposed array areas and the wider Fish and Shellfish study area as spawning grounds, with peak spawning activity occurring in February following a southerly winter migration. European plaice and common dab *Limanda limanda* are the most abundant Pleuronectiformes found within the region, with plaice playing an important role in local fisheries (JNCC 1995a; 1995b).

263. Both Atlantic herring and sandeel have been identified as having spawning grounds within the Fish and Shellfish study area. Both of these species are highly sensitive to changes in substrate composition. Atlantic herring populations within the Fish and Shellfish study area increase during the summer and autumn, with spawning peaking between April and June (JNCC 1995a; 1995b). Dogger Bank is an extensive sandeel fishing ground within UK waters, with the species also acting as a key component of food webs across the area, serving as a prey species for a wide range of predators including fish, birds and marine mammals (Cefas 2007). 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. A higher degree of resolution for the potential for Atlantic herring spawning and sandeel habituation within the Fish and Shellfish study area has been determined, using a methodology originally developed by MarineSpace for use in the EIA process for the marine aggregate industry (**Figure 2-13**, **Figure 2-14**). This assessment suggests that within the Fish and Shellfish study area, there are discrete areas of very high and high potential spawning grounds for both sandeel and Atlantic herring. For both species the highest areas of potential spawning are approximately 12 nautical miles (NM) from the coastline.

264. The migratory species Atlantic salmon *Salmo salar*, sea trout *Salmo trutta*, and European eel *Anguilla anguilla*, are all known to have populations within the Fish and Shellfish 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 (JNCC 1995a; 1995b).





Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology Study Area
- UK 12 nm limit
- ICES Rectangles
- Low spawning potential
- Medium spawning potential
- High spawning potential
- Very High spawning potential

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0004	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0004	BO	IW	TM

Title:

Sandeel spawning potential across the Fish and Shellfish study area

Figure: 2-13 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0004

Co-ordinate system: WGS 1984 UTM Zone 31N
Page Size: A3
Scale: 1:1,300,000

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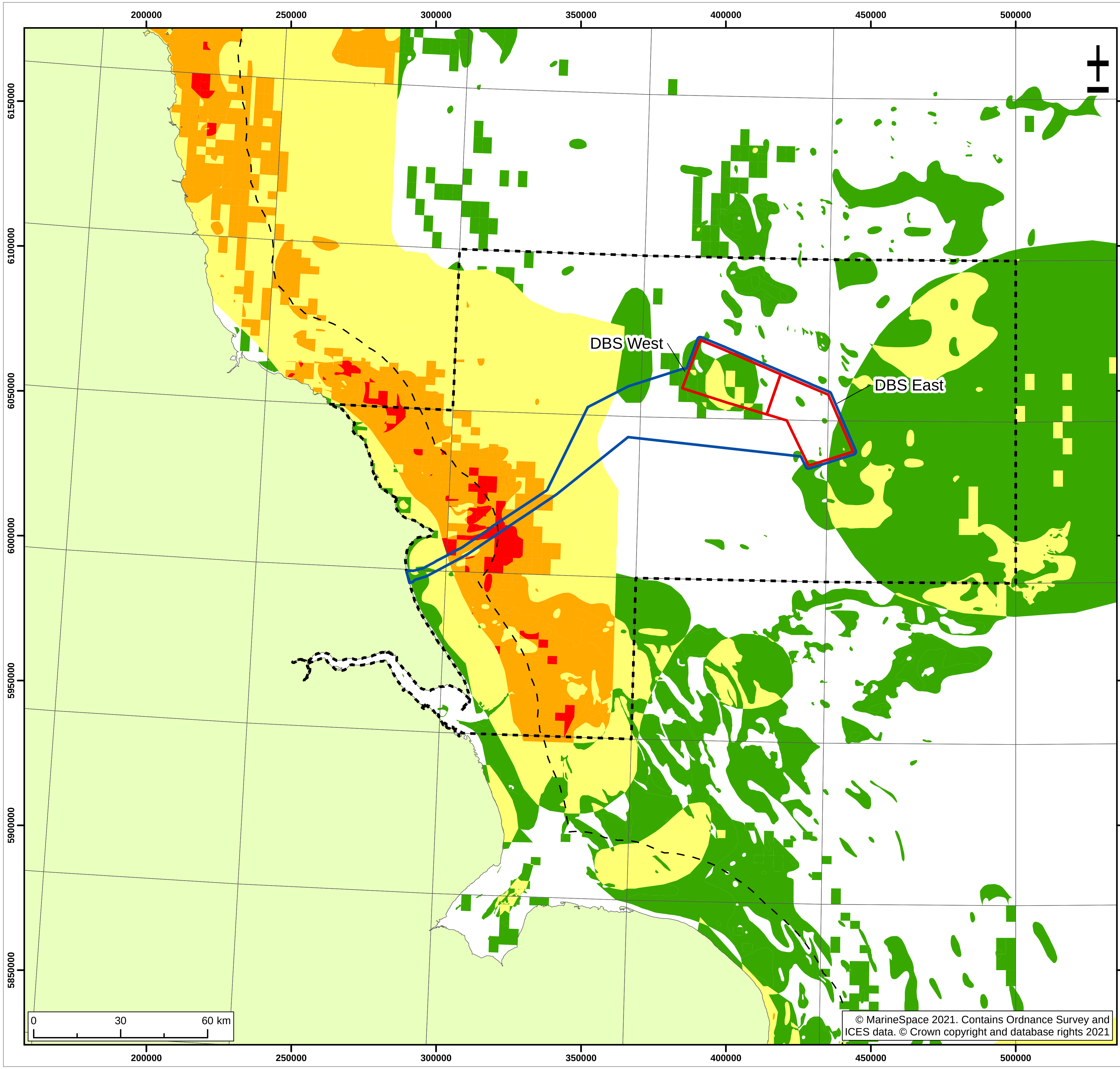

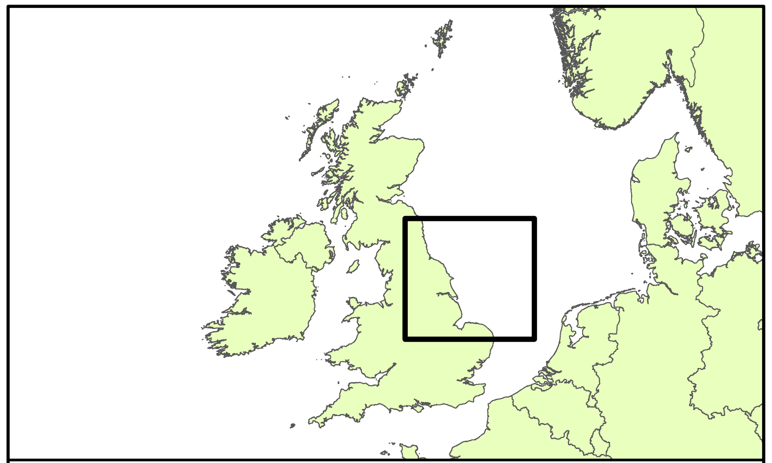

Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology Study Area
- UK 12 nm limit
- ICES Rectangles

Herring spawning potential

- Low spawning potential
- Medium spawning potential
- High spawning potential
- Very High spawning potential

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0005	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0005	BO	IW	TM

Title:

Herring spawning potential across the Fish and Shellfish study area

Figure: 2-14 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0005

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:1,300,000

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265. A number of elasmobranch species are found within UK waters, with species including small-spotted catshark *Scyliorhynus canicula*, spurdog and thornback ray *Raja clavata* having a known presence within the Fish and Shellfish study area. Other elasmobranch species present within UK waters may also have a presence within the Fish and Shellfish study area including tope, cuckoo ray *Raja naevus*, and common skate *Leucoraja batis*, with the latter classed as endangered on the International Union for the Conservation of Nature Red List.

266. 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 and brown shrimp *Crangon crangon*. European lobster and edible crab are recorded in areas of rocky reef and exposed coastline within the Fish and Shellfish study area; and Norway lobster are more abundant in regions of softer sediment into which they are able to burrow.

2.6.2. Data Sources

267. **Table 2-16** outlines existing primary data used to inform this section which will also be used to inform the EIA.

Table 2-16 Existing Datasets

Source	Summary	Coverage of Offshore Study Area
Marine Information Network (MarLIN)	Details of marine species, biotopes and sensitivity assessments.	Broadscale data not specific to the Offshore Study Area.
National Biodiversity Network (NBN) Atlas	An open access online portal for biological data in the UK.	UK wide coverage for species distributions.
Ocean Biodiversity Information System (OBIS)	A global open-access data source for biological data.	Global coverage available, and overlapping the Offshore Study Area.

Source	Summary	Coverage of Offshore Study Area
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap)(EMODnet 2019).	EUSeaMap 2019 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.	Predictive maps are available for the full Offshore Study Area.
Inshore Fisheries and Conservation Authority (IFCA)	The North Eastern IFCA (NEIFCA) Environmental and Scientific Team collects local inshore fisheries data (e.g. shellfish potting surveys).	Covers the Offshore Study Area out to 6 nautical miles.
Dogger Bank A, B, C, Sofia and Hornsea Four Offshore Wind Farms	Provide a baseline characterisation for fish and shellfish, supported by project site-specific surveys.	Available for parts of the Offshore Study Area.
ICES International Herring Larvae Surveys (IHLS)	ICES programme of IHLS in the North Sea and adjacent areas, in operation since 1967. Provides quantitative estimates of herring larval abundance.	Regional coverages across the northern and southern North Sea.

Source	Summary	Coverage of Offshore Study Area
ICES International Bottom Trawl Survey (IBTS)	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 of commercially important demersal species.	Broad-scale data, regionally covering much of the North Sea, including the Offshore Study Area.
MMO Landings Data (MMO 2020)	MMO landings data (weight and value) by species and relevant ICES rectangle.	Covers the Offshore Study Area.

268. In addition to the existing data in **Table 2-16** the data presented in **Table 2-17** will be collected to inform the baseline for assessment.

Table 2-17 Site-Specific Survey Data

Dataset	Spatial Coverage	Survey Year
Geophysical survey e.g. Side-scan sonar, Multi-Beam Echosounder, Sub-Bottom Profiler	Array areas and offshore export cable corridor	2022
Grab sampling, epibenthic trawls and drop-down video	Array areas and offshore export cable corridor	2022

2.6.3. Potential Impacts

2.6.3.1. Potential Impacts during Construction

269. Potential impacts during construction will result from direct and indirect physical disturbance of seabed habitats, and re-suspension of sediment during cable and foundation installation work (including seabed preparation).

270. The effects of direct damage and disturbance to fish and shellfish species will be largely confined to the construction footprint and the immediate vicinity. Impacts will be short term and only occur within a small proportion of the Offshore Study Area. The seabed types within the Offshore Study Area are present across the Fish and Shellfish study area and are unlikely to contain habitat types which are either rare or unique to the Fish and Shellfish study area. Fish and shellfish populations within the region are generally deemed to have a medium to high level of recoverability following exposure to direct damage and disturbance. 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. For all species, due to the limited area likely to be affected, it is considered that there is no impact pathway for this receptor group and therefore, it is proposed that direct damage and disturbance to fish and shellfish ecology is scoped out of the EIA.

271. 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. Therefore, the potential impact of increased suspended sediments and disposition 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.

272. Potential impacts related to the release of sequestered contaminants following sediment disturbance works will be limited both spatially and temporally. Whilst direct analysis of sediment chemistry within the Offshore Study Area has not been undertaken, wider historic measurements of contaminant analysis suggests that levels of elevated contamination are present surrounding estuary mouths and limited to finer sediments (e.g. muds), with fish species sampled further offshore showing a significant reduction in concentrations of certain pollutants (Dethlefsen and Tiews 1985). It is suggested that the wind industry is only likely to interact with areas of elevated levels of sediment contamination should infrastructure cross regions of historical dredge disposal (Cefas 2017). Dredge disposal sites are limited to two small nearshore sites close to the Offshore Study Area and the offshore export cable corridor will be positioned away from these sites (**Figure 2-15**) (Cefas 2013). In addition, studies carried out by Forewind (2013, 2014) have demonstrated low levels of contamination in the vicinity of the Projects. The impact of the release of contaminants on fish and shellfish via sediment disturbance has been scoped out of the EIA.

273. The risk of pollutant release will be managed via the production of an Environmental Management and Monitoring Plan (EMMP) (or similar) for the Projects which will include details on marine pollution and associated contingency plans. Chemicals to be used during offshore operations will be approved under the Offshore Chemical Regulations 2002, or otherwise approved by the MMO. In addition, all vessels involved will be required to comply with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. Should a spill occur it is likely that pollutants would disperse rapidly, and quickly undergo degradation, leading to a subsequent reduction in potential impact. As a result of these embedded mitigation measures, it is considered that there is no pathway for likely significant impacts from pollutant release, and it is proposed that this impact be scoped out of the EIA.

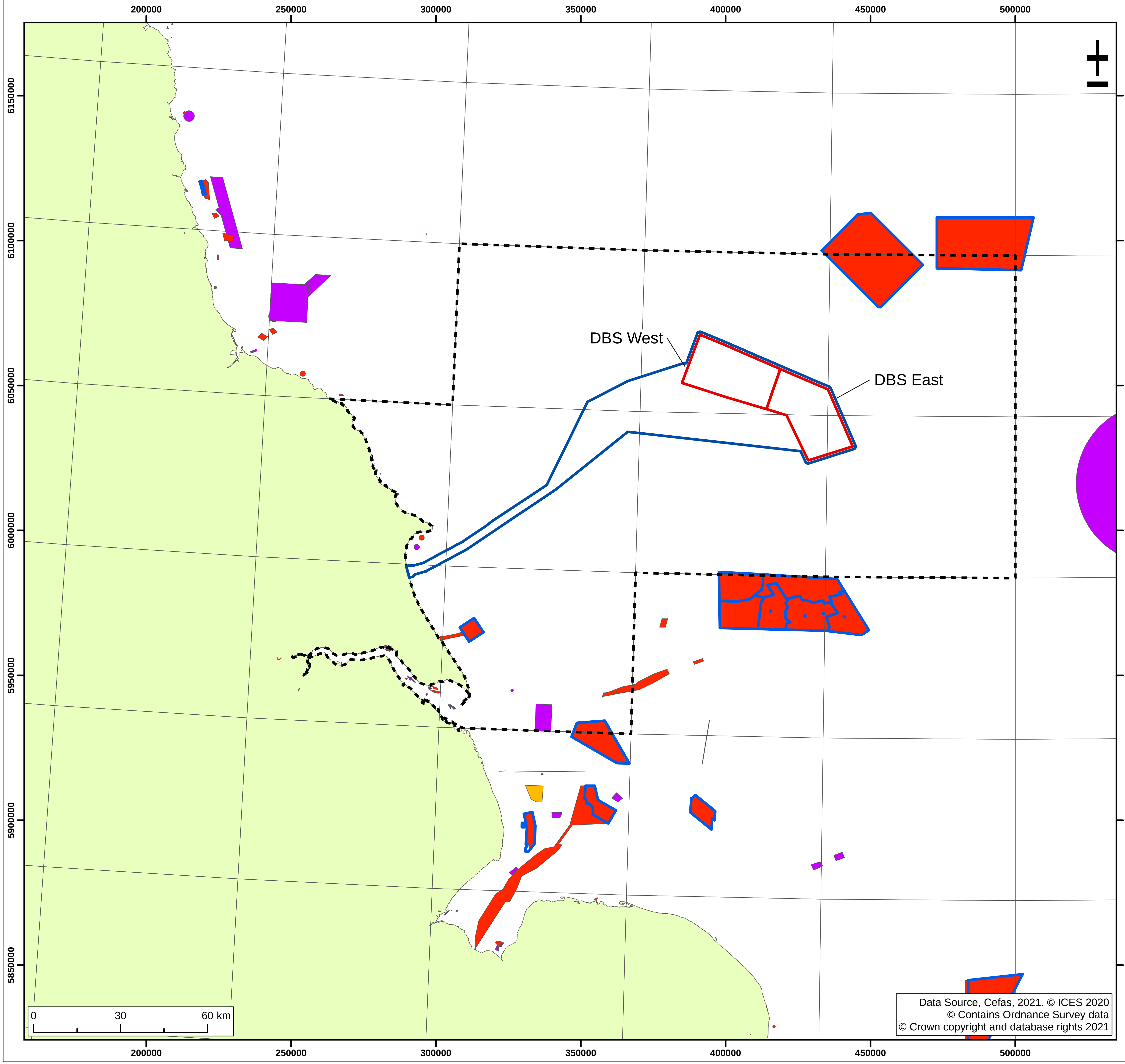
274. Underwater noise generated by pile driving, UXO clearance and other construction activities may result in disturbance and displacement of fish species and may affect spawning and nursery areas, as well as migration patterns. This impact has been scoped into the EIA.

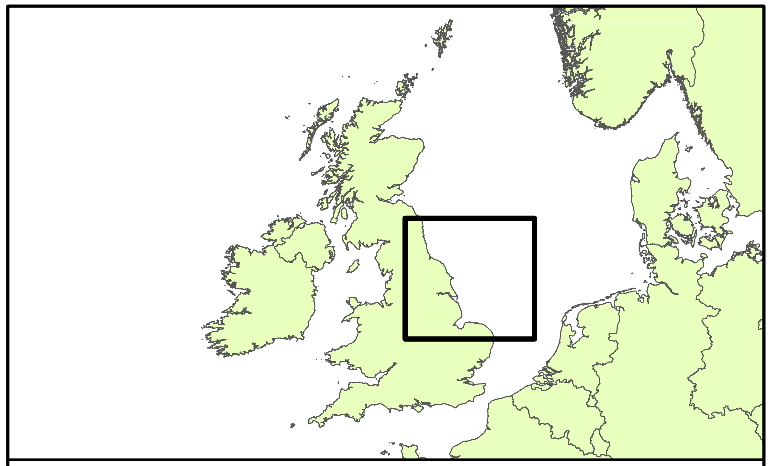
275. Impacts which span the life of the Projects (long term habitat loss; EMF effects arising from cables; and reduced fishing pressure within the array areas and increased fishing pressure outside of the array area) will be considered as part of the operation phase assessment (see section 2.6.3.2) and are therefore, not considered in the construction phase assessment to avoid duplication.

276. The ecological impact on fish and shellfish within the study area as a result of decreased fishing pressure within the array area, and an increase in fishing pressure outside of the array areas during construction, will be considered, and therefore scoped into the EIA.

277. As such, during construction the following potential impacts are scoped in for further assessment:

- Temporary increases in suspended sediment concentrations;
- Habitat loss / disturbance to spawning and nursery areas;
- Disturbance from noise and vibration (from piling and UXO clearance only); and
- Alteration in fishing pressure.





Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Fish and Shellfish Ecology Study Area
- ICES Rectangles
- Open - Offshore Wind Farm Disposal Site

Disposal site status

- Closed
- Not 4 waste dis
- Open

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0006	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0006	BO	IW	TM

Title:

Marine Disposal sites within and surrounding the Fish and Shellfish study area

Figure: 2-15 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0006

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:1,300,000

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2.6.3.2. Potential impacts during operation and maintenance

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

279. The impact of direct damage and disturbance to fish and shellfish species will be largely confined to the footprint of any infrequent maintenance operations resulting in seabed contact that may be required across the life of the Projects. Effects will be short term and only occur within a small proportion of the proposed Offshore Study Area when required. Fish and shellfish populations within the region are generally deemed to have a medium to high level of recoverability following exposure to direct damage and disturbance. Mobile species have low vulnerability to impacts of this type. Overall, for all species, due to the limited area likely to be affected, these impacts are likely to have a negligible effect on the fish and shellfish population within the region, and therefore is scoped out of the EIA.

280. The impact of increased suspended sediment concentrations and associated sediment settlement associated with maintenance activities will be negligible due to the low potential for such events to occur. This impact has been scoped out of the EIA.

281. As described and justified in section 2.6.3.1, potential impacts related to the release of sequestered contaminants following sediment disturbance scoped out of the EIA at this stage.

282. As described and justified in section 2.6.3.1, impacts from pollutant release has been scoped out of the EIA.

283. As piling and UXO clearances will be completed during the construction phase, any effects of underwater noise and vibration resulting from operation and maintenance of the Projects are unlikely to have a pathway for significant effects on fish and shellfish receptors during operation. It is possible that some UXO clearance may be required during the operation and maintenance stage. If this is the case, the Projects would seek additional marine licences. This impact has been scoped out of the EIA for this phase of the Projects.

284. Temporary habitat loss and disturbance to spawning and nursery areas have been scoped out of the operation and maintenance section of the assessment. However, long-term loss of habitat and / or change in habitat type as a result of changes in substrate composition will be considered in relation to operation and maintenance activities and are therefore scoped into the EIA.

285. Electromagnetic Fields (EMF) can be generated in the region surrounding electrical cables during the transmission of electricity and magnetic fields. Some marine organisms are sensitive to EMF, particularly those that make use of electroreceptors for orientation, navigation and prey/predator detection. Potential impacts from EMF from operational cables are not considered to result in significant effects on fish and shellfish receptors. 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 by electroreceptive fish up to 10m from the vicinity of the cable, however, this decreases at lower voltages, with the study examining cables ranging from 450kV to 33kV. The volume 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).

286. Elasmobranch fish are known to use electroreceptive organs, and have higher levels of electroreceptive sensitivity when compared to teleost (bony) fish, and are considered to be of medium sensitivity to electromagnetic disturbance.

287. Migratory teleosts including Atlantic salmon and seatrout are unlikely to encounter areas of increased EMF effect as these species spend the majority of their time in the upper water column during migration, away from the majority of EMF effect (Normandeau *et al*. 2011; Kristensen *et al*. 2018; Strøm *et al*. 2018). Further, European eels have been shown to exhibit no change in migratory behaviour in the presence of subsea export cables of higher voltages (and therefore increased EMF effects) than are expected for the Projects (Westerberg and Lagenflet 2008).

288. Most fish species tend to have a high degree of mobility, as well as a level of habitat flexibility, that should allow for any species to avoid EMF effects. For the above reasons, the sensitivity of fish to EMF effects from cables is considered to be low overall.

289. EMF effects have been shown to result in minimal changes in crab behaviour under lab conditions (PTEC 2014), whilst field studies in the Baltic Sea observed no impacts on the migratory routes of a range of shellfish species (OSPAR 2009). Bochert & Zettler (2006) report that brown shrimp do not react when exposed to EMF.

290. Although elasmobranchs have been assessed as having a medium sensitivity to EMF effects, the total volume of water within which EMF is likely to be detectable above background levels is negligible when compared to the Fish and Shellfish study area. The EMF effects from cables for shellfish receptors are considered negligible. Further, many species within the fish and shellfish receptor group have a high degree of mobility, which will allow for avoidance behaviour to unaffected areas, should EMF act as a disturbance. Based on the above evidence, and that at present knowledge on the impacts of EMF in the marine environment is limited and continues to expand, on a precautionary basis the effects of EMF during the operation and maintenance phase of the Projects have been scoped into the EIA.

291. The ecological impact on fish and shellfish within the study area as a result of decreased fishing pressure within the array area, and an increase in fishing pressure outside of the array areas during the operation and maintenance phase will be considered, and therefore scoped into the EIA.

292. As such, during operation and maintenance the following potential impacts are scoped in for further assessment:

- Long-term loss of habitat and / or change in habitat type as a result of changes in substrate composition;
- EMF effects arising from cables; and
- Alteration in fishing pressure.

2.6.3.3. Potential Impacts during decommissioning

293. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

294. The same potential impacts noted for construction are therefore, expected to be scoped in (and out) for decommissioning.

2.6.3.4. Potential cumulative impacts

295. The CIA will consider habitat loss and disturbance and noise impacts in conjunction with adjacent projects and cumulative changes to seabed habitat caused by changes in physical processes based on the results of the marine physical processes assessment.

2.6.3.5. Potential transboundary impacts

296. Given that the likely impacts of the Projects will be localised and small scale, and that the Projects are located 40km at their closest point to the EEZ boundary, transboundary impacts are unlikely to occur or to be significant. It is therefore proposed that transboundary effects are scoped out.

2.6.3.6. Summary of scoping proposals

297. **Table 2-18** outlines the impacts which are proposed to be scoped into the EIA. This may be refined by agreement through the EPP as additional information and data become available.

Table 2-18 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Fish and Shellfish Ecology Assessment.

Potential Impact	Construction	Operation	Decommissioning
Direct damage and disturbance to fish and shellfish species during construction.	×	×	×
Increase in local suspended sediment concentrations and sediment settlement.	✓	×	✓
Release of sequestered contaminants following sediment disturbance.	×	×	×
Pollution events resulting from the accidental release of pollutants.	×	×	×
Impacts on fish and shellfish species as a result of noise and vibration.	✓	×	✓
Habitat loss / disturbance to spawning and nursery areas.	✓	×	✓

Potential Impact	Construction	Operation	Decommissioning
Long-term loss of habitat and / or change in habitat type as a result of changes in substrate composition.	×	✓	×
EMF impacts arising from cables.	×	✓	×
Reduced fishing pressure within the array areas and increased fishing pressure outside of the array area.	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts	× The Projects are located 40km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.6.4. Approach to Impact Assessment

298. The proposed approach to the assessment of potential impacts on fish and shellfish ecology is detailed below:

- Natural fish populations within the Fish and Shellfish study area will be characterised via a review of existing literature, environmental data and fish landings data. Landings data will be sourced from ICES for the assessment of offshore populations, from IFCA for inshore populations, and further supported by MMO landings data.
- No project-specific surveys on fish and shellfish populations are proposed.
- Key receptor groups will be defined and used as the basis for the assessment, with the sensitivity of each receptor group clearly explained within the ES. An assessment of Atlantic herring and sandeel, with regard to potential impacts resulting from seabed disturbance, will be conducted using currently available data.
- The footprint of potential habitat loss and disturbance will be calculated and used as the basis for the impact assessment where appropriate.
- The marine physical processes assessment will be used to inform the assessment of impacts relating to fish and shellfish ecology resulting from disturbance of the seabed and changes to suspended sediments.
- An assessment of any predicted change in fishing pressure on fish and shellfish receptors will be undertaken, and with consideration of assessments undertaken for Commercial Fisheries.
- Underwater noise modelling will be undertaken to inform the fish and shellfish ecology assessment, and will be supported via a desk-based review of previous and relevant assessments (e.g. existing offshore wind farm projects and published response thresholds by Popper *et al.* 2003 and Hawking and Popper 2014).

2.7. Marine Mammals

299. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on marine mammals.

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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on marine mammals resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.7.1. Existing Environment

300. To marine mammal study area is based on the wider North Sea area to take into account the wide ranges and movements of marine mammals and relevant Management Units.

301. Assessments of the distribution of marine mammals have identified six marine mammal species that occur commonly throughout the central North Sea (e.g. Hammond *et al*. 2021; Paxton *et al*. 2016; Waggitt *et al*. 2019; DECC 2016; Special Committee on Seals (SCOS) 2020). These are:

- Baleen whales:
  - Minke whale Balaenoptera acutorostrata;
- Toothed cetaceans;
  - Harbour porpoise *Phocoena phocoena*;
  - Bottlenose dolphin *Tursiops truncatus*; and
  - White-beaked dolphin Lagenorhynchus albirostris.
- Pinnipeds:
  - Grey seal Halichoerus grypus; and
  - Harbour seal *Phoca vitulina*.

302. Other marine mammal species that have been recorded in the North Sea in lower numbers include short-beaked common dolphin *Delphinus delphis*, Atlantic white-sided dolphin *Lagenorhynchus actus*, Risso's dolphin *Grampus griseous*, and Killer whale *Orcinus orca*. Sperm whale *Physeter macrocephalus* and long-finned pilot whale *Globicephala melas* (Waggitt *et al*. 2019) also occur. However, sightings of these species are rare. More recently, a number of large whale species have been increasingly reported in the central North Sea, including humpback whale *Megaptera novaeangliae*, fin whale *Balaenoptera physalus*, and sei whale *Balaenoptera borealis*[2].

303. A large-scale survey of the presence and abundance of cetacean species around the north-east Atlantic, undertaken in the summer of 2016 (the Small Cetaceans in the European Atlantic and North Sea (SCANS) III survey; Hammond *et al*. 2021) places the Projects array areas and potential offshore export cable corridor in Block O. The results of the surveys for Block O shows harbour porpoise to be the most abundant cetacean species. Other cetacean species recorded in Block O (although in much lower abundances) include white-beaked dolphin and minke whale.

[2] As reported to the Sea Watch Foundation (https://www.seawatchfoundation.org.uk/recentsightings/).

304. The Joint Cetacean Protocol (JCP) Phase III report (Paxton *et al*. 2016) shows similar results, with only harbour porpoise present with relatively high density in the Offshore Study Area, with lower densities of minke whale and white-beaked dolphin compared to the wider North Sea region. Distribution maps of cetacean species within the north-east Atlantic (Waggitt *et al*. 2019) also indicate that harbour porpoise would be the most likely species to be present within the Offshore Study Area, with minke whale and white-beaked dolphin also having a relatively high density. Atlantic white-sided dolphin, bottlenose dolphin, Risso's dolphin, and short-beaked common dolphin may also be present, but in much lower numbers.

305. This is further supported by DECC (2016), which states that within the Offshore Study Area, only harbour porpoise is considered to be common, with white-beaked dolphin and minke whale more commonly sighted seasonally further north. Both bottlenose dolphin and Atlantic white-sided dolphin are noted as uncommon for the area.

306. Both grey seal and harbour seal are present in the Offshore Study Area, with a number of haul-out sites known to occur off the coasts of Yorkshire and Lincolnshire. Donna Nook, which is the largest grey seal breeding site in England, and one of the biggest in the UK, is located 60km to the south of the possible landfall locations (SCOS 2020).

307. Grey seal densities within the Offshore Study Area are relatively low in most areas offshore, with increased densities near to the southern and western edges of Dogger Bank, and higher closer to the coastline, particularly south of Hornsea, with an area of relatively high grey seal density within 5km of the Offshore Study Area (Carter *et al.* 2020; Russell *et al.* 2017). Harbour seal densities are low in the majority of the Offshore Study Area (Carter *et al.* 2020; Russell *et al.* 2017).

308. Two years of monthly offshore digital aerial surveys of the DBS East and DBS West array areas, plus 4km buffer (agreed with Natural England) are underway. These surveys commenced in March 2021 and are planned to be completed in February 2023. During the first year of surveys five species of marine mammal were recorded across the survey areas. (**Table 2-19**).

309. Harbour porpoise were the most frequently recorded species accounting for over 88% of all confirmed sightings.

Table 2-19 Marine Mammal Digital Area Survey Results (March 2021-February 2022)

Species	DBS East	DBS West
Harbour porpoise	276	344
White-beaked dolphin	8	12
Common dolphin	-	2
Minke whale	1	-
Grey seal	11	31
Unidentified dolphin / porpoise	35	34
Unidentified seal	25	34
Unidentified dolphin	1	2
Unidentified marine mammal	-	14

310. Monthly surveys were also undertaken for the Dogger Bank A & B and for Dogger Bank C and Sofia Offshore Wind Farms. Data from these surveys will be used to inform the potential presences or absence of species to inform the baseline. Harbour porpoise was the most commonly sighted marine mammal within these surveys, followed by white-beaked dolphin and minke whale. Low numbers of bottlenose dolphin, Atlantic white-sided dolphin, fin whale and humpback whale were also recorded, as well a number of unidentified dolphin species and unidentified baleen whale species (Forewind 2013; 2014). This supports the identified key species expected to be present in the area.

311. 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 the six most commonly occurring species within the Offshore Study Area, and therefore taken forward for assessment, will be:

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

312. As highly mobile marine predators, the status and activity of marine mammals known to occur within or adjacent to the Offshore Study Area would be considered in the context of their Management Unit (MU) population. For cetacean species, this would be based on Inter-Agency Marine Mammal Working Group (IAMMWG 2021) MUs, and for seal species this would be based on the latest population estimates from the SCOS reporting (at the time of writing, this would be SCOS 2020). **Plate 2-1**and **Plate 2-2** show the MUs for harbour porpoise, bottlenose dolphin, white-beaked dolphin, and minke whale, and **Plate 2-3** shows the MUs for both grey and harbour seal.

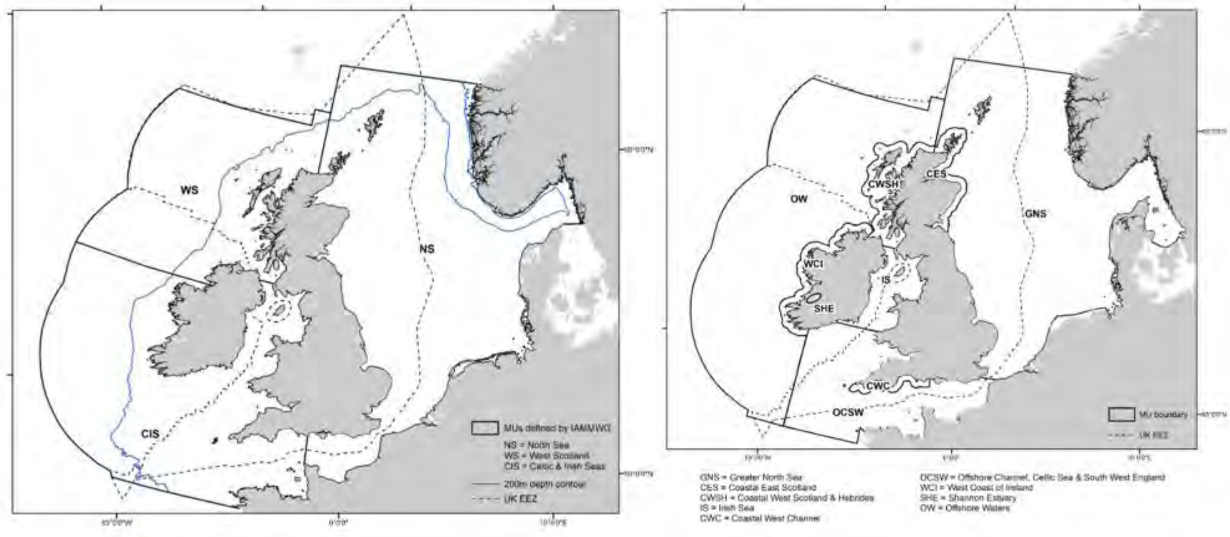


Plate 2-1 Harbour porpoise (left) and bottlenose dolphin (right) MUs (IAMMWG 2021)

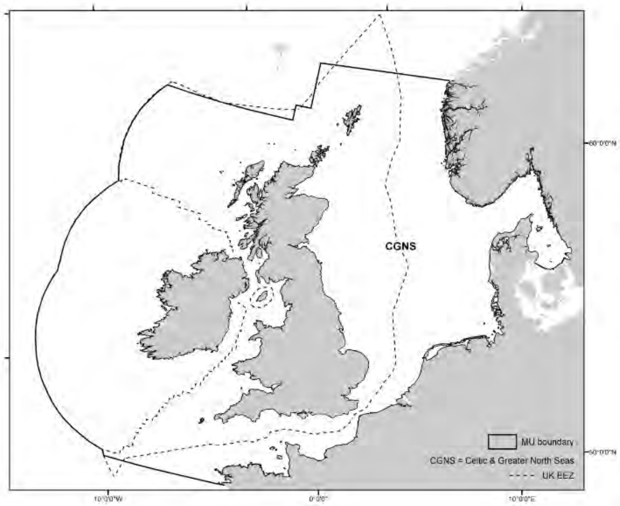


Plate 2-2 White-beaked dolphin and minke whale MUs (IAMMWG 2021)

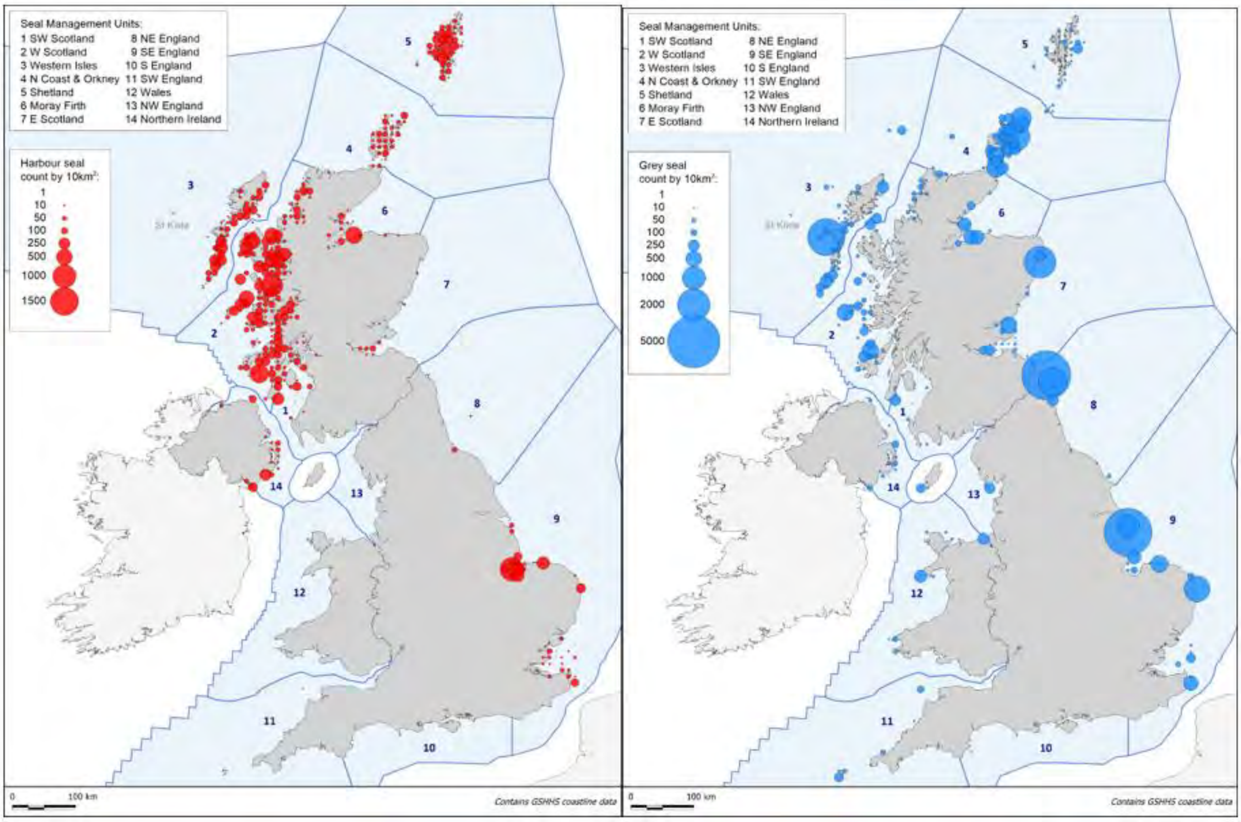


Plate 2-3 Grey seal (left) and harbour seal (right) MUs (IAMMWG 2013)

2.7.1.1. Designations

313. The DBS East and DBS West array areas, and part of the Offshore Study Area, are within the summer area of the Southern North Sea SAC, which is designated for harbour porpoise. For other marine mammal species (including bottlenose dolphin, grey seal, and harbour seal), tagging studies and information on species' movements will be reviewed to determine the potential for connectivity of marine mammal population from designated sites and the Offshore Study Area as part of the HRA screening.

2.7.2. Data Sources

314. **Table 2-20** and **Table 2-21** outline the existing primary data and site specific survey data (respectively) that has been used to inform this section and will also be used to inform the EIA.

Table 2-20 Existing Datasets

Dataset	Spatial Coverage	Survey Year /Timing
Dogger Bank Zone boat-based surveys (covering Dogger Bank A, B, C and Sofia wind farms) (Forewind 2013; 2014)	Dogger Bank Zone	January 2010 to January 2012
Dogger Bank Zone aerial surveys (covering Dogger Bank A, B, C and Sofia wind farms) (Forewind 2013; 2014)	Dogger Bank Zone	November 2009 to October 2011
Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt *et al.* 2019)	North-East Atlantic (including the North Sea)	Various
UK seal at sea density estimates and usage maps (Russell *et al.* 2017; Carter *et al.* 2020)	North-East Atlantic (including the North Sea)	Various

Table 2-21 Site-Specific Survey Data

Data Set	Spatial Coverage	Survey Year /Timing
Aerial surveys	DBS East and DBS West array areas, plus 4km buffer	March 2021 to February 2023

315. Other data and information available to inform the EIA include:

- SCANS-III: Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys (Hammond *et al*. 2021);
- SCANS-II: Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management (Hammond *et al.* 2013);
- The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area (Heinänen and Skov 2015);
- Revised Phase III data analysis of JCP data resources (Paxton *et al.* 2016);
- Offshore Energy Strategic Environmental Assessment (including relevant appendices and technical reports) (DECC 2016);
- Distributions of Cetaceans, Seals, Turtles, Sharks and Ocean Sunfish recorded from Aerial Surveys 2001-2008 (WWT 2009);
- MARINElife surveys from ferry routes across the southern North Sea area (MARINElife 2021);
- Sea Watch Foundation volunteer sightings off eastern England (Sea Watch Foundation 2021);
- Management Units for cetaceans in UK waters (IAMMWG 2021);
- Seal telemetry data (e.g. Sharples *et al*. 2008; Russel and McConnell 2014; Barker *et al*. 2014; Vincent *et al.* 2017);
- SCOS annual reporting of scientific advice on matters related to the management of seal populations (e.g. SCOS 2020);
- Trilateral surveys of Harbour Seals in the Wadden Sea and Helgoland in 2020 (Galatius *et al.* 2020); and
- EG-Seals grey seal surveys in the Wadden Sea and Helgoland in 2019-2020 (Brasseur *et al.* 2021).

316. The latest and most up to date references will be applied to the assessment and data used will also be supplemented with appropriate results of ongoing research and studies as it becomes available.

2.7.3. Potential Impacts

2.7.3.1. Potential impacts during construction

317. Potential impacts during construction will result from underwater noise, principally from piling activities and UXO clearance, but also from cable installation activities and the presence of vessels. This has the potential to cause:

- Auditory injury (piling and UXO clearance only);
- Disturbance and displacement; and
- Barrier effects as a result of disturbance and displacement (due to underwater noise).

318. Other impacts to be considered during the construction phase and scoped in for assessment would be the potential for interactions and / or an increase in collision risk with construction vessels. The assessment will consider potential for any disturbance of marine mammals foraging at sea, as well as the potential for indirect impacts as a result of changes in availability of prey species.

319. Taking into account the distances from key seal haul-out sites, including the landfall location (approximately 60km from Donna Nook) and current heavy vessel traffic in the vicinity of seal haul-out sites, the activities during construction are unlikely to result in any increased disturbance at seal haul-out sites. Therefore disturbance at seal haul-out sites has been scoped out of further assessment.

320. Potential impacts related to changes in water quality are also scoped out for assessment. As discussed in Benthic and Intertidal Ecology (Section 2.5) and Fish and Shellfish Ecology (Section 2.6) low levels of contamination have been recorded in the vicinity of the Projects (Forewind 2013, 2014) and the risk of pollutant release will be managed via the production of an Environmental Management and Monitoring Plan (or similar). This will include details on marine pollution and associated contingency plans and will be in line with the International Convention for the Prevention of pollution from Ships (MARPOL) 73/78. As the impact of any changes to water quality due to contaminants would be localised and short lived, the potential for any impacts from changes in water quality on marine mammals or their prey will not be assessed further in the EIA, and is proposed to be scoped out.

2.7.3.2. Potential impacts during operation and maintenance

321. Potential impacts during operation scoped in for assessment will mostly result from the presence of operation and maintenance vessels within the array areas (leading to an increase in vessel interactions / collision risk), underwater noise (including that generated by operational turbines, and activities such as works on cables (e.g. cable laying, re-burial, cable protection placement), and the impacts on prey species and any disruption of marine mammals foraging during any maintenance activities. These will be similar to impacts assessed for construction, but lower in magnitude due to the absence of pile driving, with fewer vessels required for maintenance than construction.

322. Impacts from operation and maintenance on the potential for disturbance to seals at haul-out sites and changes in water quality have been scoped out of further assessment.

323. The potential for impacts due to barrier effects from the physical presence of the Projects once constructed has been scoped out of the assessment. The spacing between wind turbines would allow animals to move between devices and through the operational wind farm. Studies at Dutch and Danish wind farms have shown that harbour porpoise and seal presence within operational wind farms show no evidence of exclusion (for example, Diederichs *et al.* 2008; Lindeboom *et al.* 2011; Marine Scotland 2012; McConnell *et al.* 2012; Russell *et al.* 2014; Scheidat *et al.* 2011; Teilmann *et al.* 2006; Tougaard *et al.* 2005, 2009a, 2009b). Both harbour porpoise and seals have been shown to forage within operational wind farm sites (e.g. Lindeboom *et al.* 2011; Russell *et al.* 2014) indicating no restriction to movements.

324. The potential for impacts from EMF has been scoped out. This is consistent with other recent projects (including for Norfolk Vanguard and Norfolk Boreas (Planning Inspectorate 2016; 2017b), East Anglia ONE North and East Anglia TWO (Planning Inspectorate 2017c; 2017d), and both the Dudgeon Extension and Sheringham Shoal Extension Projects (Planning Inspectorate; 2019)) as there is no evidence of any impact.

325. As such, during operation and maintenance the same potential impacts are scoped in for further assessment as for the construction phase.

2.7.3.3. Potential impacts during decommissioning

326. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

327. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.7.3.4. Potential cumulative impacts

328. The CIA will consider displacement due to cumulative underwater noise and impacts on prey species. The assessment will also consider displacement due to the presence of offshore vessels and maintenance activities during the operational phase.

2.7.3.5. Potential transboundary impacts

329. There is a significant level of marine development being undertaken or planned by EU Member States (i.e. Belgium, the Netherlands, Germany and Denmark) in the North Sea. Populations of marine mammals are highly mobile and there is potential for transboundary impacts especially when considering noise impacts. Transboundary impacts have been scoped in for assessment along with the other cumulative impacts.

2.7.3.6. Summary of scoping proposals

330. **Table 2-22** outlines the impacts which are proposed to be scoped in or out of the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-22 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Marine Mammal Ecology Assessment

Potential Impact	Construction	Operation	Decommissioning
Physical and Auditory Injury Resulting from Underwater Noise	✓	×	✓
Behavioural and Disturbance Impacts Resulting from Underwater Noise (including from Vessels)	✓	✓	✓
Barrier Effects from Underwater Noise	✓	✓	✓
Disturbance at Seal Haul-Out Sites	×	×	×
Disturbance to Foraging	✓	✓	✓
Vessel Interaction (Increase in Risk of Collision)	✓	✓	✓
Changes to Prey Resource	✓	✓	✓
Changes to Water Quality	×	×	×
Barrier Effects from the Physical Presence of the Wind Farm	×	×	×
Effects from EMFs	×	×	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.7.4. Approach to Impact Assessment

331. Underwater noise modelling will be undertaken to inform the marine mammal assessment. 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.

332. 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 (as outlined in section 1.8.2).

333. Consultation with key marine mammal stakeholders will be ongoing during the EIA process, through the Marine Mammal ETG, and will include discussion of the best available information to use, for example, to determine species density estimates and define reference populations for the assessment.

2.8. Offshore Ornithology

334. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on offshore ornithology.

The following questions are posed to consultees to help them frame and focus their response to the offshore ornithology scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on offshore ornithology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

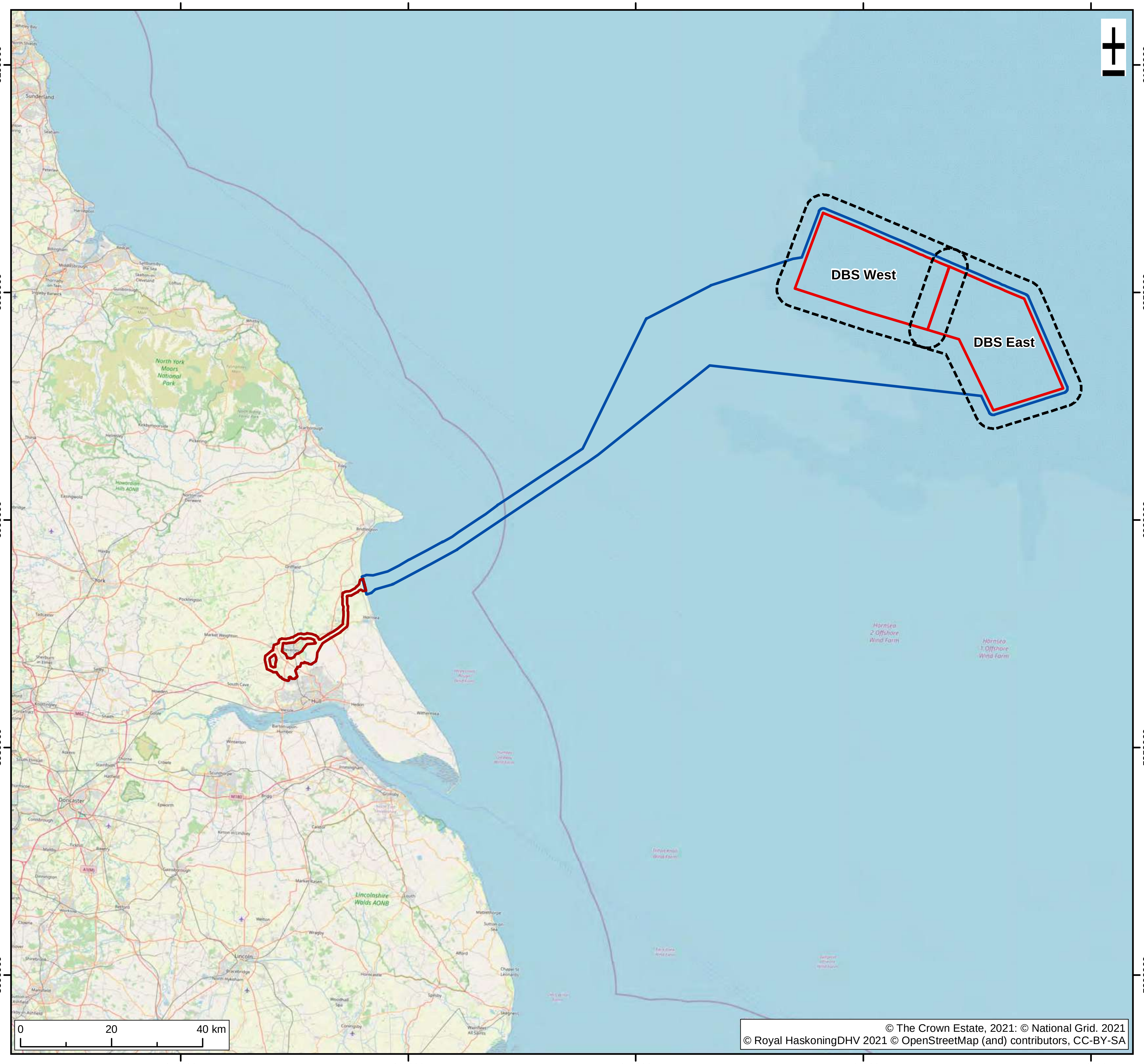
2.8.1. Existing Environment

335. The offshore ornithology impact assessment will consider potential effects on seabird species due to the Projects. This will be informed both by expert understanding of the seabird species present in the southern North Sea and analysis of site-specific survey data. As well as consideration of the regional seabird populations, the potential for connectivity of the Projects to sites with statutory designation for nature conservation, which have birds listed as qualifying features will be reviewed. Four classes of statutory designated sites will be considered: SPAs, Proposed SPAs (pSPAs), Ramsar sites and SSSIs. The first three are accorded higher status, as they signify sites of international importance, while SSSIs indicate sites of national importance.

336. The designated sites with the greatest potential for connectivity to the Projects will be those designated for breeding seabirds, with lower linkage expected for those designated for terrestrial, coastal or marine bird interests (typically overwintering aggregations).

337. The Projects' array areas do not overlap with any ornithological designations. However, since breeding seabirds can travel considerable distances whilst foraging it is necessary to consider designated sites located outside the wind farm area. The extent of connectivity between seabird SPAs and offshore wind farms during the breeding season is largely a function of distance and will be informed through review of species-specific foraging ranges (see Woodward *et al.* 2019). Outside the breeding season, patterns of migration are used to infer the origins of species recorded and SPA connectivity will be based on the data provided in Furness (2015). The Offshore Study Area closer to shore, crosses the Greater Wash SPA, for which consideration of potential impacts will need to be given.

338. This Scoping Report has considered existing data sources in predicting the likely species composition of the sites and the expected nature of the impact assessment. Drawing on past studies and wind farm impact assessments the seabird species expected to be present are provided in **Table 2-23** along with their seasonal definitions which will be used for assigning impacts to appropriate populations. It should be noted that in some instances alternative seasonal definitions may be appropriate (e.g. for apportioning impacts to designated sites). For example, evidence on colony attendance dates may be used where available to refine breeding season periods.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Aerial Survey Area (4km Buffer)

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
SX	P04	14/07/22	Fifth Issue	LM	MT	MT
SX	P03	18/05/22	Fourth Issue	LNF	MT	MT
SX	P02	08/10/21	Third Issue	LNF	MT	MT
SX	P01	06/09/21	Second Issue	LNF	MT	MT
SX	P00	21/07/21	First Issue	LNF	MT	MT

Title:

Offshore Study Area and Offshore Ornithological Aerial Survey Area

Figure: 2-16 | Drawing No: PB2340-MAC-OF-ZZ-DR-Z-0001

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:850,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

MacArthur Green RWE

Table 2-23 Species Specific Definitions of Biological Seasons (Furness 2015) for Bird Species Expected to be Present within the Array Areas.

Species	Breeding	Migration-free breeding	Migration - autumn	Winter	Migration - spring	Non-breeding
Black-headed gull	-	Apr-Jul	-	-	-	Aug-Mar
Common gull	-	May-Jul	-	-	-	Aug-Apr
Great black-backed gull	Mar-Aug	May-Jul	Aug-Nov	Dec	Jan-Apr	Sep-Mar
Herring gull	Mar-Aug	May-Jul	Aug-Nov	Dec	Jan-Apr	Sep-Feb
Lesser black-backed gull	Apr-Aug	May-Jul	Aug-Oct	Nov-Feb	Mar-Apr	-
Kittiwake	Mar-Aug	May-Jul	Aug-Dec	-	Jan-Apr	-
Little gull	Apr-Jul	May-Jul	-	-	-	Aug-Apr
'Commic' tern[3]	May-Aug	Jun	Jul-Sep	-	Apr-May	-
Arctic Skua	May-Jul	Jun-Jul	Aug-Oct	-	Apr-May	-
Great skua	May-Aug	May-Jul	Aug-Oct	Nov-Feb	Mar-Apr	-
Guillemot	Mar-Jul	Mar-Jun	Jul-Oct	Nov	Dec-Feb	Aug-Feb
Puffin	Apr-Aug	May-Jun	Jul-Aug	Sep-Feb	Mar-Apr	Mid-Aug-Mar

[3] Comic tern refers to common and Arctic terns which cannot be reliably distinguished in aerial surveys and are therefore combined.

Species	Breeding	Migration-free breeding	Migration - autumn	Winter	Migration - spring	Non-breeding
Razorbill	Apr-Jul	Apr-Jul	Aug-Oct	Nov-Dec	Jan-Mar	-
Fulmar	Jan-Aug	Apr-Aug	Sep-Oct	Nov	Dec-Mar	-
Gannet	Mar-Sep	Apr-Aug	Sep-Nov	-	Dec-Mar	-

2.8.2. Data Sources

339. As agreed with Natural England, monthly digital aerial surveys commenced across the Projects' array areas and 4km buffer in March 2021. The survey programme will run for two years and will conclude in February 2023.

340. The survey data obtained from the ongoing monthly surveys will be used in conjunction with the following datasets and guidance materials:

- Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (Furness 2015);
- Seabird Populations of Britain and Ireland (Mitchell *et al.* 2004);
- An atlas of seabird distribution in north-west European waters (Stone *et al.* 1995);
- Desk-based revision of seabird foraging ranges used for HRA screening (Woodward *et al.* 2019); and
- Data collected for the Dogger Bank Creyke Beck and Dogger Bank Teesside projects.

341. The above list will also be supplemented as appropriate with new information and the results of ongoing research and studies as it becomes available. For example, this may include data from recent and ongoing tracking studies at the Flamborough and Filey Coast SPA.

2.8.3. Potential Impacts

2.8.3.1. Potential impacts during construction

342. Impacts on ornithological receptors during construction relate to disturbance due to the presence and movement of construction vessels and associated construction activities within the wind farm site and cable route, which can cause displacement from areas used by the birds (e.g. for foraging). As well as construction vessels themselves, the sources of disturbance may include vessels moving to and from the site, associated support vessels and helicopters, if used for crew transfers.

343. Installation of the export cable also has the potential to cause disturbance, both directly from vessels involved in the installation and also indirectly through disturbance effects on prey fish caused by activities such as cable burial and potentially accidental pollution events (although this is expected to be mitigated via embedded mitigation measures). While there may be a very small amount of permanent habitat loss (e.g. of seabed around the turbine foundations), most of these potential impacts will be expected to be short-lived and are unlikely to lead to long-term effects.

344. Impacts expected to be scoped in is limited to disturbance due to the presence and movement of construction vessels and construction activities in the array areas and cable corridors.

2.8.3.2. Potential impacts during operation and maintenance

345. Impacts on ornithological receptors during operation relate to the presence of the turbines themselves. These include the risk of birds avoiding the turbines and therefore potentially being displaced from foraging areas, which may have knock-on demographic effects (e.g. reductions in survival and/or productivity). Avoidance may also lead to foraging or migration routes being extended as a result of the wind farms acting as a barrier to movement and consequently increasing energetic costs. Birds which do approach the turbines are at risk of collision with the turbines. There may also be indirect effects mediated through impacts on fish prey.

346. Potential impacts during operation and maintenance to be scoped in include:

- Disturbance and displacement related to the presence of the turbines themselves (which may also manifest as barrier effects) and due to operation of maintenance vessels;
- Mortality resulting from collisions with the rotating blades; and
- Indirect effects mediated through impacts on fish prey resources.

2.8.3.3. Potential impacts during decommissioning

347. Impacts during decommissioning are expected to be similar, but of smaller magnitude, to those anticipated during construction.

348. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.8.3.4. Potential cumulative impacts

349. Cumulative impacts will focus on the operational phase effects of displacement and collision risk. The list of projects to include in this assessment will follow industry best practice and statutory advice. The risk of cumulative effects during construction and decommissioning are scoped out on the basis that individual projects alone impacts during these phases are typically small (and this is anticipated to be the case for the Projects), localised, temporary and unlikely to overlap with construction elsewhere to any appreciable extent.

350. Cumulative impacts expected to be scoped in will therefore include disturbance and displacement due to the presence of the turbines and collision risk.

2.8.3.5. Potential transboundary impacts

351. Given the level of development in the southern North Sea by EU Member States (i.e. Belgium, the Netherlands, Germany and Denmark) and that birds are highly mobile and migratory there is potential for transboundary impacts especially with regard to displacement/barrier effects and collision risk. Transboundary impacts will be assessed as with the other cumulative impacts.

2.8.3.6. Summary of scoping proposals

352. The offshore ornithology impacts which are proposed to be scoped into the EIA are outlined in **Table 2-24**. This may be refined through the EPP as additional information and data become available.

Table 2-24 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Offshore Ornithology Assessment

Potential Impact	Construction	Operation	Decommissioning
Direct temporary habitat loss/ disturbance due to construction (array and export cable)	✓	×	✓
Indirect impacts through effects on prey species and habitats: Accidental pollution (will be mitigated via Environmental Management and Monitoring Plan).	×	×	×
Indirect impacts on ornithological features due to impacts on prey species and habitats	✓	✓	✓
Operational disturbance and displacement	×	✓	×
Collision impacts	×	✓	×
Barrier effects	×	✓	×
Cumulative impacts	×	✓	×
Transboundary impacts	×	✓	×

2.8.4. Approach to Impact Assessment

353. The impact assessment methodology will be based on that described in section 1.8, adapted to make it applicable to the assessment of ornithological features, and aligned with the key guidance document produced on impact assessment of ecological/ornithological receptors (Chartered Institute of Ecology and Environmental Management (CIEEM) 2018; updated 2019). The assessment approach will use a 'source-pathway-receptor' model.

354. The aerial surveys will provide information on species (or species-groups if species identification is not possible), abundance, distribution, behaviour, location, sex and age (where possible) and flight direction.

355. Detailed analysis of the survey data for all species, using a combination of design-based and model-based methods will provide density and abundance estimates (with associated confidence intervals and levels of precision, at 10% coverage). While model-based methods are typically considered to be superior to design-based ones, the latter do not require the larger sample sizes necessary for successful model fitting. Therefore design-based estimates will be presented for all species, with model-based ones for those species present in sufficient numbers to permit robust analysis (these are also likely to be restricted to a subset of months since the abundance of even common species will vary seasonally).

356. Flight height data derived from the aerial survey imagery will be reported, however, owing to the technical difficulties of estimating flight height from aerial imagery, it is anticipated that generic flight data (Johnston *et al.* 2014a, 2014b) will be used in the collision risk model (subject to discussion with stakeholders).

357. Quantitative methods to be used in the assessment will include:

- Displacement matrices, following the SNCB advised approach, combining ranges of displacement and mortality to obtain estimates of displacement mortality;
- Collision risk modelling using the deterministic Band model, and/or the stochastic version (McGregor 2018).; The use of appropriate models will be discussed with relevant stakeholders though the EPP; and,
- Population viability analysis (using the Natural England PVA tool) to provide predictions of the population consequences of the impacts for the Projects alone and also cumulatively and in-combination with other wind farms.

358. Reference population sizes for each species will be based on the best available information at the time of undertaking the assessment and will be agreed with key stakeholders. These are likely to be derived from Furness (2015) and breeding colony estimates in the Seabird Monitoring Programme (SMP) where these have been updated.

359. The guidance documents to be used will include:

- Using a collision risk model to assess bird collision risks for offshore wind farms (Band 2012);
- A Stochastic Collision Risk Model for Seabirds in Flight (McGregor *et al.* 2018);
- Mapping Seabird Sensitivity to offshore wind farms (Bradbury *et al.* 2014);
- The avoidance rates of collision between birds and offshore turbines (Cook *et al.* 2014);
- Joint SNCB Interim Displacement Advice Note 2017 (JNCC/SNCBs 2017);
- Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines (Johnston *et al.* 2014a, 2014b); and
- A Population Viability Analysis Modelling Tool for Seabird Species (Searle *et al.* 2019).

360. The sensitivity of each species will be determined based on a range of factors including the size of its population, its conservation status and its known sensitivity to offshore wind farms. Those species identified as at risk of potential effects will be subject to full impact assessment against the impacts listed above, taking into account relevant ecological features (e.g. auk flight heights are almost exclusively below rotor height and therefore these species have negligible collision risk). The impact assessment will be undertaken in line with guidance by CIEEM (2018; updated 2019) and expert opinion.

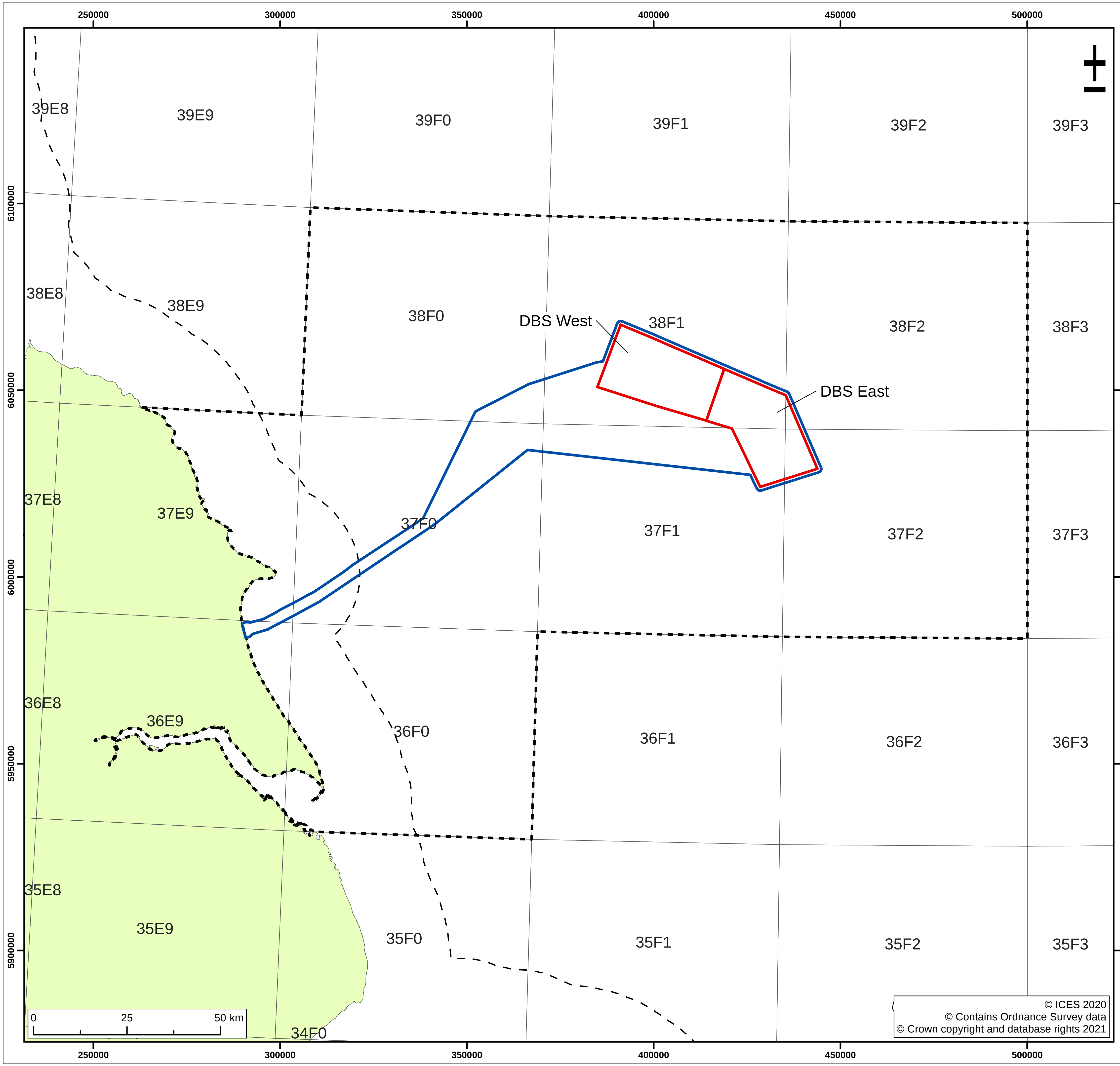
2.9. Commercial Fisheries

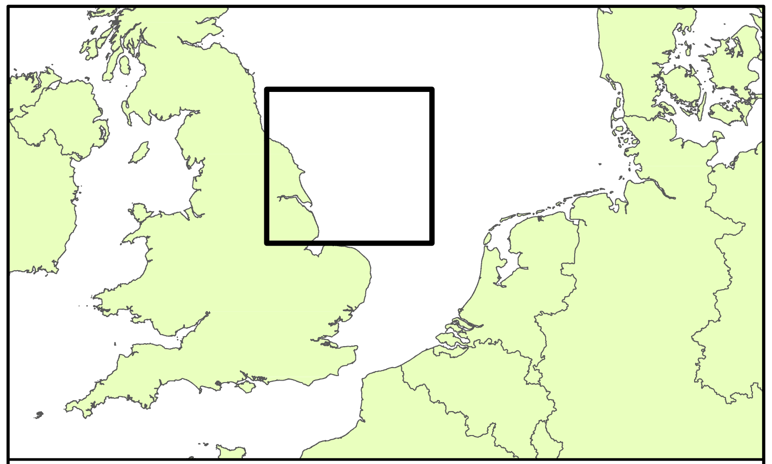
361. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on commercial fisheries.

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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on commercial fisheries resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

362. The Commercial Fisheries study area for the Projects is defined as ICES rectangles 38F0, 38F1, 38F2, 37E9, 37F0, 37F1, 37F2, 36E9, 36F0 and 36F1 (**Figure 2-17**). This Commercial Fisheries study area will provide wider regional context to the various fisheries, whilst also providing coverage for any effects that may occur both within, and outside of, the Offshore Study Area.





Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Commercial Fisheries Study Area
- UK 12 nm limit
- ICES Rectangles

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0007	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0007	BO	IW	TM

Title:

Commercial Fisheries study area

Figure: 2-17 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0007

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:1,005,563

Project: Dogger Bank South Offshore Wind Farms

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2.9.1. Existing Environment

363. Dogger Bank supports a wide range of fish and shellfish species. Many of these species have high commercial importance, with the region supporting significant fisheries for over 300 years (Plumeridge and Roberts 2017). For UK vessels, between 2015 to 2019, the average annual value of commercial fisheries, within the Commercial Fisheries study area, was £26.6 million (MMO 2020).

364. **Plate 2-4** displays the top 15 species, by weight, landed by all vessels (UK and non-UK fleet, all vessel sizes) from the Commercial Fisheries study area from 2012 to 2016. The key species in terms of weight are sandeel *Ammodytes* spp. and Atlantic herring (STECF 2017), although there are notable fluctuations in the annual landings. Whilst landings by weight of other species are lower, several have high market values, as presented in **Plate 2-4** and discussed below.

365. Danish seine vessels account for the majority of sandeel caught in the Commercial Fisheries study area (**Plate 2-4**), with the highest landings from ICES rectangle 38F1 (STECF 2017) which overlaps the array areas. Atlantic herring is predominantly caught by Danish, Dutch, French and German vessels; with the highest landings of Atlantic herring from within ICES rectangle 37F0, which is landward of the array areas. Both Atlantic herring and sandeel have been identified as having spawning grounds within the Commercial Fisheries study area, as discussed in section 2.6.

366. **Plate 2-4** indicates that European plaice, edible crab and European sprat *Sprattus sprattus* are also key species in terms of landed weight (STECF 2017). European plaice is primarily targeted by UK and Dutch vessels from ICES rectangle 37F2 and 38F2, both of which have a small overlap with the most westerly part of the array areas. The majority of edible crab landings from the Commercial Fisheries study area is caught by English vessels within ICES rectangle 36F0. The majority of European sprat landings are by Danish vessels within ICES rectangle 37F2. Other notable species in terms of landed weight are great Atlantic scallop *Pecten maximus*, whiting, Atlantic mackerel, Norway lobster, European lobster, whelk *Buccinum undatum*, Atlantic cod, European anchovy *Engraulis encrasicolus*, common sole *Solea solea* and turbot *Scophthalmus maximus*.

367. **Plate 2-5** indicates that the top species caught by UK vessels in the Commercial Fisheries study area, in terms of both value and weight (as informed by data shown in **Plate 2-4**), are lobster, crab, scallop, plaice and Norway lobster (MMO 2020 and STECF 2017). Annual landings of these species appear to fluctuate between 2015 and 2019, apart from landings of crab which show a steady increase. Crab and lobster are caught across the majority of the Offshore Study Area, but predominantly from ICES rectangle 36F0. Within ICES rectangle 38F1, where the largest proportion of the array areas is located, the dominant species caught by UK vessels are plaice, crab and sandeel.

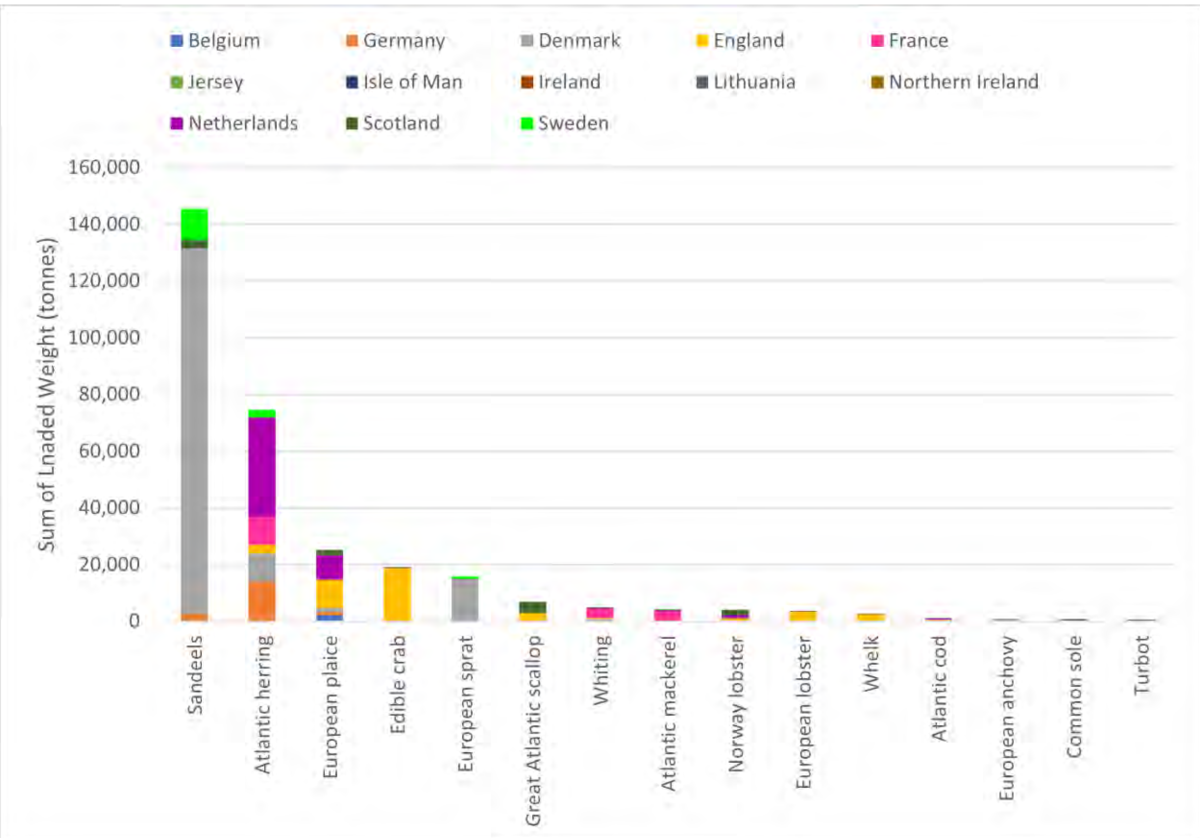


Plate 2-4 Top 15 species by weight (tonnes) from 2012 to 2016 landed from the Commercial Fisheries Study Area (STECF 2017)

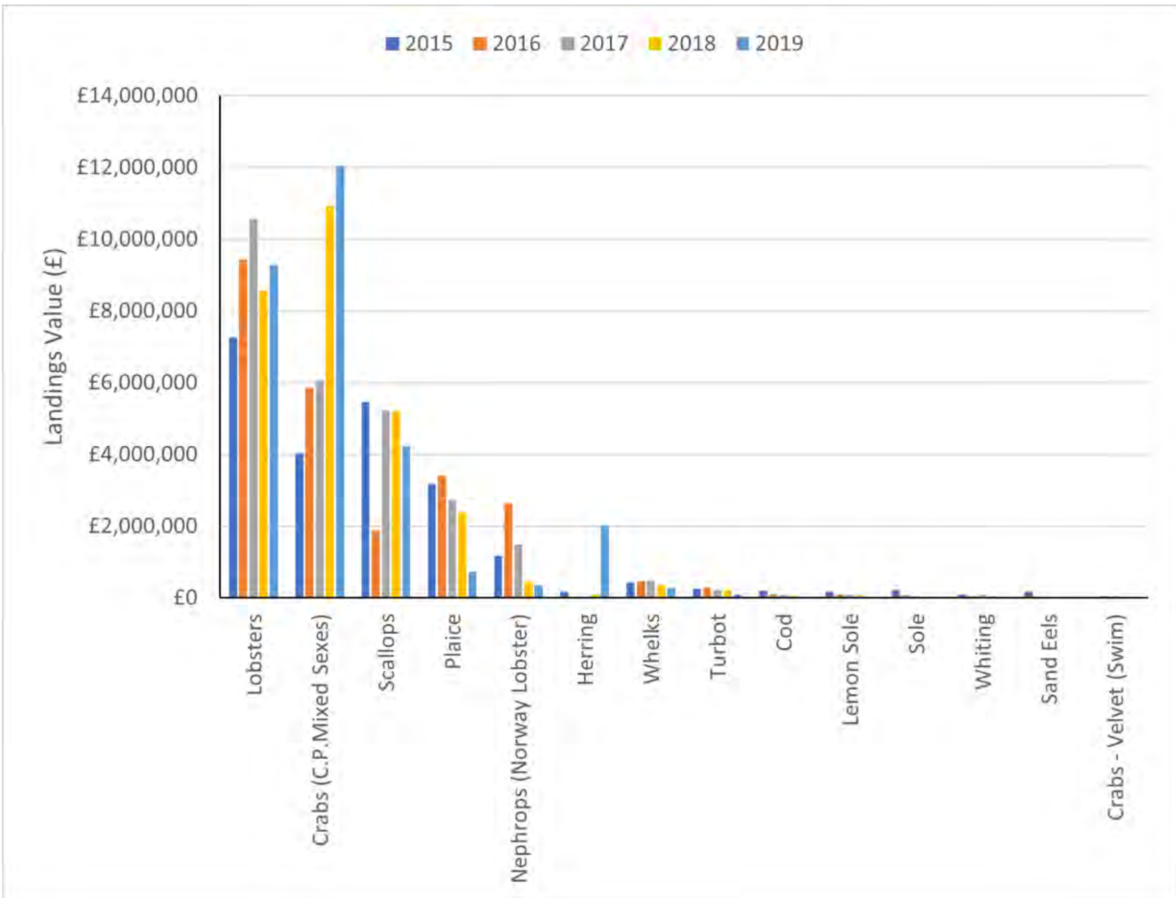
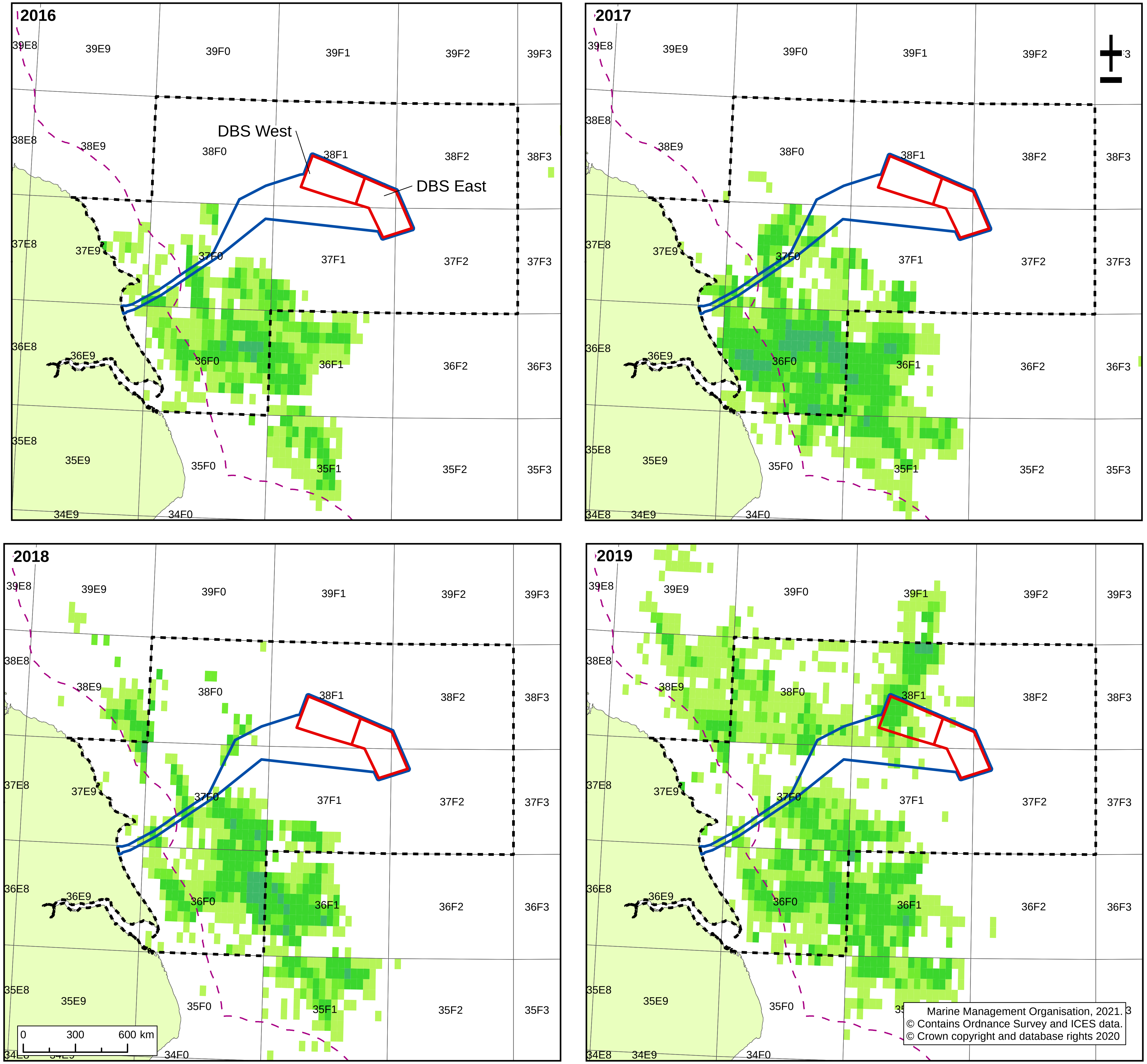


Plate 2-5 Top 15 species by value (£) from 2015 to 2019 landed from the Commercial Fisheries Study Area (UK vessels only) (MMO 2020)

368. **Figure 2-18** indicates that ≥15m UK static gear vessel activity covered a progressively greater geographical area from 2016 to 2019. Consultation feedback has indicated that the static gear activity observed in recent years within the array areas is solely due to potting, predominantly targeting shellfish. It is likely there is an under-representation of static gear activity, particularly in the inshore areas where many vessels <15m in length tend to fish, as the Vessel Monitoring Systems (VMS) data does not capture vessels ≥15m.



Legend

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Commercial Fisheries Study Area
- UK 12 nm limit
- ICES Rectangles

Value (£) Landed

- < 0.01
- £0.01 - £5,000
- £5,000 - £10,000
- £10,000 - £50,000
- £50,000 - £200,000
- £200,000 - £400,000
- £400,000 - £800,000
- £800,000 - £1,600,000
- £1,600,000 - £3,000,000

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0008	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0008	BO	IW	TM

Title:
Fishing Value (UK vessels) by passive gears 2016 - 2019

Figure: 2-18
Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0008

Co-ordinate system: WGS 1984 UTM Zone 31N
Page Size: A3
Scale: 1:2,028,176

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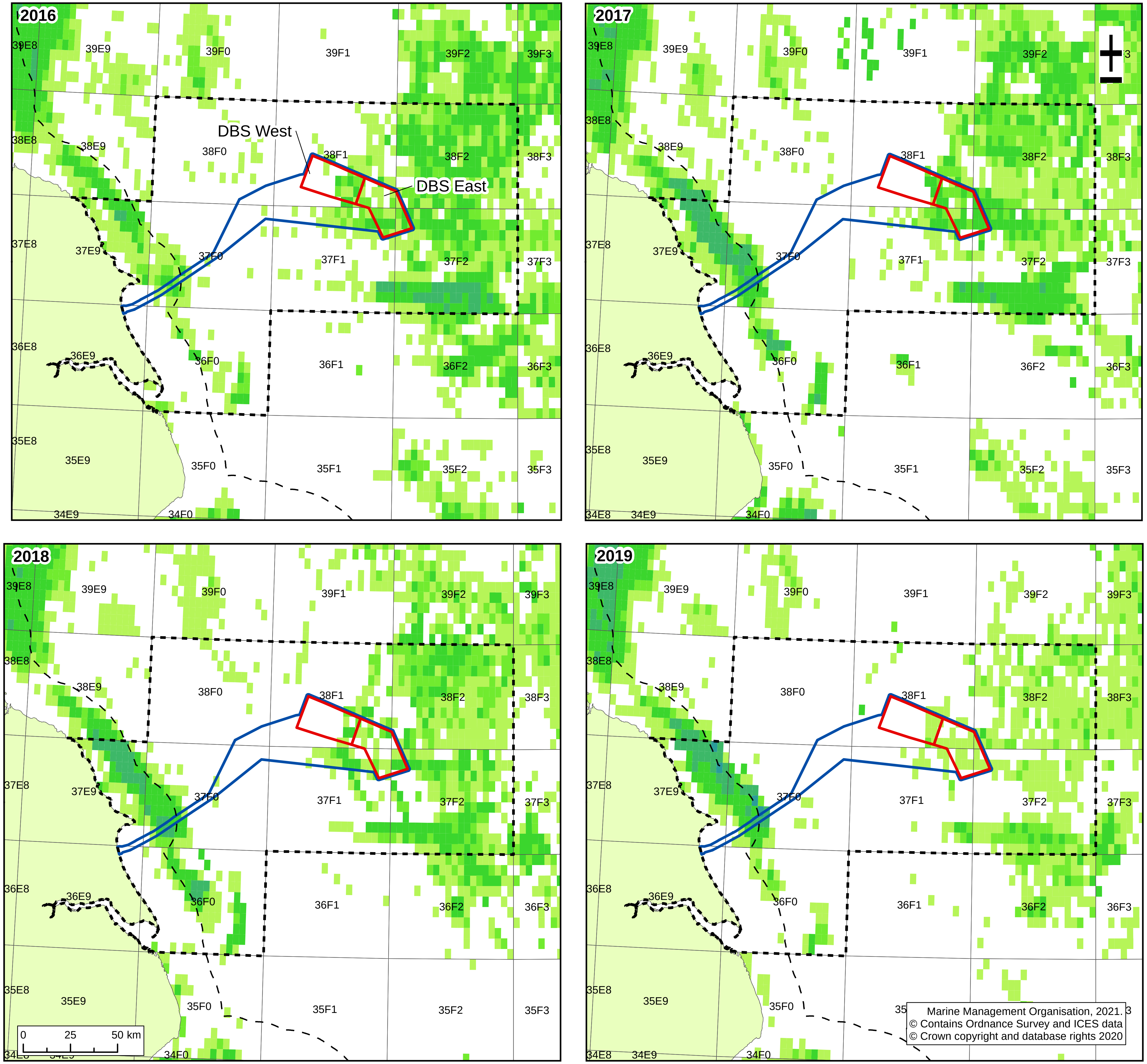
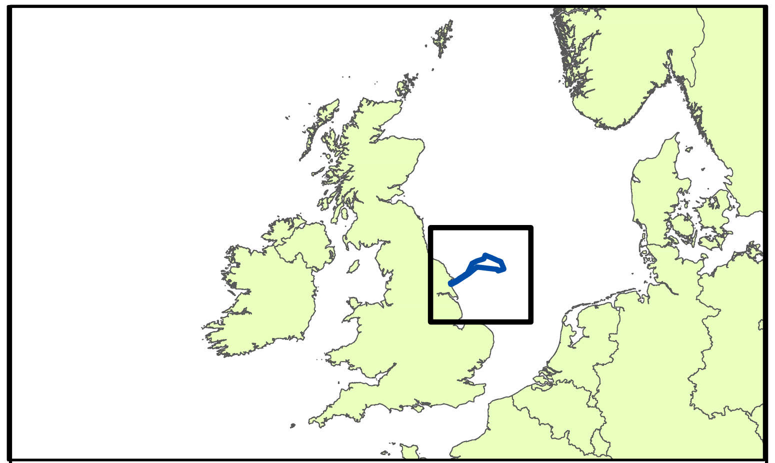
369. **Figure 2-19** indicates that ≥15m UK mobile gear vessels are active across the Commercial Fisheries study area, with more focused activity in the east (within and to the east of the array areas) and in the inshore.

370. **Figure 2-20** indicates that vessels utilising bottom otter trawls are active across both array areas, whereas beam trawl activity is focused to the south-east of the Commercial Fisheries study area. Vessels using demersal seine nets are active in localised areas, predominantly to the east of the array areas. Dredges are active within the inshore area of the Commercial Fisheries study area.

371. A large proportion of the array areas overlaps with the Dogger Bank SAC. Within the Dogger Bank SAC, scallop dredging occurred at very low levels until early 2020, when there was a large increase in scallop dredging after a lucrative scallop stock was found. A temporary closure for scallop fishing within the SAC was introduced in April 2021 (MMO 2021a). This closure became permanent when a byelaw for the Dogger Bank SAC was enacted from 13 June 2022 which prohibits the use of 'bottom towed fishing gear', including trawls, dredges, demersal seines and semi-pelagic seines; this byelaw will be reviewed every five years, or sooner if significant information is received. It is recognised that this byelaw on bottom towed gear within the SAC will change the baseline environment for commercial fisheries within the Commercial Fisheries study area, and this will be considered further within the impact assessment.





Legend

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Commercial Fisheries Study Area
- UK 12 nm limit
- ICES Rectangles

Value (£) Landed

- < 0.01
- £0.01 - £5,000
- £5,000 - £10,000
- £10,000 - £50,000
- £50,000 - £200,000
- £200,000 - £400,000
- £400,000 - £800,000
- £800,000 - £1,600,000
- £1,600,000 - £3,000,000

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0009	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0009	BO	IW	TM

Title:

Fishing Value (UK vessels)
by mobile gears 2016 - 2019

Figure: 2-19 | Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0009

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:2,028,176

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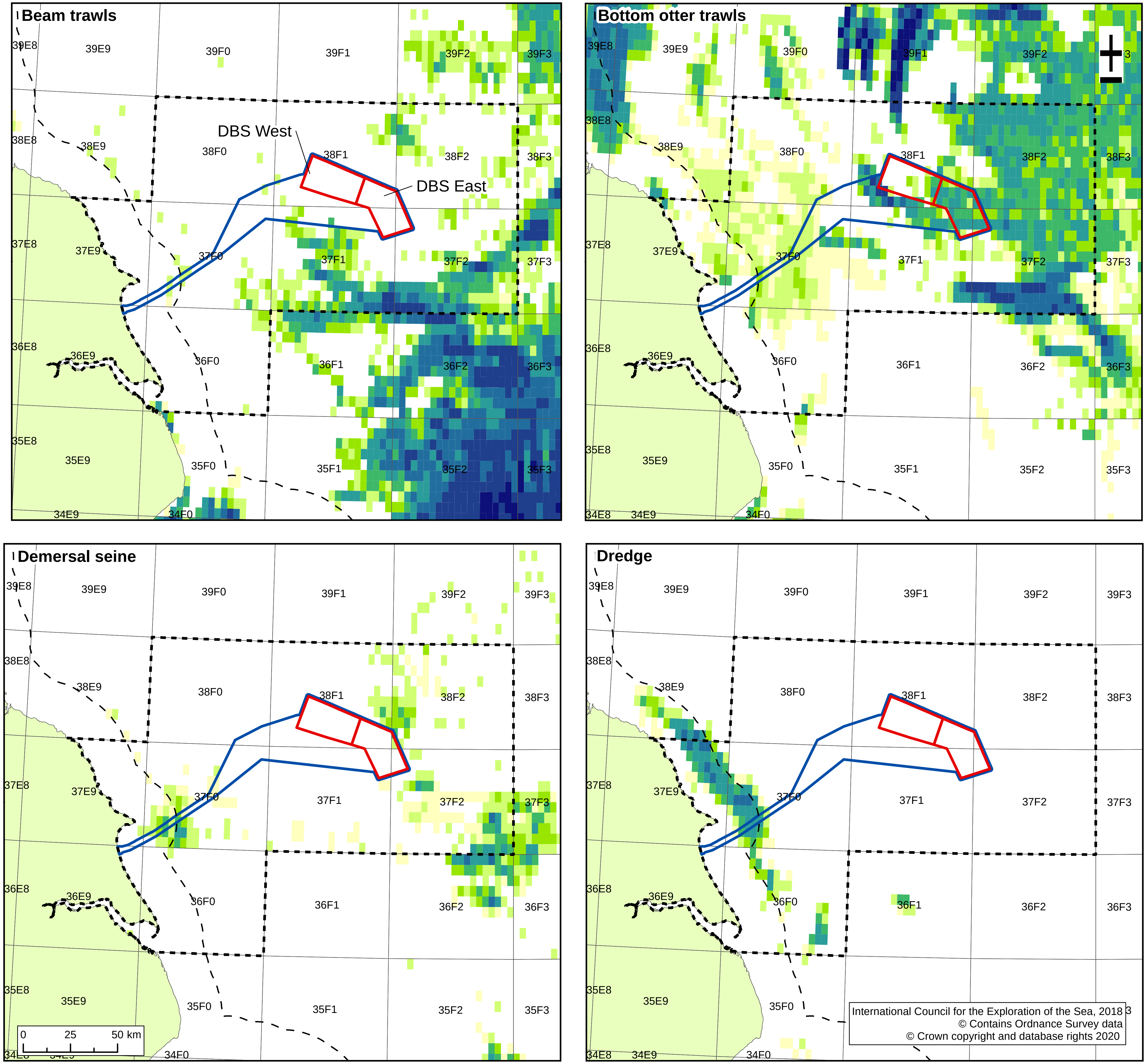

Legend

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Commercial Fisheries Study Area
- UK 12 nm limit
- ICES Rectangles

Annual fishing effort (kilowatt/hours)

- < 1,000
- 1,000 - 5,000
- 5,000 - 10,000
- 10,000 - 20,000
- 20,000 - 50,000
- 50,000 - 100,000
- 100,000 - 250,000
- > 250,000

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S2	P03	07/07/22	PB2340-MAR-OF-ZZ-DR-Z-0010	BO	IW	TM
S2	P02	29/06/22	PB2340-MAR-OF-ZZ-DR-Z-0010	BO	IW	TM

Title:

Fishing effort (UK and non-UK vessels) by gear type - 2017

Figure: 2-20 Drawing No: PB2340-MAR-OF-ZZ-DR-Z-0010

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:2,028,176

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2.9.2. Data Sources

372. An initial desk-based review of literature and data sources was undertaken to support this scoping exercise, as presented in **Table 2-25**. Additional sources of information are also listed which would be expected to inform the EIA.

373. It is acknowledged that there are various limitations and assumptions within the quantitative datasets listed. For example, smaller vessels are excluded from the analysis of VMS data, as only vessels with a beam ≥12m (ICES) or ≥15m (MMO) are captured. Also, the current datasets available will not capture the implications on fishing activity as a result of the Dogger Bank SAC byelaw. In order to support these existing datasets, consultation will be held with fisheries stakeholders to provide further insight into specific fishing grounds, activity of smaller vessels not captured within official datasets, activity of any vessels in the area and potential changes to fishing activity as a result of the Dogger Bank SAC byelaw.

374. Datasets showing fishing activity and fish landings from 2020 and 2021 will be affected by the impacts of COVID-19, therefore data will be obtained for the years prior to 2020 to avoid potential influences within the data. Data across a time period of at least four years will be collated and, where possible, data from a longer time period (e.g. 10 years) will be analysed, as recommended by commercial fisheries stakeholders.

Table 2-25 Existing Spatial Datasets

Dataset	Spatial Coverage	Survey Year / Timings
MMO fleet landings by ICES Rectangles	Commercial Fisheries study area	2015 - 2019
MMO UK and foreign fleet landings into the UK by port	Commercial Fisheries study area	2015 - 2019
EU STECF non-UK landings by ICES Rectangle	Commercial Fisheries study area	2012 - 2016
MMO fishing activity data for UK vessels (≥15 m) - VMS data	Commercial Fisheries study area	2016 - 2019
MMO fish landings to UK ports	Commercial Fisheries study area	2016 - 2019
ICES fishing activity data for mobile bottom contacting gear vessels (>12 m) using VMS data	Commercial Fisheries study area	2014 - 2017
CEFAS inshore fishing activity	Commercial Fisheries study area out to 12nm	2010 and 2012

375. In addition to the data in **Table 2-25**, **Table 2-26** describes the site-specific surveys that will be undertaken to support the assessment.

Table 2-26 Site-Specific Survey Data

Dataset	Spatial Coverage	Survey Year / Timings
Project specific marine traffic	DBS array areas	2022
Potting effort survey	DBS offshore export cable corridor and array areas	2022

376. Information will also be obtained from other sources, such as the IFCA and ICES stock assessments, to inform the characterisation of the baseline.

377. A Commercial Fisheries Working Group has been setup for the Projects and initial engagement has taken place to provide comment at this stage of the Projects. Outputs from these initial consultations have been used to inform the commercial fisheries baseline environment. Further engagement and port visits are planned, which will develop further understanding of existing fishing activity in the region and potential changes to the baseline.

2.9.3. Potential Impacts

2.9.3.1. Potential impacts during construction

378. Potential impacts scoped in for the construction phase will be related to:

- Restricted access to fishing grounds due to construction activities;
- Displacement of fishing activity due to presence of construction vessels;
- Loss or damage to gear due to snagging surveys;
- Increased steaming times due to the presence of installation vessels;
- Supply chain opportunities for local fishing vessels;
- Impacts (adverse and/or beneficial) on fish and shellfish species; and
- Navigational safety

379. The penultimate point will be informed by the fish ecology assessment. Navigational safety of commercial fisheries will be considered in the navigation assessment.

2.9.3.2. Potential impacts during operation and maintenance

380. Potential impacts during operation will focus on impacts similar to those arising during construction. The following impacts have been scoped in:

- Loss of access to fishing grounds due to infrastructure associated with the Projects;
- Displacement of fishing activity[4];
- Loss or damage to gear due to snagging;
- Supply chain opportunities for local fishing vessels;
- Impacts (adverse and/or beneficial) on fish and shellfish species; and
- Navigational safety.

[4] This impact assessment will consider potential displacement of fishing due to the Projects infra-structure and place this in the context of the Dogger Bank SAC Byelaw (13 June 2022)

381. Potential impacts from increased steaming times due to the presence of infrastructure and vessels associated with the Projects is proposed to be scoped out of the assessment. The magnitude of this impact is deemed negligible during operation as the effect will be temporary and localised. As a result, there is no pathway for the Projects to result in a likely significant effect to increased steaming times. It is proposed that the potential impact from increased steaming times to commercial fisheries is scoped out of the EIA.

2.9.3.3. Potential impacts during decommissioning

382. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

383. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.9.3.4. Potential cumulative impacts

384. The cumulative assessment for commercial fisheries will consider impacts to commercial fishing activity, stocks and loss of access to fishing grounds and displacement of fishing activity. Cumulative impacts from the development of the offshore wind farm, other wind farms and other offshore activities will be considered as part of the EIA where consultation with the fishing industry confirms that such interactions are a concern.

2.9.3.5. Potential transboundary impacts

385. Given the prevalence of vessels from other countries, transboundary impacts will be assessed for each impact as part of the construction, operation, decommissioning and CIA. Transboundary consultation with stakeholders will be undertaken and the most up to date information on European projects and fisheries data will be used to inform the assessment.

2.9.3.6. Summary of scoping proposals

386. **Table 2-27** outlines the commercial fisheries impacts which are proposed to be scoped into the EIA. This may be refined through consultation with stakeholders as additional information and data become available.

Table 2-27 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Commercial Fisheries Assessment

Potential Impact	Construction	Operation	Decommissioning
Loss of access to fishing grounds	✓	✓	✓
Displacement of fishing activity into other areas	✓	✓	✓
Impacts (adverse and/or beneficial) on fish and shellfish species	Considered in section 2.6 Fish and Shellfish Ecology, but implications from this on Commercial Fisheries will be considered.		
Increased steaming times	✓	×	✓
Loss or damage to gear due to snagging	✓	✓	✓
Supply chain opportunities for local fishing vessels	✓	✓	✓
Navigational safety	Considered in section 2.10 Shipping and Navigation.		
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.9.4. Approach to Impact Assessment

387. The commercial fisheries impact assessment will follow the EIA methodology as described in section 1.8. The following guidance documents, specific to commercial fisheries, will also be considered:

- Changes to Fishing Practices around the UK as a Result of the Development of Offshore Windfarms – Phase One (Revised) (Gray *et al.* 2016);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW 2015);
- Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW 2014);
- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments – Guidelines Based on Outputs from a Technical Workshop organised by the UK Fisheries Economic Network (Poseidon 2012); and
- Options and Opportunities for Marine Fisheries Mitigation associated with Windfarms commissioned by Collaborative Offshore Wind Research into the Environment (COWRIE) (Blyth-Skyrme 2010).

388. It is acknowledged that changes to the existing baseline could occur, not least as a result of the recently passed byelaw prohibiting fishing with mobile gear in the Dogger Bank SAC, and this will be considered within the EIA. The baseline for commercial fisheries is constantly evolving, as it is a dynamic industry with frequent and sometimes unpredictable changes in fish abundance and distribution, climatic conditions, management regulations, quotas and fuel costs, all of which affect activity. As detailed in section 2.9.2 specific consultation will be undertaken with all fisheries stakeholders, including specific discussion on the issue of the Dogger Bank SAC byelaw and implications for commercial fishing activity.

389. Receptor groups will be identified through a review of data and feedback from consultation. Impacts will be assessed separately for each receptor group. This approach will ensure all key potential impacts are assessed properly.

390. Cumulative impacts on commercial fisheries receptors have the potential to arise from interaction of the development of the Projects and other activities in the region. Consideration of the cumulative impacts is a key part of the assessment process and will be assessed as part of the EIA.

391. Where appropriate, mitigation measures will be proposed and residual impacts presented.

2.10. Shipping and Navigation

392. This section describes the methodology to be used for assessing the impact on shipping and navigation arising from the presence of the Projects including with regard to the Navigation Risk Assessment (NRA), the technical document which will inform the EIA. This section includes the main study area to be used for characterising the existing environment, an overview of the baseline conditions, the datasets that will be used to inform the EIA (and NRA), the potential impacts to be considered within the EIA and how these impacts will be assessed including the application of embedded mitigation measures.

393. The shipping and navigation assessment focuses on vessels in transit with other marine activities, including commercial fishing considered in section 2.9 and infrastructure and other users considered in section 2.12. The shipping and navigation assessment focuses on emergency response and in particular the effect on emergency response resources and search and rescue (SAR) capability.

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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on shipping and navigation resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.10.1. Existing Environment

2.10.1.1. Shipping and Navigation Study Area

394. The Shipping and Navigation array study area is defined as the array areas (DBS East and DBS West), plus a 10NM buffer. The 10NM buffer is standard for shipping and navigation assessments as it is large enough to encompass vessel routeing which may be impacted, while remaining site-specific to the area being studied. **Figure 2-21** presents an overview of the shipping and navigation study area.

395. Since separate marine traffic datasets are being collected for each array area, this study area has been separated into a 10NM buffer of each array area for the purposes of analysing marine traffic data. This is reflected in **Figure 2-22** and **Figure 2-23**.

396. A Shipping and Navigation export cable corridor study area will be defined for the offshore export cable corridor as part of the Navigation Risk Assessment (NRA) process, likely consisting of a 2NM buffer.

397. If a reactive compensation platform located within the offshore export cable corridor is required additional traffic surveys and assessment will be required. The scope of these surveys and assessment will be agreed with the MCA as part of the NRA process.

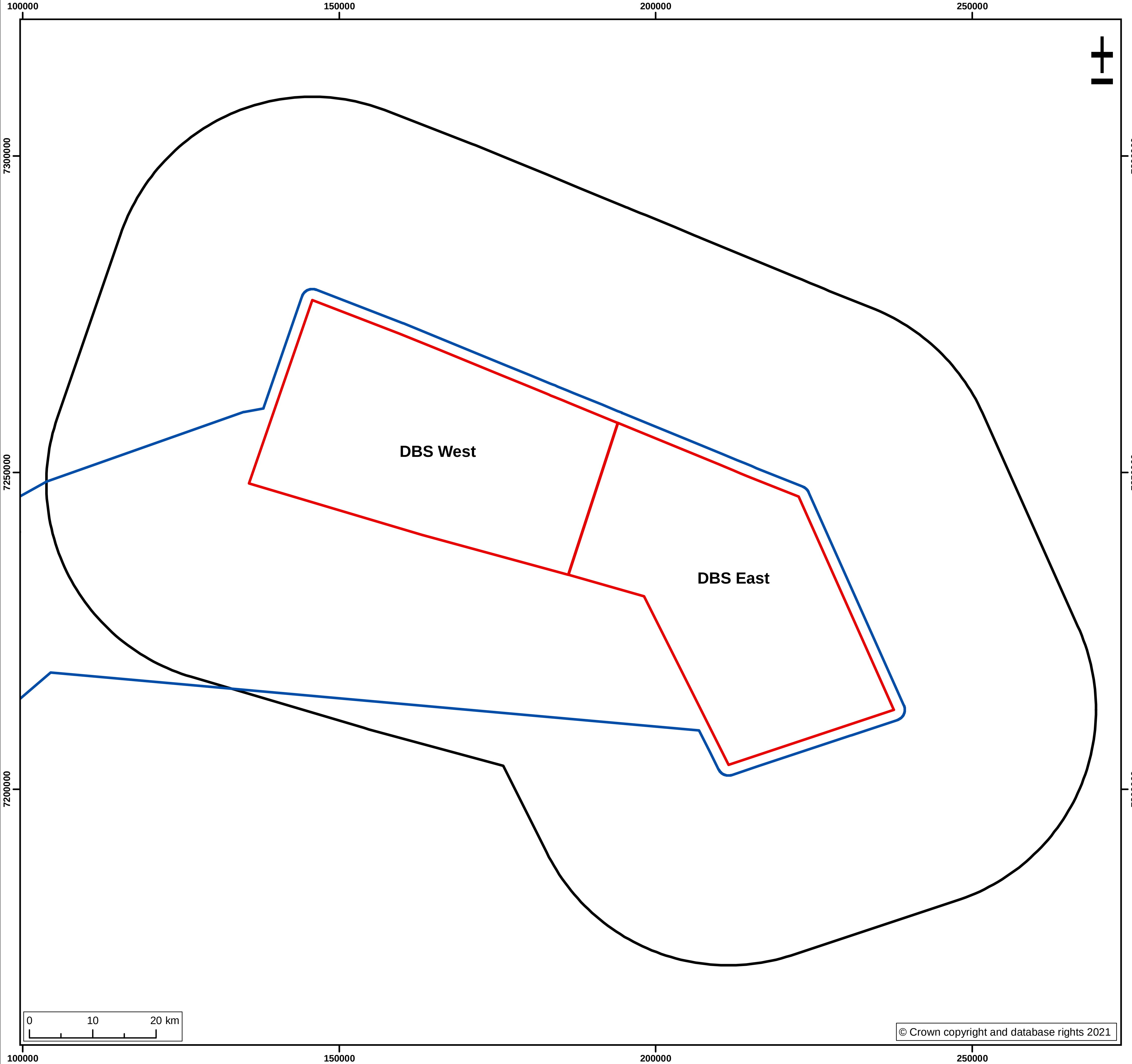
2.10.1.2. Navigational Features

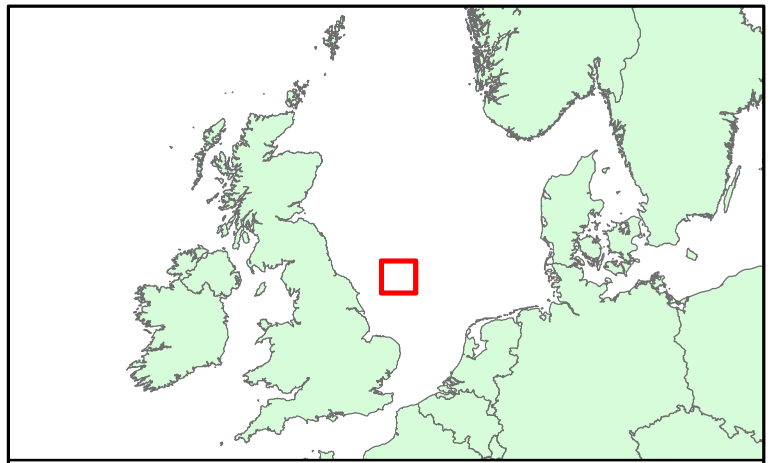
398. An overview of navigational features is presented in **Figure 2-24**.

399. There are no installations within the array areas. However, several gas field installations are located within the shipping and navigation study area including Cavendish (the nearest at approximately 1.6NM), Munro MH, Cygnus Alpha, Cygnus Bravo, Boulton and Trent. Additionally, numerous subsea pipelines are situated running between these installations. Six pipelines are noted intersecting at least one of the array areas.

400. A total of 13 charted wrecks are recorded within the Shipping and Navigation study area. Two of these were recorded within DBS West while one was recorded within DBS East, with the remainder being located in the buffer areas.

401. Charted water depths are highly variable in the area, ranging between 14m on the south west patch of the Dogger Bank and more than 60m to the west.





Legend:
- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Shipping and Navigation Study Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
AN	01	30/06/2022	Initial Draft	DS	AF	SW

Title:

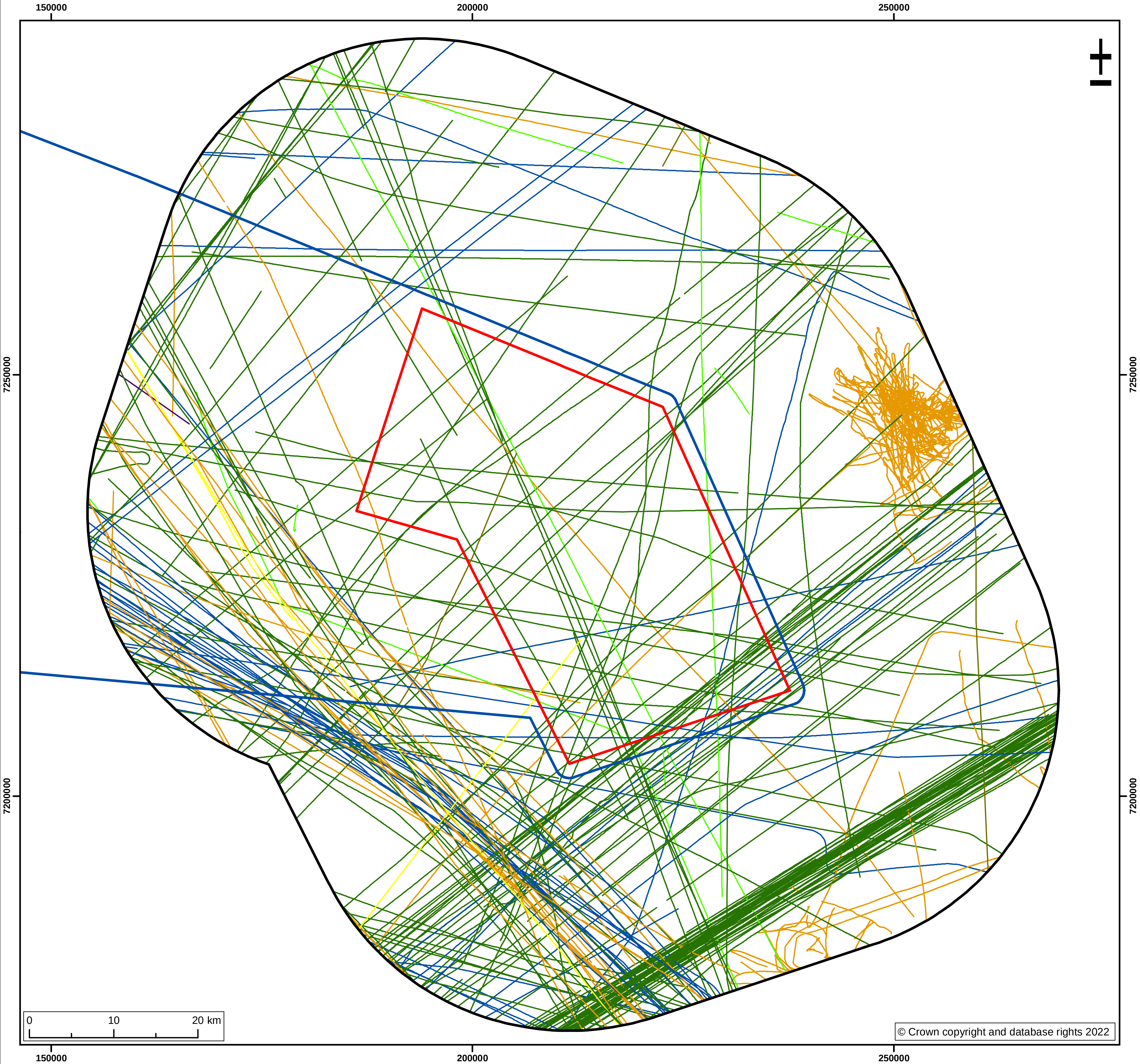
Overview of Shipping and Navigation Array Study Area

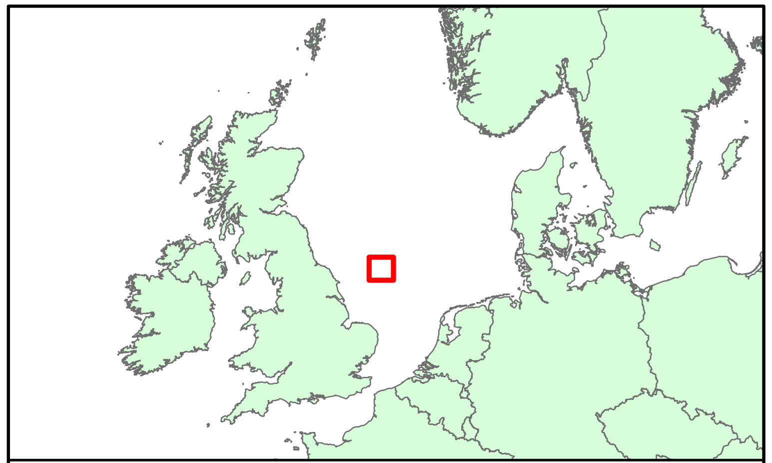
Figure: 2-21 | Drawing No: PB2340-ANA-OF-DB-DR-Z-2-0001

Co-ordinate system: WGS 1984 World Mercator | Page Size: A3 | Scale: 1:600,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report





Legend:

- Dogger Bank South East Offshore Wind Farm
- Dogger Bank South East Shipping and Navigation Study Area
- Offshore Study Area

Vessel Type

- Fishing
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Oil and Gas

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
AN	01	30/06/2022	Initial Draft	DS	AF	SW

Title:

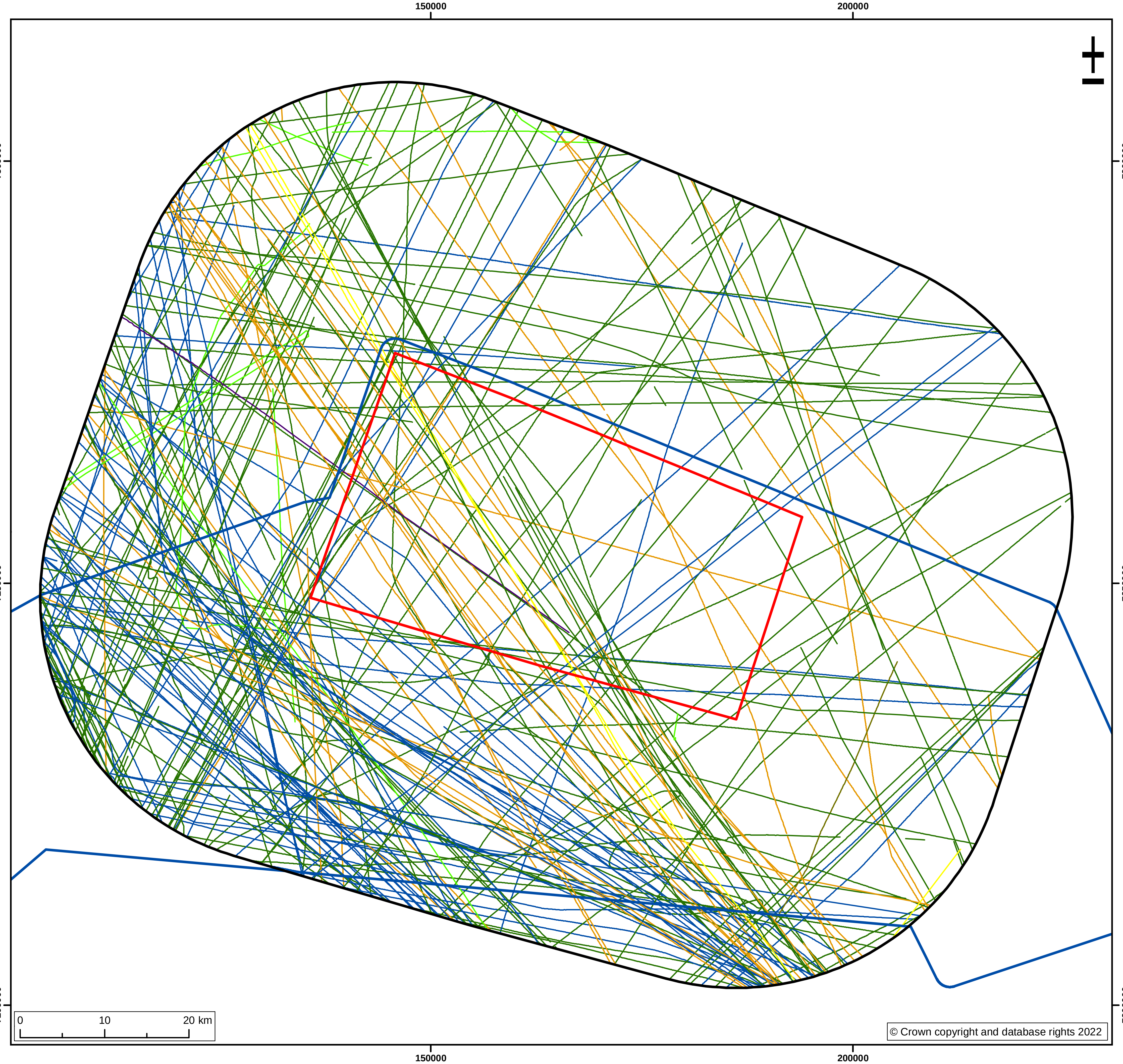
28 Days Marine Traffic Data (July 2021 and January 2022) within Dogger Bank South East Shipping and Navigation Study Area by Vessel Type

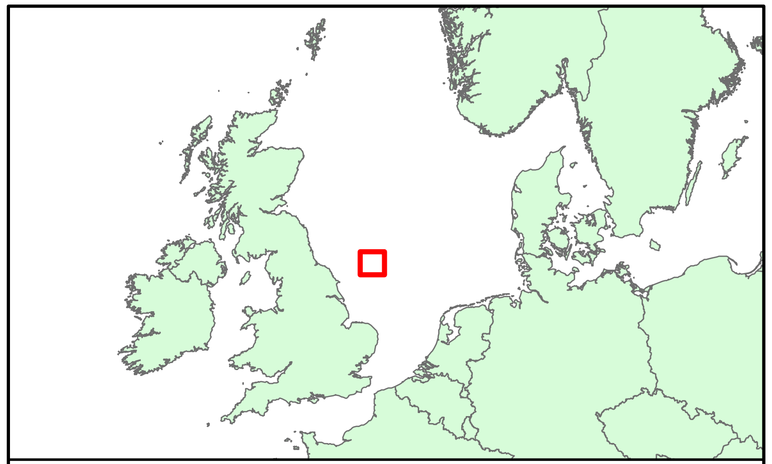
Figure: 2-22 | Drawing No: PB2340-ANA-OFDB-DR-Z-2-0003

Co-ordinate system: WGS 1984 World Mercator | Page Size: A3 | Scale: 1:450,000

Project: Dogger Bank South Offshore WInd Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report





Legend:

- Dogger Bank South West Offshore Wind Farm
- Dogger Bank South West Shipping and Navigation Study Area
- Offshore Study Area

Vessel Type

- Fishing
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Oil and Gas

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
AN	01	30/06/2022	Initial Draft	DS	AF	SW

Title:

28 Days Marine Traffic Data (July 2021 and January 2022) within Dogger Bank South West Shipping and Navigation Study Area by Vessel Type

Figure: 2-23 Drawing No: PB2340-ANA-OFDB-DR-Z-2-0004

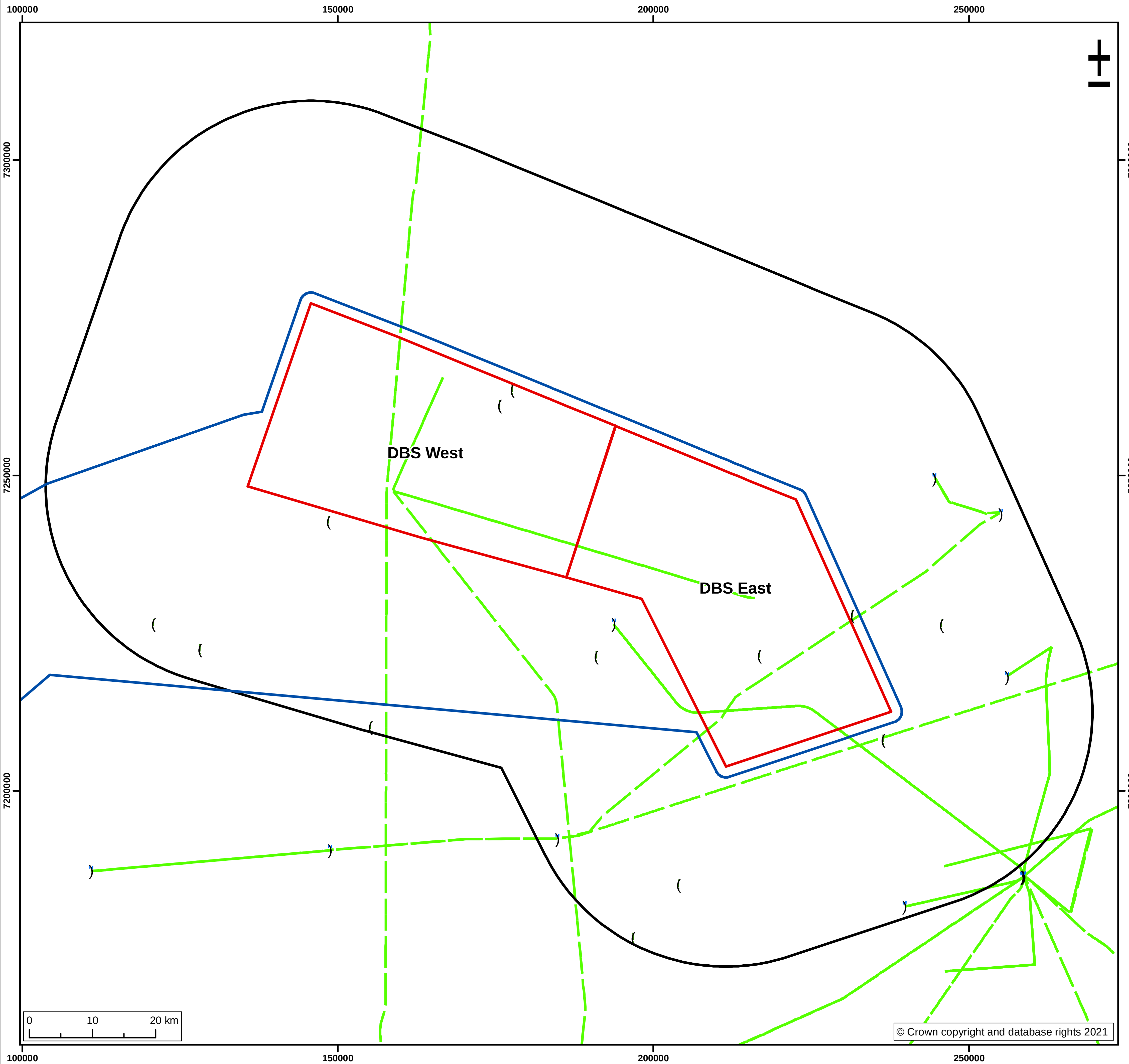
Co-ordinate system: WGS 1984 World Mercator

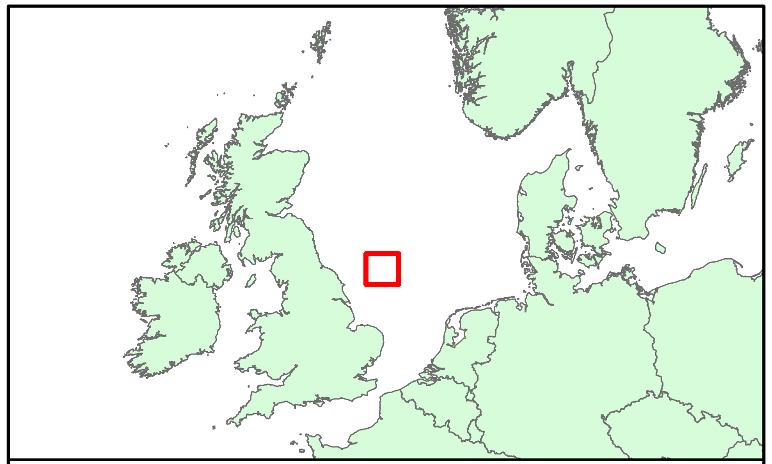
Page Size: A3

Scale: 1:450,000

Project: Dogger Bank South Offshore WInd Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report





Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Shipping and Navigation Study Area

Navigational Features

- Oil and Gas Installation
- Wreck
- Pipeline
- Firing Practice Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
AN	01	30/06/2022	Initial Draft	DS	AF	SW

Title:

Navigational features in proximity to Dogger Bank South Offshore Wind Farms

Figure: 2-24

Drawing No: PB2340-ANA-OF-DB-DR-Z-2-0002

Co-ordinate system: WGS 1984 World Mercator

Page Size: A3

Scale: 1:600,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

2.10.1.3. Vessel Traffic

402. The vessel traffic data collected during the summer 2021 and winter 2022 Automatic Identification System (AIS) survey periods (**Table 2-28**) are shown in **Figure 2-22** and **Figure 2-23**, respectively. The winter 2022 survey period includes the collection of Radar data and visual observations in addition to AIS data; the summer 2021 survey period consists of AIS data only (see section 2.10.2). It is noted that vessels deemed as representing temporary traffic (for example vessels engaged in surveys or involved in construction activities for other offshore wind farm developments) have been removed.

Table 2-28 Average Daily Vessel Count per Array Area and Survey Period

Array Area	Summer Average	Winter Average	Intersecting Average
DBS East	11	10	2
DBS West	10	7	2

403. Traffic in the DBS East shipping and navigation study area primarily consisted of cargo vessels (56%), oil and gas vessels (23%) and tankers (15%) throughout the survey periods while traffic in the DBS West shipping and navigation study area consisted primarily of cargo vessels (52%), tankers (28%) and oil and gas vessels (15%) throughout the survey periods.

404. A large proportion of the commercial cargo traffic within the DBS East shipping and navigation study area was observed transiting in a north-east to south-west direction between Immingham (UK) and Gothenburg (Sweden). A portion of this traffic was noted intersecting the south-eastern extent of DBS East.

405. Tankers were predominantly transiting within the southern sections of the DBS East and DBS West shipping and navigation study areas in a north-west to south-east direction, and overall, to the south of Dogger Bank to avoid shallower water depths.

406. Fishing vessels were typically recorded in transit within both shipping and navigation study areas. 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 for the summer period. Radar data and visual observations to be collected as part of the site-specific vessel traffic survey in summer 2022 (see below for further details) will ensure that such smaller craft are suitably accounted for the in the NRA.

407. No recreational vessel activity was recorded across the survey periods. However, recreational vessel activity may be underrepresented for the summer survey period given AIS carriage requirements, as noted in section 2.10.2.

2.10.1.4. Marine Incidents

408. An analysis of Marine Accident Investigation Branch (MAIB) incident data from 2010 to 2019 indicated that two incidents were recorded within the shipping and navigation study area. One of these was a contact involving an offshore supply vessel with a jack-up rig at the Cygnus gas field with the other an accident to person on board an offshore standby vessel at the Trent gas field.

409. Additional MAIB incident data for the previous 10 years (2000 to 2009) will be considered qualitatively in the NRA noting that maritime safety has improved through the years due to changes in legislation and improved maritime safety.

410. An analysis of Royal National Lifeboat Institution (RNLI) incident data from 2010 to 2019 indicated that one incident was recorded within the shipping and navigation study area, relating to a machinery failure.

411. It is noted these incident levels reflect the distance offshore of the array areas.

2.10.2. Data Sources

412. **Table 2-29** summarises the key data sources used to establish the shipping and navigation baseline in this Scoping Report.

Table 2-29 Existing Datasets

Source	Date	Summary	Coverage
AIS data	2 to 15 July 2021	Marine traffic data covering a 14-day period, collected from satellite and terrestrial receivers.	Shipping and navigation study area (DBS East and DBS West)
AIS, Radar and visual observations data	13 to 27 January 2022	Marine traffic data covering a 14-day period, collected from a dedicated on-site survey vessel.	DBS East shipping and navigation study area
AIS, Radar and visual observations data	28 January to 13 February 2022	Marine traffic data covering a 14-day period, collected from a dedicated on-site survey vessel.	DBS West shipping and navigation study area
Incident data provided by the MAIB	2010 to 2019	Maritime incident data reported to the MAIB including locations, types of incident and types of vessel involved.	Shipping and navigation study area (DBS East and DBS West)

Source	Date	Summary	Coverage
Incident data provided by the RNLI	2010 to 2019	Maritime incident data reported by the RNLI including the locations, types of incident and types of vessel involved.	Shipping and navigation study area (DBS East and DBS West)
Royal Yachting Association (RYA) Coastal Atlas of Recreational Boating (RYA 2019)	2019	Tool for identifying areas of importance to recreational boaters.	National dataset providing coverage in proximity to the UK coast
UKHO Admiralty Charts 266-0 and 1191-0	2021	Admiralty charts and historic mapping relevant to the defined shipping and navigation shipping and navigation study area.	International dataset providing coverage throughout the North Sea
UKHO Admiralty Sailing Directions – NP54 (UKHO 2021)	2021	Pilot book with information on the surrounding area.	International dataset providing coverage throughout the North Sea

413. 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. 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.

414. For PEIR, the ES and NRA, site-specific vessel traffic surveys will be undertaken to ensure non-AIS vessels are characterised suitably in the establishment of the existing environment. The vessel traffic surveys will be compliant with Marine Guidance Note (MGN) 654 (MCA 2021) including a minimum of 28 days of data consisting of AIS, visual observations and Radar data collected across two 14-day periods. One of these 14-day periods is already incorporated into the baseline characterisation for each array area (January/February 2022) and the other will be a summer period (to be undertaken in July and August 2022).

2.10.3. Potential Impacts

2.10.3.1. Embedded Mitigation Measures

415. 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 DCO or deemed Marine Licences.

416. The following are considered relevant embedded mitigation measures for shipping and navigation:

- 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 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 where practicable.
- Ongoing liaison with fishing fleets will be maintained during construction, maintenance and decommissioning operations via an appointed Fisheries Liaison Officer.
- Monitoring of vessel traffic will be undertaken for the duration of the construction period and during the first three years of the operational 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 during construction, maintenance and decommissioning phases.
- Where appropriate, guard vessels will be used to ensure adherence with Safety Zones or advisory passing distances.
- Where cable protection is required, MGN 654 will be adhered to with respect to changes greater than 5% to the water depth in consultation with the MCA and Trinity House.
- Lights, marks, sounds, signals and other aids to navigation will be exhibited as required by Trinity House, MCA and the Civil Aviation Authority (CAA) including a buoyed construction area around the array.
- The Projects will ensure that local Notifications to Mariners are updated and reissued regularly during construction activities and at least five days before any planned operations and maintenance works and supplemented with Very High Frequency radio broadcasts agreed with the MCA in accordance with the construction and monitoring programme approved under the relevant Deemed Marine Licence condition.
- Layout Plans (including cables) for the Projects will be agreed with the MMO following appropriate consultation with Trinity House and the MCA setting out proposed details of the Projects.
- Aids to Navigation Management Plans for the Projects will be agreed with Trinity House.

- The Projects will ensure compliance with MGN 654 and its annexes, where applicable, including completion of a SAR 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 (COLREGs) (IMO, 1972/77) and the International Convention for the Safety of Life at Sea (IMO, 1974).
- There will be a minimum blade tip clearance (air draft height) of at least 22m above MHWS in line with the recommendations in MGN 654.
- There will be appropriate marking on UKHO admiralty charts.

2.10.3.2. Potential impacts during construction, operation and decommissioning

417. The potential impacts on shipping and navigation are summarised in **Table 2-30**.

418. No matters relating to construction, operation and maintenance, or decommissioning have been scoped out at this stage. This approach takes into account that MGN 654 (MCA 2021) requires that all hazards listed within **Table 2-30** are given due consideration in the NRA, the technical assessment feeding into the EIA.

2.10.3.3. Cumulative Effects

419. Cumulative effects on shipping and navigation resulting from the impacts of the Projects and other developments will be assessed in accordance with the guidance and methodologies set out in section 2.10.4, with all effects assessed for the Projects in isolation considered on the cumulative level.

420. The developments included in the assessment of cumulative effects 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 Projects and data confidence. Given that, as of March 2022, offshore construction for Dogger Bank A has commenced, this development will be considered as part of the baseline assessment.

2.10.3.4. Transboundary Effects

421. Given the location of the Projects in the southern North Sea, there is the potential for transboundary effects upon shipping routes which transit to/from EEA States. Transboundary effects will therefore be considered in the EIA noting that consultation is undertaken by the Planning Inspectorate.

2.10.3.5. Summary of scoping proposals

422. **Table 2-30** summarises the potential impacts to be scoped into the EIA.

Table 2-30 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Shipping and Navigation Assessment

Potential Impact	Construction	Operation	Decommissioning
Displacement of vessels	✓	✓	✓
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	✓	✓	✓
Increased vessel to vessel collision risk between third-party vessels	✓	✓	✓
Vessel to structure allision risk	×	✓	×
Reduction of under keel clearance	×	✓	×
Increased anchor interaction with subsea cables	×	✓	×
Interference with marine navigation, communications and position fixing equipment	×	✓	×
Reduction of emergency response provision including SAR capability	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓

423. Impacts will be considered on a base case and future case basis, where the future case incorporates conservative assumptions of a general 10 percent and 20 percent increase in vessel traffic numbers within the shipping and navigation study area. This is aligned with the approach taken to determining the future case scenario in the NRA for other UK offshore wind farm developments.

424. All potential impacts identified will be considered further as more details of the Projects' design becomes available and more baseline data is collected and analysed. No matters or aspects are being scoped out at this stage noting that MGN 654 (MCA 2021) requires that all hazards are given due consideration in the NRA, the technical assessment feeding into the EIA.

2.10.4. Approach to Impact Assessment

425. 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. Prior to any assessments being undertaken, the methodology will be agreed at a high level with the MCA and Trinity House.

426. Additionally, the Scoping Opinion will be used to inform the NRA.

427. The key guidance document that will be considered within the shipping and navigation aspect of the EIA is 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 2021);
- IALA Guideline G1162 The Marking of Offshore Man-Made Structures (IALA 2021);
- MGN 372 Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA 2008); and
- The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA 2019).

428. As per the MCA methodology (Annex 1 to MGN 654), the NRA will assess the hazards to shipping and navigation users in line with the IMO FSA methodology (IMO 2018).

429. 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 (impact) in terms of its frequency and consequence in order that the significance of risk (effect) 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 approach.

430. 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 and agreed at the Hazard Workshop with stakeholders. The risk ranking matrix is illustrated in **Table 2-31**.

Table 2-31 Risk Ranking Matrix

	Frequency					
Consequences		Negligible	Extremely Unlikely	Remote	Reasonably Probable	Frequent
	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

431. 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 survey;
- Consideration of embedded mitigation measures;
- Lessons learnt from other offshore wind farm developments;
- Level of stakeholder concern;
- Consultation output; and
- Expert opinion.

432. The following statutory and non-statutory organisations deemed relevant to shipping and navigation will be included in further 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; and
- Local fishing representatives.

2.11. Aviation and Radar

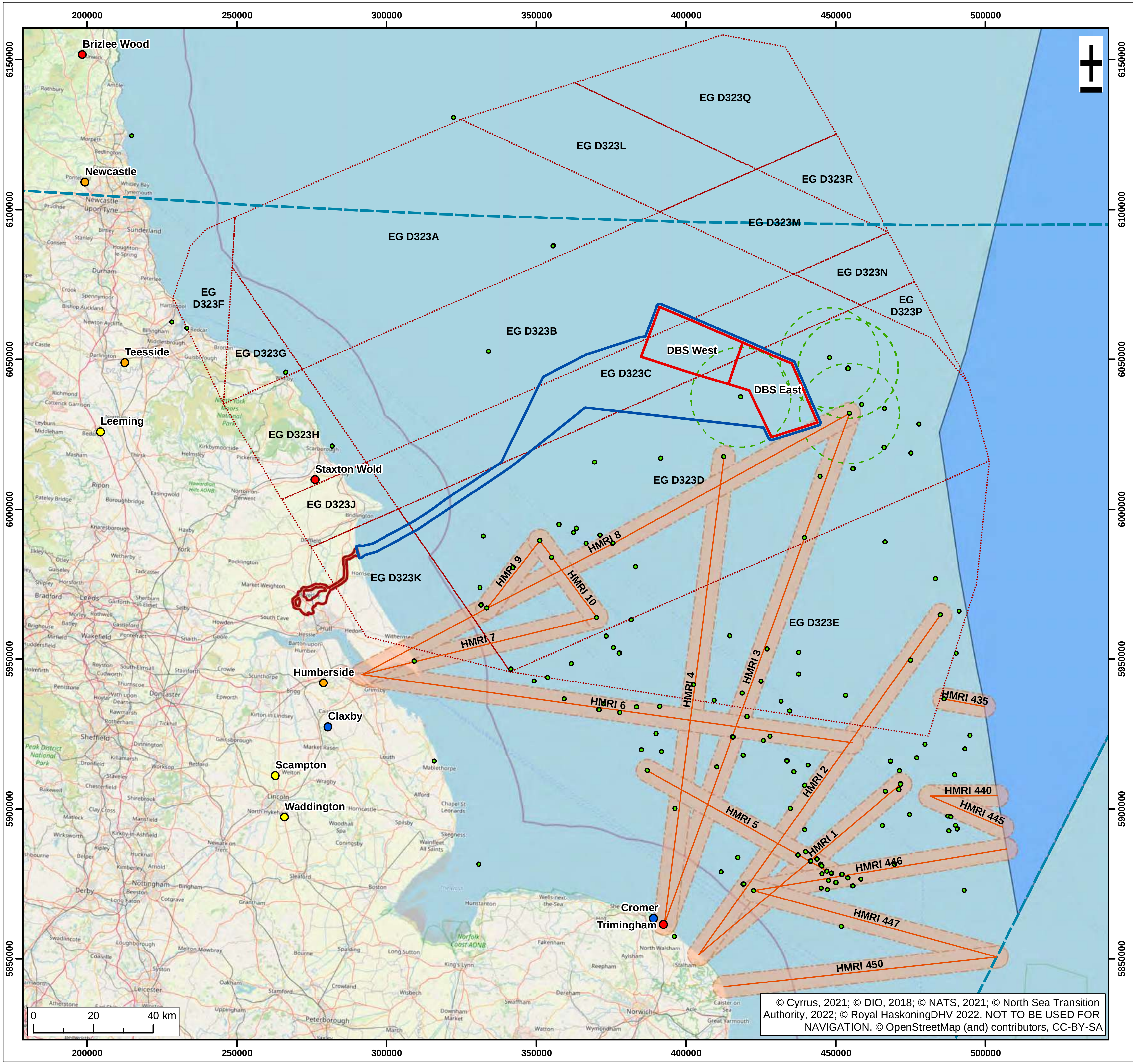
433. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on aviation and radar.

The following questions are posed to consultees to help them frame and focus their response to the aviation and radar scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on aviation and radar resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.11.1. Existing Environment

434. **Figure 2-25** presents an overview of the existing environment for aviation and radar. The following sections provide further detail on civil aviation, military aviation, helicopter main routeing indicators and offshore helidecks.



Legend:
- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Southern Managed Danger Area
- North Sea Area V
- London Flight Information Region Boundary
- Offshore Platforms Within 9NM
- Helicopter Main Routing Indicators (HMRI) 2NM Consultation Buffer
- Helicopter Main Routing Indicators (HMRI)
- Air Defence Radars
- Civil Airports
- Military Airfields
- NERL Radars
- Oil & Gas Surface Infrastructure

A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	12/05/2022	Suitable for Review & Comment	LB	JF	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Aviation & Radar Study Area

Figure: 2-25 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0224

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:1,250,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

Royal HaskoningDHV Enhancing Society Together

RWE

2.11.1.1. Civil Aviation

435. The UK airport nearest to the proposed Projects is Humberside International Airport, which is approximately 152km from the array areas. The second nearest UK airport is Teesside International, which is approximately 172km away. Both airports are equipped with primary surveillance radars. Wind turbines within the array areas would be significantly beyond the ranges at which they could have any impact on the operation of these radar facilities.

436. The nearest major European Airport is Schiphol Airport, Netherlands approximately 290km from the wind farm sites. This airport is also beyond the range at which it could be impacted by wind turbines within the array areas.

437. The airspace above and adjacent to the array areas is used by civil and military aircraft and lies within the London Flight Information Region (FIR) for air traffic control, the airspace regulated by the UK CAA. 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. The boundary of the London FIR with the Amsterdam FIR (regulated by the Netherlands Aviation Authority) lies 134km to the east at its nearest point, although a portion of UK FIR airspace is delegated to the Netherlands, North Sea area V, which lies approximately 40km east of the array areas.

438. NATS (En Route) plc (NERL) provides en-route civil air traffic services within the London FIR, except in areas such as area V, where responsibility for air traffic services has been formally delegated to the Netherlands. NERL operate a network of radar facilities which provide en route information for both civil and military aircraft. The closest NERL radars to the array areas are based at Claxby, 162km to the south-west, Cromer, 165km to the south, and Great Dun Fell, 237km to the west.

439. Preliminary analysis undertaken for the Projects indicates that wind turbines would not be within radar line of sight of these radars and therefore also any other civil radar. Consequently no civil radars have been identified as being potentially impacted by wind turbines within the array areas.

2.11.1.2. Military Aviation

440. The nearest primary radar-equipped military airfield to the proposed Projects is Royal Air Force Leeming, which is approximately 182km from the nearest point of the array areas. Wind turbines within the array areas would be significantly beyond the ranges at which they could have any impact on the operation of this radar facility.

441. The nearest Ministry of Defence air defence radars to the array areas are based at Remote Radar Head (RRH) Staxton Wold, 116km to the west, RRH Trimingham, 167km to the south, and RRH Brizlee Wood, 210km to the north-west.

442. Preliminary analysis undertaken for the Projects indicates that wind turbines in parts of the DBS West array area would be within radar line of sight of the Staxton Wold radar. No other military radars have been identified as being potentially impacted by wind turbines within the array areas.

443. The array areas lie within the Southern Managed Danger Area (MDA), one of four MDA complexes in UK airspace that provide segregated airspace for military flying training. Specifically, the array areas lie beneath danger areas EGD323B, EGD323C and EGD323D which, when activated, each have vertical limits from FL50 (approximately 5,000ft AMSL) up to FL660 (approximately 66,000ft AMSL).

2.11.1.3. Helicopter Main Routeing Indicators

444. 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 (HMRIs). These routes have no lateral dimensions, however there should be no obstacles within 2NM of the route centreline. HMRI 8 passes within 2NM of the south-eastern corner of the DBS East array area. The CAA publication Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines (CAA 2016) states that planned obstacles within 2NM should be consulted upon with helicopter operators and the Air Navigation Service Provider.

2.11.1.4. Offshore Helidecks

445. To help achieve a safe operating environment, a 9NM consultation zone for planned obstacles exists around offshore helicopter destinations. There are six platforms within 9NM of the DBS array areas: Cavendish, Cygnus Alpha (three platforms), Cygnus Bravo, and Munro. As stated in CAP 764, this 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.

2.11.2. Data Sources

446. 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 2-32**.

Table 2-32 Existing Datasets

Source	Summary
CAP 032: UK AIP (CAA 2022)	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 2021)	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 (CAA 2021)	Sets out the Rules of the Air and includes the application of lighting to wind turbines in UK territorial waters (articles 222 and 223).

Source	Summary
UK Military AIP (MOD 2022)	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.
MCA Marine Guidance Note (MGN) 654: Safety of Navigation: OREIs – 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.

2.11.3. Potential Impacts

2.11.3.1. Potential impacts during construction

447. Potential impacts on civil and military aviation and radar during the construction phase are associated with:

- The presence of tall crane vessels and partially constructed structures increasing the risk of collision with low-flying aircraft;
- Extending aircraft routeing to avoid obstructions; and
- Temporary interference on Staxton Wold military radar.

448. These construction impacts have been scoped in. Impacts on all other civil and military radars have been scoped out.

2.11.3.2. Potential impacts during operation and maintenance

449. Wind turbines have the potential to affect civil and military aviation (fixed-wing and helicopters), either through their physical dimensions limiting access and affecting safeguarding or safe passage, or through their effects on radar systems. Potential impacts on civil and military aviation and radar during operation are associated with:

- The presence of wind turbines increasing the risk of collision with low-flying aircraft;
- Extending aircraft routeing to avoid obstructions; and
- Permanent interference on Staxton Wold military radar.

450. These operational impacts have been scoped in. Impacts on all other civil and military radars have been scoped out.

451. Helicopter traffic as a result of planned activities in support of the Projects, if required, will raise the overall level of air traffic in the area and increase the likelihood of aircraft-to-aircraft collision. This impact has been scoped in.

2.11.3.3. Potential impacts during decommissioning

452. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

453. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.11.3.4. Potential cumulative impacts

454. The cumulative assessment will consider the impacts in combination with other offshore wind farms and associated aviation activities, including increased collision risk and cumulative impacts on radar.

2.11.3.5. Potential transboundary impacts

455. The airspace around the array areas is used by international civil aviation and is adjacent to the Amsterdam FIR. The potential impacts on international use of the airspace will therefore be considered.

2.11.3.6. Summary of scoping proposals

456. **Table 2-33** summarises the potential impacts to be scoped into the EIA.

Table 2-33 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Aviation and Radar assessment

Potential impact	Construction	Operation	Decommissioning
Impacts on Staxton Wold military radar system	✓	✓	✓
Creation of an aviation obstacle environment for civil and military aircraft	✓	✓	✓
Increased air traffic in the area related to wind farm activities	✓	✓	✓
Cumulative impacts on Staxton Wold military radar system	✓	✓	✓
Cumulative creation of an aviation obstacle environment for civil and military aircraft	✓	✓	✓
Cumulative increased air traffic in the area	✓	✓	✓
Transboundary impacts	✓	✓	✓

2.11.4. Approach to Impacts Assessment

457. The EIA process will be supported by further desk-based studies, including radar line of sight modelling, that will identify and examine in greater detail sensitive aviation and radar 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, allowing for any concerns that are raised to be considered in the wind farms design optimisation process.

2.12. Infrastructure and Other Users

458. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on infrastructure and other users.

The following questions are posed to consultees to help them frame and focus their response to the infrastructure and other users scoping exercise which will in turn inform the Scoping Opinion:

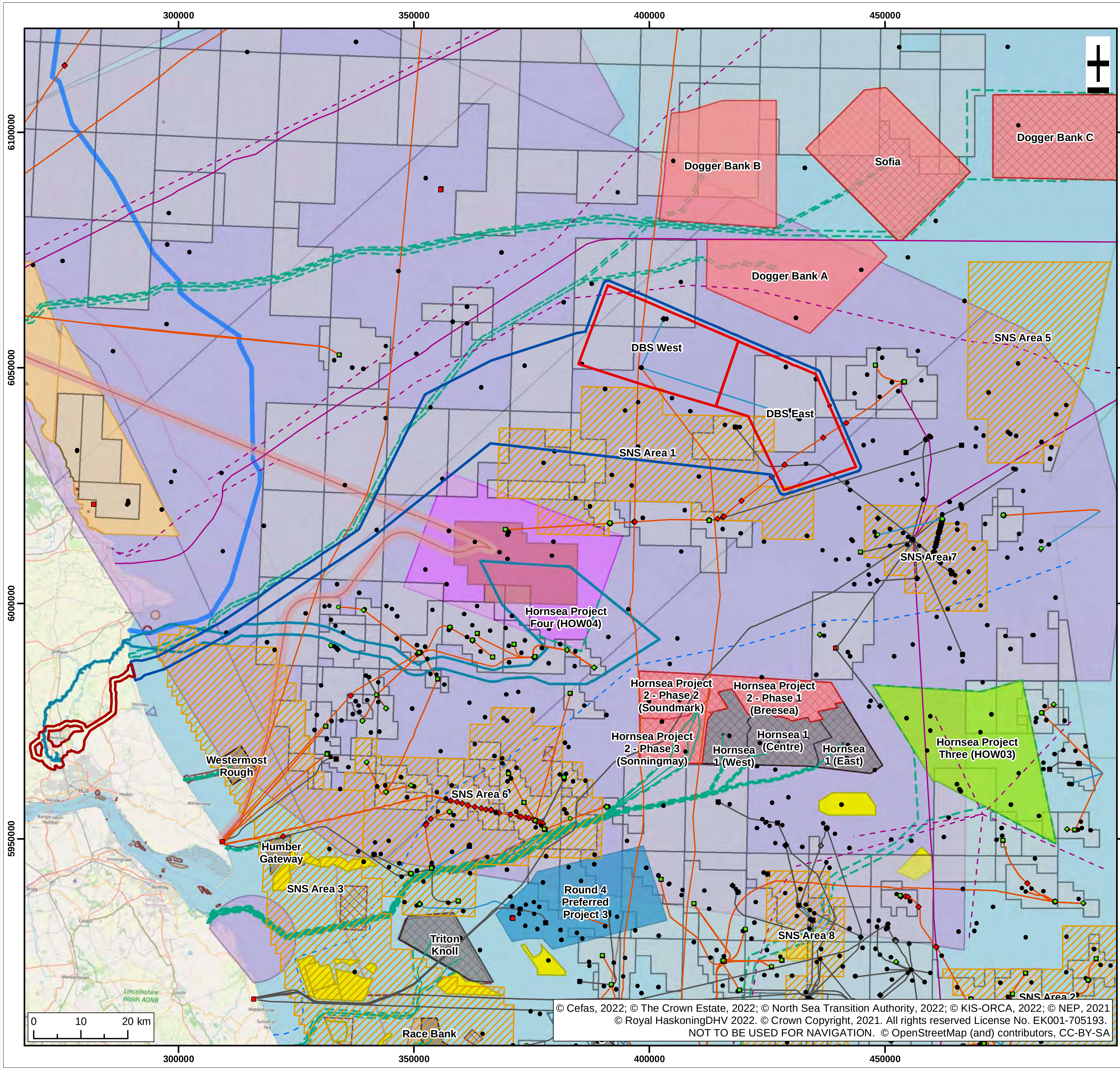
- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on infrastructure and other users resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.12.1. Existing Environment

459. This section considers interactions with other plans/projects within an area which has the potential to be affected by the Projects. This includes industries not already covered as EIA topics in their own right, such as Commercial Fisheries (section 2.9), Shipping and Navigation (section 2.10) and Aviation and Radar (section 2.11).

2.12.1.1. Offshore wind infrastructure

460. Offshore wind developments in the vicinity (50km buffer) of the array areas are summarised in **Table 2-34** and shown on **Figure 2-26**.



Legend:

Dogger Bank South Offshore Wind Farms
Offshore Study Area
Onshore Study Area
Offshore Subsurface Mining Site

Other Offshore Wind Farms
Pre-planning Application
Round 4 Preferred Projects
Consented
Under Construction
Active/In Operation
HOW04 Application Boundary
Offshore Wind Farm Export Cable
Offshore Wind Export Cable Corridor

Marine Aggregate Site
Exploration and Option Area
Production Agreement Area

Marine Disposal Sites
Closed
Disused
Not 4 waste disposal
Open
Carbon Capture Storage Site
Carbon Capture Storage Licence Round

Northern Endurance CCS Project
Geological Store
Proposed Corridor
Proposed Route

PEXA Danger Area
PEXA Non Danger Area
Oil & Gas Licence Block

Wells
Abandoned/Plugged
Completed
Drilling

Surface Infrastructure
Abandoned
Active
Not in Use

Sub-surface Infrastructure
Abandoned
Active
Not in Use
Removed

Pipeline
Abandoned
Active
Not in use

Submarine Cable
Telecommunication Cable
Out of Use Cable
Viking Link Interconnector
Proposed Interconnector

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	06/05/2022	Suitable for Review & Comment	LB	BH	HC

Title:

Other Marine Users

Figure: 2-26 Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0225

Co-ordinate system: WGS 1984 UTM Zone 31N
Page Size: A3
Scale: 1:800,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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Table 2-34 Offshore Wind Farm Projects Within 50km of the Array Areas

Offshore Wind Farm	**Distance from the Projects (km)**	
	DBS West	DBS East
Dogger Bank A (under construction)	8	7
Dogger Bank B (under construction)	17	25
Sofia (pre-construction)	37	34
Hornsea Two (under construction)	Over 50km	40
Hornsea Four (pre-construction)	42	41
Hornsea One (in operation)	Over 50km	44
Hornsea Three (pre-construction)	Over 50km	46

461. Offshore wind farm export cables and corridors within the Offshore Study Area are listed with their status in **Table 2-35** and shown on **Figure 2-26**.

Table 2-35 Offshore Wind Farm Projects Export Cables Within the Offshore Study Area

Offshore Wind Farm	**Wind Farm Status**
Dogger Bank A	Under Construction
Dogger Bank B	Under Construction
Sofia	Pre-construction
Dogger Bank C	Pre-construction
Hornsea Four	Pre-construction

2.12.1.2. Oil and gas infrastructure

462. The nearest oil and gas infrastructure is associated with the Cavendish, Gordon and Esmond gas fields. There is no surface infrastructure in the arrays areas. The nearest platform (Cavendish) is 3km west of DBS East, this platform ceased production in August 2018 and was approved for decommissioning in June 2020 (Offshore Petroleum Regulator for Environment and Decommissioning 2021). Decommissioning activities for Cavendish are scheduled to conclude in 2024 (Lepic 2020).

463. There are no active wells in or adjacent to the array areas (**Figure 2-26**). There is an active wellhead in DBS West, however all wells within the array areas are abandoned/plugged. Within 15km of DBS East, there are three active subsurface infrastructures (one wellhead and two manifolds).

464. Within the Offshore Study Area there are five active pipelines that contain either natural gas or methanol. Pipelines that run through the array areas are listed in **Table 2-36** and displayed in **Figure 2-26.** In addition, the active Langeled gas pipeline (UK to Norway) crosses the Projects' export cable corridor approximately 47km offshore from the coastline.

Table 2-36 Pipelines Within Array Areas

Project	Pipeline	Material	Status
DBS West	Shearwater to Bacton	Gas	Active
	Esmond to Bacton		Active
	Esmond to Forbes		Abandoned
DBS West / DBS East	Esmond to Gordon		Abandoned
DBS East	Cygnus to ETS		Active
	Cavendish		Active
	Cavendish	Methanol	Active

465. Both Projects overlap with several oil and gas blocks licensed for exploration and production as listed in **Table 2-37**.

Table 2-37 Licensed Blocks That Overlap With the Array Areas

Project	Licence Blocks
DBS West	43/7; 43/8; 43/12a, b; 43/13b; 43/14a,b
DBS East	43/15; 43/19a; 43/20b; 44/11d

2.12.1.3. Subsea cables

466. One disused subsea cable (UK-Germany 6) transits through DBS West, with no existing cables in DBS East. The proposed Eastern Link 2 HDVC power cable route falls is located approximately 2km north of offshore export cable route for the Projects.

2.12.1.4. Carbon Capture Storage

467. Located adjacent to the Offshore Study Area is the proposed site of Northern Endurance Carbon Capture Storage (CCS) Project. Associated pipelines of the Northern Endurance CSS project are proposed to run from Redcar, Teesside and from Easington, Hull. Installation of the pipelines and seabed infrastructure for the project is scheduled to commence in 2024, with the first CO_2 injection anticipated to take place in 2026 (Xodus 2021). At time of writing the Projects export cable corridor would cross the intended pipeline route for Northern Endurance CSS.

468. In addition, a new leasing round opened by the North Sea Transition Authority in June 2022 includes areas of seabed overlapping with the array areas and offshore study area (see **Figure 2-26**).

2.12.1.5. Marine aggregates and mining

469. There are no licenced aggregate production areas or active subsurface mining sites within the Offshore Study Area.

2.12.1.6. Dumping and disposal sites

470. There are no dumping or disposal sites located within the Offshore Study Area.

2.12.1.7. Ministry of Defence activities

471. The following Practice and Exercise Areas encompass the Offshore Study Area:

- D323B;
- D323C;
- D323D; and
- D323F.

472. These sites are designated as RAF Danger Areas for Air Combat Training and High Energy Manoeuvres between 5,000 and 66,000 ft.

473. As a result of both World War 1 and World War 2, there is also potential for UXO within the Offshore Study Area and in the wider southern North Sea region. Locations of any UXO would be determined post-consent, with mitigation for any detonation activity required agreed in consultation with Natural England, JNCC and MMO.

2.12.2. Data Sources

474. The infrastructure and other users assessment will be informed by the latest Geographical Information Systems (GIS) datasets including but not limited to:

- Marine disposal sites (Cefas 2021);
- Offshore wind farms and associated export cables (The Crown Estate 2021);
- Marine aggregate sites (The Crown Estate 2021);
- Military Practice and Exercise Areas (PEXA) (Marine ThemesForest 2021);
- Wells (Oil & Gas Authority 2021);
- Surface infrastructures (Oil & Gas Authority 2021);
- Subsurface infrastructures (Oil & Gas Authority 2021);
- Pipelines (Oil & Gas Authority 2021); and
- Submarine cables (KIS-ORCA 2021).

475. Where there is potential for interactions with other users, RWE will liaise with the relevant infrastructure owners/operators.

2.12.3. Potential Impacts

2.12.3.1. Potential impacts during construction

476. Installation of cables or foundations has the potential to impact on other marine infrastructure and users if they are within the construction footprint or adjacent to it. This could be through pathways such as limiting access to other vessels, requirement for cable crossings and reduction in available area for other users. The following impacts are scoped in:

- Potential interactions with other wind farms;
- Potential interactions with oil and gas operations and decommissioning activities;
- Interactions with subsea cables and pipelines; and
- Impacts on MoD activities.

2.12.3.2. Potential impacts during operation and maintenance

477. Operations and maintenance activities have the potential to impact projects within or adjacent to the Offshore Study Area. These include the following:

- Potential interactions with other wind farms;
- Potential interactions with oil and gas operations and decommissioning activities;
- Physical impacts on subsea cables and pipelines;
- Impacts on disposal sites; and
- Impacts on MoD activities.

2.12.3.3. Potential impacts during decommissioning

478. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

479. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.12.3.4. Potential cumulative impacts

480. Potential impacts of the Projects on infrastructure and other users are expected due to the considerable amount of infrastructure both within, and in close proximity to, the Offshore Study 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 agreements or similar). All other parties (i.e. another wind farm operator) that interact with the same receptor will also need to demonstrate no impact or agree mitigation. Therefore, it is anticipated that there will be no pathways for cumulative impacts. It is proposed that these impacts are scoped out.

2.12.3.5. Potential transboundary impacts

481. The only potential transboundary receptors within the array areas and export cable corridor are the disused UK-Germany 6 subsea cable that routes through the DBS West array area and the active Langeled gas pipeline that routes through the Projects export cable corridor. As any potential impacts to these assets will be covered in the assessments outlined above, so there will be no need for a separate transboundary assessment to be undertaken.

2.12.3.6. Summary of scoping proposals

482. **Table 2-38** outlines the potential impacts which are proposed to be scoped in to the EIA.

Table 2-38 Summary of Impacts to be Scoped In (✓) and Out (×) for the Infrastructure and Other Users Assessment

Potential Impact	Construction	Operation	Decommissioning
Potential interference with other wind farms	✓	✓	✓
Potential interference with oil and gas operations including decommissioning activities	✓	✓	✓
Physical impacts on subsea cables and pipelines	✓	✓	✓
Impacts on aggregate dredging activities	×	×	×
Impacts on MoD activities	✓	✓	✓
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×

2.12.4. Approach to Impact Assessment

483. RWE will undertake consultation with all relevant developers, operators and marine users within the vicinity of the Projects to establish any concerns relating to the Projects. 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.

484. The EIA will be based on existing data and information gathered through consultation. The EIA will focus on the Projects and consider infrastructure or users that overlap with those boundaries. The assessment will consider agreed or best practice mitigation.

2.13. Offshore Archaeology and Cultural Heritage

485. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on offshore archaeology and cultural heritage. Onshore archaeology and cultural heritage (landwards of MHWS) are assessed in section 3.5.

The following questions are posed to consultees to help them frame and focus their response to 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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on offshore archaeology and cultural heritage resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

2.13.1. Existing Environment

486. The Projects are within an area of high prehistoric archaeological significance. Within this area, archaeological and palaeoenvironmental evidence related to human occupation of the UK may be preserved.

487. The area is part of the wider prehistoric landscape of the North Sea which, at several times in the past, has been 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. This can be used to develop an understanding of the wider natural environment within which early humans lived.

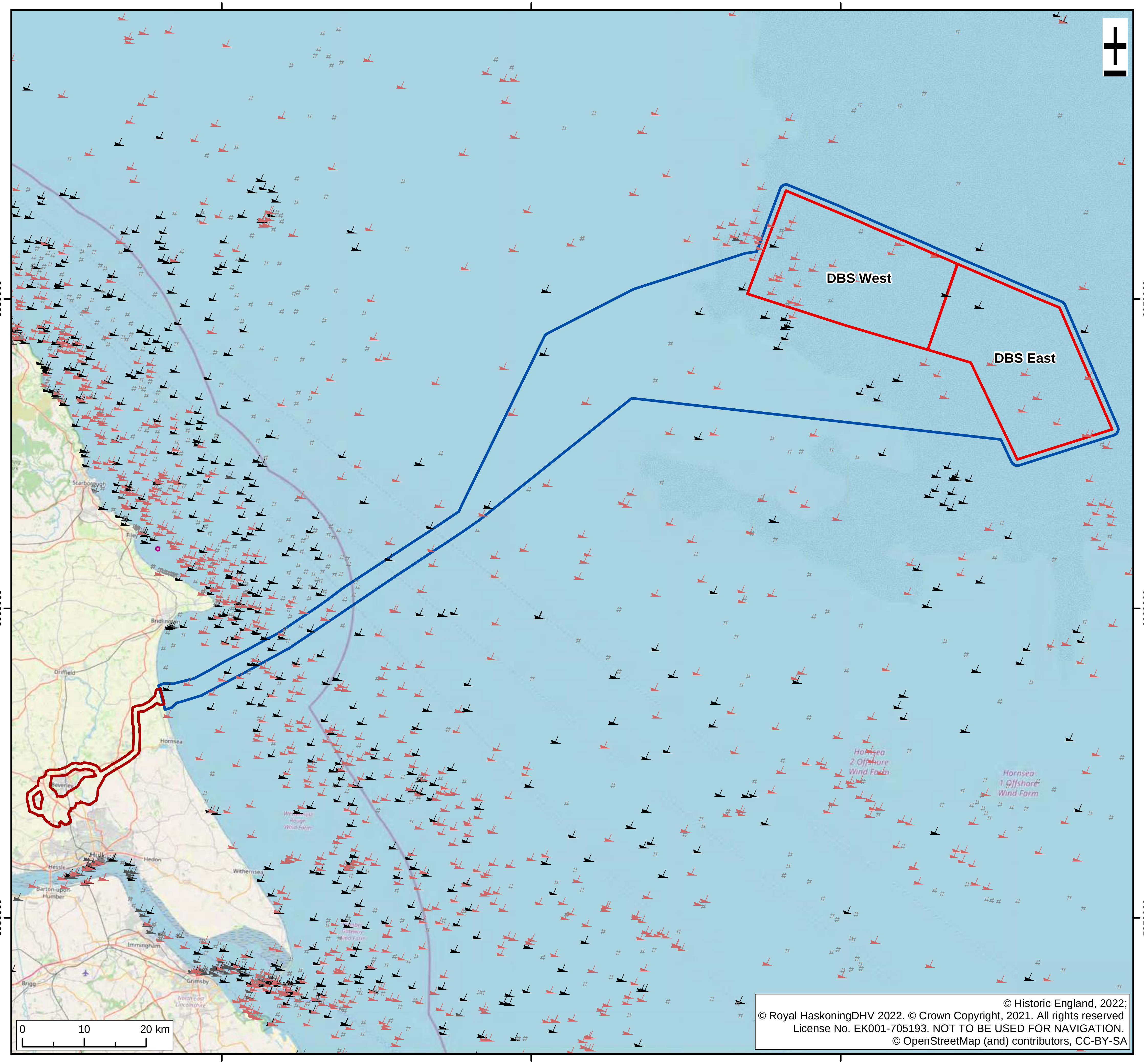
488. In recent years, the archaeological assessment of marine geophysical and geotechnical data acquired for constructed and planned projects in the Dogger Bank area of the North Sea have led to a much greater understanding of the potential for prehistoric, maritime and aviation archaeology. For example, assessment undertaken for the Dogger Bank Wind Farms (A, B and C) and the Sofia Offshore Wind Farm, have demonstrated the presence of palaeolandscape features and sub-seabed deposits of palaeoenvironmental interest.

489. Combined with targeted archaeological investigations, such as the use of Remote Operated Vehicles to ground truth geophysical anomalies, this data has led to the identification of multiple new sites and finds within offshore contexts. Through this process, several wrecks and seabed features of potential archaeological interest within the boundaries of these offshore wind farms have also identified.

490. Within the Offshore Study Area there are no nationally important wrecks protected under the Protection of Wrecks Act 1973.

491. There is high potential for other wrecks, wreck remains, aircraft and aircraft remains to be present within the Offshore Study Area. There are a large number of UKHO records within the Offshore Study Area, with the highest concentrations towards land. Most of these records are likely wreck related, but others are possibly related to aviation losses (**Figure 2-27**).

492. Within the DBS West array area there are 22 UKHO records two of which are ‘dead’. Eight are recorded within the DBS East array, one of which is ‘dead’. Within the possible offshore export cable corridor there are 52 UKHO records, 29 of which are ‘dead’. ‘Dead’ wrecks are wrecks which have not been identified since their loss and so are presumed not to exist.



Legend:

- Dogger Bank South Offshore Wind Farms
- Offshore Study Area
- Onshore Study Area
- Protected Wreck
- Live Wreck
- Dead Wreck
- Lifted Wreck
- Obstruction

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	07/07/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	LB	GSP	HC

Title:

Recorded Losses

Figure: 2-27 | Drawing No: PB2340-RHD-OF-ZZ-DR-Z-0226

Co-ordinate system: WGS 1984 UTM Zone 31N | Page Size: A3 | Scale: 1:625,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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493. The coastline and adjacent offshore area have changed significantly since the prehistoric period. Studies suggest that the coastline may have receded by at least 6km since the Bronze Age (Humber Field Archaeology 2008). As such, this area could also have been exposed as dry land in the past suggesting there could be potential for submerged palaeolandscapes.

494. The Holderness coast has undergone significant retreat, most notably from the thirteenth century to sixteenth century (Fulford *et al.* 1997). Therefore, there is potential for lost settlements to exist off this coastline within the Offshore Study Area close to the possible landfall locations. There are three former settlements recorded within the study area by the HER comprising the lost settlements of Cleeton, Withow and Hyde.

495. There is also potential for submerged archaeology in the intertidal zone due to the high rate of erosion including prehistoric submerged forest and lost villages.

496. It is also of note that there is high potential for wetland archaeological sites on the foreshore and under the coastal cliffs in the study area (Maritime Archaeology 2009).

497. Similarly, the remains of coastal defences related to WWI and WWII are likely to be present within the intertidal zones of the possible landfall locations. A large proportion of records identified during assessment undertaken for Dogger Bank A & B Offshore Wind Farms were WWII defensive structural remains.

498. Within the intertidal zone of the possible landfall locations there are 34 HER records. These comprise:

- Four prehistoric find spots (worked flint, pottery and animal remans including auroch horns and a mammoth tusk);
- A find spot of a Roman coin hoard;
- Seven records of ditches or pits seen in the cliff face (five undated and two suggested as Medieval or Post-medieval in date);
- The location of a former fish weir;
- 21 WW2 records comprising defensive structures, an observation post and the site of a training camp.

499. There is therefore potential for similar, undiscovered remains to be within the intertidal zone at the possible landfall locations.

500. The potential receptors that may be present within the Offshore Study 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.

2.13.2. Data Sources

2.13.2.1. Data Sources

501. 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 2-39**.

Table 2-39 Existing Datasets

Data source	Data contents
UKHO	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. GIS data for all Protected Wrecks, Scheduled Monuments, Listed Buildings, Registered Parks and Gardens and Registered Battlefields.
Relevant Historic Environment Record (HER) (The Humber HER)	Contains data on all recorded non-designated heritage assets, held by the Humber Archaeology Partnership. The data includes archaeological, historic landscape and historic building information. Information on previous events (archaeological surveys and investigations) will also be obtained.

Data source	Data contents
BGS	Historic borehole logs and the wider geological background for the region.
National Historic Seascape Characterisation	GIS data and character texts for the Historic Seascape Character (HSC) of coastal and marine areas around England, mapped through a series of projects funded by Historic England and consolidated into a single national database.
Existing archaeological studies and published sources	Background information on the archaeology of the North Sea and Dogger Bank, including the results of archaeological assessments carried out for Dogger Bank Wind Farm and Sofia Offshore Wind Farm and recent work undertaken in the wider North Sea. Background information relating to submerged landscapes and lost villages.

502. In addition to the data presented in Table 2-39, the data presented in Table 2-40 will be collected for the assessment.

Table 2-40 Site-Specific Survey Data

Data Set	Source	Year Survey/Timings
Geophysical Survey	Array areas and offshore export cable corridor	To be completed in 2022

503. The marine geophysical survey data which will be acquired to inform the EIA during 2022 will be subject to archaeological assessment by a qualified and experienced archaeological contractor. This is in accordance with industry good practice set out in available guidance such as Marine Geophysics Data Acquisition, Processing, and Interpretation (Historic England 2013).

504. The data acquired will consist of Side Scan Sonar (SSS), Sub Bottom Profiler (SBP), Magnetometer and Multi-beam bathymetry. The SSS is intended to be acquired at 200% coverage with other data acquired on the same lines, however where this is not possible Multi-beam Backscatter will be used as a substitute.

505. In addition, if any geotechnical investigations are completed, allowance will be made for archaeological involvement in the planning of such surveys and the samples will be made available for geoarchaeological assessment.

2.13.3. Potential Impacts

506. Heritage assets may be affected by direct physical changes or by indirect changes to their setting (Historic England – GPA 2 2015b).

507. 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 proposed scheme (i.e. foundations or cables) or from construction related activities (i.e. seabed clearance and anchoring).

508. There is also the potential for the Projects 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 the marine physical processes (section 2.1).

509. 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).

510. Similarly, historic character may also be affected if the proposed scheme results in a change to the prevailing character of the area and/or alters perceptions of the seascape.

2.13.3.1. Potential impacts during construction

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

512. Indirect impacts to heritage assets may occur if the physical presence of construction vessels and offshore infrastructure impacts 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.

513. There would also be potential for temporary impacts to the setting of heritage assets and to the Historic Seascape Character (HSC) from the presence of vessels associated with the installation of offshore infrastructure and activities at the landfall.

514. Based on the above, all construction related impacts are scoped in.

2.13.3.2. Potential impact during operation and maintenance

515. Direct impacts may occur if archaeological material is present where routine and non-routine maintenance activities which disturb the seabed (for example, seabed contact by legs of jack-up vessels and / or anchors). Similarly, this can occur in exceptional circumstances such as the replacement of cabling.

516. Indirect impacts to heritage assets may occur if the physical presence of the installed infrastructure impact the hydrodynamic or sedimentary regime. This includes the potential for increased scour around foundations.

517. There would also be potential for impacts to the setting of heritage assets and to the HSC from the presence of the installed infrastructure and ongoing maintenance activities.

518. Based on the above all impacts that may occur during operation and maintenance are scoped in.

2.13.3.3. Potential impacts during decommissioning

519. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

520. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

2.13.3.4. Potential cumulative impacts

521. 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.

522. 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 HSC of the North Sea may also be affected.

523. There is also the potential for cumulative indirect impacts associated with changes to marine physical processes. As such, cumulative impacts are scoped in at construction, operation and decommissioning.

2.13.3.5. Potential transboundary impacts

524. 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.

525. As such, direct transboundary impacts at construction, operation and decommissioning are all scoped in.

526. Indirect transboundary impacts, associated with changes to marine physical processes, where those changes cross an international boundary, are not expected to occur. Based on the ES findings for Dogger Bank A & B Offshore Wind Farms (Forewind 2013), which found no potential for significant transboundary effects, it is proposed to scope out indirect transboundary effects on Offshore Archaeology and Cultural Heritage, recognising that the Projects are located further away from the EEZ boundary.

2.13.3.6. Summary of scoping proposals

527. **Table 2-41** outlines the impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data become available.

Table 2-41 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) to the Offshore Archaeology and Cultural Heritage Assessment.

Potential Impact	Construction	Operation	Decommissioning
Direct impacts to heritage assets	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes	✓	✓	✓
Change to the setting of heritage assets, which could affect their heritage significance	✓	✓	✓
Change to character which could affect perceptions of the HSC	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts (direct)	✓	✓	✓
Transboundary impacts (indirect)	× The Projects are located 40km from the EEZ boundary and therefore there is no pathway for transboundary impacts		

2.13.4. Approach to Impact Assessment

528. The marine archaeology assessment will be informed by the interpretation of the geophysical survey data (namely the bathymetry and SSS data to identify seabed features, such as wrecks, magnetometry data to identify magnetic anomalies and sub-bottom profile data to identify palaeolandscape features).

529. A marine archaeological desk-based assessment (ADBA) will be undertaken to establish the baseline for both known and potential heritage assets within the defined areas based upon the desk-based sources listed in **Table 2-39**. 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.

530. The ADBA and assessment of geophysical data will be used to identify a strategy for mitigation including the avoidance of identified heritage assets through the application of Archaeological Exclusion Zones where appropriate.

531. The methodology of the assessment will also take account of guidance and documentation including:

- North Sea Prehistory Research and Management Framework (H. Peeters *et al.* 2009);
- People and the Sea: a maritime archaeological research agenda for England (J. 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 (2014a) and Code of Conduct (2014b); and
- Institute of Environmental Management and Assessment (IEMA), Institute of Historic Building Conservation (IHBC) and CIfA Principles of Cultural Heritage Impact Assessment (2021).

2.14. Seascape, Landscape and Visual Impact

532. This section considers the impacts of the Projects' offshore elements (array areas and offshore electrical infrastructure) on seascape, landscape and visual amenity. The landscape and visual impacts of the onshore infrastructure and construction works are discussed in section 3.6.

The following questions are posed to consultees to help them frame and focus their response to the Seascape, Landscape and Visual Impact Assessment (SLVIA) scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on SLVIA resulting from the Projects been identified in the Scoping Report?
- Do you agree that SLVIA can be scoped out of further assessment?

2.14.1. Existing Environment

533. The array areas are located off the north-east coast of England. DBS West is a minimum of 100km from the closest point on the coast, at Flamborough Head; and DBS East is a minimum of 118km from the same closest point. The offshore export cables will be submerged and will not give rise to any impacts on seascape character or visual amenity. The offshore export cable corridor is not considered further.

534. **Figure 2-28** shows the array areas in the context of a 70km SLVIA study area. The SLVIA study area includes part of the North Sea, well to the east of coastal settlements such as Sunderland and Hornsea. At its closest point, the SLVIA study area is approximately 30km from the coast at Flamborough Head.

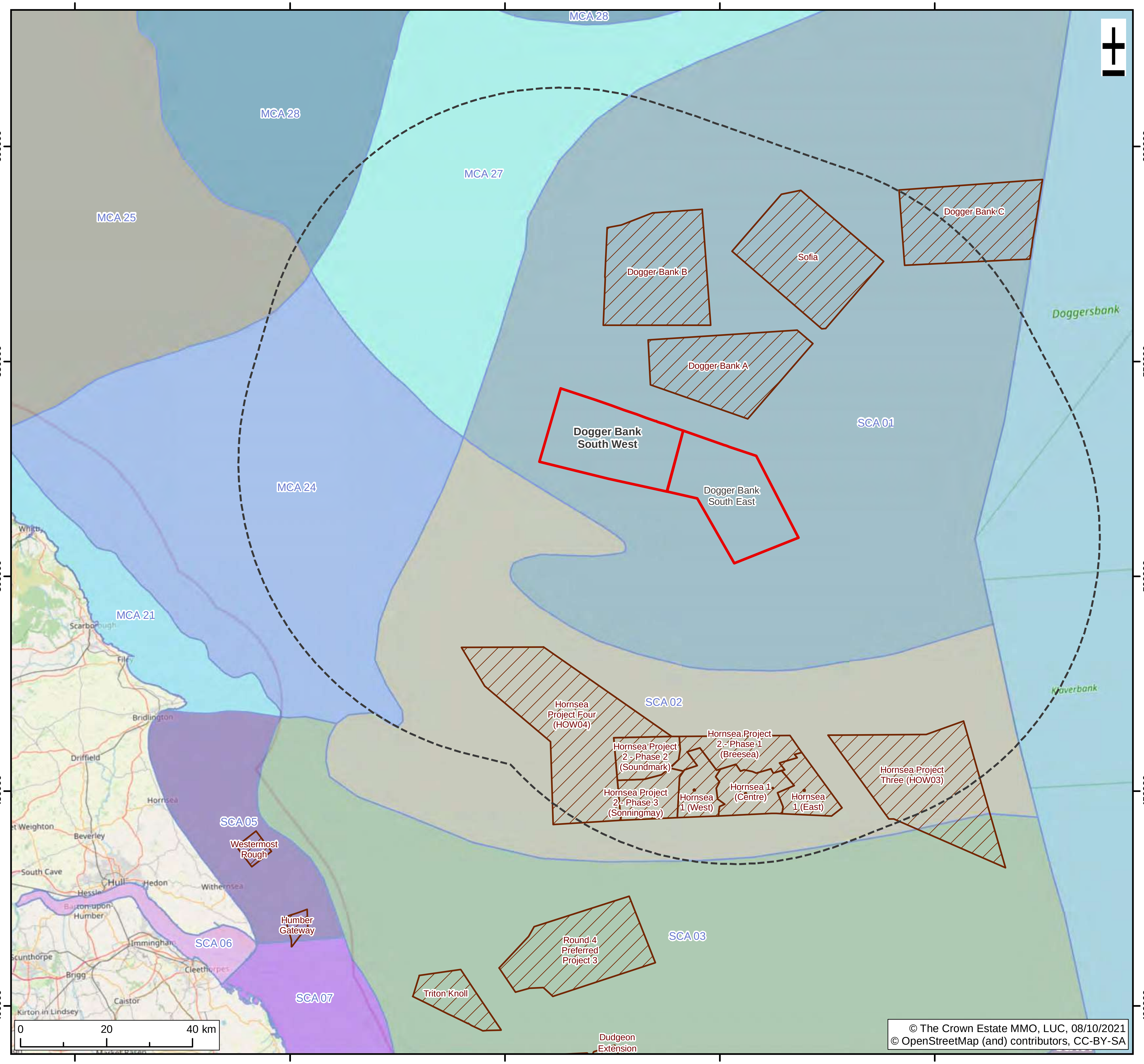
535. The seascape around the array areas includes evidence of human activity, including offshore wind farms, offshore gas platforms and shipping. The array areas are approximately 7.5km from the array area of the consented Dogger Bank A Offshore Wind Farm. The consented Dogger Bank B and C and Sofia Offshore Wind Farms lie further to the north-east. To the south is the operational Hornsea One wind farm, with the planned Hornsea Two, Three and Four projects alongside.

536. Seascape character is defined at a national scale in the seascape assessments published by the MMO (2012) . The array areas will be within the Dogger Bank Marine Character Area, within the East Offshore Marine Plan Area. The key characteristics for this Marine Character Area 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."*

537. Due to the curvature of the earth, there would be no visibility of the maximum height turbines (397m) from sea level at over 71.5km from the array areas. Although there are more elevated areas along the Yorkshire coast, the limits of visual acuity and atmospheric visibility mean that the wind farm is unlikely to be visible from shore. Visual receptors within the 70km 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.

538. An offshore reactive compensation station may be required along the offshore export cable route, which would be mounted on a platform. Any such station would be at least 40km from the landfall, and would be less than 100m in height (excluding narrow elements such as masts or cranes). While such a station could be visible from the coast, views of a single platform are considered unlikely to give rise to significant effects.



- Dogger Bank South Offshore Wind Farms
- SLVIA study area
- Wind site agreement

Marine Character Area

- 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
- 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

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
EL	01	31/08/2021	Scoping	EL	DF	PM

Title: SLVIA Study Area

Figure: 2-28 Drawing No: PC2340-LUC-OF-ZZ-DR-Z-0001

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:900,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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2.14.2. Data Sources

539. The following data sources provide information relevant to SLVIA:

- MMO (2018) Seascape Character Assessment for the North East Inshore and Offshore marine plan areas;
- MMO (2012) Seascape character area assessment East Inshore and East Offshore marine plan areas;
- Offshore wind farm data from The Crown Estate;
- Offshore gas platform data from the Oil and Gas Authority; and
- Admiralty charts and Ordnance Survey (OS) maps at a range of scales.

2.14.3. Potential Impacts

2.14.3.1. Potential impacts during construction

540. During construction of the offshore infrastructure (turbine arrays and cables) the presence of construction activity and partially completed structures within the seascape has the potential to impact seascape character and visual receptors. However, impacts during the temporary construction phase of the offshore infrastructure will never be greater than the operational effects of the completed wind farm. As such, it is proposed that offshore construction effects are scoped out of the SLVIA.

2.14.3.2. Potential impacts during operation

541. Given the existing seascape character and the presence of consented and under-construction wind farms in the area, the susceptibility of the seascape is likely to be low. It is considered that operation of the offshore wind farm is unlikely to significantly impact on the key characteristics of the host Marine Character Area or other Marine Character Areas within the SLVIA study area. It is therefore proposed that operational effects on seascape character are scoped out of the SLVIA.

542. Because of the intervening distance between coastal and non-coastal landscapes, the presence of the offshore wind farm in the sea is unlikely to significantly impact landscape character or the special qualities of landscape designations. It is proposed that impacts on landscape character and designations, resulting from operation of the offshore wind farm, are scoped out of the SLVIA.

543. The visual receptors within the Offshore Study Area are likely to be of low susceptibility to changes in their views of the surrounding sea, and significant impacts are not anticipated. Visibility of the offshore wind farm from the coast, over an intervening distance of approximately 100km, will be very limited, and there will be no significant impacts on the visual amenity of onshore receptors. Consequently, it is proposed that visual effects resulting from operation of the offshore wind farm are scoped out of the SLVIA.

2.14.3.3. Potential impacts during decommissioning

544. The presence of activity and partially dismantled structures during decommissioning has the potential to impact seascape and visual receptors. However, impacts during the temporary decommissioning phase will never be greater than during construction or operation phases considered in the SLVIA and are proposed to be scoped out.

2.14.3.4. Potential cumulative impacts

545. The array areas are in close proximity to consented offshore development at Dogger Bank A, B and C and Sofia Offshore Wind Farms. There is potential for cumulative effects to result within the SLVIA study area. However, given the seascape characteristics of the area and the low susceptibility of potential seascape and visual receptors, it is considered that these effects would not be significant. Cumulative impacts are proposed to be scoped out of the SLVIA.

2.14.3.5. Potential transboundary impacts

546. The array areas are around 40km from the limit of UK waters, and the SLVIA study area extends beyond this into Dutch waters. Seascape and visual transboundary effects could therefore affect receptors in Dutch waters. However, the susceptibility 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 under-construction Dogger Bank and Sofia Offshore Wind Farms. It is therefore considered that transboundary effects would not be significant and are proposed to be scoped out.

2.14.3.6. Summary of scoping proposals

547. **Table 2-42** confirms that all seascape, landscape and visual impacts are proposed to be scoped out, and therefore no offshore SLVIA will be included within the EIA process.

Table 2-42 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Seascape, Landscape and Visual Impact Assessment

Potential Impact	Construction	Operation	Decommissioning
Seascape and coastal character	×	×	×
Landscape character	×	×	×
Designated landscape	×	×	×
Visual receptors	×	×	×
Cumulative seascape, landscape and visual impacts	×	×	×
Transboundary seascape, landscape and visual impacts	×	×	×

3. Onshore

548. This section presents the main baseline characteristic of the onshore environment within the Onshore Study Area (including the possible landfall locations) (**Figure 1-1**), excluding the intertidal zone which is covered in the offshore sections. Unless otherwise stated, the potential impacts of the Projects during construction, operation and decommissioning are considered in line with the methodology presented in section 1.8. Each section outlines which impacts are proposed to be scoped in to the EIA and which will be scoped out.

3.1. Terrestrial Ecology and Onshore Ornithology

549. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on terrestrial ecology and onshore ornithology. Impacts to intertidal receptors will be assessed within the benthic and intertidal assessment (section 2.5).

The following questions are posed to consultees to help them frame and focus their response to the terrestrial ecology and onshore ornithology scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on terrestrial ecology and onshore ornithology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in for further assessment?
- Do you agree with the proposed approach to assessment?

3.1.1. Existing Environment

550. The data sources used to inform this ecological desk-based assessment are shown in **Table 3-1**.

Table 3-1 Ecological Desk Study Data Sources

Data	Source	Date
European designated sites (SPA, SAC, Ramsar sites)	JNCC	2021
UK designated sites SSSI, NNR, Local Nature Reserve (LNR), Local Wildlife Sites (LWS)	JNCC Natural England North and East Yorkshire Ecological Data Centre	2021 2022
UK Habitats of Principal Importance	JNCC Multi-Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk)	2021
Protected and Notable species	NBN website (www.nbnatlas.org) North and East Yorkshire Ecological Data Centre	2021 2022

551. Any additional data sets will be identified through feedback received from stakeholders in response to the submission of this Scoping Report.

3.1.1.1. Designated sites

552. There are a total of 55 designated (statutory and non-statutory) sites that are located within and up to 2km from the Onshore Study Area. These are presented alongside their qualifying feature(s), where known, in **Table 3-2** and on **Figure 3-1**.

Table 3-2 Designated Sites Within the Onshore Study Area and 2km buffer

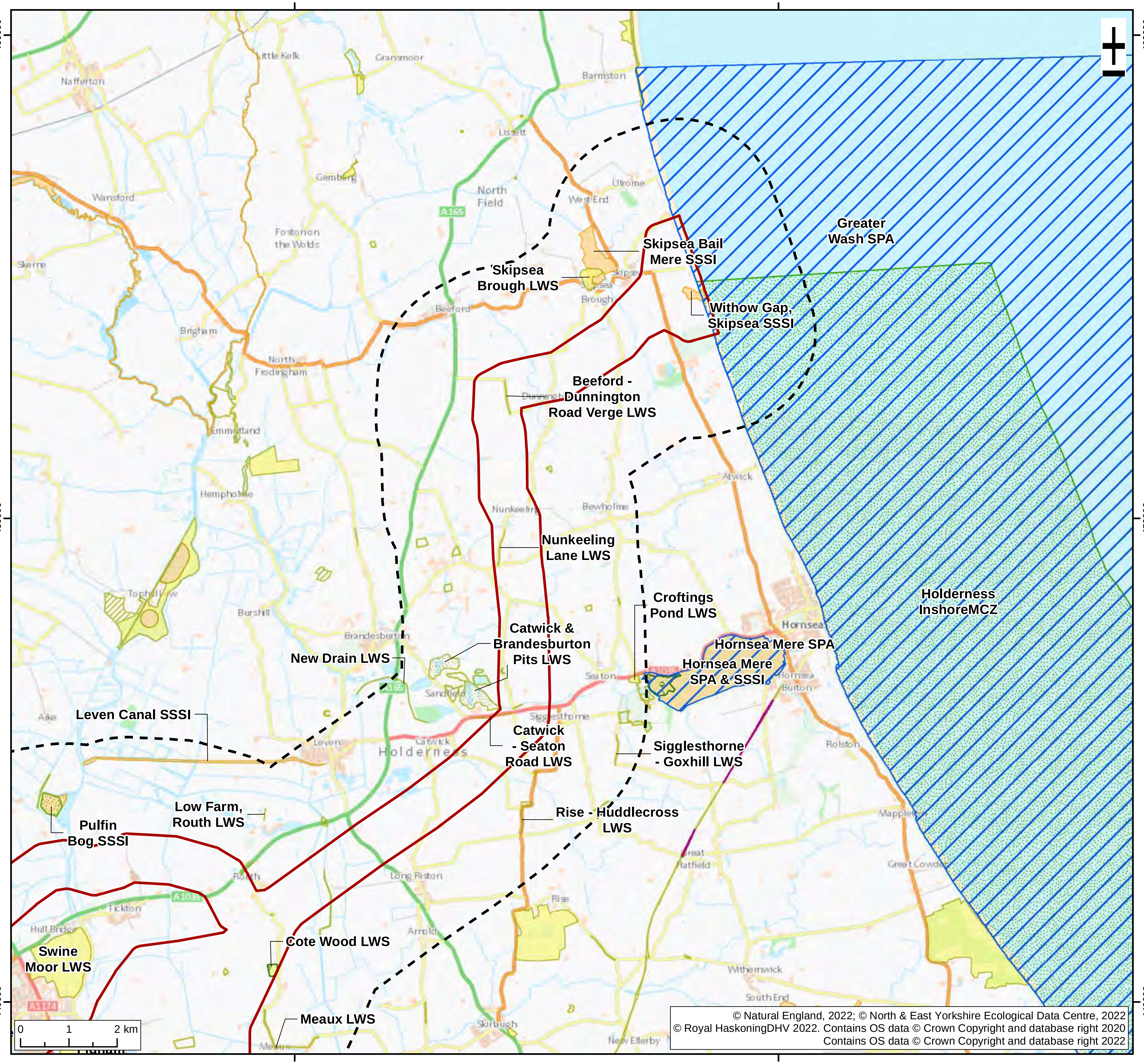
Site name and Designation	Qualifying feature(s)
Greater Wash SPA	The Greater Wash SPA is classified for the protection of red-throated diver *Gavia stellata*, common scoter *Melanitta nigra*, and little gull *Hydrocoloeus minutus* during the non-breeding season, and for breeding Sandwich tern *Sterna sandvicensis*, common tern *Sterna hirundo* and little tern *Sternula albifrons*.
Withow Gap, Skipsea SSSI	The site consists of accumulated sediments of an ancient lake (mere).
Burton Bushes SSSI	Oak woodland on Holderness Till soils.
Southorpe LNR	This site consists of a disused railway line with grassland species present.
Sigglesthorne Station LNR	This site is an example of a good quality established semi-natural verge.
Beverley Parks LNR	This is a 49 acre site featuring an orchard, a small wood and two fields which are being restored by the East Riding of Yorkshire Countryside Access Team to a traditional parkland landscape.
Noddle Hill LNR	This site comprises fishing lakes and recreational activities (e.g. children's play area and sport pitches).
Beverley Limekilns LWS	Old, established semi-natural neutral and calcareous grassland.
Snuff Mill Fields LWS	Old, established semi-natural neutral grassland.
Swine Moor LWS	Site is a mosaic of habitats including grassland and wetland.
Cote Wood LWS	Ancient semi-natural woodland that is also assigned to W8 NVC Community.
Croftings Pond LWS	Nutrient rich standing water.

Site name and Designation	Qualifying feature(s)
Mill Beck and Fields LWS	Old, established semi-natural neutral grassland.
Risby Park LWS	Mosaic of semi-natural habitats including woodland and grassland.
Fishpond Wood, Risby Estate LWS	Mosaic of semi-natural habitats including woodland and wetland that also supports field evidence of features of ancient or long-standing acid woodland.
Low Farm, Routh LWS	Good quality hedgerow.
Willerby Low Road LWS	Good quality hedgerow with 10 woody species per 30m sample.
Wood Lane, Cottingham LWS	Good quality hedgerow with 7 woody species per 30m sample.
Eppleworth Wood LWS	Ancient semi-natural woodland.
Priory Meadows LWS	Old, established semi-natural neutral grassland.
Little Wood LWS	Field evidence of features of ancient or long-standing neutral to calcareous and wet woodland.
Moor Lane LWS	Good quality hedgerow with 6 woody species per 30m sample.
Newbald Road LWS	Good quality hedgerow with 7 woody species per 30m sample.
Woodhill Path, Cottingham LWS	Good quality hedgerow with 6 woody species per 30m sample.
Driffield Road LWS	Good quality hedgerow with 6 woody species per 30m sample.

Site name and Designation	Qualifying feature(s)
Scrub Wood Lane LWS	Good quality hedgerow with 6 woody species per 30m sample.
Rise – Huddlecross LWS	Good quality 'vergescape' consisting of a hedgerow with 6 woody species per 30m sample and verge habitats.
Skipsea Brough LWS	Old, established semi-natural neutral and calcareous grassland.
Nunkeeling Lane LWS	Good quality 'vergescape' consisting of verge and ditch habitats and a hedgerow with 6 species per 30m sample.
North Newbald - Beverley Road LWS	Good quality established semi-natural verge.
North Newbald - Beverley Road LWS	Good quality established semi-natural verge.
Bygot Wood Lane, Leconfield LWS	Good quality established semi-natural verge.
Arnold Drain LWS	Good quality established semi-natural verge.
Meaux LWS	Good quality established semi-natural verge and hedgerow.
Sigglesthorne – Goxhill LWS	Good quality established semi-natural verge.
Low Balk Road, Bishop Burton LWS	Good quality established semi-natural verge.
Catwick - Seaton Road LWS	Good quality hedgerow with 6 woody species per 30m sample.
Bentley Moor Wood LWS	Ancient semi-natural woodland.
Birkhill Wood LWS	Ancient semi-natural woodland with evidence of features to support this.

Site name and Designation	**Qualifying feature(s)**
Drove Road LWS	Semi-natural broadleaved woodland.
Raventhorpe Embankment LWS	Good quality established semi-natural linear grassland.
Figham Pastures LWS	Mosaic of semi-natural habitats including grassland and wetland.
Beverley Westwood Waxcaps LWS	Site supports an assemblage of eight or more species of waxcaps from multiple visits.
Jillywood Lane LWS	Good quality hedgerow, medieval boundary and ancient woodland boundary.
Catwick and Brandesburton Pits LWS	Standing water.
Burton Bushes Veteran Trees LWS	Veteran trees.
Leconfield Low Parks LWS	Grassland, scrub and standing water.
Newbald Road, Beverley Westwood LWS	Good quality hedgerow.
Beeford - Dunnington Road Verge LWS	Good quality established semi-natural verge.
Dunswell Adits LWS	No data available.
Land east of Cumbrian Way SNCI	No data available.
River Hull (including banks) SNCI	No data available.

Site name and Designation	Qualifying feature(s)
Keldmarsh Yorkshire Wildlife Trust Reserve	Area of woodland.
Pulfin Yorkshire Wildlife Trust Reserve	Area of wetland.
Priory & Snuff Mill Fields Yorkshire Wildlife Trust Reserve	Area of grassland.



Legend:

- Onshore Study Area
- Onshore Study Area 2km Buffer

Nature Conservation Areas

- Ancient Woodland
- Local Nature Reserves
- Marine Conservation Zones
- Special Protection Areas
- Sites of Special Scientific Interest
- Yorkshire Wildlife Trust Reserve

East Yorkshire Local Wildlife Site (LWS)

- Candidate LWS
- Deleted LWS
- Designated LWS
- Historic LWS

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	29/06/2022	Suitable for Approval	LB	CS	HC
S3	P01	04/05/2022	Suitable for Review & Comment	LB	CS	HC

Title:

Nature Conservations Areas
(Page 1 of 2)

Figure: 3-1 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0227

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:80,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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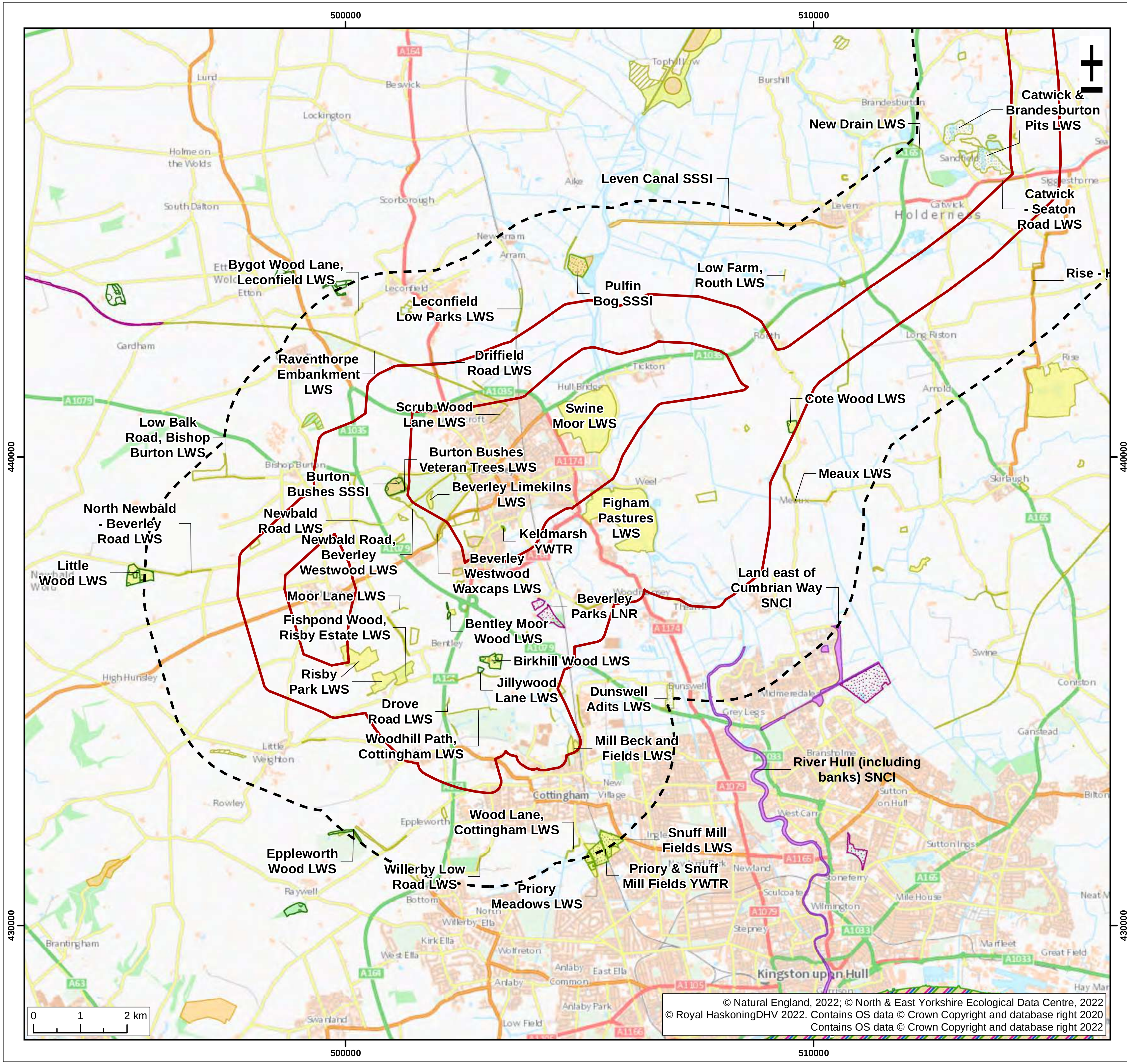

Legend:

Onshore Study Area

Onshore Study Area 2km Buffer

Nature Conservation Areas

Ancient Woodland

Local Nature Reserves

Ramsar

Special Areas of Conservation

Special Protection Areas

Sites of Special Scientific Interest

Hull Sites of Nature Conservation Importance (SNCI)

Yorkshire Wildlife Trust Reserve

East Yorkshire Local Wildlife Site (LWS)

Candidate LWS

Deleted LWS

Designated LWS

Historic LWS

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	29/06/2022	Suitable for Approval	LB	CS	HC
S3	P01	04/05/2022	Suitable for Review & Comment	LB	CS	HC

Title:

Nature Conservations Areas
(Page 2 of 2)

Figure: 3-1 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0227

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:80,000

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3.1.1.2. Terrestrial habitats

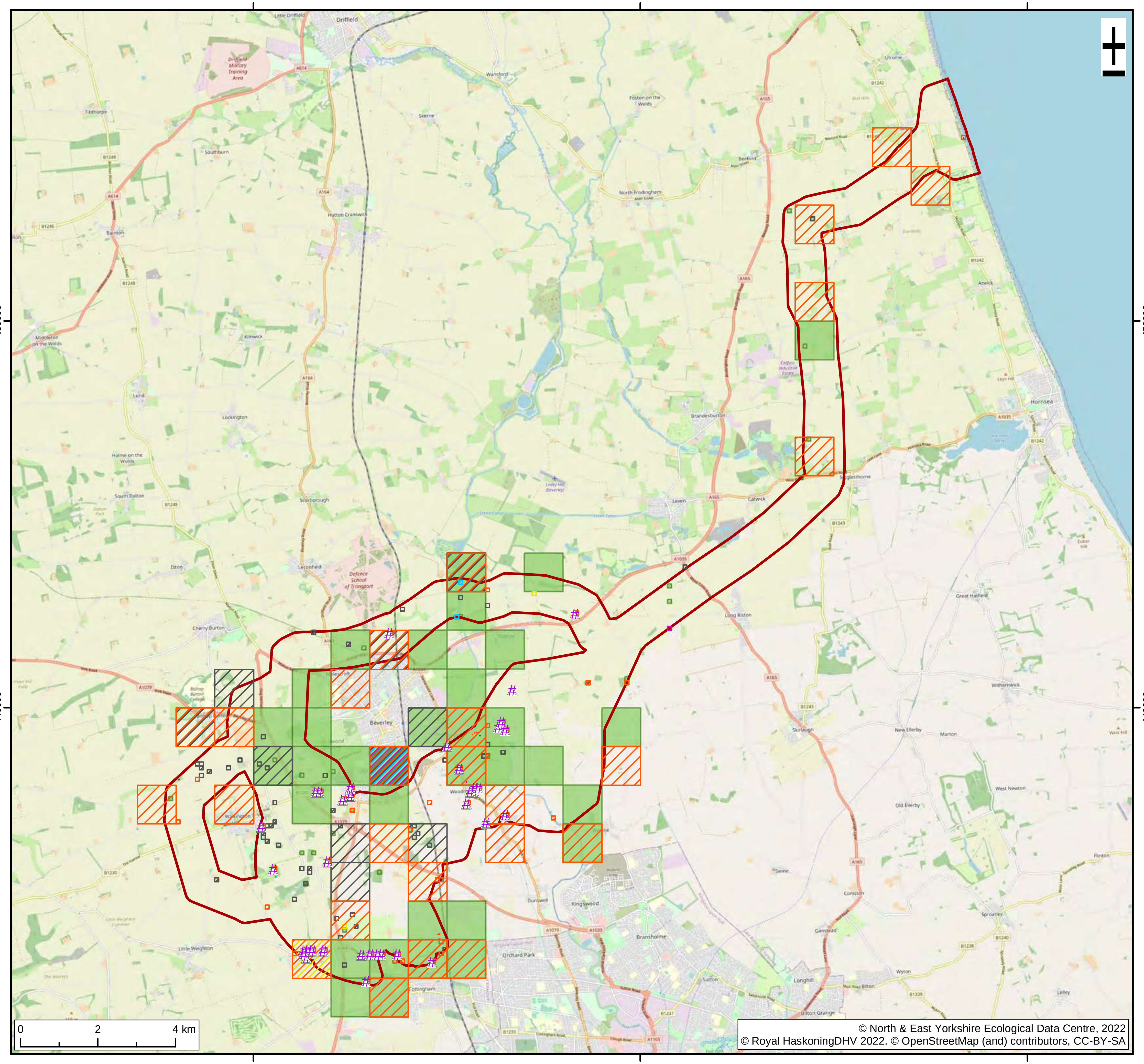
553. UK Habitats of Principal Importance recorded within the Onshore Study Area include the following:

- Ancient woodland;
- Maritime cliffs and slopes;
- Coastal and floodplain grazing marsh;
- Deciduous woodland;
- Wood pasture and parkland;
- Traditional orchards;
- Good quality semi-improved grassland;
- Lowland meadows;
- Reedbeds; and
- Lowland fens.

3.1.1.3. Protected, Notable and Non-native Invasive species

554. The desk study review, using the data sources presented in **Table 3-1** and as presented in **Figure 3-2**, has identified the following protected and notable species may be present within the Onshore Study Area:

- Badger;
- Bats;
- Great crested newt;
- Water vole and otter;
- Terrestrial and aquatic invertebrates;
- Reptiles; and
- Birds (breeding and over-wintering).



Legend:

Onshore Study Area

Species Records within Onshore Study Area

- Amphibian
- Bird
- Fish
- Insect
- Reptile
- Terrestrial Mammal
- Other (Plants)

Bat Records within Onshore Study Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	20/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	LB	CS	HC

Title:

Biological Records

Figure: 3-2 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0228

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

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3.1.2. Data Sources

555. Detailed survey information is required to identify the potential effects on terrestrial ecology receptors within the Onshore Study Area. This information will be obtained through an Extended Phase 1 Habitat Survey of the onshore export cable corridor, possible landfall locations and possible substation sites within the Onshore Study Area and followed, where required, by targeted species-specific surveys.

556. All proposed onshore ecology surveys will be undertaken by suitably qualified ecologists, within their optimal surveying windows and in accordance with industry accepted survey guidance. Information on habitats and their condition within the Onshore Study Area will be obtained in accordance with the UK Habitat Classification system methodology.

557. **Table 3-10** sets out the ecological surveys that have been identified at this time as being required within the Onshore Study Area. The Extended Phase 1 Habitat Survey will precede the species-specific surveys that will be undertaken in either 2022 or 2023, subject to landowner access being granted. No surveys are planned for dormouse as East Riding of Yorkshire Council has confirmed the absence of this species from the Onshore Study Area.

Table 3-3 Site-Specific Survey Data

Survey title	Proposed year of survey	Summary of proposed survey
Extended Phase 1 Habitat Survey (will also include presence/absence checks for badgers and invasive non-native species)	May – September 2022 and March – July 2023	Will cover the onshore export cable corridor, possible landfall locations and possible substation sites plus a 50m buffer and will include the mapping of habitats and identification of all UK protected species potential alongside recommendations for targeted species-specific Phase 2 surveys.
Depending on the outcome of the Extended Phase 1 Habitat Survey and following a review of the obtained biological records results and consideration of embedded mitigation measures, the following targeted species-specific survey may be required.		
Wintering bird surveys	October 2022 to March 2023 (note: only one year of survey data will be obtained)	Will cover all suitable habitats (including any functionally linked habitats) that may be impacted by the Projects and/or afforded protection for over-wintering birds.
Great crested newt presence/absence survey	June 2022 and March – June 2023	Will consist of a Habitat Suitability Index survey of all ponds within a 250m buffer of the onshore export cable corridor, possible landfall locations and possible substation sites, followed by an Environmental DNA (eDNA) survey of all suitable ponds to determine the presence or likely absence of great crested newt.

Survey title	Proposed year of survey	Summary of proposed survey
Bat activity survey and bat roost survey	May – October 2022 and April - June 2023 (bat activity) May – September 2022 and May – September 2023	Will consist of activity transect surveys of all suitable commuting/foraging habitats that may be impacted by the Projects. All potential features (e.g. trees/structures) assessed as providing suitability to support roosting bats that may be impacted by the Projects will be surveyed.
Water vole and otter survey	May – September 2022 and May – July 2023	Will cover all suitable aquatic habitats that may be impacted by the Projects.
Reptile survey	September 2022 and March 2023	Will cover all suitable habitats that may support significant populations of reptiles and which may be impacted by the Projects.
Breeding bird survey	April – August 2022 and April – June 2023	Will cover all suitable habitats (including any functionally linked habitats within the Onshore Study Area) that may be impacted by the Projects and / or afforded protection for breeding birds.
Invertebrate survey (terrestrial and aquatic)	July – September 2022 and July 2023	Will cover all terrestrial and / or aquatic habitats that may support rare or notable invertebrates and which may be impacted by the Projects.
Botanical	June – August 2022	Will cover all suitable habitat that may be impacted by the Projects.

3.1.3. Potential Impacts

558. The terrestrial ecology and onshore ornithology assessment is likely to have key inter-relationships with geology and land quality, flood risk and hydrology, land use, noise and vibration and air quality. These will be considered where relevant.

3.1.3.1. Potential impacts during construction

3.1.3.1.1. Impacts to designated sites

559. Statutory and non-statutory designated sites for nature conservation have been avoided wherever possible as part of the site selection and route planning process. Therefore, direct impacts to designated sites are not predicted.

560. Potential indirect impacts upon statutory and non-statutory designated sites consist of the following:

- Disturbance caused by works associated with the onshore substations, landfall and onshore export cable corridor due to activities which generate fugitive emissions (i.e. noise and dust); and
- Activities which may alter the local drainage patterns of habitats associated with designated sites that are hydrologically connected (i.e. water dependent habitats).

561. These potential impacts will be assessed as part of the EIA and are therefore scoped in to the assessment.

3.1.3.1.2. Permanent and temporary loss/fragmentation of habitats

562. There is likely to be some permanent and/or temporary loss of habitats as a result of the Projects. Permanent habitat loss will be minimised during the site selection and route refinement process of the Projects, with the most sensitive habitats (if identified) being avoided where possible. Furthermore, the use of HDD methodologies, where feasible and possible to do so, will be adopted to avoid direct permanent and temporary impacts. All habitats temporarily lost will be reinstated on completion of the works associated with the Projects.

563. Potential impacts from the temporary loss/fragmentation of Habitats of Principal Importance during trenching activities, such as loss of sections of hedgerows will be assessed as part of the EIA and are therefore scoped in to the assessment. Key considerations are likely to be habitats which support protected and notable species.

3.1.3.1.3. Impacts on protected species or upon resting or breeding bird sites

564. The potential exists for protected species to be impacted by construction activities either physically or from disturbance. Until results from the detailed ecological field surveys are available all UK legally protected and notable species are assumed to be potentially affected by the Projects. Therefore, potential impacts on protected species will be assessed as part of the EIA and are therefore scoped in to the assessment.

3.1.3.1.4. Spread of non-native invasive species

565. There is potential for the presence of non-native invasive species within the Onshore Study Area which could be spread by construction activities. Control of invasive species, where required, would be incorporated into the Outline Ecological Management Plan for the Projects to provide mitigation. However, at this stage, the impact of the spread of non-native invasive species has been scoped in to the assessment.

3.1.3.2. Potential impacts during operation and maintenance

566. Planned maintenance at the onshore substations or routine access and maintenance at link boxes along the onshore export cable corridor is anticipated to be localised with a minimal likelihood of disturbance expected to the adjacent habitats and species. During operation of the onshore substations it is assumed that there will be no requirement for continuous lighting and therefore disturbance impacts on species is not predicted.

567. In the unlikely event of a cable failure there may be a need to access the buried cables to enable the replacement of a failed cable section. Such reactive repairs are expected to have potential impacts similar to those of construction, however they would be expected to be more localised, of smaller scale and temporary in nature.

568. Based on this, the same potential impacts noted for construction are therefore expected to be scoped in for operation and maintenance phase.

569. Any planting which may be included as part of potential screening proposals could result in a beneficial impact.

3.1.3.3. Potential impacts during decommissioning

570. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction but of smaller magnitude.

571. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.1.3.4. Potential cumulative impacts

572. Onshore cumulative impacts 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 Projects will be identified during consultation and following a review of available information.

573. The assessment will consider the potential for significant cumulative impacts to arise as a result of the construction, operation and decommissioning of the Projects in the context of other developments that are existing, consented or at application stage.

574. Cumulative impacts as a result of the works required by National Grid Electricity Transmission to connect the Projects to the electricity transmission network will be included as part of this assessment.

3.1.3.5. Summary of scoping proposals

575. **Table 3-4** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-4 Summary of Impacts Proposed to be Scoped In (✓) and Out (✗) for the Terrestrial Ecology and Onshore Ornithology Assessment

Potential impacts	Construction	Operation	Decommissioning
Impacts to designated sites	✓	✓	✓
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and species isolation	✓	✓	✓
Impacts on protected species or on their resting or breeding sites	✓	✓	✓
Disturbance of bird populations	✓	✓	✓
Spread of non-native invasive species	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.1.4. Approach to Impact Assessment

576. An Ecological Impact Assessment (EcIA) will be undertaken in accordance with the industry guidance, specifically the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (September 2018).

577. The approach to assessment and data gathering will be discussed and agreed as part of the EPP (detailed in section 1.7) prior to commencement. Consultation will be undertaken at key stages throughout the EIA process.

578. The CIEEM guidelines aim to predict the residual impacts on important ecological features affected, either directly or indirectly by a development, once all the appropriate mitigation has been implemented.

579. The approach to determining the significance of an impact follows a systematic process for all impacts. This involves identifying, qualifying and, where possible, quantifying the sensitivity, value and magnitude of all ecological receptors which have been scoped into this assessment. Using this information a significance of each potential impact can be determined.

3.2. Geology and Land Quality

580. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on geology and land quality.

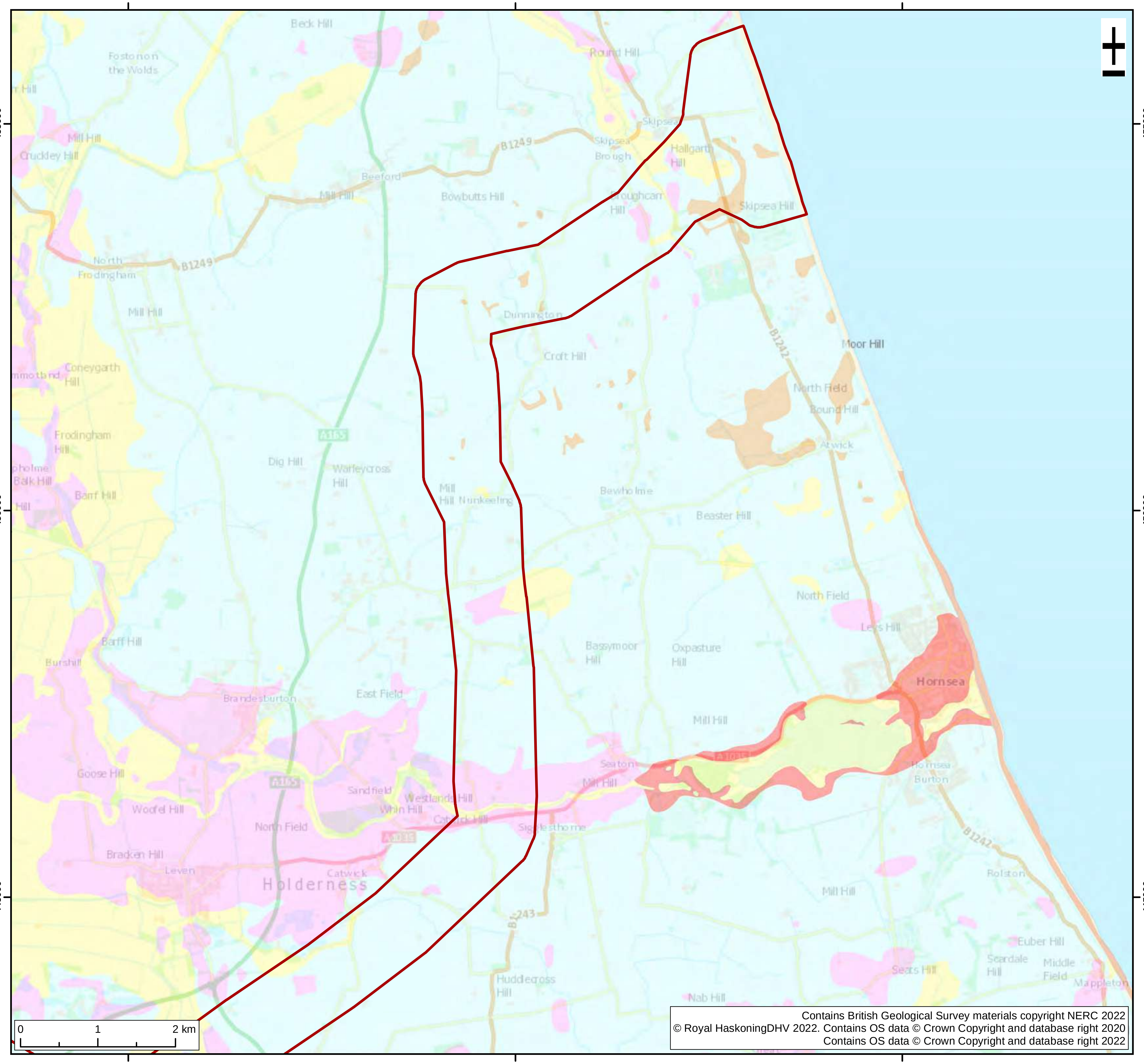
The following questions are posed to consultees to help them frame and focus their response to the geology and land quality scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on geology and land quality resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in for further assessment?
- Do you agree with the proposed approach to assessment?

3.2.1. Existing Environment

3.2.1.1. Geology and Hydrology

581. A review of the published geological mapping available on the BGS Geoindex website (BGS 2022) and BGS maps portal (BGS 2020) indicates that the Onshore Study Area is underlain by a number of different superficial and bedrock deposits as summarised in **Table 3-5** and shown on **Figure 3-3** and **Figure 3-4**. It is also considered possible that localised areas of Made Ground associated with, for example, previously developed or infilled land may underlie parts of the Onshore Study Area.



Legend:

Onshore Study Area

Superficial Geology

- Sand & Gravel of Uncertain Age & Origin - Sand & Gravel
- River Terrace Deposits (Undifferentiated) - Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Sand, Silt & Clay
- Head - Clay, Silt, Sand & Gravel
- Marine Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Sand, Silt & Clay
- Marine Beach Deposits - Sediment, Shell (Shells)

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A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	11/05/2022	Suitable for Review & Comment	LB	KD	HC

Title:

Superficial Geology:
(Page 1 of 2)

Figure: 3-3 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0229

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:50,000

Project: Dogger Bank South Offshore Wind Farms

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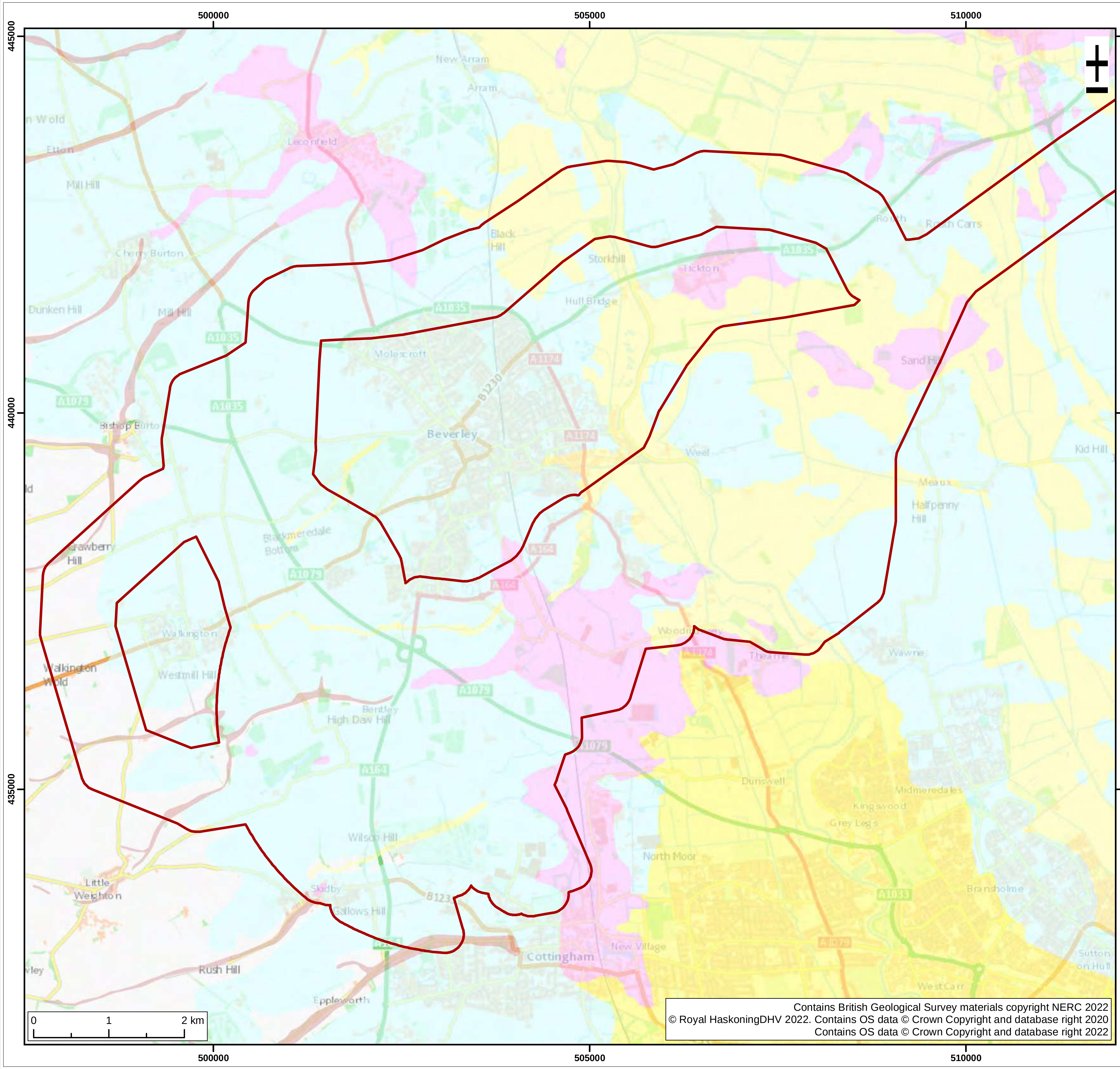

Legend:

Onshore Study Area

Superficial Geology

- Sand & Gravel of Uncertain Age & Origin - Sand & Gravel
- River Terrace Deposits (Undifferentiated) - Sand & Gravel
- Glaciofluvial Deposits, Devensian - Sand & Gravel
- Till, Devensian - Diamicton
- Alluvium - Clay, Silt, Sand & Gravel
- Lacustrine Deposits - Sand, Silt & Clay
- Head - Clay, Silt, Sand & Gravel
- Marine Beach Deposits - Sand & Gravel
- Tidal Flat Deposits - Sand, Silt & Clay
- Marine Beach Deposits - Sediment, Shell (Shells)

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Title:

Superficial Geology:
(Page 2 of 2)

Figure: 3-3 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0229

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:50,000

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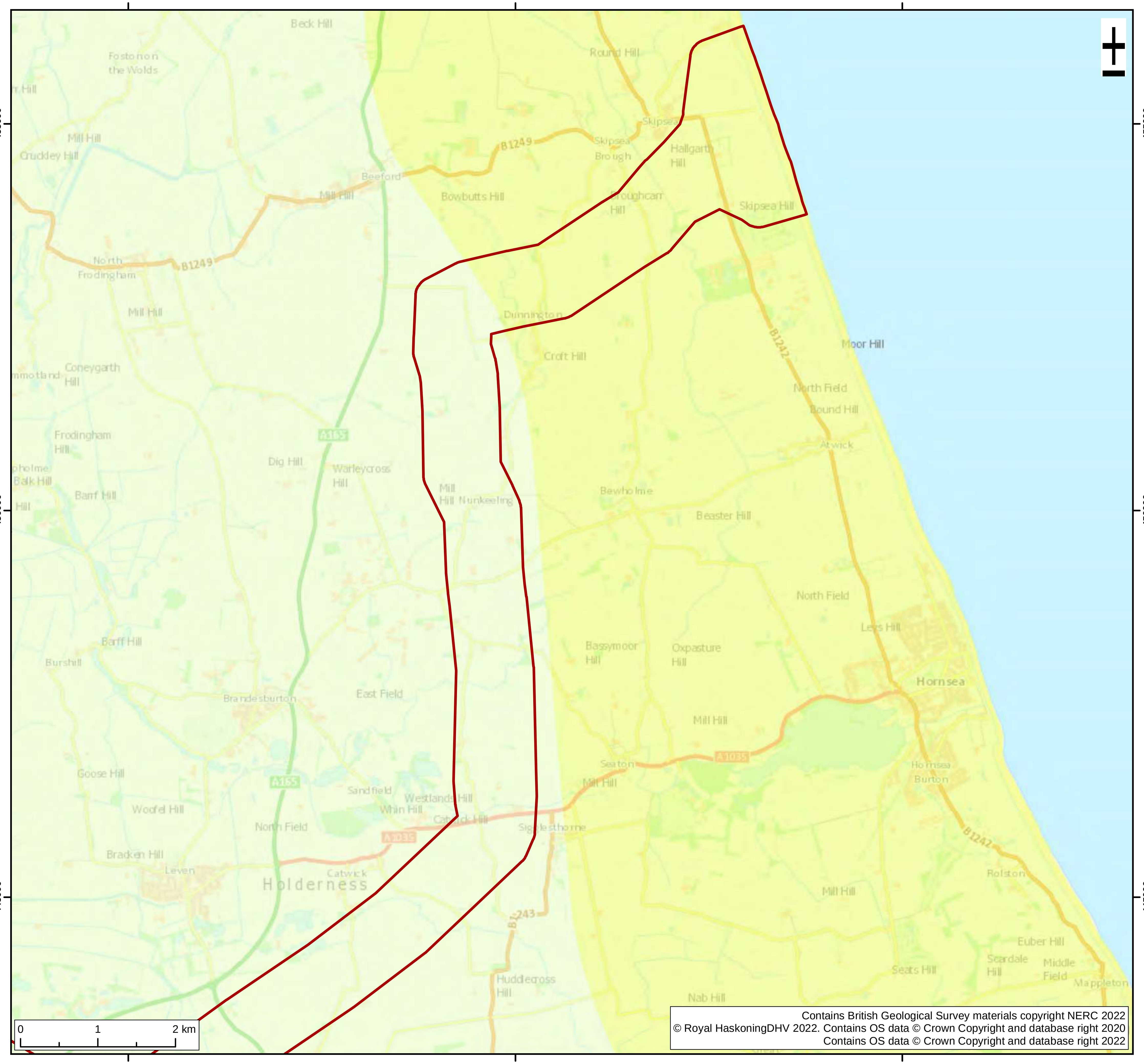

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Legend:

Onshore Study Area

Bedrock

Flamborough Chalk Formation - Chalk

Rowe Chalk Formation - Chalk

Burnham Chalk Formation - Chalk

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A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	11/05/2022	Suitable for Review & Comment	LB	KD	HC

Title:

Bedrock Geology:
(Page 1 of 2)

Figure: 3-4 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0230

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:50,000

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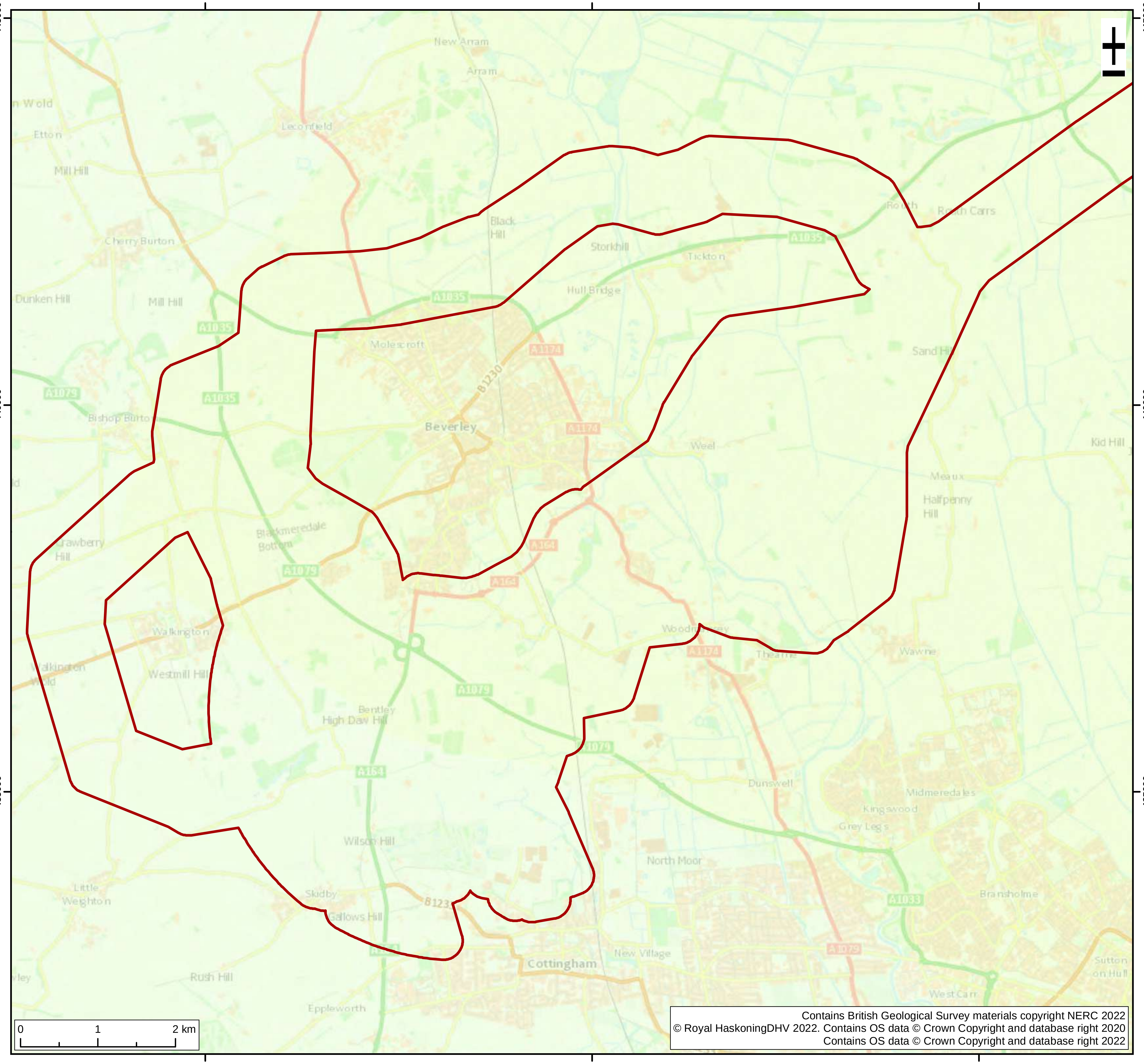

Legend:

Onshore Study Area

Bedrock

- Flamborough Chalk Formation - Chalk
- Rowe Chalk Formation - Chalk
- Burnham Chalk Formation - Chalk

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
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S3	P01	11/05/2022	Suitable for Review & Comment	LB	KD	HC

Title:

Bedrock Geology:
(Page 2 of 2)

Figure: 3-4 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0230

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Table 3-5 Summary of Geology and Aquifer Designations

Stratum	Unit	Aquifer Designation
Superficial deposits	Lacustrine Deposits – sand, silt, clay	Secondary B Aquifer
	Alluvium – clay, silt, sand and gravel	Secondary A Aquifer
	Head – clay, silt, sand and gravel	Secondary Undifferentiated Aquifer
	River Terrace Deposits (undifferentiated) – sand and gravel	Secondary A Aquifer
	Glaciofluvial Deposits – sand and gravel	Secondary A Aquifer
	Glacial Till	Secondary Undifferentiated Aquifer
	Rowe Chalk Formation - chalk	Principal Aquifer
	Flamborough Chalk Formation - chalk	Principal Aquifer
Bedrock	Burnham Chalk Formation - chalk	Principal Aquifer

582. A review of the mineral resource plan for the Onshore Study Area, contained within the East Riding Local Plan (East Riding of Yorkshire Council 2016), has been undertaken. The review identified multiple areas designated as Mineral Safeguarding Areas that are protective of extractable resources within the Onshore Study Area.

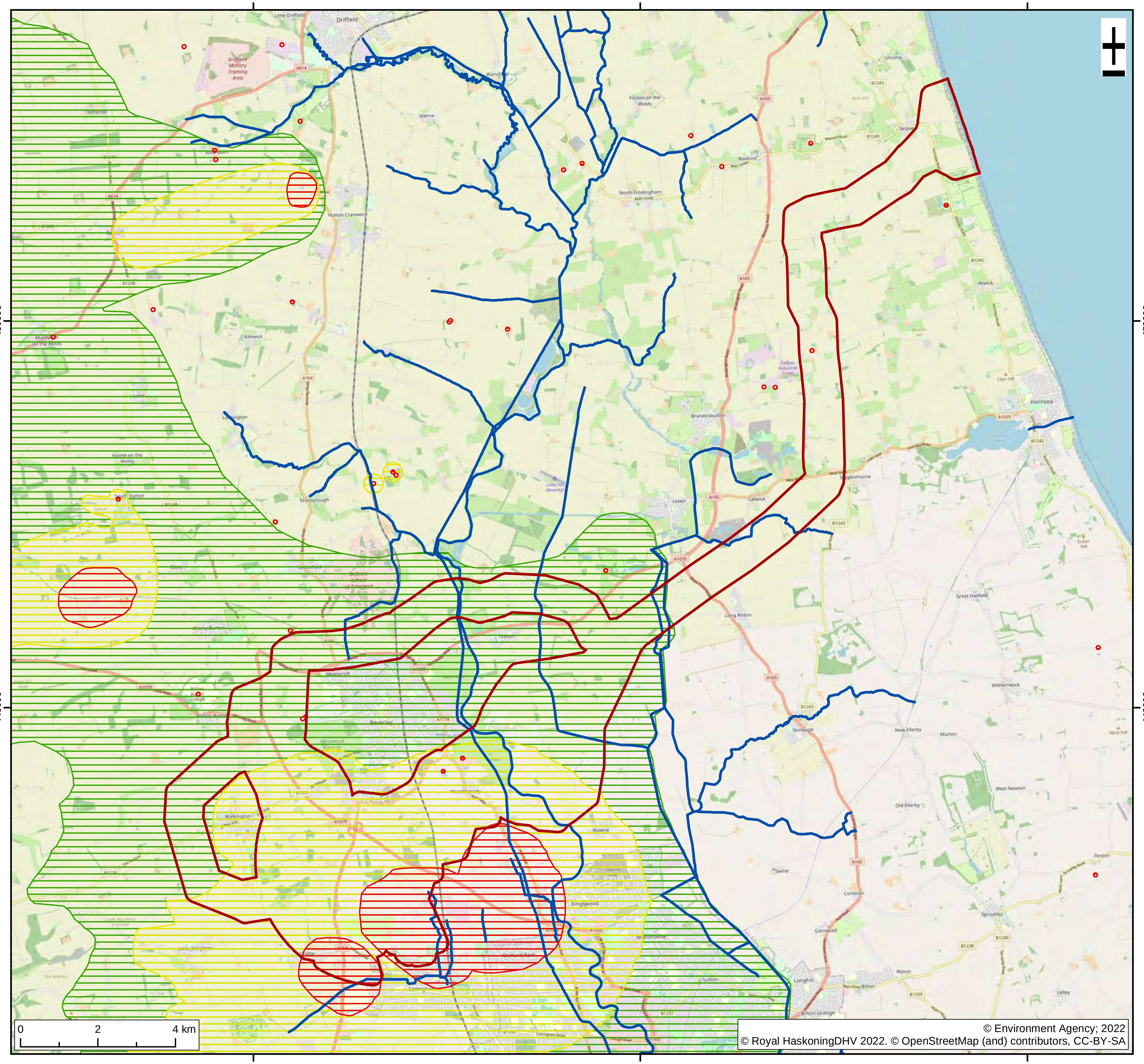
583. The Environment Agency's groundwater vulnerability map (Environment Agency undated) shows that the geology underlying the Onshore Study Area ranges from 'low' to 'high'. A low groundwater vulnerability classification indicates that these areas provide the greatest protection of groundwater from pollution, whereas a high groundwater vulnerability indicates that the area can easily transmit pollution to groundwater.

584. The geology underlying the Onshore Study Area is designated to reflect the importance of the aquifers present and the groundwater resource they provide. The Environment Agency designation maps (Environment Agency undated) show that the majority of the Onshore Study Area is fed by superficial deposits which are designated as Secondary A, B and Undifferentiated Aquifers. The superficial deposits are underlain by chalk bedrock units which are designated as Principal Aquifers.

585. Within the Onshore Study Area, Zone I, II and III Source Protection Zones (SPZs) are present which are associated with potable groundwater abstraction wells (**Figure 3-5**). The protected areas are largely concentrated around the settlement of Beverley in the south western part of the Onshore Study Area. Smaller localised Zone I SPZs are present throughout the onshore export cable corridor.

586. Although not recorded on the information reviewed, private groundwater abstractions may be present throughout the Onshore Study Area. Data related to these features will be obtained and reviewed as part of the EIA process. Should this be the case, a 50m Zone I will be present surrounding each of the abstractions.

587. It should also be noted that there is the potential for smaller unlicensed potable groundwater abstractions (abstracting <20m^3 per day) to be present within the Onshore Study Area. Data related to these features will be obtained (e.g., through liaison with landowners and local authorities) and reviewed as part of the EIA process.



Legend:

- Onshore Study Area
- Statutory Main River

Source Protection Zone

- Zone I
- Zone II
- Zone III

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S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
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Title:

Source Protection Zones

Figure: 3-5

Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0237

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3.2.1.2. Hydrology

588. A number of inland rivers are located either wholly or partially within the Onshore Study Area, these include but are not limited to the following:

- Beverley and Barmston Drain;
- Beverley and Skidby Drain;
- Beverley Parks Sewer;
- Catchwater Drain;
- Catfoss Drain;
- Holderness Drain;
- River Hull;
- Routh and Meaux Drain;
- Skipsea Drain;
- South Bullock Dike;
- Steam Dyke; and
- Wanless Beck.

589. Numerous smaller streams and ponds/lakes are located within the Onshore 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 Onshore Study Area.

590. Similar to groundwater abstractions, there are likely to be both licensed and unlicensed surface water abstraction points present within the Onshore Study Area.

591. Flood risk and hydrology is considered in further detail in section 3.3.

3.2.1.3. Designated sites

592. Ecologically designated sites located either wholly or partially within the Onshore Study Area are outlined in section 3.1. In relation to geologically designated sites, the following are present within the Onshore Study Area (**Figure 3-6**):

- Withow Gap, Skipsea SSSI – the site is designated due to the presence of Late Devensian and Flandrian deposits; and
- Skipsea Drain Local Geological Site (LGS) – the site is designated due to the presence of Late Devensian Glacial Till.

593. The Onshore Study Area is also located within the following Nitrate Vulnerable Zones (NVZ) (**Figure 3-6**):

- Surface water –
  - Holderness Drain (from Fordyke Stream to Humber NVZ);
  - Bramston Sea Drain (from Skipsea Drain to North Sea NVZ); and
  - River Hull (from Arram Beck to Humber NVZ).
- Groundwater –
  - Yorkshire Chalk.

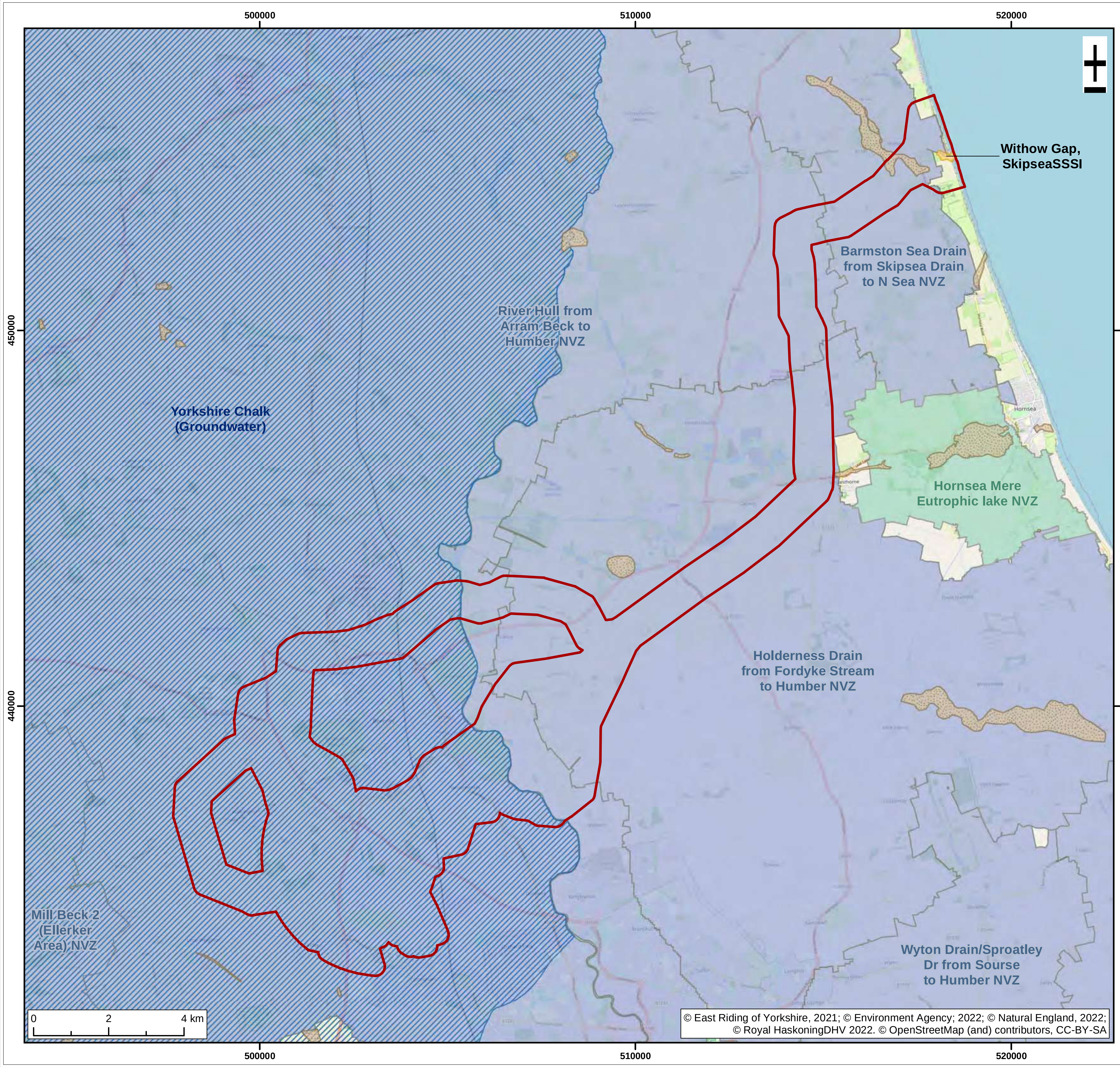
3.2.1.4. Land quality

594. The Onshore Study Area is largely agricultural in nature, which 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 Onshore Study Area also have the potential to contain historical sources of ground contamination due to past industrial use.

595. There are 23 records of historical landfill sites within the Onshore Study Area (**Figure 3-7**). The materials accepted at these sites are not recorded for all locations, however where they are recorded inert, industrial, commercial and household wastes were accepted.

596. There is one recorded authorised landfill site within the Onshore Study Area (Integrated Waste Management Ltd) with permitted wastes recorded as household, commercial and industrial.

597. Following consultation via an ETG, the local authority highlighted the presence of a potential dilute and disperse landfill adjacent to the onshore cable corridor near to Catwick which may represent a potential source of contamination to the underlying aquifers.



Legend:

- Onshore Study Area
- Site of Special Scientific Intesest (SSSI)*
- Local Geological Site

Nitrate Vulnerable Zones (2021)

- Groundwater
- Eutrophic Water
- Surface Water

*SSSI designated for geological features

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Title:

Designated Sites (Geology)

Figure: 3-6 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0245

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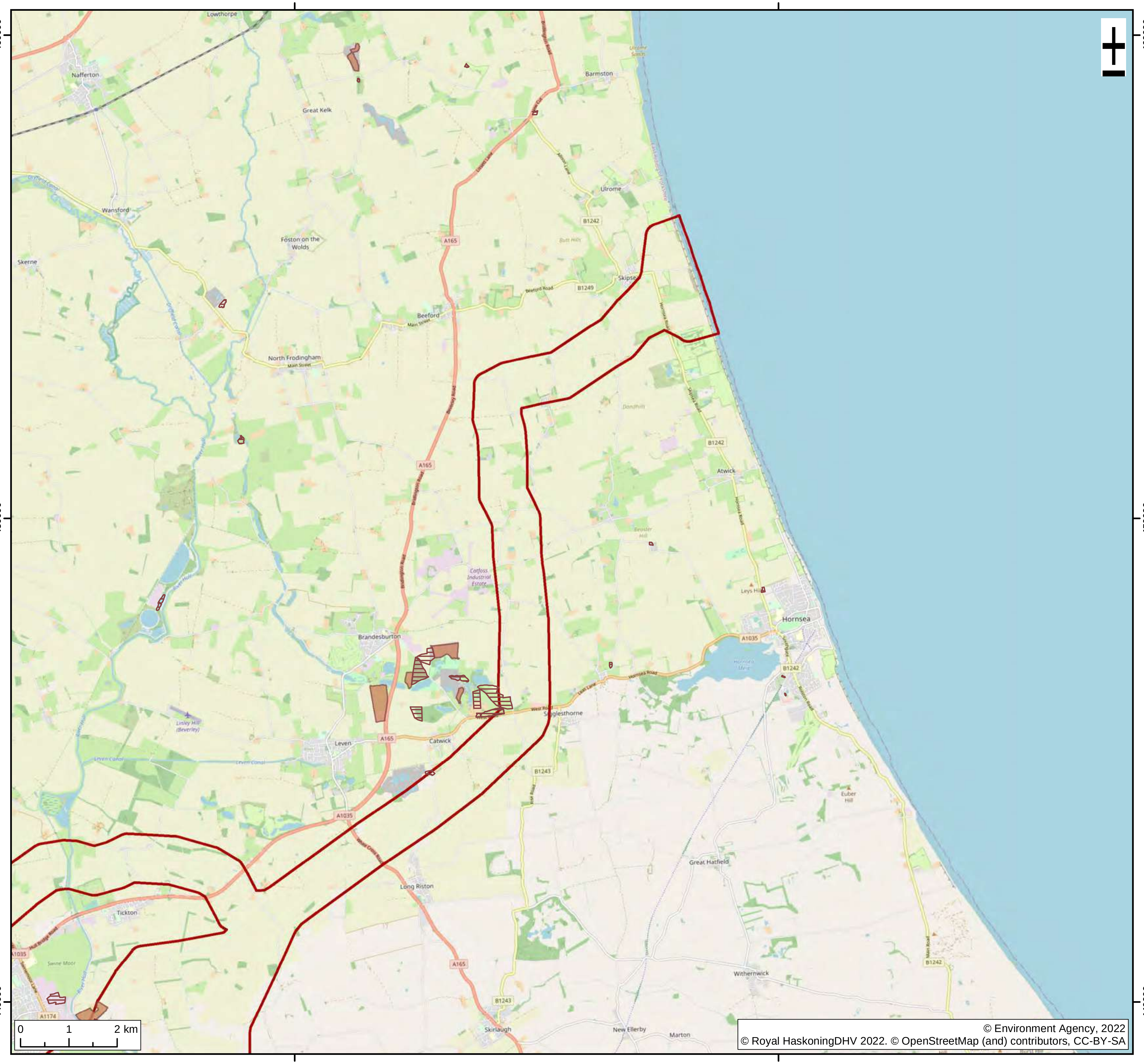

Legend:

- Onshore Study Area
- Authorised Landfill Site
- Historic Landfill Site

A01	C01	15/07/2022	Authorized	LB	JF	HC
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Title:

Historic and Authorised Landfill Sites
(Page 1 of 2)

Figure: 3-7 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0231

Co-ordinate system: British National Grid

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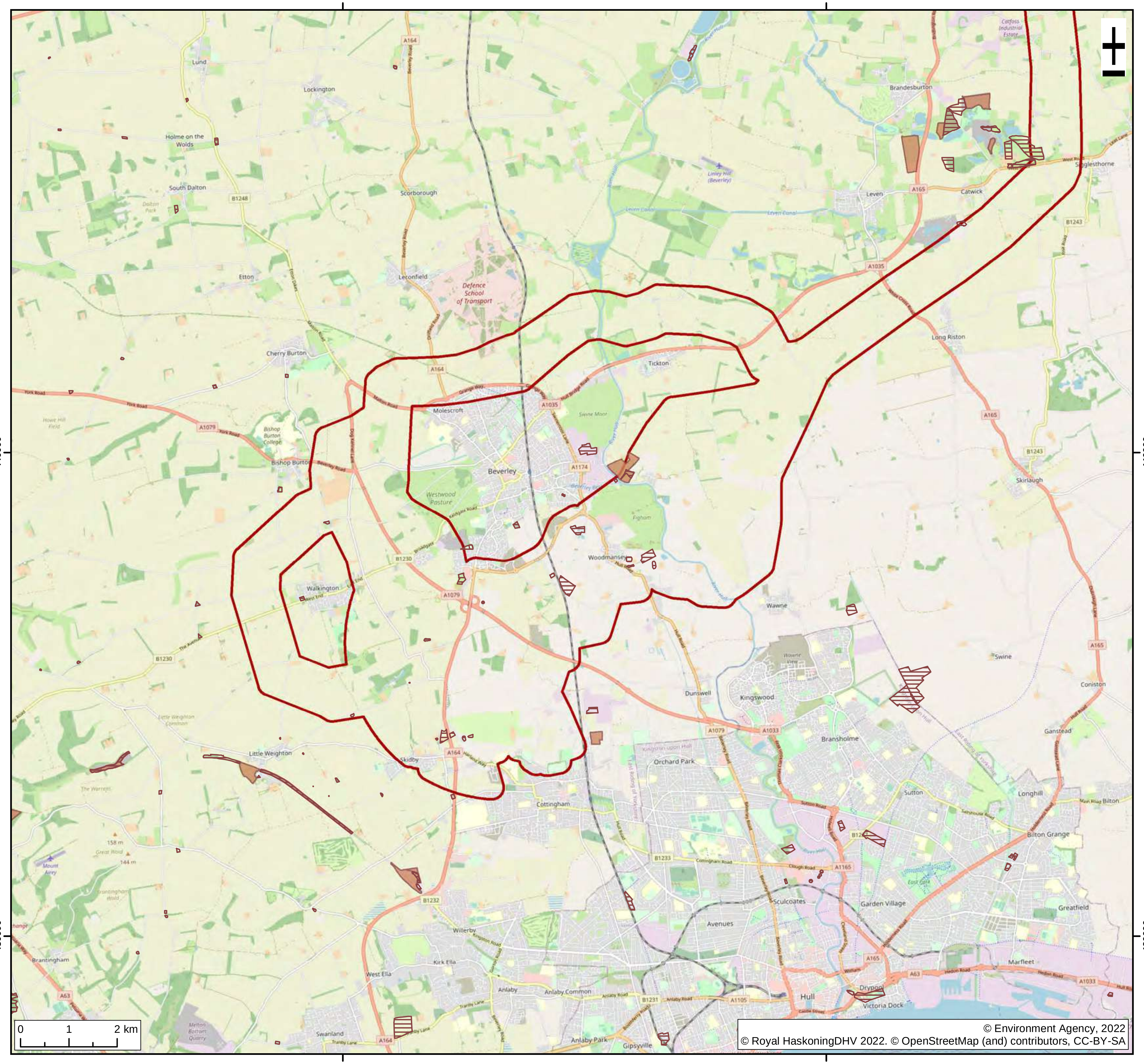

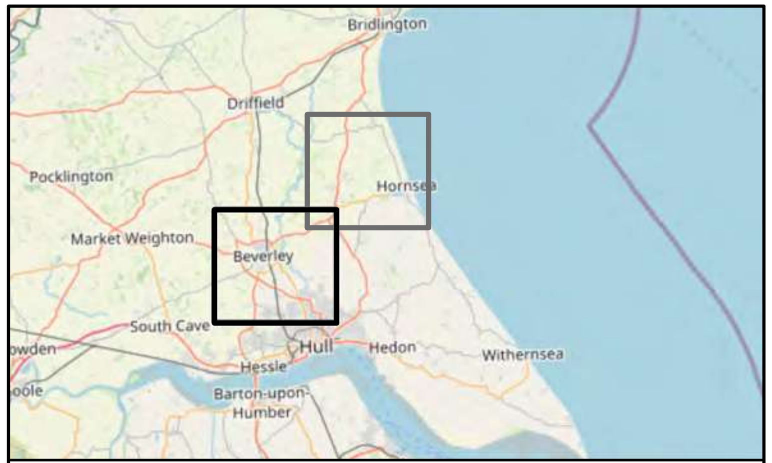

Legend:

- Onshore Study Area
- Authorised Landfill Site
- Historic Landfill Site

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
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Title:

Historic and Authorised Landfill Sites
(Page 2 of 2)

Figure: 3-7 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0231

Co-ordinate system: British National Grid
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3.2.2. Data Sources

598. The existing environment will be characterised using the data sources set out in **Table 3-6**.

Table 3-6 Existing Datasets

Data Source	Data Contents
Envirocheck Report	Historical maps, site sensitivity data, trade directory and regulatory information.
Public Health England	Radon gas risk.
Environment Agency	Historical landfill sites, permitted waste sites – authorised landfill site boundaries, aquifer designations, groundwater abstractions and groundwater SPZs.
Coal Authority	Closed mining sites.
BGS	Solid geology, superficial geology and borehole records. Mineral extraction sites.
MAGIC map application	Ramsar sites, SPAs, SACs, SSSIs, National and Local Nature Reserves, groundwater vulnerability and aquifer designations – superficial deposits and bedrock.
East Riding of Yorkshire Council	Mineral Safeguarding Areas and groundwater abstractions. Private groundwater abstractions, brownfield register, contaminated land register, Part 2A sites determined as contamination land. Regionally Important Geological Sites.

599. Any additional datasets will be identified through ongoing consultation with stakeholders.

3.2.3. Potential Impacts

600. The geology and land quality assessment is likely to have key inter-relationships with terrestrial ecology, flood risk and hydrology and land use. These will be considered where relevant.

3.2.3.1. Potential impacts during construction

601. Direct impacts to the Secondary A, Secondary Undifferentiated, Secondary B Aquifers associated with superficial deposits, SPZs and associated groundwater abstractions (both licensed and private unlicensed) may occur due to the intrusive nature of earthworks, trenching and piling (if required). The significance of the disturbance will be dependent on the depth of the aquifer units in relation to the proposed depth of the intrusive works. These potential effects will be assessed as part of the EIA and are therefore scoped in.

602. During construction, surface layers will be excavated allowing increased infiltration of rainwater and surface run-off to the subsurface. This could potentially mobilise existing sources of contamination and create new pathways to the superficial aquifers. This could indirectly lead to a deterioration in shallow groundwater quality. These potential effects will be assessed as part of the EIA and are therefore scoped in.

603. Direct impacts to the Principal Aquifers of the bedrock geology, SPZs, and associated groundwater abstractions (both licensed and private unlicensed), 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 Aquifers. These potential effects will be assessed as part of the EIA and are therefore scoped in.

604. Direct impacts to the Principal Aquifers, SPZs and groundwater abstractions (both licensed and private unlicensed) may occur as a result of piling methodology. Piling may be required to provide foundations for the onshore substations. 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. These potential effects will be assessed as part of the EIA and are therefore scoped in.

605. Direct impacts to surface water receptors and associated ecological habitats from existing sources of contamination by the creation of new pathways to surface water via groundwater, installation of temporary drainage or surface water run off during construction. This could result in a reduction in WFD status. These potential effects will be assessed as part of the EIA and are therefore scoped in.

606. The construction works could also introduce new sources of contamination, for example, from the storage of fuels and chemicals or via spillages and leaks. These have the potential to migrate vertically and/or horizontally which may result in indirect impacts to the underlying aquifers or surface waters. Human receptors may also be directly exposed to these contaminants during construction works. These potential effects will be assessed as part of the EIA and are therefore scoped in.

607. Excavation activities, including trenchless techniques, surface excavation, earthworks during cable laying and site preparation for the onshore substations as well as other onshore infrastructure has the potential to mobilise existing sources of ground contamination. This could result in effects on human and ecological receptors through the generation of potentially contaminated dusts, vapours or ground gas released during construction works. These potential effects will be assessed as part of the EIA and are therefore scoped in.

608. Direct impacts to geologically designated sites (SSSI and LGS) through construction activities such as excavation works during cable laying and site preparation could occur. These potential effects will be assessed as part of the EIA and are therefore scoped in.

609. Construction activities have the potential to result in direct impacts to Mineral Safeguarding Areas located within the Onshore Study Area through the prevention of future extraction of identified resources. These potential effects will be assessed as part of the EIA and are therefore scoped in.

3.2.3.2. Potential impacts during operation and maintenance

610. Installed cables along the onshore export cable route, the permanent footprint of landfall and the onshore substations infrastructure would prevent future extraction of mineral resources within the permanent footprint of the Projects during their lifetime. These potential effects will be assessed as part of the EIA and are therefore scoped in.

611. Indirect impacts along the onshore export cable route, the permanent footprint of landfall and the onshore substations infrastructure may occur as a result of leakages of stored materials or spillages of materials during the operational phase. These potential effects will be assessed as part of the EIA and are therefore scoped in.

612. Additional significant impacts from the operation of the Projects are considered unlikely. Workers conducting routine operation and maintenance activities would be provided with information regarding ground conditions so that site and task specific risk assessments and method statements can be developed and mitigated, therefore minimising any potential impacts. However, at this stage, these potential effects will be assessed as part of the EIA and are therefore scoped in.

3.2.3.3. Potential impacts during impacts during decommissioning

613. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

614. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.2.3.4. Potential cumulative impacts

615. Cumulative effects on geology and land quality resulting from the effects of the Projects and other developments will be assessed in accordance with the guidance and methodologies set out in section 1.8. The assessment will be dependent on the availability and accessibility of information for other developments.

3.2.3.5. Summary of scoping proposals

616. **Table 3-7** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-7 Summary of Impacts Proposed to be Scoped In (✓) and Out (✗) for the Geology and Land Quality Assessment

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	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.2.4. Approach to Impact Assessment

617. As part of the EIA process, the existing environment with respect to geology and land quality will be described, including, but not limited to, the following:

- Hydrology;
- Geology and mineral resources;
- Hydrogeology, aquifer designations and groundwater resources;
- Historical land use and potential contamination sources; and
- Sensitive land uses (including designated sites).

618. The baseline for geology and land quality will be established following current guidance which advocates a phased risk-based approach. A Land Quality Desk Study and Preliminary Risk Assessment (PRA) will be undertaken to develop a Preliminary Conceptual Site Model (PCSM). The PCSM will aid in the identification of potential sources of contamination at the site, as well as the risk posed to sensitive receptors. Sensitive receptors include both those that currently exist at the site or will be introduced by the Projects e.g. construction workers.

619. The PRA will include the landfall, onshore export cable corridor and onshore substations. A 250m buffer zone will also be included to assess for potential sources of contamination, discharge consents, pollution incidents, landfills and contemporary trade entries. In addition to the 250m buffer zone, a 1km buffer zone will also be included within the PRA within which historical maps will be reviewed to identify potential contaminant sources in the surrounding area. Both groundwater and surface water abstraction points within the 1km buffer zone will also be assessed as part of the PRA.

620. The key guidance which will be used to inform the assessment will include:

- Defra 'Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance', PB13735 (2012);
- The NPPF (2021);
- Environment Agency 'Approach to Groundwater Protection Position Statements' (2018);
- Environment Agency 'Land Contamination: Risk Management Framework (2021);
- Department of the Environment 'Industry Profiles for previously developed land' (1995);

- Construction Industry Research and Information Association (CIRIA) 'Assessing Risks Posed by Hazardous Ground Gases to Buildings', C665 (2007);
- British Standard 'Investigation of Potentially Contaminated Sites – Code of Practice', BS EN 10175:2011 +A2:2017;
- British Standard 'Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings' BS8485:2015 +A1:2019;
- British Standard 'Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds', BS 8576:2013;
- British Standard 'Code of Practice for Ground Investigations', BS 5930:2015; and
- CIRIA 'Contaminated Land Risk Assessment – A Guide to Good Practice', C552 (2001).

621. 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 being identified. The PRA will be progressed based on data obtained from an Envirocheck Report which incorporates historical maps, site sensitivity data, and regulatory information, and will be supplemented with information from those additional sources listed in **Table 3-6**.

622. In addition to the desk-based PRA, a waste assessment for the Projects will be produced and form an appendix to the geology and land quality EIA chapter. The assessment will be produced in accordance with current policy, legislation and guidance.

623. Following refinements of the Onshore Study Area, further liaison with the stakeholders will be undertaken to agree the approach and methodology to data collection for EIA purposes and the specific assessment methodology. A detailed method statement will be developed and agreed with stakeholders through the EPP.

3.3. Flood Risk and Hydrology

624. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on flood risk and hydrology.

The following questions are posed to consultees to help them frame and focus their response to the flood risk and hydrology scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on flood risk and hydrology resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.3.1. Existing Environment

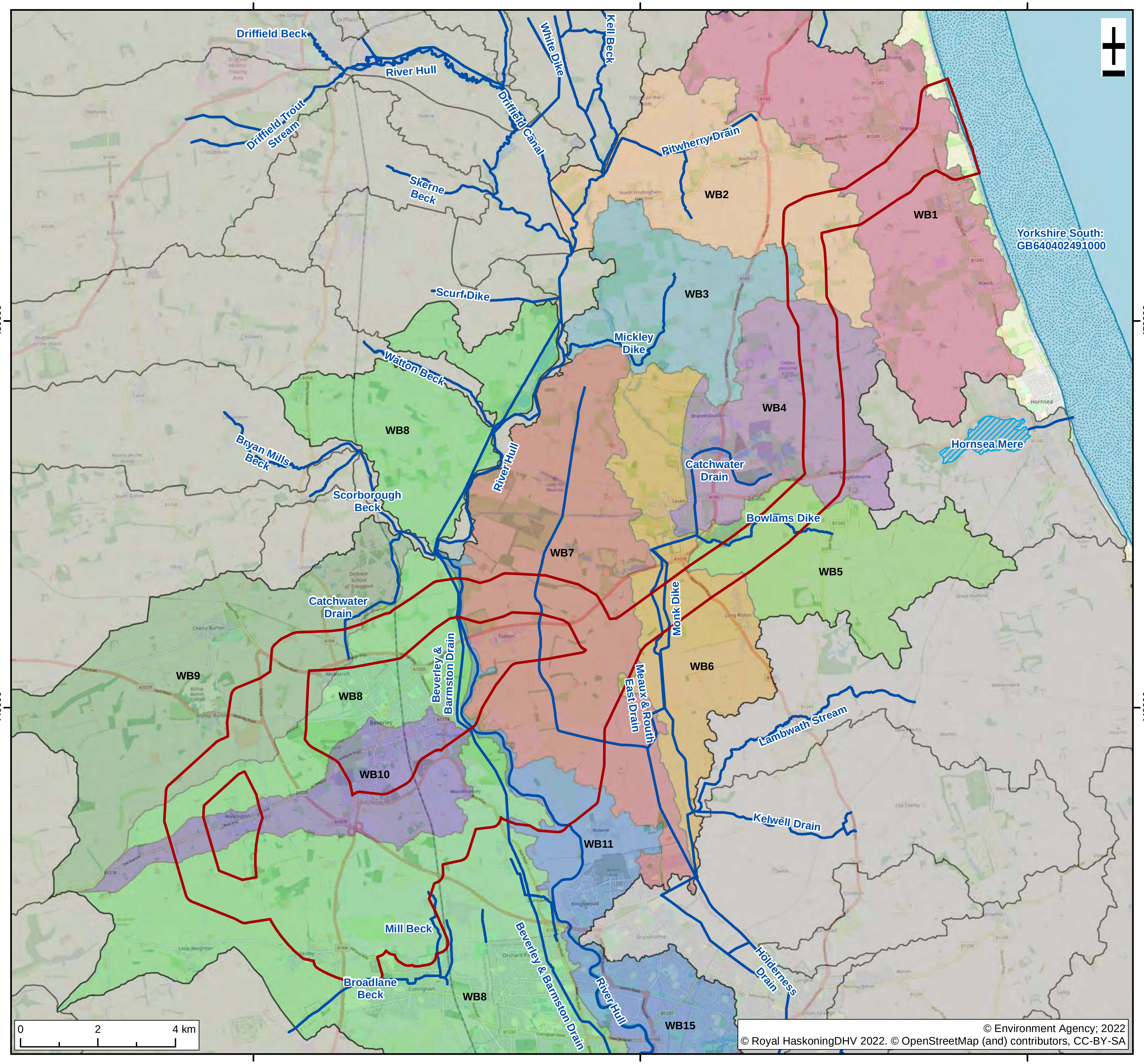
3.3.1.1. Surface waters

625. The majority of the Onshore Study Area falls within the River Hull catchment (**Figure 3-8**). This river system drains the eastern side of the Yorkshire Wolds and flows in a generally north-south direction to join the Humber Estuary at Hull. Several of the Hull's tributaries rise very close to the coast and flow inland to join the main river. Although upstream parts of the River Hull catchment include highly sensitive chalk rivers (i.e. watercourses such as Driffield Beck, Eastburn Beck, West Beck, Frodingham Beck, Kelk Beck and Foston Beck, which make up the River Hull Headwaters SSSI), the Onshore Study Area does not cross any watercourses with a statutory designation. The Onshore Study Area does not cross any of the named East Riding chalk streams listed in the WWF State of England's Chalk Streams report (WWF 2014).

626. Much of the Onshore Study Area is relatively flat, improved farmland that has been drained in the past. As well as the main surface water catchments, the Onshore Study Area is characterised by numerous cuts, dikes, drains and ditches. The main watercourses within the Onshore Study Area are: Skipsea Drain (West Branch), Dunnington Sewer, Milldam Beck, Catfoss Drain, Stream Dike, Monk Dike, Routh and Meaux Drain, Routh and Meaux East Drain, Routh and Meaux Road Drain, Holderness Drain, River Hull, Beverley and Skidby Drain, Beverley and Barmston Drain, Beverley Parks Sewer, South Bullock Dike and Meaux West Drain. Under the WFD these watercourses fall within water bodies classed as either heavily modified or artificial, and base mapping shows they have straight/heavily engineered planforms.

627. The Onshore Study Area is largely rural. As a result, agricultural and rural land management issues are adversely affecting water quality. There are also water quality issues surrounding waste treatment and disposal, and discharges from the water industry. Specific water quality issues for each WFD water body are described in Section 3.3.1.3.

628. Within the Onshore Study Area there are two SSSIs: Withow Gap, Skipsea, and Burton Bushes. Withow Gap, Skipsea is a geological site designated for its importance in the interpretation of Late Devensian (glacial) and Flandrian (post-glacial) environmental history in Holderness. Burton Bushes is considered a good example of woodland characteristic of Holderness Till soils. Skipsea Bail Mere is also located immediately downstream of the Onshore Study Area – the site contains organic deposits which have infilled the basin and contain pollen and macrofaunal environmental records that begin in the Devensian Late Glacial. Further information regarding each of these designated sites is provided in Section 3.1.1.



Legend:

- Onshore Study Area
- Statutory Main Rivers
- WFD Lake Water Bodies
- WFD Transitional & Coastal Water Bodies

WFD River Water Body Catchments

- WB1: Barmston Sea Drain / Skipsea Drain to Conf
- WB2: Old Howe/Frodingham Beck to R Hull
- WB3: Mickley Dike Catchment
- WB4: Catchwater Drain
- WB5: Foredyke Stream Upper
- WB6: Foredyke Stream Lower to Holderness Dr
- WB7: Holderness Drain Source to Foredyke Stream
- WB8: Beverley and Barmston Drain
- WB9: High Hunsley to Arram Area
- WB10: High Hunsley to Woodmansey Area
- WB11: Hull from Arram Beck to Humber
- Catchments outside of Study Area

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	11/05/2022	Suitable for Review & Comment	LB	ID	HC

Title:

Surface Water Features

Figure: 3-8 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0232

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:100,000

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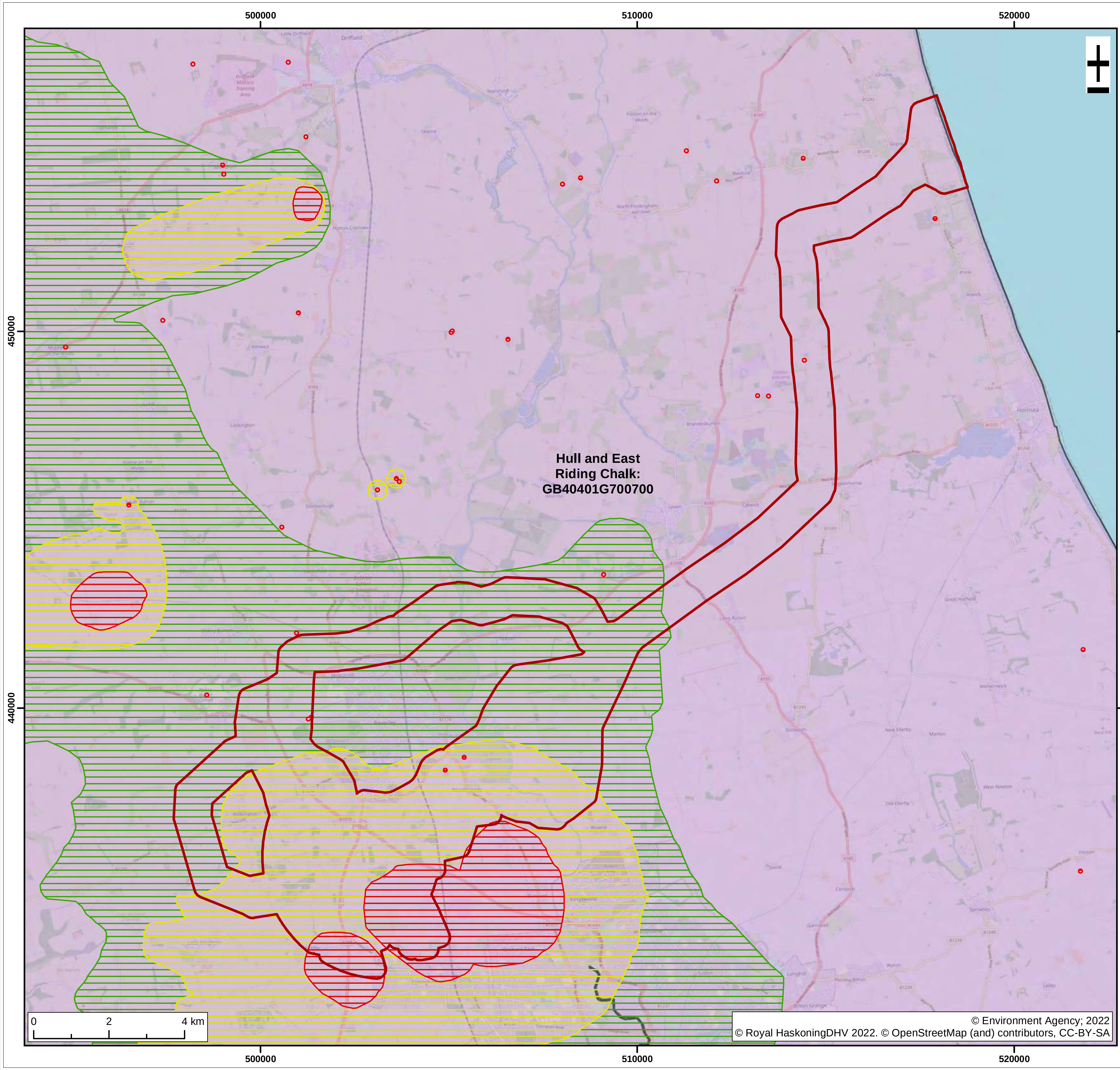
3.3.1.2. Groundwater

629. Bedrock geology is characterised by the White Chalk Subgroup across the entire Onshore Study Area, and these rocks support a similarly extensive Principal aquifer (**Figure 3-9**). Principal aquifers provide significant quantities of drinking water, and water for business needs. They may also support rivers, lakes and wetlands. Superficial deposits are more varied but are dominated by till (diamicton). A wide belt of alluvium (sand, silt and clay), interspersed with more restricted pockets of glacial sand and gravel, runs north-south through the Onshore Study Area. Around the periphery of Beverley there are also Quaternary river terrace sediments and areas of head.

630. Superficial deposits support extensive Secondary (undifferentiated) aquifers. For these features it is not possible to apply either a Secondary A or B definition, because of the variable characteristics of the rock type – they have only a minor value. There are also several large Secondary A aquifers in the River Hull valley and other alluvial settings. Secondary A aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers. Small Secondary B aquifers are also present in the Skipsea area. Secondary B aquifers are lower permeability layers which may yield limited amounts of groundwater due to localised features such as fissures, permeable horizons and weathering.

631. The Onshore Study Area crosses Cottingham and Dunswell Drinking Water Safeguard Zone (groundwater), Tophill Low Drinking Water Safeguard Zone (surface water), and several Source Protection Zones (Zones I, II and III). SPZ I is the most sensitive, having a 50 day travel time of pollutant to source with a 50 metres default minimum radius. SPZ II has a 400 day travel time of pollutant to source. This has a 250 or 500 metres minimum radius around the source depending on the amount of water taken. SPZ III (total catchment) is the area around a supply source within which all the groundwater ends up at the abstraction point.

632. Groundwater quality is adversely affected by diffuse and point source pollution from a variety of sources, including agriculture, sewage discharge, and groundwater abstraction (Environment Agency 2022).



Legend:

- Onshore Study Area

WFD Groundwater Bodies

- Hull and East Riding Chalk

Source Protection Zone

- Zone I
- Zone II
- Zone III

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
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S3	P01	11/05/2022	Suitable for Review & Comment	LB	ID	HC

Title:

Groundwater Features

Figure: 3-9 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0233

Co-ordinate system: British National Grid

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3.3.1.3. WFD water bodies

633. **Table 3-8** and **Table 3-9** show the names and status (2022) of WFD rivers and groundwater water bodies, respectively, within the Onshore Study Area. The ecological status of river water bodies is Moderate, and Fail for chemical status. Issues preventing surface waters reaching a Good status are related to physical modifications and pollution (urban (e.g., sewage discharge); rural (e.g., poor nutrient management)). Groundwater quality is classed as Poor overall and Poor for chemical status. Poor groundwater status is due to diffuse and point source pollution.

Table 3-8 WFD Water Bodies (Rivers) (Environment Agency 2022)

WFD Water Body	Ecological	Chemical	RNAG element
Beverley and Barmston Drain **GB104026067211**	Moderate	Fail	Dissolved oxygen Phosphate PBDEs Mercury and its compounds
Catchwater Drain **GB104026066970**	Moderate	Fail	Dissolved oxygen Phosphate Ammonia Invertebrates PBDEs Mercury and its compounds
Foredyke Stream Lower to Holderness Drain **GB104026066910**	Moderate	Fail	Dissolved oxygen Phosphate Ammonia Fish PBDEs PFOS Mercury and its compounds Mitigation measures

WFD Water Body	Ecological	Chemical	RNAG element
Foredyke Stream Upper **GB104026066890**	Moderate	Fail	Phosphate Ammonia Invertebrates PBDEs Mercury and its compounds Mitigation measures
High Hunsley to Arram Area **GB104026066841**	Moderate	Fail	Phosphate Ammonia PBDEs Mercury and its compounds Benzo(k)fluoranthene Benzo(g-h-i)perylene Benzo(b)fluoranthene
High Hunsley to Woodmansey Area **GB104026066820**	Moderate	Fail	Fish PBDEs Mercury and its compounds
Holderness Drain Source to Foredyke Stream **GB104026066950**	Moderate	Fail	Dissolved oxygen Phosphate Ammonia PBDEs Mercury and its compounds Mitigation measures

WFD Water Body	Ecological	Chemical	RNAG element
Hull from Arram Beck to Humber **GB104026067212**	Moderate	Fail	Phosphate Tributyltin compounds PBDEs Mercury and its compounds Benzo(k)fluoranthene Benzo(g-h-i)perylene Benzo(b)fluoranthene
Mickley Dike Catchment **GB104026066990**	Moderate	Fail	Dissolved oxygen PBDEs Mercury and its compounds Mitigation measures
Old Howe/ Frodingham Beck to River Hull **GB104026067021**	Moderate	Fail	PBDEs Mercury and its compounds
Barmston Sea Drain/ Skipsea Drain to Confluence **GB104026077770**	Moderate	Fail	Dissolved oxygen Phosphate Invertebrates Ammonia PBDEs Mercury and its compounds

Table 3-9 WFD Water Bodies (Ground Water) (Environment Agency 2022)

WFD Water Body	Ecological	Chemical	RNAG element
Hull and East Riding Chalk **GB40401G700700**	N/A	Poor	Chemical GWDTEs test Trend Assessment Chemical Drinking Water Protected Area General Chemical Test Chemical Saline Intrusion Quantitative Saline Intrusion

3.3.1.4. Flood risk

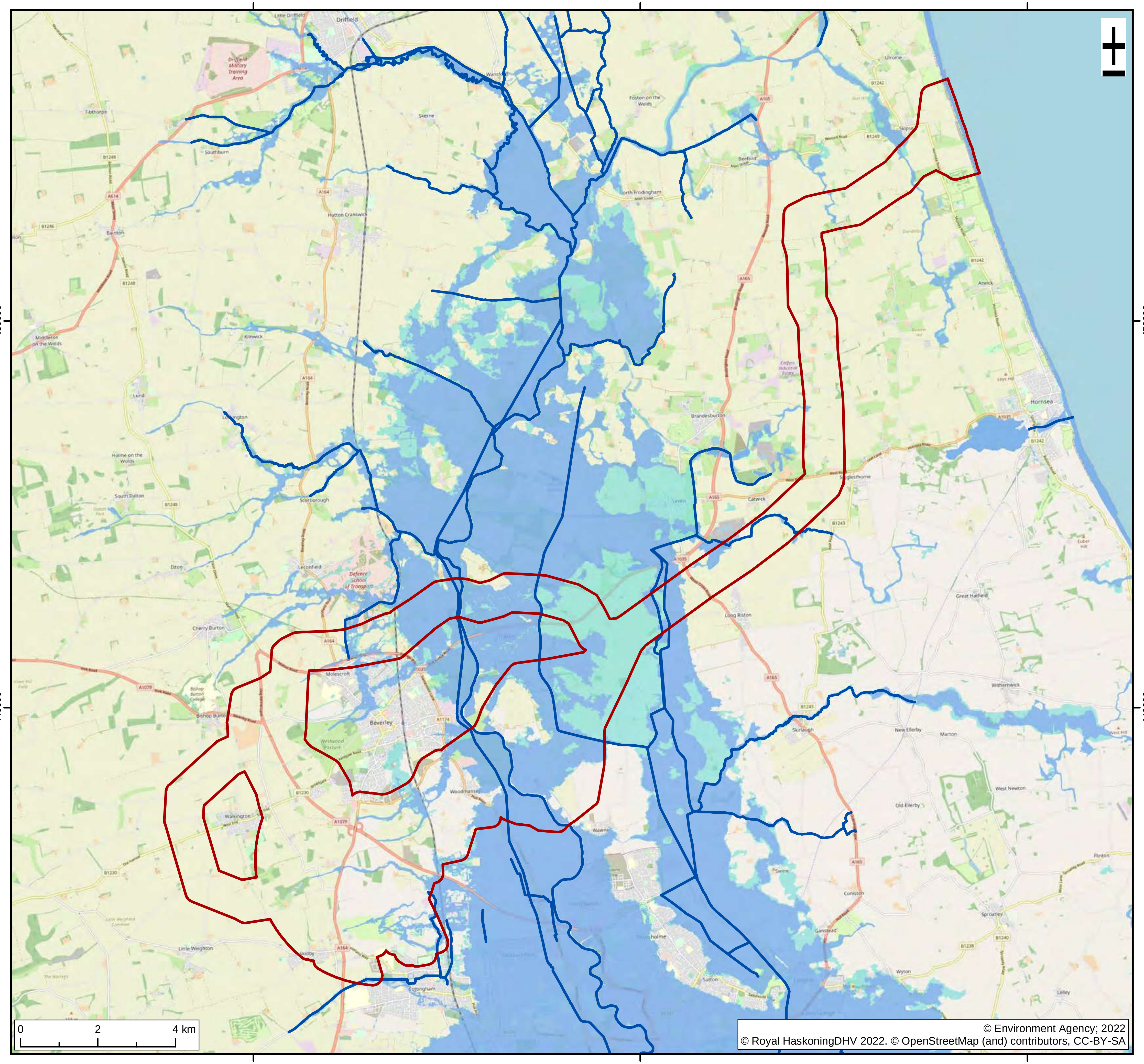
634. Much of East Riding is defended against fluvial and coastal flooding. As such, much of the flood risk posed to the area is residual as a result of flood events exceeding the standard of protection afforded by the defence, defence or pumping failure, or flooding behind defences due to local runoff or groundwater (East Riding of Yorkshire Council 2019).

635. Flood zone maps show that most of the Onshore Study Area is in Flood Zone 1 (<0.1% Annual Exceedance Probability (AEP)) (**Figure 3-10**). Within the relatively flat River Hull valley there are extensive areas of land in Flood Zone 3 (>1% AEP). Specifically, the Onshore Study Area crosses a swathe of Flood Zone 3 from the junction of the A1035 and A165 in the east to Routh in the north and Wawne to the south. To the west, Flood Zone 3 extends to approximately the eastern side of Beverley. In the area from Routh and south to Meaux, there is a large area of land that occupies Flood Zone 2. To the west and south of Beverley, flood risk associated with Flood Zones 2 and 3 is limited and associated with several ordinary watercourses immediately north west of Cottingham. Narrow areas of Flood Zone 3 also cross the Onshore Study Area associated with Skipsea Drain (West Branch) and Dunnington Sewer near the coast, and Stream Dike north of Long Riston.

636. Given the low-lying topography of the Onshore Study Area, the risk of surface water flooding is high in many places. Surface water flood risk occurs as isolated areas of ponding and discrete flow pathways. For example, in the area west of Beverley which is at low risk of flooding from rivers and the sea (FZ1), there are numerous narrow high risk (3.3% AEP) flow paths that drain towards Beverley. There are also numerous medium to high risk flow paths in the area between Cottingham and Beverley. A lot of the narrow surface water flood risk pathways are associated with drains and hollows, but these connect to flatter areas in places to create more extensive areas of surface water flooding (but generally lower risk (1-0.1% AEP)). These areas are located: north west of Tickton, immediately northeast of Beverley (close to North Bullock Dike), immediately south of Beverley (near Beverley Parks Sewer), and close to Holderness Drain and Meaux West Drain.

637. Groundwater emergence maps for the East Riding show that vast majority of the Onshore Study Area may be susceptible to elevated groundwater levels (and thus result in groundwater flooding) following periods of prolonged rainfall (East Riding Local Plan 2018). The East Riding groundwater emergence zone largely coincides with the underlying chalk geology.

638. The Onshore Study Area does not cross any areas at risk of ‘dry-day’ or ‘wet-day’ flood risk associated with a dam or reservoir failure.



Legend:

- Onshore Study Area
- Statutory Main River
- Flood Zone 2
- Flood Zone 3

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	11/05/2022	Suitable for Review & Comment	LB	ID	HC

Title:

Flood Risk

Figure: 3-10

Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0234

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3.3.2. Data Sources

639. The assessment will primarily be informed by a desk-based assessment using existing secondary data sets. The existing data sets that will be used to inform the EIA are set out in **Table 3-10**.

Table 3-10 Existing Datasets

Data used to inform the assessment	Source
WFD water body status objectives and classification data	Environment Agency Catchment Data Explorer
Water quality data	Environment Agency Water Quality Data Archive
Aquatic ecology data	Environment Agency Ecology and Fish Data Explorer
SPZs	Environment Agency (data.gov.uk)
Aquifer designation (bedrock and superficial) mapping	Magic.defra.gov.uk
Groundwater vulnerability mapping	Magic.defra.gov.uk
Geological mapping	British Geological Survey
Licensed abstraction data	Environment Agency (available upon request)
Consented discharges	Environment Agency (available upon request)
Unlicenced (private) abstraction data	Environment Agency and East Riding of Yorkshire Council (data holdings may not be complete)
Statutory and non-statutory designated sites	Natural England (data.gov.uk)
Flood Map for Planning	Environment Agency

Data used to inform the assessment	Source
Flood risk mapping (rivers and sea, surface water, groundwater, reservoirs) Humber 2100+	Environment Agency (data.gov.uk) environment-agency.gov.uk
Detailed flood risk information (Product 4, 5 and 8)	Environment Agency (available upon request)
Historical flood incident information relating to highways, surface water and drainage flooding	Lead Local Flood Authority (LLFA) (available upon request)
East Riding of Yorkshire Council Strategic Flood Risk Assessments – Level 1 East Riding of Yorkshire Local Flood Risk Management Strategy 2015-2027 East Riding Local Plan	eastriding.gov.uk
Shoreline Management Plans	Environment Agency East Riding of Yorkshire Council

640. A geomorphology baseline survey will also be undertaken to inform the EIA, as outlined in **Table 3-11**. 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 3-11 Site-Specific Survey Data

Data content	Data information
Geomorphology baseline	The geomorphology baseline survey will collect information about the existing condition of the major watercourses within the Onshore Study Area. It will specifically focus on reaches where crossings of main rivers or other sensitive watercourses are proposed.

641. Any additional primary or secondary datasets will be identified through ongoing consultation with stakeholders through the EPP.

3.3.3. Potential Impacts

642. The flood risk and hydrology assessment is likely to have key inter-relationships with terrestrial ecology, geology and land quality, land use and onshore archaeology. These will be considered where relevant.

3.3.3.1. Potential impacts during construction

643. Construction activities within the Onshore Study Area could directly impact upon the geomorphology, hydrology, water quality and physical habitats of the surface water bodies identified. Disturbance could occur from the installation of buried electrical cables and associated infrastructure (e.g. temporary access crossings over surface watercourses). It could also occur in the event of an accidental release of drilling fluid from trenchless drilling techniques (e.g. HDD or auger boring) used to install cables below sensitive watercourses. In addition, installation of buried infrastructure beneath watercourses and associated flood defences could potentially constrain any future upgrades to these defences.

644. Construction activities could increase soil erosion and 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 export cable corridor and temporary/permanent infrastructure. Increased sediment supply would increase turbidity levels within the water column, resulting in greater fine sediment deposition on the channel bed. This could, in turn, alter local geomorphological adjustment rates and impact upon in-channel morphological features. Higher sediment loads entering the channel 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.

645. 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 body. Trenchless techniques, such as HDD, could also introduce contaminants to the underlying principal aquifer. 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 concrete and inert drilling fluids from 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. 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 subsurface activities (e.g. HDD).

646. Site preparation and construction activities within the Onshore Study Areas could lead to an increase in surface water runoff due to alterations in surface drainage patterns and surface flows. Infiltration rates could be reduced as a result 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). Flood risk could also be altered and/or increased, particularly to third-party land and property in the Onshore Study Areas designated as Flood Zone 2 or 3. Subsurface 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 water courses that rely on assisted pumping.

647. During construction the following potential impacts are scoped in for further assessment:

- Direct disturbance on surface water bodies;
- Increased sediment supply;
- Supply of contaminants; and
- Changes to surface water runoff and flood risk.

648. No potential construction impacts have been scoped out at this stage.

3.3.3.2. Potential impacts during operation and maintenance

649. There is the potential for accidental release of contaminants to surface water 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 on aquatic ecology and the use of water resources for abstractions.

650. Permanent onshore infrastructure (i.e. the onshore substations) 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 Study Areas designated as Flood Zone 2 or 3. Increased surface runoff could impact on watercourses that rely on assisted pumping. Operational activities associated with the TJB will not affect existing sea defences or flood risk.

651. During operation and maintenance the following potential impacts are scoped in for further assessment:

- Increased sediment supply;
- Supply of contaminants; and
- Changes to surface water runoff and flood risk.

652. Direct disturbance of surface water bodies during operation has been scoped out as post-construction there will be no mechanisms by which elements of the Projects could directly disturb water bodies. This is consistent with other recent projects, such as both the Dudgeon Extension and Sheringham Shoal Extension Projects (Planning Inspectorate 2019) as there is no evidence of any impact.

3.3.3.3. Potential impacts during decommissioning

653. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

654. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.3.3.4. Potential cumulative impacts

655. Potential cumulative impacts related to water resources and flood risk are likely to include increased sediment supply if other projects are being constructed within 1km of the onshore construction areas. All potential impacts are scoped in to the cumulative impacts assessment.

3.3.3.5. Summary of scoping proposals

656. **Table 3-12** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-12 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Flood Risk and Hydrology Assessment

Potential Impact	Construction	Operation	Decommissioning
Direct disturbance of surface water bodies	✓	×	✓
Increased sediment supply	✓	✓	✓
Supply of contaminants	✓	✓	✓
Changes to surface water runoff and flood risk	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.3.4. Approach to Impact Assessment

3.3.4.1. Study area

657. The study area for surface water resources and flood risk will include all the surface hydrological catchments that contain components of the Projects or are hydrologically connected to (i.e. directly upstream or downstream) these catchments. The Environment Agency's WFD river water body catchments are based on surface hydrological catchments and will therefore be used to delineate the boundaries of the study area and define surface water receptors.

658. The study area for groundwater resources will include all the hydrogeological units that underlie the Projects or are hydrologically connected to these units. The Environment Agency's WFD groundwater bodies are based on large-scale hydrogeological units and will therefore be used to delineate the boundaries of the study area and define groundwater receptors.

3.3.4.2. Environmental Impact Assessment

659. 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, Drinking Water Protected Areas); water-dependent habitats and groundwater-dependent terrestrial ecosystems, including designated sites (e.g. SAC, SPA, SSSI); and water supply infrastructure (including treatment plants, pumping stations and distribution networks) and surface and foul drainage infrastructure.
- Flood risk to the Projects 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.

660. 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 (2015) and Highways Agency (2009).

661. The approach to assessment and data gathering will be discussed and agreed through production of a method statement and discussion with stakeholders as part of the EPP. Consultation will be undertaken at key stages throughout the EIA process. Following the refinement of the Onshore Study 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.

3.3.4.3. Supporting assessments

662. 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 (MHCLG 2019) and following suitable guidance (e.g. MHCLG 2014) to assess the flood risk to the development and surrounding areas. This would inform the identification of any required mitigation measures.
- A WFD Compliance Assessment (which includes risks to ecological status) will be required to assess compliance with the requirements of the WFD in line with 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).

3.4. Land Use

663. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on land use.

The following questions are posed to consultees to help them frame and focus their response to the 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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on land use resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.4.1. Existing Environment

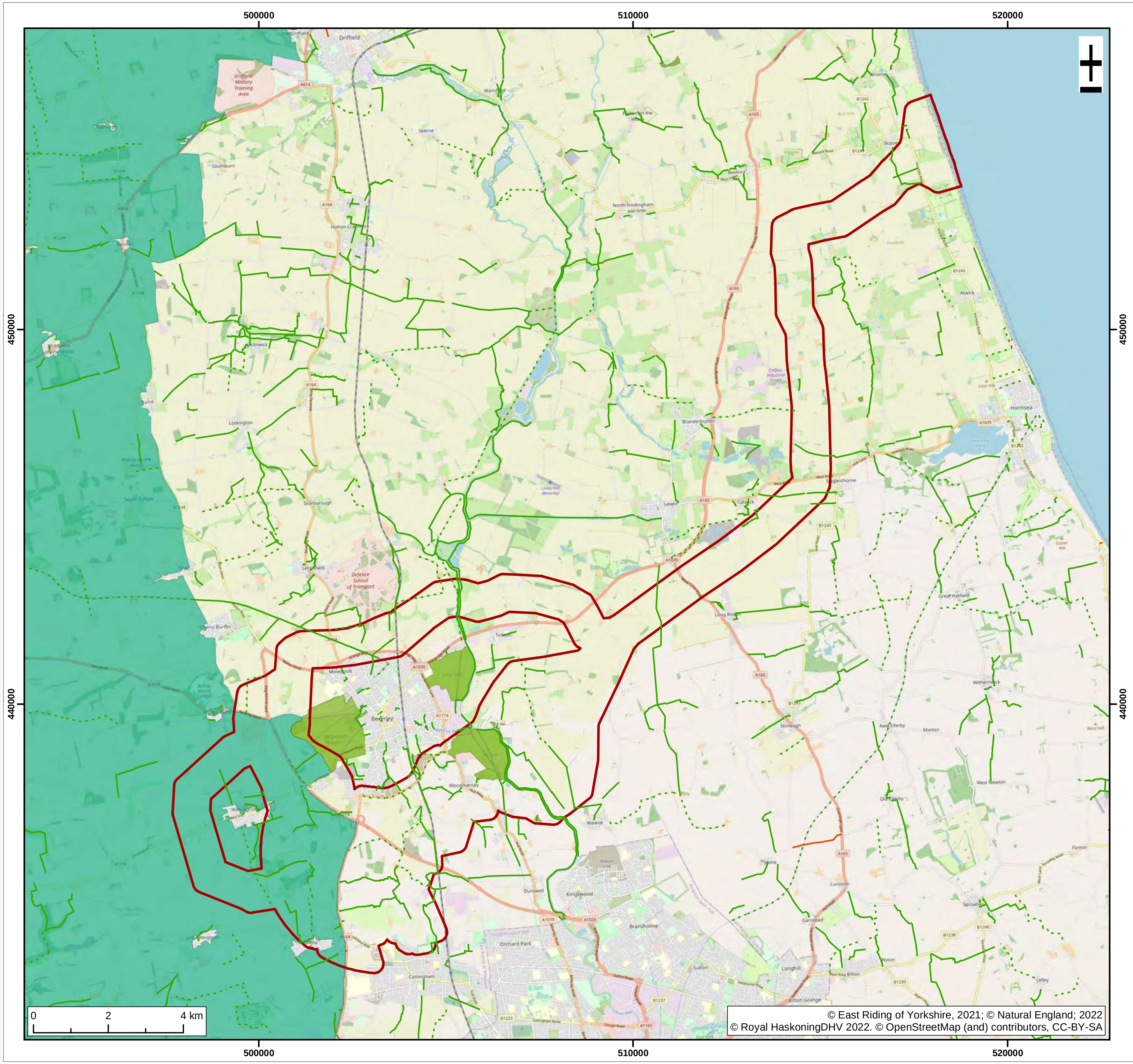
3.4.1.1. Existing land uses

664. The existing land use within the Onshore Study Area is predominantly arable agricultural land. A range of other land cover types are present including, but not limited to, built-up urban areas, areas of light industry, parcels of woodland, watercourses and ponds.

665. There are 23 recorded historical landfill sites located within the Onshore Study Area (**Figure 3-7**). The materials accepted at these sites are not recorded for all locations, however where they are recorded inert, industrial, commercial and household waste was accepted.

666. There is one recorded authorised landfill site within the Onshore Study Area (Integrated Waste Management Ltd) with permitted wastes recorded as household, commercial and industrial.

667. There are a total of 98 Public Rights of Way (PRoW) located within the Onshore Study Area, these comprise 24 bridleways, 73 footpaths and one combined bridleway/footpath (**Figure 3-11**).



Legend:

- Onshore Study Area
- Conclusive Registered Common Land
- Important Landscape Areas

Public Right of Way

- Footpath
- Bridleway
- Byway Open to All
- Restricted Byway

A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	11/05/2022	Suitable for Review & Comment	LB	KD	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Land Uses

Figure: 3-11 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0236

Co-ordinate system: British National Grid

Page Size: A3

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668. Land identified within the East Riding Local Plan (East Riding of Yorkshire Council 2016) as Important Landscape Areas are also located within the Onshore Study Area. These designated areas are located to the south west of Beverley (**Figure 3-11**).

669. Common Land and Countryside Rights of Way (CRoW) are located within the Onshore Study Area. These areas are located within close proximity to the settlements of Woodmansey and Beverley in the south western part of the Onshore Study Area. These areas do not overlap with the Important Landscape Areas discussed above, however they are located adjacent to one another (**Figure 3-11**).

3.4.1.2. Agricultural land and soil quality

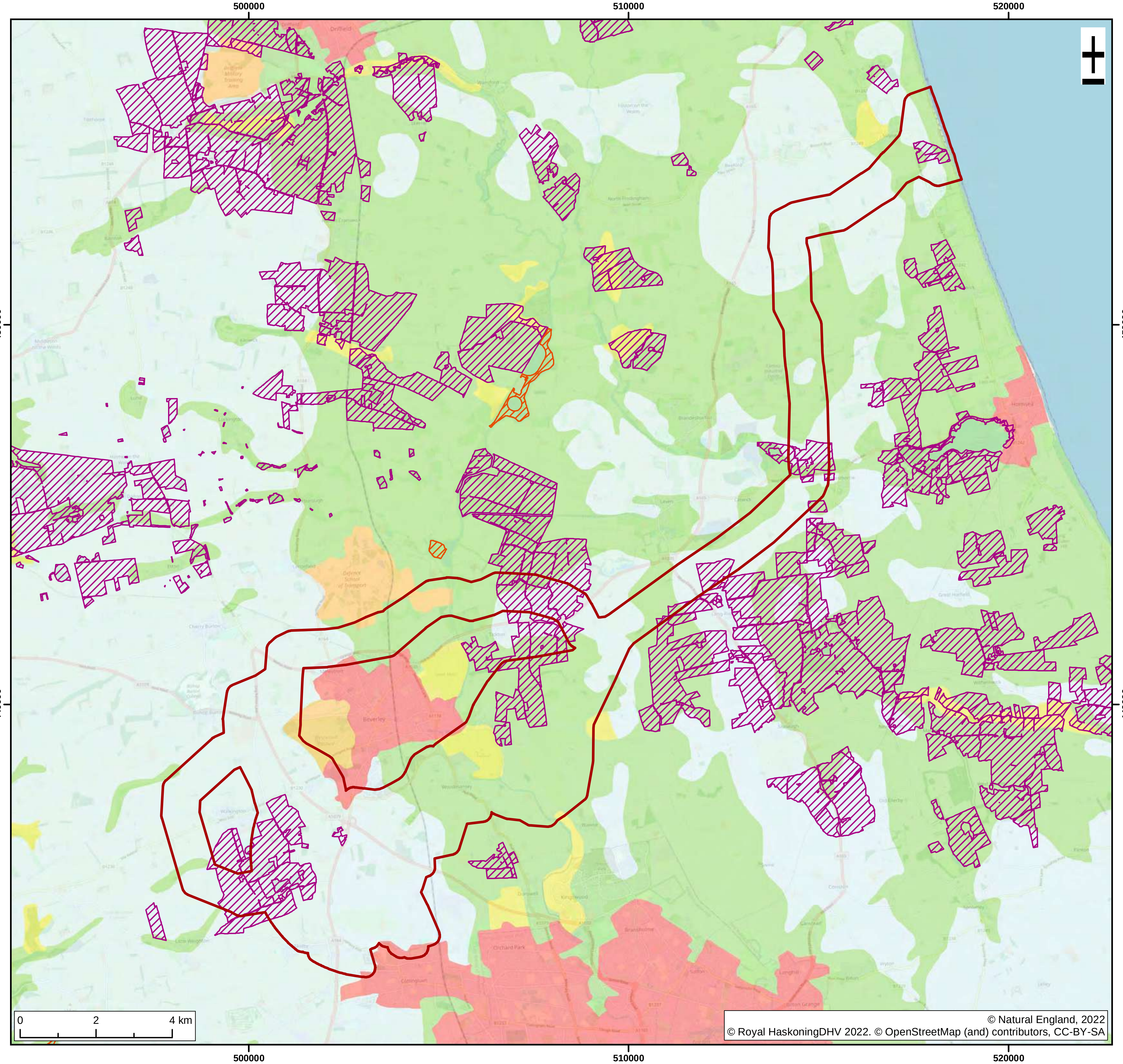
670. The agricultural land which comprises the majority of the Onshore Study Area is considered in terms of its agricultural value using Natural England's Agricultural Land Classification (ALC) dataset. ALC grades agricultural land from Grade 1 (best quality) through to Grade 5 (poorest quality) based on factors including climate, nature of the soil and site-based factors. 'Best and Most Versatile' (BMV) agricultural land is defined as ALC Grades 1, 2 and 3a (Grade 3 is 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.

671. The Onshore Study Area contains agricultural land of Grades 2 – 4, with the majority of land classified as Grades 2 – 3 (**Figure 3-12**).

672. A number of Environmental Stewardship Schemes are recorded within the Onshore Study Area, these are designated to encourage environmentally beneficial land management practices.

3.4.1.3. Utilities

673. It is anticipated that utilities are present within the Onshore Study Area. These are likely to include telecommunications, buried and above ground electricity cables, gas and public water mains. Detailed utilities data for the Onshore Study Area will be presented in the PEIR.



Legend:

Onshore Study Area

Agricultural Land Classification

- Grade 2
- Grade 3
- Grade 4
- Non Agricultural
- Urban

Environmental Stewardship Schemes

- Entry Level plus Higher Level Stewardship
- Higher Level Stewardship

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	11/05/2022	Suitable for Review & Comment	LB	KD	HC

Title:

Land Use Categories

Figure: 3-12

Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0235

Co-ordinate system: British National Grid

Page Size: A3

Scale: 1:100,000

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3.4.2. Data Sources

674. The existing environment will be characterised using the data sources set out in **Table 3-13**.

Table 3-13 Existing Datasets

Data source	Data contents
Natural England	Agricultural land classification maps Environmental stewardship schemes
Countryside and Rights of Way Act 2000 – Section 4 Conclusive Registered Common Land, Natural England	Common land Countryside Rights of Way
East Riding of Yorkshire Council	Planning policy adopted proposals maps Public Rights of Way
OS mapping Aerial photography	'A' Roads, railway lines and urban areas
Utilities records requested from local utilities suppliers (various)	Utilities

675. Any additional datasets will be identified through ongoing consultation with stakeholders. No surveys are proposed to inform the assessment of impacts related to land use.

3.4.3. Potential Impacts

676. The Land Use assessment is likely to have key inter-relationships with geology and land quality, terrestrial ecology and onshore ornithology, traffic and transport, and socio-economics, tourism and recreation. These will be considered where relevant.

3.4.3.1. Potential impacts during construction

677. There is the potential for the groundworks associated with the onshore export cable installation and onshore substation construction to impact the natural and artificial field drainage systems within the Onshore Study Area. Existing field drains are expected to be made of ceramic or plaster and are typically found at a depth between 0.5 - 1.5m. As such, it is likely that the drains would be impacted by any excavation works through agricultural fields. Therefore, potential impacts on drainage systems have been scoped into the EIA.

678. There is the potential for soils to become compacted and for soil structure to deteriorate during construction works. Degradation is most likely to occur at temporary compound locations and along access routes where heavy materials and equipment are stored. Deterioration of the soil structure can lead to reduced biological activity, water infiltration, soil porosity and permeability. These impacts can lead to reduced fertility and crop yields. Therefore, potential impacts to agricultural productivity have been scoped into the EIA.

679. The majority of the Onshore Study Area is located within areas associated with agricultural production. Construction activities within these areas would contribute to the temporary loss of agricultural land. Construction activities also have the potential to isolate land outside of the Onshore Study Area which would effectively take it out of agricultural use. This would result in the loss of growing seasons in the area affected. Therefore, potential impacts to farming practices have been scoped into the EIA.

680. There is the potential for soil erosion to occur as a result of excavation, storage and reinstatement processes that are likely to occur during construction. Therefore, potential impacts associated with soil erosion have been scoped into the EIA.

681. There is the potential for both ecological and financial implications to occur as a result of construction within areas located with Environmental Stewardship Schemes. The effects on landowners/occupiers would depend on the extent and duration of construction works within land parcels managed, and the terms and conditions attached to the agreements in place. Therefore, potential impacts to Environmental Stewardship Schemes have been scoped into the EIA.

682. During the construction phase, cable installation activity has the potential to impact on water, power, gas and communication infrastructure. Therefore, potential impacts to existing utilities have been scoped into the EIA.

683. There is the potential for temporary impacts to public access to PRoW and CRoW as a result of construction works. There is also the potential for these temporary impacts to effect public health and safety during construction works. Therefore, potential impacts associated with public access have been scoped into the EIA.

3.4.3.2. Potential impacts during operation and maintenance

684. Permanent infrastructure and hardstanding at the onshore substations, plus the presence of buried cables and transition joint bays has the potential to permanently impact upon land drainage. Impacts are considered further in section 3.3.3.

685. Buried electrical cable systems have the potential to emit heat, therefore potentially causing impacts to soil characteristics and productivity. The proposed electrical system of the Projects is designed to minimise heat loss to a level which is not likely to affect crop growth. Therefore, impacts associated with agricultural productivity are proposed to be scoped out of the EIA.

686. The presence of permanent above ground infrastructure at the onshore substations and TJBs (plus permanent easements) will result in the permanent loss of land including agricultural land, and therefore also a loss in productivity of these areas. Given the extent of BMV within the Onshore Study Area, there is a potential for loss of BMV during the lifetime of the Projects from the onshore substations, therefore it is proposed to scope this into the EIA. For buried infrastructure, land will be reinstated, and as such, there will be no permanent loss of BMV where buried infrastructure is present. There is, however, the potential for buried infrastructure to restrict farming practices during the operational phase of the Projects. Therefore, potential impacts on farming practices during operation have been scoped into the EIA.

687. Impacts associated with erosion are not anticipated to occur during the operational phase of the Projects. Therefore, it is proposed that potential impacts during operation are scoped out of the EIA.

688. There is the potential for land associated with existing/future Environmental Stewardship Schemes within the footprint of the onshore substations to be permanently taken out of use during the operational phase of the Projects. Schemes located at the landfall and within onshore export cable corridor would be reinstated following completion of construction works. Therefore, potential impacts associated with the onshore substations have been scoped into the EIA. Impacts associated with the onshore landfall and onshore export cable corridor are not anticipated and so it is proposed to scope this out of the EIA.

689. It is not anticipated that existing utilities will be impacted during the operational phase of the Projects. Therefore, it is proposed that impacts on utilities is scoped out of the EIA.

690. There is the potential for permanent diversions to PRoW and CRoW in areas associated with the onshore substations during the lifetime of the Projects. Therefore, it is proposed to scope potential impacts in the area surrounding the onshore substations into the impact assessment. It is also proposed that impacts to public health and safety associated with above ground infrastructure be scoped into the EIA. For buried infrastructure, permanent diversions to PRoW and CRoW as well as impacts to public health and safety are not anticipated. It is therefore proposed to scope this out of the EIA.

3.4.3.3. Potential impacts during decommissioning

691. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

692. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.4.3.4. Potential cumulative impacts

693. Onshore cumulative impacts will be considered as set out in section 1.8. Potential cumulative impacts related to land use include other nearby development projects interacting with the same utilities or existing land uses with temporal overlaps with the Projects' construction phase.

3.4.3.5. Summary of scoping proposals

694. **Table 3-14** outlines the impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-14 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Land Use Assessment

Potential impact	Construction	Operation	Decommissioning
Drainage	✓	✓	✓
Agricultural productivity (overground infrastructure)	✓	✓	✓
Agricultural productivity (buried infrastructure)	✓	×	✓
Disruption to farming practices	✓	✓	✓
Disruption to farming practices (soil heating)	×	×	×
Soil erosion	✓	×	✓
Environmental Stewardship Schemes	✓	✓ (onshore substations)	✓
Existing utilities	✓	×	✓
PRoW and CRoW access	✓	✓ (onshore substations)	✓
Cumulative impacts	✓	✓	✓

3.4.4. Approach to Impact Assessment

695. The EIA for land use will identify the likely impacts of the Projects, assess the impacts and identify appropriate mitigation measures if required. The assessment will consider both direct and indirect impacts.

696. The methodology for the assessment of the effects on land use will be informed by the following current guidance:

- NE124 – Look after your land with Environmental Stewardship (Natural England 2012);
- Design Manual for Roads and Bridges (DMRB) LA 112 Population and Human Health Section 3 (Land Use and Accessibility);
- Defra guidance including the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra 2018); and
- A New Perspective on Land and Soil in Environmental Impact Assessment (Institute of Environmental Management and Assessment 2022).

3.5. Onshore Archaeology and Cultural Heritage

697. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on onshore archaeology and cultural heritage. Offshore archaeology and cultural heritage (seawards of MHWS) are assessed in section 2.13.

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 high-level characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report,
- Do you agree with the approach to onshore archaeology and cultural heritage surveys, including the phased approach to baseline surveys?
- Have all the potential impacts on onshore archaeology and cultural heritage resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?

3.5.1. Existing Environment

698. For the purpose of this Scoping Report, initial illustrative heritage study areas are shown and based on buffers, as detailed below, of the Onshore Study Area. As part of the EIA process these will be updated based on refinements to the Projects. The existing historic environment with respect to onshore archaeology and cultural heritage will be described in the EIA including, but not limited to the following:

- Known non-designated heritage assets within 500m of the Onshore Study Area;
- Potential for buried archaeological remains and previously unrecorded above ground heritage assets within 500m of the Onshore Study Area;
- Designated heritage assets within 1km of the Onshore Study Area and 5km of the refined substation area of search (see section 1.6.5.1), to inform a setting assessment of heritage assets identified as potentially being affected by the projects 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 LVIA consultants.

699. It should be noted that for the designated heritage assets study area the current 5km buffer around the refined substation area of search will incorporate many designated assets within the urban area of Hull where no visibility/change to setting would occur, should this be the case the heritage 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 heritage study area for designated assets may be agreed with the relevant Historic Environment Services, pending any refinement of the proposed location of the substations.

700. 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).

701. The secure hill-tops, fertile floodplains, mineral resources and navigable rivers have all contributed to the Region's historic environment (Government Office for Yorkshire and The Humber 2008).

702. The Onshore Study Area is in proximity to several historic towns, such as Beverley and Cottingham, and numerous medieval villages and hamlets, many of which are protected with Conservation Area and Listed Building statuses.

703. Both Regionally and Nationally significant (some protected as Scheduled Monuments) archaeological remains have been identified in the heritage study area and include, but are not limited to:

- Barrow cemeteries and Romano-British settlement remains on Westwood Common;
- Medieval moated sites (such as Cellar Heads, Parkhouse Farm, Moor Grange, Hallgarth and Balmston Old Hall);
- Medieval deserted villages, settlement and ecclesiastical sites (such as Risby Hall, Meaux Abbey, Skipsea Castle and Eske); and
- Post-medieval manorial and ecclesiastical sites.

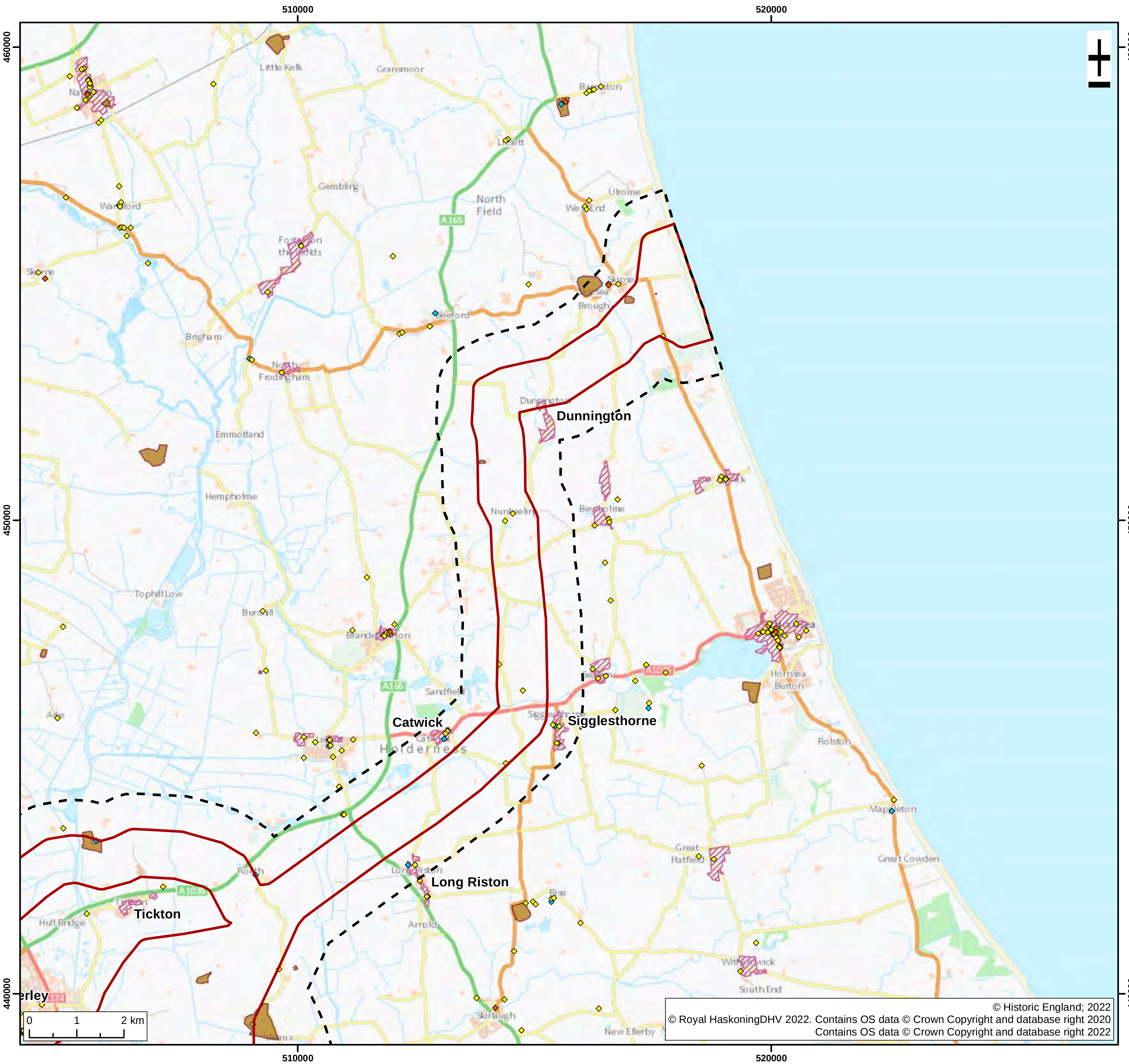
704. A search of designated heritage assets from the National Heritage List of England (NHLE) has been carried out (1km from the Onshore Study Area plus 5km from the refined substation area of search). There are 757 designated assets within the heritage study area (**Figure 3-13**), comprising:

- 47 Scheduled Monuments;
- 685 Listed Buildings (such as the Grade I Minster Church of St John, Beverley and Church of St Mary, Cottingham);
- 2 Registered Park and Garden (Risby Hall and Thwaithe Hall); and
- 23 Conservation Areas (including Beverley, Cottingham, Walkington, Bishop Burton and Skidby).

705. Within the wider landscape there is anticipated to be a high potential for buried archaeological remains dating from the prehistoric to modern periods. This has been evidenced by archaeological works undertaken for the other wind farm projects and other linear infrastructure schemes within the wider region.

706. Data for non-designated heritage assets from the Humber Historic Environment Record (Humber HER) has been acquired. This information has already been obtained in support of detailed site selection and cable route options refinement. The Humber HER data will also be used to inform the subsequent EIA process (see section 3.5.4). Non-designated heritage assets within the 500m study area (**Figure 3-14**) can generally be characterised by:

- Prehistoric settlement sites (e.g. such as cropmarks west of Walkington);
- Prehistoric findspots;
- Ring ditches and barrow cemeteries;
- Deserted medieval settlement sites;
- Post-medieval settlement and agricultural features;
- WWII defences; and
- Undated cropmarks, potentially representing buried archaeological remains.



Legend:

- Onshore Study Area
- Designated Assets Study Area
- Conservation Area
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	LB	FB	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets
(Page 1 of 2)

Figure: 3-13 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0238

Co-ordinate system: British National Grid
Page Size: A3
Scale: 1:80,000

Project: Dogger Bank South Offshore Wind Farms

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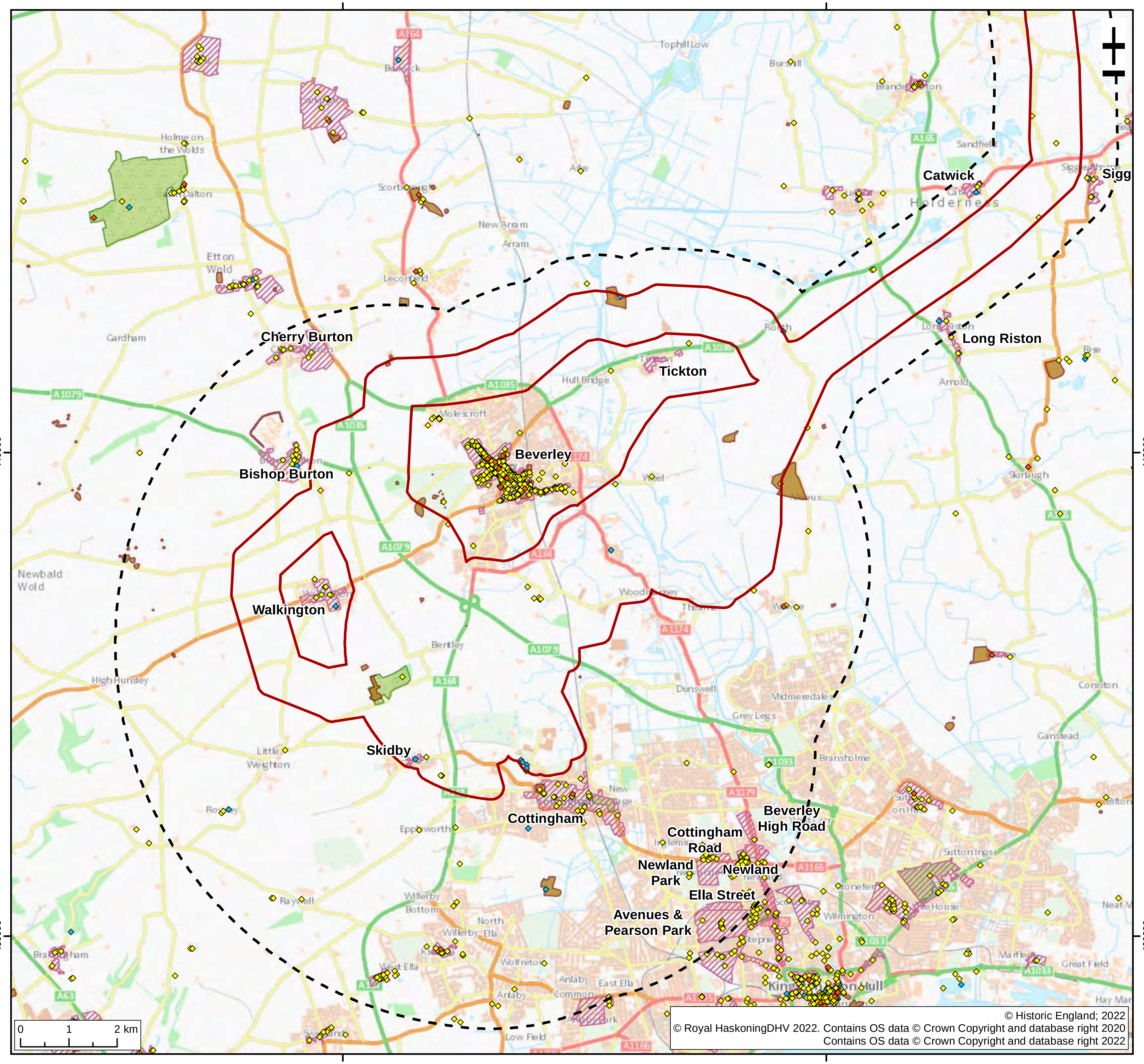

Legend:

- Onshore Study Area
- Designated Assets Study Area
- Conservation Area
- Registered Park & Garden
- Scheduled Monument

Listed Building

- Grade I
- Grade II
- Grade II*

A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
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SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Designated Heritage Assets
(Page 2 of 2)

Figure: 3-13 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0238

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:80,000

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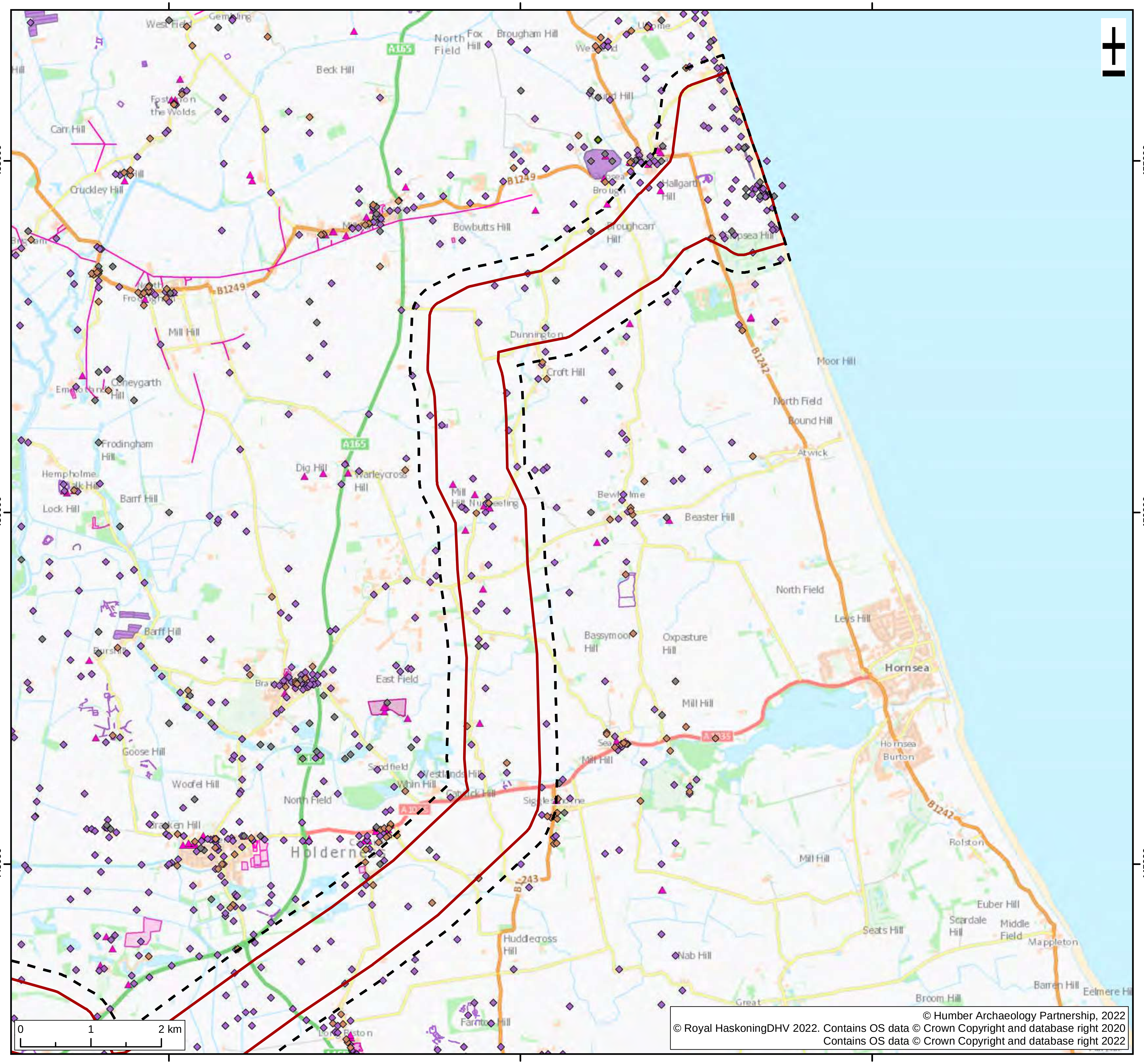

Legend:

- Onshore Study Area
- Non-Designated Assets Study Area

Historic Environment Records (events)

- Point
- Line
- Region

Historic Environment Records (monuments)

- Building
- Find Spot
- Landscape
- Monument
- Building
- Monument
- Building
- Find Spot
- Monument

S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	LB	FB	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Non-Designated Heritage Assets
(Page 1 of 2)

Figure: 3-14 Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0239

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:55,000

Project: Dogger Bank South Offshore Wind Farms

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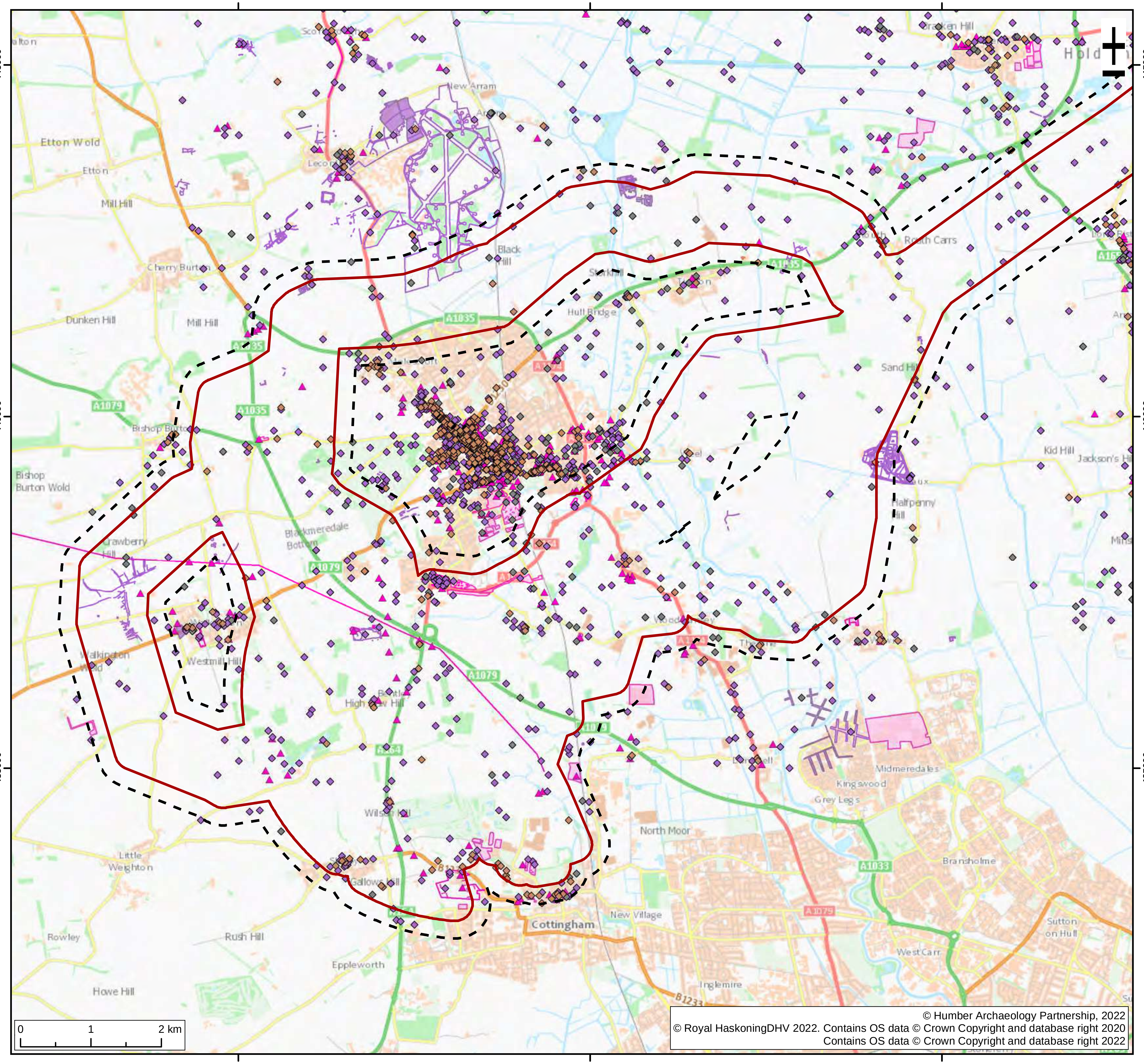

Legend:

- Onshore Study Area
- Non-Designated Assets Study Area

Historic Environment Records (events)

- Point
- Line
- Region

Historic Environment Records (monuments)

- Building
- Find Spot
- Monument
- Building
- Monument
- Building
- Monument

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	29/04/2022	Suitable for Review & Comment	LB	FB	HC

Title:

Non-Designated Heritage Assets
(Page 2 of 2)

Figure: 3-14 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0239

Co-ordinate system: British National Grid | Page Size: A3 | Scale: 1:55,000

Project: Dogger Bank South Offshore Wind Farms

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3.5.2. Data Sources

3.5.2.1. Data sources

707. The data sources that will be accessed to characterise the existing historic environment with respect to onshore archaeology and cultural heritage are presented in **Table 3-15**.

Table 3-15 Existing Datasets

Data source	Data contents
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.
The Humber Archaeology Partnership HER (Humber HER)	Contains data on all recorded non-designated heritage assets. The data includes archaeological, historic landscape character and historic building 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. 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.
[Heritage] Conservation Areas	East Riding of Yorkshire Council and Hull City Council.

Data source	Data contents
Zone of Theoretical Visibility (ZTV) Model	Any ZTV produced by the Landscape and Visual Impact Assessment (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.

708. **Table 3-16** presents the surveys that will be undertaken in 2022 and 2023 to inform the assessment in accordance with industry guidelines and agreed in advance with the relevant historic environment stakeholders.

Table 3-16 Site-Specific Survey Data

Survey/study	Spatial coverage
Walkover Surveys	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	Heritage assets identified as potentially being affected by the Projects (through a change in their setting impacting heritage significance) will be visited to inform the setting assessment.

Survey/study	Spatial coverage
Priority (then further/full) Geophysical Survey	Priority (PEIR) then Full (or as close to full as possible) coverage ES - Initially targeted/prioritised areas for geophysical survey, identified 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/DCO application stage.
Geoarchaeological desk-based assessment	Refined onshore project areas. Will determine the scope of any required bespoke approaches to onsite monitoring of engineering led site/ground investigations work and whether any further bespoke approaches would be required.
Archaeological and Geoarchaeological elements to any engineering-led site/ground investigation work	Bespoke approaches, including the possibility of onsite monitoring and watching brief associated with any engineering-led site/ground investigation work (SI/GI 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)	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)

709. 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 projects infrastructure such as substations and landfall and / or at other project related pinch-points.

3.5.3. Potential Impacts

710. 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.

711. A direct physical impact is one in which construction works involved with the Projects (e.g. excavations, and groundworks) result in a direct physical change to the fabric of a heritage asset (e.g. partial or complete removal).

712. 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, this too can impact heritage assets.

713. An indirect physical impact is one that results from the Projects but is not caused by direct (planned) intervention from the Projects' 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 Projects' parameters).

714. 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 Projects result in a change to the prevailing character of the area.

715. The Onshore Archaeology and Cultural Heritage assessment is likely to have key inter-relationships with offshore and intertidal archaeology, flood risk and hydrology, noise and vibration, traffic and transport, and LVIA. These will be considered where relevant.

3.5.3.1. Potential impacts during construction

716. 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 permanent above ground infrastructure; and
- General construction activities such as plant movement or increased traffic movements due to construction.

717. The potential impacts during construction that will be assessed and are scoped in are:

- Direct, physical impacts to designated heritage assets;
- Direct, physical impacts to non-designated heritage assets;
- Indirect, physical impacts to designated heritage assets;
- Indirect, physical impacts to non-designated heritage assets;
- Temporary change to the setting of designated heritage assets, which could affect their heritage significance; and
- Temporary change to the setting of non-designated heritage assets, which could affect their heritage significance.

3.5.3.2. Potential impacts during operation

718. As most of the Projects' onshore infrastructure is buried sub-surface (i.e. infrastructure associated with the buried cable systems), the operational phase will have limited potential to further impact the onshore archaeology and cultural heritage resource.

719. Activity which could have an ongoing impact to onshore archaeology and cultural heritage will be the presence of the onshore substations. Any permanent above ground infrastructure has the potential to result in a change to the setting of heritage assets, which could affect heritage significance.

720. The potential impacts during operation are:

- Permanent change to the setting of designated heritage assets, which could affect their heritage significance; and
- Permanent change to the setting of non-designated heritage assets, which could affect their heritage significance.

721. As the operational phase will have limited potential to further impact the onshore archaeology and cultural heritage resource, it is proposed to scope out direct physical impacts to designated and non-designated heritage assets during operation.

3.5.3.3. Potential impacts during decommissioning

722. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

723. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.5.3.4. Potential cumulative impacts

724. The Projects 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.

725. Where these impacts occur because of the Projects, 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.

3.5.3.5. Summary of scoping proposals

726. **Table 3-17** outlines the summary of the impacts proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-17 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Onshore Archaeology and Cultural Heritage Assessment

Potential Impact	Construction	Operation	Decommissioning
Direct, physical, impacts to designated heritage assets.	✓	×	✓
Direct, physical, impacts to non-designated heritage assets.	✓	×	✓
Indirect, physical, impacts to designated heritage assets.	✓	✓	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	✓	✓
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.	✓	✓	✓
Cumulative impacts	✓	✓	✓

3.5.4. Approach to Impact Assessment

727. 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 Projects' onshore export cable route and substation locations.

728. The impact assessment upon the onshore archaeology and cultural heritage resource will follow a heritage significance-based approach to historic environment decision-making.

729. As part of the site selection work a commercial search of the Humber HER has been undertaken. 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.

730. As part of the EIA process the existing historic environment with respect to onshore archaeology and cultural heritage will be described, including, but not limited to the following:

- Designated heritage assets within 1km of the onshore export cable corridor and 5km of the onshore substations.
    - This will inform a setting assessment of heritage assets identified as potentially being affected by the Projects through changes to their setting.
- Known non-designated heritage assets within 500m of the onshore export cable corridor and the onshore substations.

731. Identification of heritage assets potentially affected by the Projects will be undertaken through spatial analysis of the heritage data within a GIS framework.

732. 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 Projects' design.

733. Identification of any areas which will potentially be subject to intrusive archaeological evaluation (as set out in section 3.5.2) as part of the DCO application, 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.

734. 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 for Energy (EN-1);
- National Policy Statement for Renewable Energy Infrastructure (EN-3).
- National Planning Policy Statement (NPPF), Section 16: conserving and enhancing the historic environment (MHCLG 2021);
- Planning Practice Guidance (PPG): Historic Environment (Ministry of Housing, Communities & Local Government (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 (CIfA 2019); and
- Principles of Cultural Heritage Impact Assessment in the UK (IEMA, IHBC & CIfA 2021).

735. 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.

736. 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 export cable corridor and onshore substation locations.

737. The map regression exercise will be undertaken to identify changes in land use throughout history and will provide further information on potential heritage assets.

738. Other technical reports to be produced which will inform the baseline environment and ultimately inform assessment (see **Table 3-17**), 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.
- 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).
  - For example: monitoring and/or watching briefs.

739. 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 Projects. This will follow the Historic England five-step approach (Historic England 2017).

740. Following this scoping stage technical-level consultation with Historic England and Humber Archaeology Partnership will begin. This will help to further identify and agree the primary methodologies, present initial findings and ensure potential historic environment issues and risk are identified and considered during the EIA.

3.6. Landscape and Visual Impact

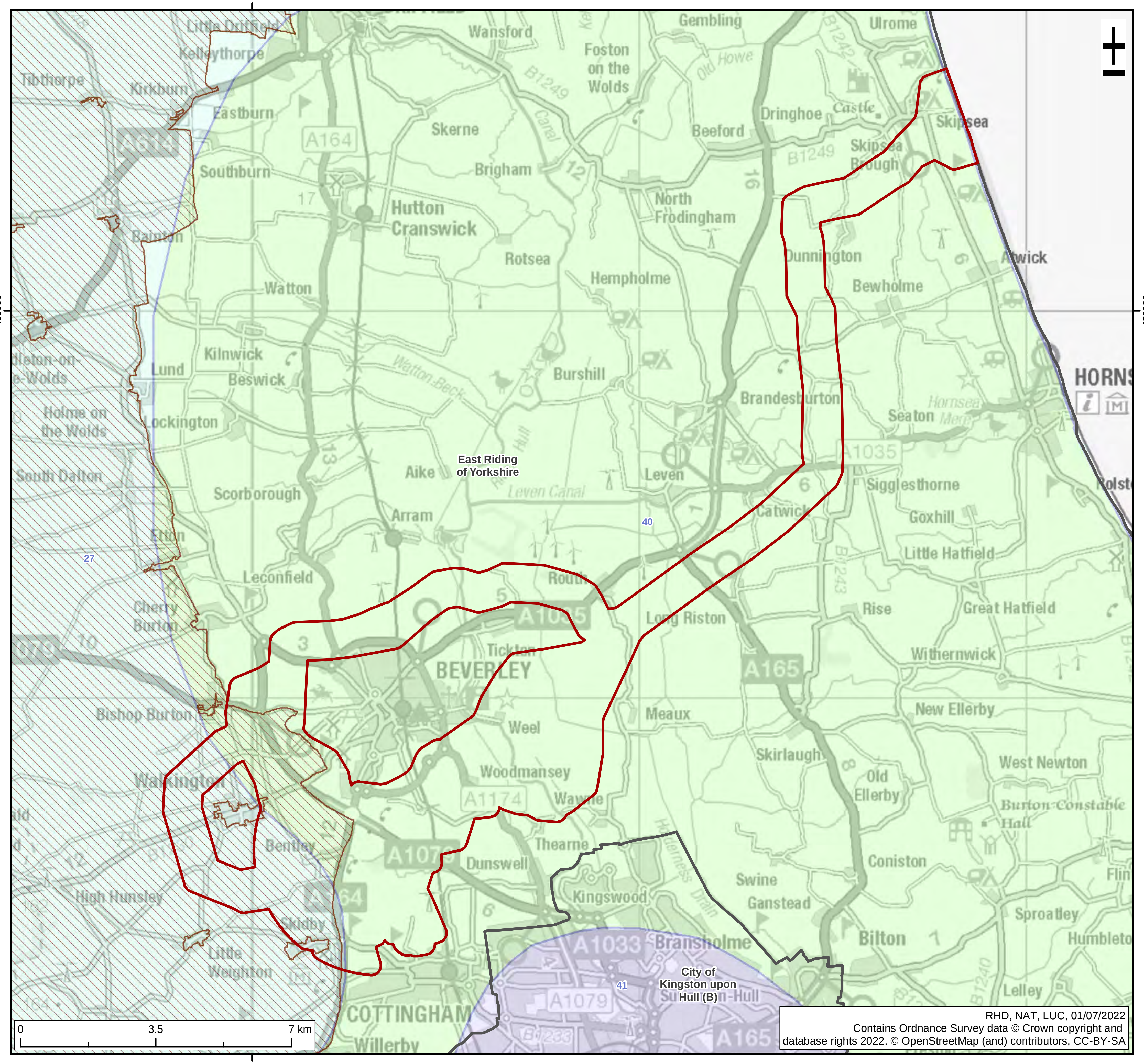
741. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on landscape and visual amenity. The SLVIA impacts of the offshore infrastructure are discussed in section 2.14.

The following questions are posed to consultees to help them frame and focus their response to the LVIA scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on landscape and visual receptors resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.6.1. Existing Environment

742. The onshore existing environment is described for the Onshore Study Area, which is within the East Riding of Yorkshire (see **Figure 3-15**). The Onshore Study Area will be refined through the site selection, consultation and engineering review process, prior to the LVIA.



Onshore Study Area
Local authority boundary
Important Landscape Area

National Character Area

27: Yorkshire Wolds
40: Holderness
41: Humber Estuary

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
EL	01	01/07/2022	Scoping	EL	PM	PM

Title:

Onshore Study Area - Landscape and Visual

Figure: 3-15 Drawing No: PC2340-LUC-ON-ZZ-DR-Z-0002

Co-ordinate system: British National Grid
Page Size: A3
Scale: 1:100,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

LUC

RWE

3.6.1.1. Onshore landscape character and designations

743. The Onshore Study Area (see **Figure 3-15**) extends inland from the potential landfall locations south of Bridlington, towards Beverley. The Onshore Study Area includes land to the south of Beverley in which the onshore substations will be located, on a site yet to be determined.

744. The majority of the Onshore Study Area is in the Holderness National Character Area (NCA). A small part of the Onshore Study Area extends into the Yorkshire Wolds NCA to the west of Beverley. Local landscape character is described in the East Riding of Yorkshire Landscape Character Assessment (East Riding of Yorkshire Council 2018).

745. There are no national-level designations within, or adjacent to, the Onshore Study Area. There is an area of Heritage Coast at Flamborough Head, though this is over 10km north-east of the Onshore Study Area.

746. East Riding of Yorkshire Council has identified the Yorkshire Wolds as an Important Landscape Area (East Riding of Yorkshire Council 2016), and the Onshore Study Area extends into this to the west of Beverley. The Yorkshire Wolds is being considered by Natural England for designation as an AONB. In June 2022 a candidate AONB boundary was published for consultation. This candidate boundary does not include any areas within 10km of the Onshore Study Area and so will not be considered further.

3.6.2. Data Sources

747. **Table 3-18** lists the data sources that have been used to inform this section and will also be used to inform the LVIA.

Table 3-18 Existing Datasets

Data Source	Spatial Coverage	Date
National Character Area Profiles published by Natural England	Onshore Study Area	2014
East Riding of Yorkshire Landscape Character Assessment	Onshore Study Area	2018
East Riding Local Plan	Onshore Study Area	2016
Ordnance Survey mapping and digital terrain models	Onshore Study Area	2022
Aerial and street-level photography available online	Onshore Study Area	Various

748. These data sources will be augmented with field surveys across the Onshore Study Area.

3.6.3. Potential Impacts

749. The LVIA is likely to have key inter-relationships with onshore archaeology and cultural heritage, traffic and transport and socio-economics, tourism, and recreation. These will be considered where relevant.

3.6.3.1. Potential impacts during construction

750. During construction the presence of construction activity and partially completed structures has the potential to locally impact designated landscapes, landscape character and visual receptors.

751. Impacts on landscape and visual amenity arising from landfall and onshore export cable installation works will be short-term and localised. Established good practice measures will be applied to minimise disturbance and to ensure rapid reinstatement. Due to the minimal nature of effects on landscape and visual receptors, the impacts of construction of the landfall and onshore export cable corridor have been scoped out of recent Environmental Statements, for example Hornsea Project Four Environmental Statement (Ørsted 2022). On this basis, impacts arising from construction of the landfall and onshore export cable corridor will be scoped out of the LVIA.

752. Construction of the onshore substations will involve longer-term disturbance due to the greater complexity and scale of works anticipated. The construction impacts of the onshore substations are scoped in to the LVIA.

3.6.3.2. Potential impacts during operation and maintenance

753. Following installation and restoration of ground, below ground cables would not significantly impact landscape or visual receptors. Operational impacts resulting from the landfall and onshore export cable are therefore scoped out of the LVIA.

754. The potential for the operation of the onshore substations to significantly impact designated landscapes, landscape character and visual amenity varies dependent on locational choice and design development. However, the substations will be large structures and it is proposed that impacts associated with operation of the onshore substations will be scoped into the LVIA.

755. Views of the onshore substations may affect visual receptors (people) at locations where the substation buildings can be seen. Receptors will include static and moving receptors, and some, such as residents and recreational users, will be of high susceptibility to change. Effects on visual receptors resulting from operation of the onshore substations are proposed to be scoped into the LVIA. A list of assessment viewpoints identifying representative views towards the onshore substations will be developed and agreed as the basis for examination of visual effects.

3.6.3.3. Potential impacts during decommissioning

756. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

757. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.6.3.4. Potential cumulative impacts

758. There is potential for cumulative impacts to arise in relation to the onshore infrastructure, with other similar types of projects such as substations. The substation area of search is already a focus for grid infrastructure, including the existing Creyke Beck substation, overhead power lines, battery storage, and with the onshore substation for the Hornsea Four Offshore Wind Farm proposed in the area. The potential for other projects to give rise to cumulative effects has therefore been scoped in at this stage. The scope of the cumulative LVIA will be agreed with stakeholders at a later date through the EPP.

3.6.3.5. Summary of scoping proposals

759. **Table 3-19** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-19 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) of the Landscape and Visual Impact Assessment

Potential Impact	Construction	Operation	Decommissioning
Those on designated landscapes and protected coastline, landscape character and visual receptors, including cumulative effects (resulting from the landfall and onshore export cables)	×	×	×
Those on designated landscapes and protected coastline, landscape character and visual receptors, including cumulative effects (resulting from the onshore substations)	✓	✓	✓

3.6.4. Approach to Impact Assessment

760. The approach to impact assessment will be based on the principles set out in the guidance listed below:

- Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment. 3rd edition. Routledge. (GLVIA3); and
- Landscape Institute (2019) Visual Representation of Development Proposals. Technical Guidance Note 06/19.

3.6.4.1. Impact Assessment Methodology

761. The location of the onshore substations is yet to be determined. Effects of the onshore substations will be examined across a landscape and visual study area, likely to be up to 5km radius around the proposed substation sites. Following identification of the substation sites, the extent of the landscape and visual study area will be agreed during consultation through the EPP.

762. Preparation of the LVIA will involve the following key steps:

- The 'worst case' development parameters will be identified, and the landscape and visual study area will be determined and agreed through consultation;
- ZTVs for the onshore substations will be generated across the landscape and visual study area;
- The landscapes of the landscape and visual study area will be analysed to identify landscape receptors, drawing on published landscape character assessments;
- The visual baseline will be recorded in terms of the different groups of people who may experience views of the onshore components, the places where they will be affected and the nature of their views and visual amenity;
- A series of assessment viewpoints will be selected in consultation with Natural England and the East Riding of Yorkshire Council;
- Visualisations (wirelines and photomontages) will be generated based on 3D modelling – the number, type and detail of visualisations will be agreed with Natural England and the East Riding of Yorkshire Council;
- Potentially significant effects on landscape character will be identified, including implications for designated landscapes;
- Potentially significant effects on visual amenity will be identified; and
- The level and significance of residual landscape and visual effects will be judged with reference to the sensitivity of the resource/receptor (its susceptibility and value) and magnitude of change (a combination of the scale of change, geographical extent and duration/reversibility).

763. Mitigation proposals, including design of the substation buildings and landscape treatments, will be developed in response to any potentially significant impacts that are identified in the LVIA.

3.7. Traffic and Transport

765. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on traffic and transport.

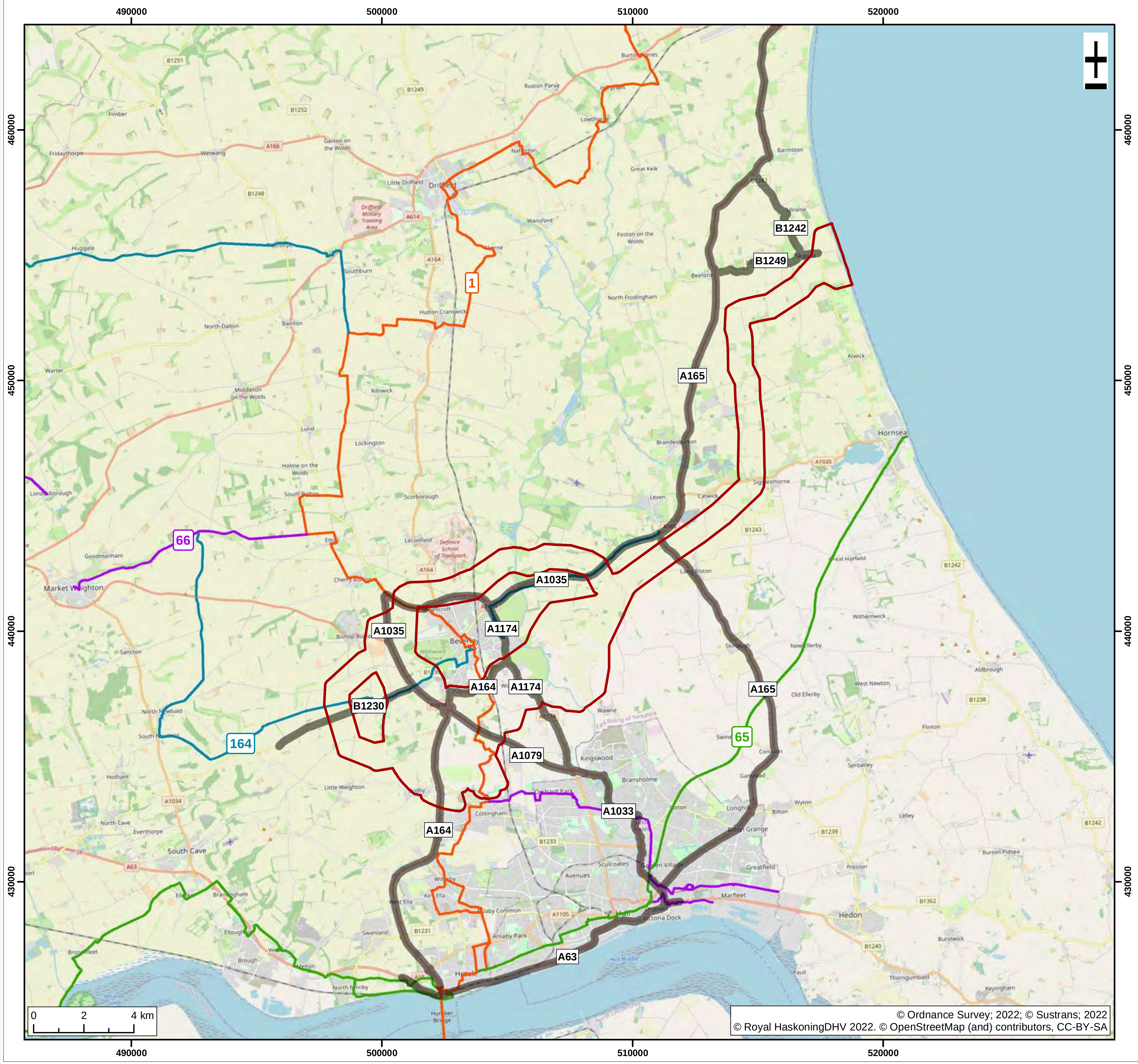
The following questions are posed to consultees to help them frame and focus their response to the traffic and transport scoping exercise which will in turn inform the Scoping Opinion:

- Do you agree with the characterisation of the existing environment?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on traffic and transport resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) for further assessment?
- Do you agree with the proposed approach to assessment?

3.7.1. Existing Environment

766. The following section provides a review of the existing environment in relation to an initial traffic and transport study area. Further refinement of the traffic and transport study area will be undertaken once the location of the onshore transmission works (and associated access locations) are finalised, and traffic demand is determined. Section 3.7.4 includes details of the approach that would be adopted to refining the traffic and transport study area.

767. The initial traffic and transport study area is shown in **Figure 3-16**. The traffic and transport 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.



Legend:

- Onshore Study Area
- Traffic and Transport Study Area
- National Cycle Network 1
- National Cycle Network 65
- National Cycle Network 66
- National Cycle Network 164

SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR
A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P02	30/06/2022	Suitable for Approval	ND	LB	HC
S3	P01	12/05/2022	Suitable for Review & Comment	LB	ST	HC

Title:

Traffic and Transport Study Area

Figure: 3-16

Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0240

Co-ordinate system: British National Grid

Page Size: A3

Scale: 1:150,000

Project: Dogger Bank South Offshore Wind Farms

Report: Dogger Bank South Offshore Wind Farms EIA Scoping Report

Royal HaskoningDHV
Enhancing Society Together

RWE

3.7.1.1. Road Network

768. The Onshore Study Area (**Figure 3-16**) extends from the town of Bridlington in the north towards Beverley and Hull in the south.

769. The following section describes the main A and B roads that form the traffic and transport study area.

3.7.1.1.1. Strategic Road Network

770. The Strategic Road Network within the traffic and transport study area comprises of the A63. The A63 could provide a key route for construction employees and materials.

771. 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.

772. National Highways are currently undertaking improvement works to the A63 known as A63 Castle Street Junction Improvement. National Highways identify that these improvements will improve access to the port, 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.

3.7.1.1.2. Local Highway Network

773. Within the traffic and transport study area, there is an extensive network of A and B roads managed by the East Riding of Yorkshire Council. It is considered that these routes would provide links for employees and material deliveries to directly access the onshore infrastructure (onshore export bales, landfall, and onshore substations).

774. The A164 intersects with the A63 to the west of Hull and provides the main north south link towards Beverley where it intersects with the A1079. To the north of the A1079 the A164 provides a southern bypass of Beverley linking to the A1174. The A164 comprises of both single and dual carriageway.

775. East Riding of Yorkshire Council are proposing improvements to the A164 as part of the 'Jocks Lodge Improvement Scheme' that will widen the A164 to the south of its junction with the A1079 and improve capacity at this junction.

776. The A1174 provides a single carriageway link to the east of Beverley intersecting with the A164 and the A1079.

777. The A1079 provides a route to the south of Beverley that connects to the A164 (to the south of Beverley) and A1033 to the north of Hull. The A1079 also provides a wider regional link west towards York. The A1079 comprises of both single and dual carriageway sections.

778. The A1079 links with the A1035 to the west of Beverley. The A1035 provides a generally north easterly route from Beverley towards Leven where it intersects with the A165. The A1035 is a single carriageway road, except for a short section of dual carriageway to the east of Leven.

779. The A165 intersects with the A1035 to the south of Leven before continuing north towards Bridlington. The A165 also heads south from Leven to Hull where it links to the A1033 and A63. To the north of the A1033 the A165 is a single carriageway road.

780. The A1035 to the east of Leven provides a single carriageway link from the A165 towards Hornsea.

781. To the south of the A1035, the A165 is a single carriageway road and is managed by the East Riding of Yorkshire Council until it reaches the outskirts of Hull, the road then becomes a dual carriageway and is managed by Hull City Council.

782. The B1249 and B1242 provide links from the A165 towards potential landfall locations close to Skipsea. The B1249 and B1242 are managed by the East Riding of Yorkshire Council and comprise of single carriageway roads.

783. The B1230 provides a link from the west of Beverley towards the A1034 and A63/M62 in the westand comprise of a single carriageway road.

784. Within the traffic and transport study area, there are two main A roads within the administration area of Hull City Council. It is considered that these routes would provide key links for employees based within the city of Hull and any material deliveries from the ports in Hull.

785. The A1033 provides a main link through 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 comprises of both single and dual carriageway.

786. The A165 provides a route northeast from the city of Hull towards the northern extents of the Onshore Study Area. The A165 is a dual carriageway.

3.7.1.1.3. Background Traffic Flows

787. **Table 3-20** provides a summary of the 2019 background traffic flows on the main A road serving the traffic and transport study area. Covid impacted data in 2020 have not been considered

Table 3-20 Background Traffic Flows

Highway Authority	**Road**	**Daily Traffic Flows**	
		All vehicles	Percentage of HGVs
National Highways	A63 (east of the A164)	62,151	9.7%
East Riding of Yorkshire Council	A164 (south of the A1079)	32,822	3.9%
	A164 (south of Beverley)	9,574	4.4%
	A1174 (east of Beverley)	15,671	4.4%
	A1079 (west of the A164)	19,516	5.5%
	A1035 (west of the A165)	19,389	4.7%
	A165 (north of the A1033	8,305	6.1%
	A1035 (east of the A165)	8,305	6.1%
	A165 (within East Riding of Yorkshire Council area)	9,461	5.4%
Hull City Council	A165 (within Hull City Council area)	14,653	2.1%
	A1033	24,145	6.6%
Notes: Data sourced from the Department for Transport Road Traffic Statistics - https://roadtraffic.dft.gov.uk			

788. Traffic flows presented in **Table 3-20** were recorded in 2019, more recent flows from 2020 have been discounted as these are not considered to be representative as they were undertaken during the COVID-19 pandemic. Section 3.8.4 provides details of how further baseline data will be collated.

3.7.1.2. Walking and Cycling

789. Within the traffic and transport study area there is an extensive network of walking and cycling routes within Hull and Beverley. In addition, there is an extensive network of National Cycle Routes (NCRs), these are shown in **Figure 3-16**.

790. NCR1 runs north from Hull past the existing electricity transmission network substation at Creyke Beck to Beverley (where it intersects with NCR164) and then onwards towards Driffield.

791. NCR164 heads northeast from Beverley towards Leven (following the A1035) and southwest from Beverley towards Walkington following the alignment of the B1230.

792. 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.

793. 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.

3.7.1.3. Rail and Sea

794. To the south of the traffic and transport study area, there are existing port and rail freight terminals alongside the River Humber that can be accessed from the A62 and A1033. These facilities could provide the potential for the import of project cargoes to the wider traffic and transport study area by road.

795. No other suitable ports or rail freight facilities have been identified within the traffic and transport study area.

3.7.2. Data Sources

796. To date, the existing environment has been characterised using the data sources set out in **Table 3-21**.

Table 3-21 Existing Datasets

Data Source	Data Contents
Department for Transport road traffic statistics - https://roadtraffic.dft.gov.uk	Annual average 2019 traffic counts for all main 'A' roads
Google Maps, Bing Maps, etc.	Online mapping
Sustrans – https://www.sustrans.org.uk/national-cycle-network	Details of national cycle routes

797. To facilitate the impact assessment, the following additional data will also be obtained:

- Baseline traffic flow data for all roads within the refined traffic and transport study area;
- Details of sensitive receptors (as defined within **Table 3-22**);
- Collision data for the latest five year period for all roads within the refined traffic and transport study area;
- Existing pedestrian/ cycle/ bus routes; and
- Trip generation, including number and type of construction vehicles and employee trips.

798. The impacts of COVID-19 on background traffic conditions were discussed with National Highways at an ETG meeting on the 10 September 2021. It has been agreed with National Highways that new baseline traffic flow surveys undertaken post September 2021 would be accepted as being representative of future baseline conditions (as long as COVID-19 restrictions are not re-introduced).

799. It is also proposed that collision data should be sourced for the latest five-year period, i.e. inclusive of the period where traffic flows were lower due to COVID-19 restrictions.

3.7.3. Potential Impacts

800. 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.

801. The Traffic and Transport assessment is likely to have key inter-relationships with land use, noise and vibration, air quality and human health. These would be considered where relevant.

3.7.3.1. Potential impacts during construction

802. 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 3.7.1).

803. **Table 3-22** sets out the potential construction traffic impacts and the likely user groups that would be affected.

Table 3-22 Potential Construction Traffic Impacts

Potential Impact	Potential Impact of Construction Traffic	Affected user groups
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.	Commuters, visitors, and business users.
Road safety	Construction traffic impacting upon sites with a history of collisions and / or the introduction of new risks associated with the formation of new construction accesses.	Commuters, visitors, and business users.
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		
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.

804. Traffic borne impacts upon noise and vibration and air quality are considered separately in section 3.8 and section 3.9 respectively. The cumulative interactions of all transport effects will be considered within the Human Health chapter (section 4.2).

805. The preferred base port (or ports) for the offshore construction of the Projects is not known and any decision would not be expected until post-consent.

806. 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. To ensure that any potential impacts associated with the Projects' offshore construction phase (including cumulative impacts) are assessed and mitigated, RWE will consider a DCO Requirement to produce construction and operational phase Port Traffic Management Plans once the final location of the preferred base port (or ports) is known. The use of a Port Traffic Management Plan has been accepted for other recently consented nationally significant offshore wind farm projects, e.g. East Anglia Three and Hornsea Three.

807. Recognising that RWE will consider producing a Construction Port Traffic Management Plan, it is proposed to scope out of the assessment the onshore impacts of the traffic and transport impacts associated with offshore construction activities.

808. GEART identifies that some developments may involve the transportation of dangerous or hazardous loads by road and that the ES should clearly outline the estimated number and composition of such loads.

809. 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.

810. 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 during the construction phase only. 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.

811. 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 Heavy Goods Vehicles (HGVs). Therefore, it is proposed that a separate assessment of hazardous loads is scoped out of the assessment.

3.7.3.2. Potential impacts during operation and maintenance

812. It is expected that the onshore substations will not be permanently manned and staff will periodically visit to carry out routine checks and maintenance. Most annual maintenance will be short, but if necessary, some campaigns may be longer.

813. Any inspections/ maintenance of the onshore export cable route will be infrequent and subject to very low vehicle demand.

814. Considering the activities above, no significant traffic and transport impacts are anticipated during the operational phase and it is therefore proposed that this phase will be scoped out of the assessment.

815. Similar to the construction phase, no decision has been made on a preferred base port for the offshore operation and maintenance of the Projects. Therefore, it is proposed to scope out of the assessment the onshore traffic and transport impacts of offshore operation and maintenance activities.

816. As set out for construction, to ensure that any potential impacts associated with the Projects offshore operational phase (including cumulative impacts) are assessed and mitigated, RWE will consider a DCO Requirement to produce a Port Traffic Management Plan once the final location of the preferred base port (or ports) is known.

817. Recognising that RWE will consider producing an Operational Port Traffic Management Plan, it is proposed to scope out of the assessment the onshore impacts of the traffic and transport impacts associated with offshore operational activities.

818. The use of a Port Traffic Management Plan has been accepted for other recently consented nationally significant offshore wind farm projects, e.g. East Anglia Three and Hornsea Three.

3.7.3.3. Potential impacts during decommissioning

819. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

820. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.7.3.4. Potential cumulative impacts

821. Onshore cumulative impacts 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 Projects will be identified. Consultation with the relevant highway authorities will seek to identify any significant developments that could have a cumulative impact with the construction phase, e.g. major road improvement schemes, other NSIPs, etc.

822. The assessment will consider the potential for significant cumulative impacts to arise because of the construction of the Projects in the context of other developments that are existing, consented or at the application stage.

3.7.3.5. Summary of scoping proposals

823. **Table 3-23** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-23 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Traffic and Transport Assessment

Potential Impact	**Construction**		**Operation**		**Decommissioning**	
	Onshore	**Offshore** *	**Onshore**	**Offshore** *	**Onshore**	**Offshore** *
Driver delay (capacity)	✓	×	×	×	✓	×
Driver delay (highway constraints)	✓	×	×	×	✓	×
Road safety	✓	×	×	×	✓	×
Severance	✓	×	×	×	✓	×
Amenity	✓	×	×	×	✓	×
Abnormal loads	✓	×	×	×	✓	×
Hazardous loads	×	×	×	×	×	×
Cumulative impacts	✓	×	×	×	✓	×
Notes * impacts associated with vehicles travelling to and from the selected base port(s) to construct, operate and decommission the offshore elements of the Projects.						

3.7.4. Approach to Impact Assessment

824. 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 3-24**.

Table 3-24 Supplementary Technical Transport Guidance

Document	Purpose/Application
PPG - Travel Plans, Transport Assessment and Statements (Ministry of Housing Communities and Local Government, March 2014)	Provides overarching guidance upon the structure of transport assessments and travel plans.
DMRB CD 123 - Geometric design of at grade priority and signal-controlled junctions (National Highways, November 2021)	Provides the standards for the design of new points of access.
Manual for Streets (Department for Transport, September 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 September 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/ road closures.

825. 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%).
- Rule 2: Include any other specifically sensitive areas where traffic flows, or the number of HGVs are predicted to increase by 10% or more.

826. The above criteria applied to the Projects' 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.

827. 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.

3.7.4.1. Identification of Sensitive Locations

828. 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.

829. Applying the GEART principles, **Table 3-25** provides broad definitions of the different sensitivity levels that would be adopted for the assessment.

Table 3-25 Example Definitions of the Different Sensitivity Levels

Sensitivity	Severance and amenity	Driver delay (capacity)	Driver delay (highway constraints)	Highway safety
High	High concentrations of sensitive receptors (e.g. hospitals, schools, areas with high footfall) and limited separation provided by the highway environment; or a low concentration of sensitive receptors and no separation from traffic provided by the highway environment.	Junctions operating at or over capacity.	Roads less than 5.5m wide with no passing places provided.	Links with collision rates above national averages and / or collisions clusters with emerging patterns of collisions.
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.	Junctions or links operating close to capacity.	Roads less than 5.5m wide but with passing places provided.	Links with collision rates close to national averages and / or collision clusters.
Low	Few sensitive receptors and / or highway environment can accommodate changes in volumes of traffic.	Junctions or links with spare capacity	Roads in excess of 5.5m in width.	Links with collision rates lower than national averages and / or no collision clusters.
Negligible	Links that fall below GEART Rule 1 and 2 screening thresholds and major ‘A’ roads or motorways with no pedestrian or cycle environment.			

3.7.4.2. Impact assessment process

830. Construction 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.

831. The Projects' traffic demand would be assigned to the highway links within the traffic and transport study area and the increase in traffic flow to baseline conditions determined. This would facilitate an assessment of the magnitude of effect by applying the thresholds in **Table 3-26** to inform a detailed evaluation of potential impacts.

Table 3-26 Magnitude of Effect Thresholds

Impact	**Negligible**	**Low**	**Medium**	**High**
Severance	Change in total traffic flow of less than 30%	Change in total traffic flow of 30-60%	Change in total traffic flow of 60-90%	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	
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.			
Highway Safety	Informed by a review of existing collision records from within the study areas and the forecast increase in traffic.			
Abnormal Loads	Informed by an assessment of the suitability of the access routes to accommodate abnormal loads.			

832. The magnitude of effect (**Table 3-26**) would then be combined with the receptor sensitivity (**Table 3-25**) to determine the overall impact of the Projects traffic in accordance with the impact assessment matrix (section 1.8).

3.8. Noise and Vibration

833. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on onshore noise and vibration levels at human sensitive receptors. The impacts of airborne noise on offshore receptors is assessed in section 2.4.

The following questions are posed to consultees to help them frame and focus their response to the 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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on noise and vibration resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

3.8.1. Existing Environment

834. The Projects have the potential to result in direct noise and vibration impacts at receptors inside the Onshore Study Area and in proximity to it, maximum distances from the Project to sensitive receptors included in each impact assessment are as follows:

- Construction: noise up to 300m, vibration up to 100m (as defined in the Design Manual for Roads and Bridges LA111 Noise and Vibration); and
- Operational noise: up to 500m.

835. This section therefore describes the existing noise environment in these locations.

836. The Onshore Study Area is within the administrative area of the East Riding of Yorkshire. It encompasses a variety of receptors, including residential areas of the town of Beverley.

837. Inland, smaller settlements include Skidby, Skipsea Walkington, Tickton, Woodmansey and Cottingham all of which are located within or immediately adjacent to the Onshore Study Area.

838. The following potential sources of noise have been identified in the Onshore Study Area. At receptors close to these sources, existing noise levels are likely to be elevated.

- A165, A1174 and the A1079 (north-south alignment);
- A1035 (east-west alignment);
- Aircraft using Linley Hill (Beverley) Airfield;
- Local roads;
- Mainline railway between Hull and Bridlington;
- Foss Hill and Beverley quarries; and
- Industrial areas to the north west of Brandesburton (Cat Foss) and to the south-west of Bridlington (Carnaby).

839. Onshore ecological receptors which may be sensitive to noise are identified in section 3.1.

840. Sensitive receptors with respect to noise and vibration are typically residential premises. It is also necessary to consider a wider range of receptors including schools, places of worship, noise sensitive commercial/industrial premises and spaces used for recreation.

841. Receptor types are classified by sensitivity in **Table 3-27**. Although detailed below, receptors classified as being of 'negligible' sensitivity will not be considered within the noise assessment.

Table 3-27 Definitions of the Different Types and Sensitivity Levels for Noise

Assigned Sensitivity	Definitions and Classification Type
High	Noise receptors have been categorised as high sensitivity where noise may be detrimental to vulnerable receptors. Such receptors include: Certain hospital wards (e.g. operating theatres or high dependency units) or care homes at night
Medium	Noise receptors have been categorised as medium sensitivity where noise may cause disturbance and a level of protection is required but a level of tolerance is expected. Such subgroups include: • Residential accommodation • Private gardens • Other hospital wards • Care homes (during the day) • Schools • Universities • Research facilities • National parks (during the day) • Temporary holiday accommodation (including holiday lets)
Low	• Noise receptors have been categorised as low sensitivity where noise may cause short duration effects in a recreational setting although particularly high noise levels may cause a moderate effect. Such subgroups include: • Offices • Shops (including cafes) • Outdoor amenity areas during the day (including recreation, public amenity space/play areas and PRoW) • Doctors‘ surgeries • Sports facilities • Places of worship

Assigned Sensitivity	Definitions and Classification Type
Negligible	Noise receptors have been categorised as negligible sensitivity where noise is not expected to be detrimental. Such subgroups include: • Warehouses • Light industry • Car parks • Agricultural land

3.8.2. Data Sources

842. The existing environment will be characterised using the data sources set out in **Table 3-28**.

Table 3-28 Existing Datasets

Data Source	Data Contents
Google Maps Aerial Photography Local Authority Local Plans	Location of noise sources and sensitive receptors within the Onshore Study Area
Environment Agency LIDAR Data (Open Licence)	Topographical data
OS Mapping	Vector mapping
Existing and proposed baseline noise surveys	Baseline noise data
Local Authority planning portal	Location of sensitive receptors which are not constructed but have planning consent and have the potential to be impacted by the Project

843. No baseline noise monitoring has been undertaken to date. Once the noise and vibration onshore study area has been refined, a baseline noise survey will be undertaken to inform the assessment.

844. The baseline survey methodology and geographical extent will be agreed in advance with the East Riding of Yorkshire Council's Environmental Health Officer.

845. Measurements will be undertaken in accordance with guidance detailed within 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'. Survey locations would be representative of the potentially most affected noise sensitive receptors.

846. Data collection will likely comprise a combination of short term attended and longer term (up to a week) unattended measurement. A weather station would also be deployed to identify site-specific meteorological conditions during the surveys.

847. A review of baseline data contained within published ESs and planning documents within the public domain for other developments would also be undertaken where data are available and relevant.

3.8.3. Potential Impacts

848. The noise and vibration assessment is likely to have key inter-relationships with landscape and visual, air quality, terrestrial ecology, tourism and recreation, traffic and transport and human health. These will be considered in the EIA where relevant.

3.8.3.1. Potential impacts during construction

849. Typically, noise and vibration generating activities are associated with, but not limited to:

- Earthworks;
- Directional drilling;
- Surface excavation and earth moving during cable laying and site preparation for the landfall, onshore substations and other onshore infrastructure;
- Piling, or use of other foundation stabilising techniques, for the onshore substations;
- Temporary increases in HGVs delivering to site, operating in designated works areas and using haul routes;
- Nearshore cable laying activities; and
- Other general onshore construction activities.

850. Piling may also be used (if necessary) to provide a stable temporary platform for the drilling rigs at landfall and along the onshore export cable route at potential trenchless crossings.

851. Construction effects will be temporary and will vary both spatially and temporally in nature across the Onshore Study Area. The magnitude of impact will depend on factors such as the proximity of the proposed construction activities to noise and vibration sensitive receptors, the number and type of plant used for each activity and the activity duration.

852. The closest sensitive human and ecological receptors have the potential to be impacted by noise from these temporary works activities. Vibration impacts could occur from temporary construction works where vibration generating activities (such as piling or ground compaction) are undertaken. Therefore, all potential impacts are scoped in for the construction phase.

3.8.3.2. Potential impacts during operation and maintenance

853. There are no operational noise impacts from the buried infrastructure at the landfall and along the onshore export cable route and therefore they have been scoped out from further assessment.

854. An assessment will be undertaken to determine the likely impacts due to operational noise emissions from the onshore substations on identified sensitive receptors. The magnitude of impact will be based on the difference between the substation noise levels and the background sound levels at sensitive receptors. Substation noise levels will depend on factors such as the proximity to sensitive receptors, the sound power levels of the proposed substation plant and any screening which is present.

855. The potential impacts of operational and maintenance noise from the Project's onshore substations will therefore be scoped in to the EIA.

856. During operation, maintenance activities would generate a small number of additional road vehicles on an infrequent basis, which would not give rise to any significant noise or vibration effects. It is therefore proposed to scope operational phase traffic noise impacts out of the ES. This is consistent with the approach agreed by the Planning Inspectorate for other offshore wind projects such Hornsea Four and the Dudgeon and Sheringham Extension Projects.

857. The operational vibration effects are considered negligible as industry standard requires the use of vibration isolation pads/mounts to prevent transmission of ground borne vibration. The onshore substations will be designed to achieve negligible levels of ground-borne vibration and therefore operational vibration has been scoped out of further assessment.

3.8.3.3. Potential impacts during decommissioning

858. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

859. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.8.3.4. Potential cumulative impacts

860. Onshore cumulative impacts 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 Projects will be identified during consultation as part of the EPP and following a review of available information. These projects will then be included in the CIA and therefore are scoped in to the assessment.

861. There is potential for cumulative noise and vibration impacts with other schemes or activities that are in proximity to sensitive receptors affected by the Project and will occur at similar times, for example:

- Noise and vibration generating construction or operational activities for the Projects occurring at the same time as those associated with other plans or projects; and
- Construction phase road traffic noise and vibration on highway links used by the Projects and other schemes;

3.8.3.5. Summary of scoping proposals

862. **Table 3-29** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-29 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Noise and Vibration Assessment

Potential Impact	Construction	Operation (Onshore substations only)	Decommissioning
Noise affecting human receptors	✓	✓	✓
Vibration affecting human receptors	✓	×	✓
Road traffic impacts	✓	×	✓
Nearshore airborne noise	✓	×	✓
Cumulative impacts	✓	✓	✓

3.8.4. Approach to Impact Assessment

863. The assessment of construction noise and vibration impacts will refer to the guidance detailed 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. The assessment will be based on the proposed construction phasing and associated activities, for example, cable installation, directional drilling works and piling.

864. The spatial scope of the construction and decommissioning noise assessment would include the following:

- Landfall, onshore export cable route, onshore substations and offshore airborne noise where activities could affect noise sensitive receptors; and
- Traffic routes and routes subject to significant changes in traffic flows (and / or percentage HGV) associated with the construction of the Projects.

865. Construction phase traffic noise impacts will be calculated as a Basic Noise Level (BNL) using the methodology detailed in Calculation of Road Traffic Noise (CRTN) (HMSO 1988), and using criteria from the DMRB, LA111 Noise and Vibration, Revision 2 (Highways England 2020).

866. Operational impacts will include noise associated with the onshore substations. The assessment will be based on the guidance and methodology detailed in BS 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound.

867. The noise and vibration assessment will be undertaken in accordance with following standards and guidance (or the latest published version thereof):

- Overarching NPS for Energy (EN-1) (DECC 2011a);
- NPS for Renewable Energy Infrastructure (EN-3) (DECC 2011b);
- NPS for Electricity Networks Infrastructure (EN-5) (DECC 2011c);
- BS 4142:2014+A1:2019 – Method for Rating and Assessing Industrial and Commercial Sound;
- 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;
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise;
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration;
- BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings;
- Calculation of Road Traffic Noise 1988;
- DMRB, LA111 Noise and Vibration, Revision 2;
- WHO (1999) Guidelines for Community Noise;
- WHO (2009) Night Noise Guidelines for Europe; and
- WHO (2018) Environmental Noise Guidelines for the European Region.

3.9. Air Quality

868. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on air quality. The impacts on offshore air quality are assessed in section 2.3.

The following questions are posed to consultees to help them frame and focus their response to the 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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on air quality resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) for further assessment?
- Do you agree with the proposed approach to assessment?

3.9.1. Existing Environment

869. Air quality effects arising from 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 Projects 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.

870. The Onshore Study 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 2021) notes that air quality within the area is good, and no statutory Air Quality Management Areas (AQMAs) have been declared. The Onshore Study 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 such as Beverley.

871. 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 2021) 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 a number of actions to improve air quality.

3.9.1.1. Sensitive Receptors

872. The following receptors may be sensitive to changes in air quality:

- Human receptors, present within scattered settlements across the Onshore Study Area, and more isolated residential properties; and
- Sensitive ecological receptors within designated ecological sites (see **Table 3-2)** where these sites contain habitats or features which are sensitive to changes in airborne pollutant concentrations or nitrogen and/or acid deposition.

3.9.2. Data Sources

873. Based on the approach taken to other infrastructure project of this nature within this area, 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 data (i.e. a project-specific air quality survey) for the assessment. This was agreed in principle with the East Riding of Yorkshire Council through the EPP and will be reconfirmed with the East Riding of Yorkshire and Hull City Council once the study area is fully defined.

874. It is anticipated that, due to COVID-19, baseline air quality data collected during 2020 and 2021 would not be representative due to changes in traffic flows. As such, it is expected that 2019 monitoring data would be used in the assessment to characterise baseline conditions; this would be agreed with the relevant authorities through the EPP.

875. The following existing data will be used in the assessment:

- Air quality monitoring data collected by the local authorities;
- Defra mapped background pollutant concentrations for 1 km x 1 km grid squares across the UK (Defra 2020); and
- The Air Pollution Information System (APIS) website (Centre for Ecology and Hydrology 2022) would be used to obtain background pollution concentrations and deposition rates at designated ecological sites.

3.9.3. Potential Impacts

876. The Air Quality assessment is likely to have key inter-relationships with terrestrial ecology, traffic and transport and human health. These topics will be considered as appropriate.

3.9.3.1. Potential impact during construction

877. 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. from earthworks and stockpiling of soils. Impacts may also occur as a result of exhaust emissions from construction phase plant and road vehicle movements generated during construction. These emissions will add to existing pollutant concentrations at human receptors and pollutant concentrations and deposition levels at designated ecological sites. As such, air quality impacts during construction have been scoped in to the assessment.

3.9.3.2. Potential impacts during operation and maintenance

878. It is expected that air quality impacts during the operational phase would be negligible. During operation, the infrastructure would not generate any emissions to air and 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. It is therefore proposed to scope operational phase air quality impacts out of the ES. This is consistent with the approach agreed by the Planning Inspectorate for other offshore wind projects such as Hornsea Four and Sheringham Shoal and Dudgeon Extension Projects.

3.9.3.3. Potential impacts during decommissioning

879. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude.

880. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

3.9.3.4. Potential cumulative impacts

881. Cumulative impacts of dust and construction plant emissions may occur as a result of concurrent construction activities associated with other plans or projects within the Onshore Study Area, where they interact spatially with the Projects. Cumulative impacts may also arise as a result of traffic generated by other plans and projects which uses the road network along which Project-generated vehicles are expected to travel. These cumulative impacts may affect both human and ecological receptors. Cumulative impacts have therefore been scoped into the assessment for construction and decommissioning. As noted above, operational phase impacts are proposed to be scoped out.

3.9.3.5. Summary of scoping proposals

882. **Table 3-30** outlines the impacts which are proposed to be scoped in to the EIA. This may be refined through the EPP as additional information and data become available.

Table 3-30 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Air Quality Assessment

Potential Impact	Construction	Operation	Decommissioning
Impacts of emissions of dust from earthworks and construction on human and ecological receptors	✓	×	✓
Impacts of emissions from plant and machinery on human health and ecological sites	✓	×	✓
Impacts of emissions from road traffic on human health and ecological sites	✓	×	✓
Cumulative impacts on human health and ecological sites	✓	×	✓

3.9.4. Approach to Impact Assessment

883. Existing air quality conditions within the air quality study area will be characterised using the data sources as identified in section 3.9.1. Receptors will be identified using OS mapping data for human receptors and the Defra MAGIC website for designated ecological sites.

884. The air quality assessment will be undertaken in accordance with the following guidance documents:

- Defra (2018) Local Air Quality Management Technical Guidance LAQM.TG(16);
- Institute of Air Quality Management (IAQM) (2016) Guidance on the Assessment of Dust from Demolition and Construction;
- IAQM and Environmental Protection UK (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 (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.

885. 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.

886. During construction, Non-Road Mobile Machinery (NRMM) and plant can increase air emissions which may impact upon human and ecological receptors. Technical guidance provided by Defra (Defra 2018) 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. If required, this assessment may be qualitative or quantitative depending on the scale and nature of activities, their duration and existing air quality conditions.

887. The increase in construction traffic flows generated by the Projects 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 with an aerodynamic diameter of 10μm or less (PM10) and 2.5μm or less (PM2.5) 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 ecologists.

888. The approach would be discussed and the relevant input parameters and receptor locations would be agreed with stakeholders prior to undertaking the assessment.

4. Project Wide Aspects

889. This section presents the main baseline characteristics of the environment associated with project wide aspects, i.e. those which can be affected by the offshore and onshore elements of the Projects. Unless otherwise stated, the potential impacts of the Projects during construction, operation and decommissioning are considered in line with the methodology presented in section 1.8. Each section outlines which impacts are proposed to be scoped in to the EIA and which will be scoped out.

4.1. Socio-economics, Tourism and Recreation

890. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on socio-economics, tourism and recreation.

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 relevant data sources been identified in the Scoping Report?
- Have all the potential impacts on socio-economics, tourism and recreation resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

4.1.1. Existing Environment

891. The existing environment relevant to the EIA will consider two receptor groups:

- Economic receptors, i.e. people or businesses that would benefit from or be adversely affected by the Projects and associated development; and
- Social receptors, which are the social infrastructure relevant to a community that would benefit from or be adversely affected by the Projects. Impacts on social receptors subsequently impact on the population and its health and wellbeing.

4.1.1.1. Offshore

892. The Offshore Study Area (**Figure 1-1**) covers part of the southern North Sea, which is an active shipping area used by commercial shipping vessels, fishing vessels and dredging operators. Impacts to shipping and navigation are considered in section 2.10, impacts to commercial fishing are considered in section 2.9 and impacts to other marine users including dredging are considered in section 2.12. Therefore, no further consideration is given to these aspects in this chapter.

4.1.1.2. Onshore

893. Socio-economic data are reported at a local authority level by the Office for National Statistics. The following sections describe the baseline socio-economic conditions within the relevant local authorities.

4.1.1.2.1. Defining the study areas

894. The socio-economic study area is defined using a set of principles commonly applied to UK offshore wind farm projects:

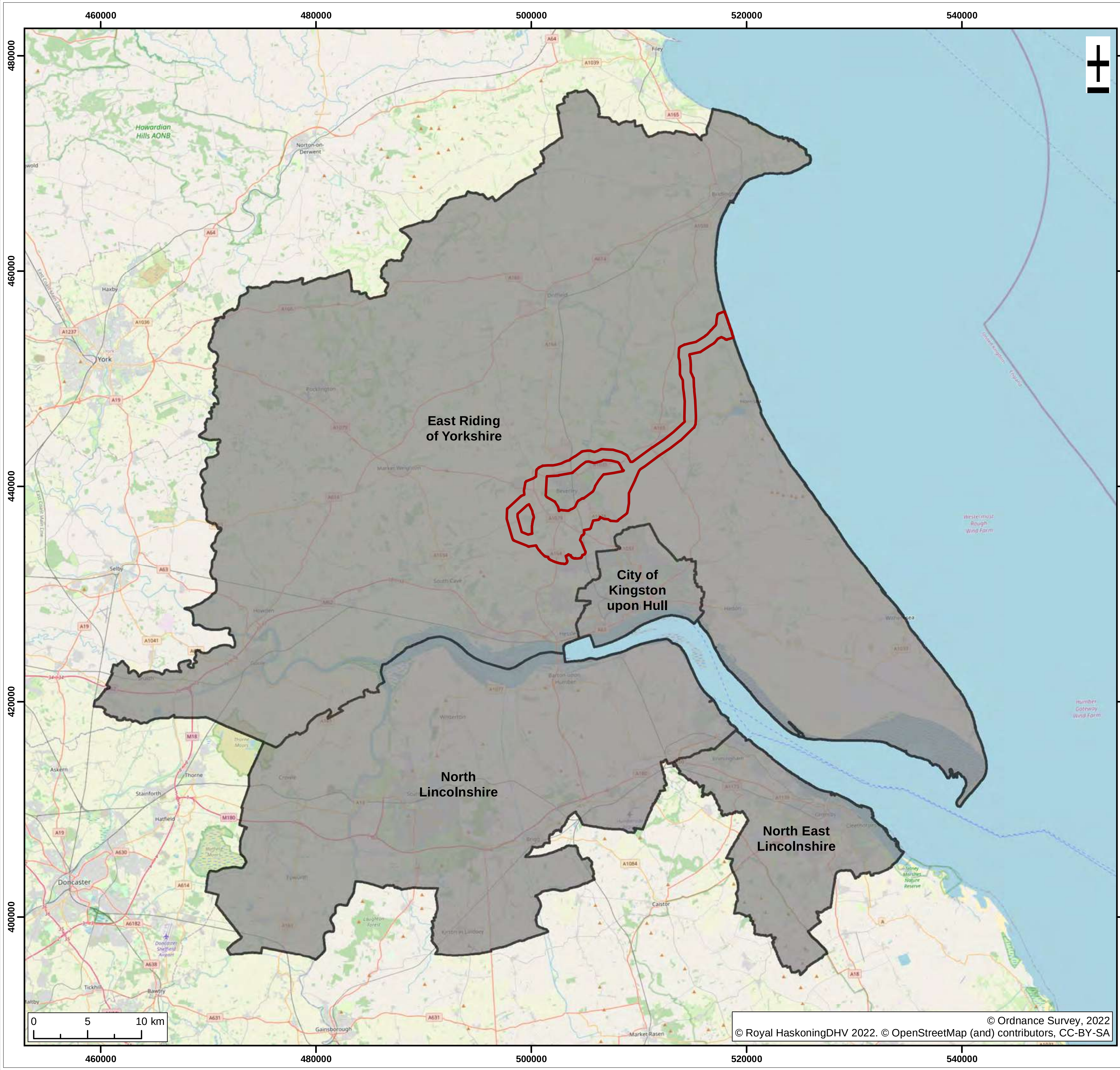
- Principle 1 (Dual Geographies) - The local area for the supply chain and investment impacts should be separate from the local area(s) for wider socio-economic impacts, including tourism and recreation;
- Principle 2 (Appropriate Impacts) - The appropriate impacts to be considered for assessments should be identified before defining the local areas;
- Principle 3 (Epicentres) - The local areas should include all the epicentres of the appropriate impacts;
- 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.

895. The exact location of the ports that will be used during the construction and operation have not been decided at this time. To ensure that the geographies for the socio-economic impact assessment are accountable and understandable, local authorities have been used as the building blocks of the economic and demographic study areas.

896. The socio-economic study area is the smallest area that will include all likely epicentres of impact as defined by the following local authorities (shown on **Figure 4-1**):

- East Riding of Yorkshire;
- City of Hull;
- North East Lincolnshire; and
- North Lincolnshire.

897. In addition, economic impacts will be assessed at the Yorkshire and Humber and UK levels.



Legend:

- Onshore Study Area
- Socio-economic Study Area

A01	C01	15/07/2022	Authorized	LB	JF	HC
S4	P01	01/07/2022	Suitable for Approval	LB	JF	HC
SUI	REV	DATE	DESCRIPTION	DRW	CHK	APR

Title:

Socio-Economic Study Area

Figure: 4-1 | Drawing No: PB2340-RHD-ON-ZZ-DR-Z-0260

Co-ordinate system:	Page Size:	Scale:
British National Grid	A3	1:350,000

Project:
Dogger Bank South
Offshore Wind Farms

Report:
Dogger Bank South
Offshore Wind Farms
EIA Scoping Report

Royal HaskoningDHV
Enhancing Society Together

RWE

898. The socio-economic study area will be the area for the assessment of potential disturbance to the tourism industry and recreational activities. This area has been defined by the combined following electoral wards:

- Beverley Rural;
- East Wolds and Coastal;
- Mid Holderness;
- Minster and Woodmansey;
- North Holderness;
- South West Holderness; and
- St Mary's.

4.1.1.2.2. Socio-economic study area

899. The socio-economic study area has a population of 934,400 people.

900. Of this population, 60% are aged between 16 and 64 (compared to the UK average of 62%). The share of the working age population that is economically active is 76% in the Economic Study Area and 4% are unemployed (compared to the UK average of 77% and 5%) (ONS 2022). Professional and technical occupations account for 29% of employment in the Socio-economic Study Area compared to 39% across the UK (ONS 2022). The biggest employment sectors are manufacturing, which accounts for 17% of the workforce, wholesale and retail trade (15%) and human health and social work activities (13%).

4.1.1.2.3. Onshore Study Area

901. The Onshore Study Area has a population of 100,100 people and is administered by the East Riding of Yorkshire Council.

902. Of the population in the Onshore Study Area, 57% 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 (ONS 2022). The biggest employment sectors are manufacturing, which accounts for 19% of the workforce, wholesale and retail trade (14%) and public administration and defence (13%).

4.1.2. Data Sources

903. The socio-economics assessment presented in the EIA will be informed by a desk-based assessment and will include collecting data on:

- Regional and local labour market and trends;
- High level indication 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 area.

904. In addition to data provided by the Applicant, the sources that shall be used in this assessment will include:

- ONS (2021b) Business Register and Employment Survey;
- ONS (2022) Annual Business Survey;
- Offshore Wind Industry Council (2021) People Skills Survey 2021 - 2026;
- Offshore Wind Industry Council (2020) Collaborating for Growth: Strategies for Expanding the UK Offshore Wind Supply Chain;
- Oxford Brookes University (2020) Guidance on assessing the socio-economic impacts of offshore wind farms;
- ORE Catapult (2020) Offshore Wind Operations and Maintenance a ¬£9 billion per year opportunity by 2030 for the UK to seize;
- BVG Associates (2019) Guide to an Offshore Wind Farm.
- ONS (2021d) House Price Statistics for Small Areas (HPSSAs);
- ONS (2021e) Private rental affordability, England;
- ONS (2021c) Annual Population Survey; and
- ONS (2021a) Population Estimates.

905. Social data relating to crime, health and leisure will also be considered where this is available, along with the identification of social infrastructure such as schools, nurseries, libraries, doctors, dentists, pharmacies, social care homes, post offices, pubs, community halls, recreational assets, churches, and other places of worship. Data on health are presented in section 4.2.

4.1.3. Potential Impacts

4.1.3.1. Potential impacts during construction

906. 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 (such as recreation and sports facilities) where the projects components and activities to construct them impact on specific receptors, unless they are identified and mitigation measures area applied.

907. The EIA will consider direct economic benefits through the supply chain required for the Projects, including spending on goods and services in the Socio-economic study area, Yorkshire and the Humber and the UK.

908. Increased employment as well as potential changes to demographics due to national migration and immigration will be assessed, considering likely recruitment strategies.

909. Impacts on onshore and offshore activities which contribute to the existing social and economic characteristics of the socio-economic study area will also be considered and assessed. This may include disturbance as a result of potential air quality, noise, visual and traffic impacts on social infrastructure, where these might arise at a material scale.

910. As such the following potential construction related impacts are scoped in to the assessment:

- Direct economic benefit (supply chain);
- Increased employment;
- Change in demographics due to immigration;
- Loss of, disruption to or pressure on local infrastructure;
- Disturbance (noise, air, visual and traffic) to social infrastructure;
- Disruption to recreational activities; and
- Disruption to the tourism industry.

4.1.3.2. Potential impacts during operation and maintenance

911. The impacts assessed for the operation and maintenance phase of the Projects will be as described above for construction. However, it is anticipated that any impacts to the local economy will be most significant during the construction phase, with fewer impacts being predicted on the local economy during the operational phase.

912. The impact of economic benefits, increased employment and changes in demographic due to immigration during operation and maintenance are scoped in to the assessment.

913. The impacts associated with the loss of, disruption to or pressure on local services and offshore activities, disturbance to social infrastructure and disruption to tourism and recreation activities during operation and maintenance will be negligible and are therefore scoped out of the assessment.

4.1.3.3. Potential impacts during decommissioning

914. Impacts during decommissioning are expected to be similar, but of smaller magnitude, to those anticipated during construction.

915. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

4.1.3.4. Potential cumulative impacts

916. Cumulative impacts will be considered as set out in section 1.8. Potential cumulative impacts related to socio-economics include cumulative effects with other offshore wind development in the region to potentially boost the local skill-base. Conversely, there is also potential to cumulatively impact on other industries negatively as a result of displacement of workers currently employed in other industries. This will be considered further in the EIA.

4.1.3.5. Summary of scoping proposals

917. **Table 4-1** presents the impacts which are proposed to be scoped into (or out of) the EIA. This may be refined through the EPP as additional information and data becomes available.

918. The socio-economic assessment is likely to have links with shipping, commercial fisheries, tourism and recreation and land use. These will be considered where relevant.

Table 4-1 Summary of Impacts Proposed to be Scoped In (✓) and Out (✗) for the Socio-Economics Assessment

Potential Impact	Construction	Operation	Decommissioning
Direct economic benefit (supply chain)	✓	✓	✓
Increased employment	✓	✓	✓
Change in demographics due to immigration	✓	✓	✓
Loss of, disruption to or pressure on local infrastructure	✓	✗	✓
Disturbance (noise, air, visual and traffic) to social infrastructure	✓	✓	✓
Disruption to recreational activities	✓	✗	✓
Disruption to the tourism industry	✓	✗	✓
Cumulative impacts	✓	✓	✓

919. The impacts which have been scoped into the socio-economic, tourism and recreation assessment are outlined in **Table 4-2** along with the likely geographic epicentres of these impacts. These have been used to define the study areas in Section 4.1.1.2.

Table 4-2 Impacts Scoped into the Assessment and Associated Epicentres

Impact	Epicentre(s) of impact
Direct economic benefit (supply chain)	Construction ports Operational ports O&M base Onshore export cable corridor Substation site Supply chain hubs
Increased employment	As above
Change in demographics due to immigration	As above
Loss of, disruption to or pressure on local infrastructure	As above
Disturbance (noise, air, visual and traffic) to social infrastructure	Construction ports Operational ports Onshore export cable corridor Landfall Substation site
Disruption to recreational activities	Onshore export cable corridor Landfall Substation site
Disruption to the tourism industry	Onshore export cable corridor Landfall Substation site

Impact	**Epicentre(s) of impact**
Cumulative impacts	Construction ports Operational ports O&M base Onshore export cable corridor Substation site Supply chain hubs

4.1.4. Approach to Impact Assessment

920. The Overarching 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.

4.1.4.1. Economic Impacts

921. The economic impacts which will be considered will be reported in terms of:

- Gross Value Added (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 development and construction phase of the 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 operational phase of the project.

922. 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 2020). The focus of the assessments will be the direct and indirect (supply chain) effects. In addition to this, this assessment shall also consider the effects of staff spending and the economic impact that this subsequent increase in demand stimulates (the induced effect).

923. It is acknowledged that at the time of writing, the exact levels of expenditure shall be 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 Projects. This value may change between the production of the PEIR and ES to reflect any agreements reached between the Applicant and potential suppliers and any changes in the market that shall impact prices.

924. The analysis will cover the three stages of the Projects, namely:

- Development stage;
- Construction stage; and
- Operational and maintenance stage.

925. The decommissioning stage will not be covered specifically by the analysis as it is assumed impacts during decommissioning will be similar, but of smaller magnitude, to those anticipated during the construction stage.

926. The impacts during the development and construction phases will be based on the actual expenditure that has occurred to date as well as the planned expenditure associated with these stages. In addition to the total impact over the period, the assessment will also consider the timings of impacts during these stages to understand the peaks and troughs of this activity.

927. The impacts during the operational phase for the Projects will be based on projected operational expenditure.

928. In instances where impacts are expected to occur over a number of years, such as the operational 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).

4.1.4.2. Tourism and Recreation Impacts

929. 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 farm 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 farm developments.

930. The tourism assessment shall consider the baseline assessment of the tourism economy in the Onshore Study Area. This will consider the key drivers of the tourism economy in this area and consider how the development of the Projects will affect these drivers.

931. The assessment will consider the potential effects that the development could have on specific tourism attractions, recreational assets and local accommodation providers within the Onshore Study Area. The assessment of the magnitude of the impacts, both positive and negative, will build on the evidence available on behaviour changes as a result of similar developments.

932. 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's advice notes.

4.1.4.3. Demographic and Social Impacts

933. 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.

934. This will then consider the capacity of the Economic Study Area 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 health and education and the ability of the local providers to meet this demand.

935. The change in demand as a result of the Projects 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 outlines in section 1.8.

936. The impact on community infrastructure as a result of environmental factors, such as noise or transport, shall be considered within the relevant PEIR/ES chapters.

937. The assessment will only consider the development and construction phase, as the activity during the operational phase will be a smaller magnitude.

4.2. Human Health

938. This section considers the potential impacts of construction, operation and maintenance, and decommissioning of the Projects on human health.

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 health baseline?
- Have all the relevant data sources been identified in the Scoping Report?
- Have all the likely and potentially significant impacts on population health resulting from the Projects been identified in the Scoping Report?
- Do you agree with the determinants of health and population groups that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

4.2.1. Existing Environment

939. The following baseline data is from the Office for Health Improvement and Disparities (OHID) Fingertips data tool. At this stage baseline indicators have been selected to provide a general coverage of the wider determinants of health at the local authority level (East Riding of Yorkshire). The PEIR/ES will report on relevant ward level data. In the following summary baseline profile, the comparative terminology of 'quintile', 'similar', 'better' or 'worse' in relation to the national average is a Fingertips classification.

940. The age profile of the East Riding of Yorkshire shows that the percentage of young people falls in the lowest quintile compared to England, with 16.4% aged 15 or younger. In contrast, the percentage of older people falls into the highest quintile, with 26.2% aged 65 and over (2019 data). The black and minority ethnic population, at 1.9% is lower than the average for England (2011 data). Only 0.4% of the population cannot speak English well or at all, which is lower than the average for England.

941. Deprivation can be used as a health resilience indicator. Deprivation mapping (2019) indicates relatively low levels of deprivation in the majority of the East Riding of Yorkshire. For overall deprivation the East Riding of Yorkshire is in the second lowest quintile compared to England. There is elevated deprivation near the coast, with lower layer super output area (LSOA) East Riding 012A to 012E in the 40% most deprived neighbourhoods in the country. Other pockets of higher deprivation include LSOA East Riding 017A. The potential for pockets of deprivation within areas of overall low deprivation is noted.

942. Overall health can be informed by life expectancy indicators. Life expectancy at birth for men, 80.1 years, and women, 83.5 years, are both better in the East Riding of Yorkshire compared to the average for England, 2018-2020 data.

943. Health inequalities are an important public health consideration and can also be measured with reference to life expectancy indicators. Reflecting how health varies by social gradient, the following indicator shows the difference in life expectancy between the most deprived and least deprived areas in the East Riding of Yorkshire. For men, the difference in life expectancy at birth is 6.8 years, which equates to the second lowest quintile when compared to the average for England. For women, the equivalent figure is 4.0 years, which is in the lowest quintile compared to the average for England. These figures, based on 2017-2019 data, suggest relatively low baseline health inequalities on this measure.

944. Injury rates can be used as a road safety indicator. Compared to the average for England, the number of people killed or seriously injured on roads is worse in the East Riding of Yorkshire (63.0 per 100,000) based on 2016-2018 data.

945. Changes to the physical, social and economic environment can influence health behaviours as measured through healthy lifestyle indicators. For smoking, compared to the average for England, the percentage of adult tobacco smokers is similar in the East Riding of Yorkshire (12.1%), 2019 data. For exercise, compared to the average for England, the percentage of physically active adults is similar in the East Riding of Yorkshire (63.5%), 2019/2020 data. The linked measure of obesity is relevant. Compared to the average for England, the percentage of adults classified as overweight or obese is similar in the East Riding of Yorkshire (64.0%), 2019/2020 data. For children, compared to the average for England, the prevalence of obesity in Year 6 (age 10-11 years) is better in the East Riding of Yorkshire (18.2%), 2019/2020 data.

946. Socio-economic status has correlations with health, both for those directly employed and their dependants. Compared to the average for England the percentage of people in employment is similar in the East Riding of Yorkshire (74.8%). With regards dependants, compared to the average for England the proportion of children in low-income families is better in the East Riding of Yorkshire (12.2%), 2016 data. For the East Riding of Yorkshire the percentage of people in poverty for both children (11.8%) and older people (10.8%) are better than the average for England (2019 data). Rates of unemployment amongst those of working age are, at 2.1%, better than the average for England, as is the rate of long-term unemployed people, at 3.3 per 1,000 working age population, (2019/2020 data).

947. Education status can influence future health. Compared to the average for England, the average Attainment 8 score (best eight GCSEs) is similar in the East Riding of Yorkshire (50.7 score), 2019/2020 data.

948. The Projects have benefits for climate change, energy security and potentially energy costs. A relevant public health indicator relates to excess deaths at times of extreme cold temperatures when home heating is a factor. Compared to the average for England, the excess winter deaths index is similar in the East Riding of Yorkshire (21.6% of index), August 2019 - July 2020 data.

949. As summarised by the OHID Local Authority health profile for the East Riding of Yorkshire (2019) the health of people in the East Riding of Yorkshire is generally better than the England average.

950. The East Riding Health and Wellbeing Strategy 2019 – 2022 (East Riding Health and Wellbeing Board 2019) identifies that the following priorities:

- For children and young people to enjoy good health and wellbeing;
- For working age adults to reduce their risk of ill health;
- For residents to achieve healthy, independent ageing; and
- For health inequalities to be reduced.

951. East Riding Local Plan (adopted April 2016) includes objectives to deliver *"A Strong and Healthy Community"*. This includes to "*Support the vitality of settlements by seeking to protect and/or enhance community facilities and services, including education, health care, recreation, cultural and sports facilities."*

952. East Riding Local Plan Update 2020 – 2039 Draft Strategy Document Update May 2021 confirms that the Council will continue to seek infrastructure contributions as set out under the currently adopted Local Plan and not include a Community Infrastructure Levy charge at this time.

4.2.2. Data Sources

953. The health receptors for the assessment are populations based onshore. The assessment will focus on the onshore elements of the Projects, and on the local population within the Onshore Study Area most likely to be affected.

954. No baseline human health surveys or monitoring are proposed to be undertaken as part of the assessment. The health assessment will bring together the conclusions of the assessments made in other relevant chapters of the EIA (see section 4.2.3) and explain their implications for public health.

955. At PEIR additional data on health-related statistics will be sought to highlight key sensitivities at the local authority level and for representative wards. Representative wards will be selected to highlight issues, such as areas of greater deprivation along the onshore export cable corridor. It would not be proportionate, and would not improve the assessment, to provide detailed baseline for every ward within the Onshore Study Area. 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.

956. Key data sources for the PEIR/ES health assessment will be:

- OHID Fingertips,
- Local Health data sets;
- Office of National Statistics (ONS); and official labour market statistics (NOMIS);
- Indices of Deprivation mapping;
- Google Earth Pro; and
- Local Joint Strategic Needs Assessment and Health and Wellbeing Strategy data.

957. The approach to assessment will ensure that Health Impact Assessment (HIA) is embedded within the EIA in line with good practice (see section 4.2.4).

4.2.3. Potential Impacts

958. The scoping of the HIA has been informed by the scoping conclusions of other topics within this Scoping Report, notably potential for population health effects relating to the following scoped-in topic areas:

- Offshore: marine sediment and water quality; commercial fisheries; and shipping and navigation.
- Onshore: air quality; noise and vibration; traffic and transport; landscape and visual impact; land use; flood risk and hydrology; and geology and land quality.
- Project wide aspects: socioeconomics, tourism and recreation; and climate change.

959. The health scoping exercise has also considered wider determinants of health not covered by other EIA chapters.

960. It is noted that offshore effects in relation to air quality, airborne noise and seascape, landscape and visual impact have been scoped out by their respective technical topic areas, so are unlikely to have the potential for significant population health effects.

961. At this scoping stage there is not a fixed location for the port/harbour from which offshore workforces and vessels will operate. The health considerations in relation to port activities are therefore scoped in without certainty of a particular location. As the final port decision may not be taken before application for development consent, it is anticipated that issues relating to the port will be addressed by condition. The need for health input to such conditions will occur at the relevant stage of the planning process.

4.2.3.1. Potential impacts during construction

962. During construction the potential impacts on healthy behaviours and lifestyles are scoped in. Healthy lifestyles will be considered in relation to open space (green and blue), recreational facilities and physical activity (including in natural habitats). Consideration will be given to the influences on nearshore recreation, e.g. sailing and similar. Should the landfall and onshore infrastructure affect community open space or recreational amenities, coastal or inland, these will be assessed for impacts to physical activity and mental health. Should there be a need to temporarily or permanently make provision for alternative space or access, this will be assessed as part of the PEIR/ES health chapter.

963. The impacts to public rights of way and cycle routes from the onshore infrastructure works, notably any temporary diversions required due to the onshore export cable corridor or in relation to the construction of the onshore substations, are scoped in.

964. The Projects would support upskilling and career development in relation to its workforces. This may include apprenticeships and adult learning. Such effects are scoped in to consider how benefits, including for local and vulnerable groups, could be enhanced.

965. The Projects provide opportunities for good quality employment. The health chapter will consider the potential population health effects of direct and indirectly employment, including opportunities to enhance benefits for local and vulnerable groups. Should there be any unemployment implications, these will also be discussed. For example, the Projects' effects on commercial fisheries.

966. Onshore air quality, including dust is scoped in. The health chapter will be informed by the air quality modelling undertaken for the Projects (section 3.9). 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.

967. Onshore and nearshore water quality is scoped in. Pollution of surface water or groundwater bodies which are subsequently used as a potable source could result in human effects, further details are provided in section 3.3. The Onshore Study Area is predominately agricultural and food safety could also be compromised by contaminated soils, if encountered, affecting agricultural water sources. Soil contamination is only considered to pose a potentially significant health risk to the public where it is associated with water contamination, soil contamination in itself is scoped out. Bathing water quality is scoped in to consider any temporary effects during the landfall works that may deter use of outdoor coastal spaces and physical activity.

968. The noise effects from onshore and nearshore activities are scoped in. The health chapter will be informed by the noise and vibration assessment (section 3.8). UK regulatory standards will be used as a benchmark.

4.2.3.2. Potential impacts during operation and maintenance

969. The Projects would support upskilling and career development in relation to its workforces. This may include apprenticeships and adult learning. Such effects are scoped in to consider how benefits, including for local and vulnerable groups, could be enhanced.

970. The Projects provide opportunities for good quality employment. The health chapter will consider the potential population health effects of direct and indirectly employment, including opportunities to enhance benefits for local and vulnerable groups.

971. Health effects of climate change are scoped in. The Projects would be a part of a wider energy sector transition that reduces the severity of climate change. The benefits to population health will be discussed.

972. Operational noise and vibration effects are scoped in to consider the potential for noise from the onshore substations.

973. In line with good practice, public understanding of risk in relation to operational electro-magnetic fields (EMF) will be included in the health chapter. This includes considering 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.

974. During operation, the Projects' wider societal contribution to supporting public health is scoped in. The Projects would provide energy infrastructure that supports many aspects of public health. A reliable supply of electricity is required in relation to factors including, population food safety, thermal confomt, healthcare, learning, income generation and social networking.

4.2.3.3. Potential impacts during decommissioning

975. Impacts during decommissioning are expected to be similar, but of smaller magnitude, to those anticipated during construction.

976. The same potential impacts noted for construction are therefore expected to be scoped in (and out) for decommissioning.

4.2.3.4. Potential impacts scoped out

977. The following additional statements are provided to justify scoping out some specific health issues and determinants of health listed in guidance (Pyper *et al*. 2021, Cave *et al*. 2020). These guidance documents include an indicative list of determinants of health to consider and it is good practice to provide a concise rationale where some of these determinants of health are scoped out. The decision to scope these potential health effects out reflects they are considered not to have the potential for significant population level health effects.

978. Health promotion within the Projects' workforces will be considered as a good practice enhancement measure but is otherwise scoped out.

979. Issues of community health behaviours being detrimentally affected by the presence of the construction workforce are scoped out. This reflects the expectation of a relatively small onshore workforce, which is expected to have a high proportion of workers from the regional area.

980. The issue of communicable illness, including in relation to COVID-19, is noted but scoped out. The Project will operate appropriate measures to safeguard the project workforce and the public in line with Government guidance of the day, including in relation to vessel crews. Risks are similar to other routine construction and shipping activities.

981. Effects on population diet are scoped out. Any loss of farmland, or its reduced access or compaction, that reduces productivity are not expected to have the potential to affect population health through changes in the availability or price of healthy foods.

982. Housing related issues are scoped out. No new housing is proposed as part of the Projects. 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.

983. There is not expected to be a loss of residential housing or permanent loss of outdoor spaces associated with dwellings. The onshore infrastructure, including the substations, is relatively low impact in terms of its built form, limiting the potential for any widespread adverse effect on housing value or affordability.

984. The potential for the Projects to affect existing features of the built environment that are supportive of population health has been considered and scoped out. The Projects would have a relatively low impact, including due to the use of trenchless techniques to avoid surface disruption at sensitive features, such as road crossings.

985. Where trenching techniques and other surface excavations are undertaken these would be within controlled work areas. The risk to the public from accidental injury, e.g. falls or drowning is scoped out. Similarly, the position of existing services, such as water and sewer systems will be taken into account in planning the export cable corridor and techniques used. Disruption to such services on a scale that could affect population health is scoped out.

986. Other than the effects on public rights of way and cycle routes, other transport issues are scoped out. Due to the use of trenchless techniques at road crossings there is limited potential for transport disruption associated with the onshore export cable corridor. During construction, vehicle transport is expected to predominantly relate to the movement of goods, materials, people and plant to and from a port location associated with the offshore construction. Although the port has not been determined, the road infrastructure to ports in general is good. As described in this Scoping Report, a Port Traffic Management Plan would be produced. On the basis of an effective Port Traffic Management Plan the following issues are scoped out of the health assessment:

- Active travel along road routes;
- Road safety;
- Emergency response times;
- Public transport;
- Community severance; and
- Health, education and social care journey times.

987. This is considered reasonable as the port would operate within its existing consented levels of activity, which are granted with an understanding of the associated effects to the surrounding community.

988. Issues of community safety are scoped out. The Projects workforces are assumed to include a high proportion of people who are resident in the regional area. The project workforce requires skilled technical roles. There are not anticipated to be community safety or security issues associated with worker behaviour in ports or communities. The Projects would operate appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime that could affect population health is unlikely.

989. Changes in community identity are scoped out. 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. Visual impacts of the Projects are expected to be limited, including due to the offshore distance of the wind turbines. Onshore infrastructure, including the TJBs at landfall and the onshore substations, are not expected to be of a scale of visual impact that could affect population health outcomes. Transient effects along the onshore export cable corridor, including due to temporary lighting and temporary changes in views, are not expected to influence community identity or disrupt community gatherings.

990. The potential to adversely affect access to schools is limited by the use of trenchless techniques in sensitive locations. A large influx for workers, including those bringing families, is not expected, so changes to educational capacity or quality are unlikely.

991. The Projects will operate appropriate equality policies but is not expected to influence how employment affects family structures and relationships in local populations. Occupational working conditions in the onshore and offshore construction industry include particular risks. The Projects will operate appropriate health and safety polices. There are no differences from industry norms that would affect population health.

992. Consistent with section 2.3 of this Scoping Report on air quality, the offshore air quality effects on all phases to human health are scoped out.

993. Operational onshore air quality effects to population health are scoped out. This reflects limited onshore maintenance requirements.

994. Drinking water infrastructure is scoped out on the basis that disruption of the existing water utilities network would be avoided, including through diversions if appropriate.

995. Ground condition and soil effects are scoped out. Risks of pollutant mobilisation, including direct exposure and food contamination, are highly likely to be addressed by standard good practice mitigation measures discussed in section 3.2. This topic is scoped out, but a watching brief will be kept to confirm this scoping conclusion remains appropriate once the PEIR findings are available.

996. Consistent with the section 2.4 of this Scoping Report, the offshore airborne noise effects to human health are scoped out. For all stages, port activities would generate noise but are not expected to be of a scale, timing or character that differs from existing operational port levels.

997. Offshore EMF effects are scoped out. Offshore electrical infrastructure, including offshore substations, are not located in proximity to people. Relevant occupational safeguards would be followed. No EMF risk is therefore likely for offshore aspects of the Projects.

998. For onshore electrical infrastructure, the 'actual EMF' risks are scoped out on the basis that the Projects 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. 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. Relevant public EMF exposure guideline limits are noted in NPS EN-5 and would be complied with by the Project.

999. Transboundary effects in relation to health are not expected. Port activities within another jurisdiction, if required, would be expected to operate within their consented levels of activity. Any international supply chain would be expected to operate appropriate policies that safeguard against significant population challenges to equality, health and safety, for both workers and, as appropriate, the public.

1000. Effects on health and social care are scoped out. The project workforce is assumed to include a high proportion of people who are resident in the regional area. The UK workforce would have National Health Service (NHS) entitlement irrespective of place of residence. Workers away from their usual place of residence for a prolonged period would be able to register with local primary healthcare on a temporary basis. This would facilitate NHS funding for their care. The Projects will make assumptions in the EIA about the workforce that will be reported to support routine NHS service planning. The Projects will operate appropriate occupation health services. It is not expected that a high proportion of workers would move to the area with dependants requiring social care. Health protection measures such as screening and immunisations are expected to continue from the workers' usual place of residence. Similarly routine dental appointments are assumed to be with the worker's dental practice close to their usual place of residence. Other health services are not expected to be affected as no largescale in-migration is expected and the workforce of skilled technical roles would return to their usual places of residence when ashore.

1001. In relation to preparedness for emergency scenarios, this is most relevant to offshore shipping and port storage/loading. In line with proportionate assessment it is proposed to scope emergency planning implications of the Projects out of the health chapter. Relevant occupational practices and emergency planning procedures would be required by law.

4.2.3.5. Summary of scoping proposals

1002. **Table 4-3** outlines the impacts which are proposed to be scoped into the EIA. This may be refined through the EPP as additional information and data become available.

Table 4-3 Summary of Impacts Proposed to be Scoped In (✓) and Out (×) for the Human Health Assessment

Potential impact	Construction	Operation	Decommissioning
Changes in access to open space and recreation affecting health related behaviours and lifestyles.	✓	×	✓
Changes in housing availability affecting population health.	×	×	×
Disruption to the built environment and community infrastructure affecting population health.	×	×	×
Transport, public rights of way and cycle routes affecting population health.	✓	×	✓
Community safety risks affecting population health.	×	×	×
Changes in community identity affecting population health.	×	×	×
Education, potential for workforce upskilling benefiting population health.	✓	✓	✓
Employment and investment benefiting population health.	✓	✓	✓
Climate change, the Projects' contribution to reducing health risks.	×	✓	×

Potential impact	Construction	Operation	Decommissioning
Air quality affecting population health.	✓	×	✓
Water quality affecting population health.	✓	×	✓
Soil contamination affecting population health.	×	×	×
Noise disturbance affecting population health.	✓	✓	✓
Actual electro-magnetic field risks affecting population health.	×	×	×
Public concern and understanding of electro-magnetic field risks.	×	✓	×
Additional demand for health and social care services and routine NHS service planning.	×	×	×
Wider societal benefits of energy infrastructure supporting public health.	×	✓	×
Cumulative effects	✓	✓	✓

4.2.4. Approach to Impact Assessment

1003. The wider determinants of health and health inequalities are key considerations when undertaking an assessment of human health as part of EIA.

1004. A population health approach will be taken, informed by discussion of receptors within other EIA chapters. For each determinant of health, the human health chapter will identify relevant inequalities through consideration of disproportionate or differential effects between the 'general population' of the study area and effects to the 'vulnerable population group' of that study area. The vulnerable population group being comprised of relevant sensitivities for that determinant of health. This includes potential vulnerability due to: young age, older age, low income, poor health status, social disadvantage, or restricted access or geographic proximity to the Projects activities.

1005. The methodology will use best practice as published by IEMA and relevant HIA and health in EIA guidance. Relevant publications include:

- The Institute of Public Health (IPH), Health Impact Assessment Guidance, Standalone HIA and health in environmental assessment (2021). This island of Ireland guidance can be applied more broadly and is the only UK HIA guidance that provides detail on the analysis and reporting of human health in EIA. It shows good practice.
- International Association for Impact Assessment (IAIA) and European Public Health Association (EUPHA), Human health: Ensuring a high level of protection. A reference paper on addressing Human Health in Environmental Impact Assessment (2020). This reference paper informed the IPH guidance.
- IEMA, Health in Environmental Impact Assessment: A Primer for a Proportionate Approach (outlined in Cave *et al*. 2017). This sets broad principles that have been developed in more detail by the IPH guidance.
- Public Health England (PHE) guidance, Health Impact Assessment in spatial planning (PHE 2020). This sets a broad context, including that HIA be integrated into EIA.

1006. It is noted that IEMA and OHID are in the process of producing updated guidance on the coverage of human health within EIA, which will be taken into account if available at PEIR/EIA.

1007. The methods use the World Health Organization (WHO) definition of health, namely "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.*" In so doing parity is given to physical, mental and social drivers of health outcomes. The WHO definition of mental health is also used, namely "*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). The mental health outcomes of the Projects will be considered, and mitigation proposed where appropriate. For example, community dialogue and sharing of non-technical information to avoid adverse effects from understandings of risk that differ from actual risks.

1008. Consistent with the methods described above, a range of data sources will be collated and analysed, in line with good practice guidance. Scientific evidence, baseline data and local health priorities will be referenced. Policy analysis (notably NPS EN-1, EN-3 and EN-5), regularly standards and consultation themes will also inform the significance conclusions. Magnitude and sensitivity considerations will be reported for each determinant of health, including for the general population and vulnerable groups. A qualitative analysis setting out reasoned conclusions will provide an evidence-based narratives for each determinant of health.

1009. Where significant adverse population health effects are identified, including for vulnerable groups, then mitigation will be proposed to avoid or reduce the effects. Mitigation will be secured as part of the Projects' design or development consent. In line with good practice the Projects will take a proportionate approach to identifying opportunities to enhance beneficial population health effects, including for vulnerable groups.

1010. Where proportionate, monitoring will be proposed, and governance described. For example, in relation to any residual significant adverse effects, or instances where there is high uncertainty on the efficacy of secured mitigation.

1011. The inter-related effects between determinants of health will be considered, including how these are distributed geographically and in terms of vulnerable population groups. For example, how educational opportunities and socioeconomic status benefits may be mutually reinforcing, particularly for young people; or how access restrictions, air quality, water quality and noise effects at a given location may coincide and affect physical and mental health.

4.3. Climate Change

1012. Climate change was included as a required topic as part of the EIA Directive 2014/52/EU, which was implemented into the UK EIA Regulations in May 2017. The climate change chapter of the Environmental Statement will include consideration of the impact of the Projects on climate change (net change in GHG emissions), and the impact of climate change on the Projects (vulnerability of infrastructure and assets).

1013. The climate change assessment will therefore comprise two separate assessments, an assessment which quantifies the GHG emissions released from activities associated with the Projects. This will also determine the 'net' effect of the provision of renewable energy to the UK grid. In addition, a climate resilience assessment of the infrastructure on the projected effects of climate change will be carried out.

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 the relevant data sources been identified in the Scoping Report?
- Have all the potential climate change impacts resulting from the Projects been identified in the Scoping Report?
- Do you agree with the impacts that have been scoped in (or scoped out) of further assessment?
- Do you agree with the proposed approach to assessment?

4.3.1. Existing Environment

4.3.1.1. Green House Gas (GHG) Emissions

1014. The Onshore Study Area is situated within the East Riding of Yorkshire Council's jurisdiction. Existing GHG emissions for UK local authorities are available from BEIS (BEIS 2021). GHG emissions within the East Riding of Yorkshire currently arise from a number of different sectors, but are likely to be dominated by industrial and commercial sources, in particular large industrial operations (BEIS 2021).

1015. The Climate Change Act 2008 provides a framework for the UK to meet its long-term goals of reducing GHG emissions to 'net-zero' (i.e. at least a 100% reduction) by 2050 ('climate mitigation'). This target was introduced by the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which amended the previous 2050 GHG target of an 80% reduction compared to 1990 levels.

1016. Emissions from the energy sector have already decreased by 68% since 1990, the majority of which have happened in the last decade as a result of a move away from coal towards gas and low-carbon generation (CCC 2020b). The sector was responsible for 65 $MtCO_2$ in 2018, 15% of the UK's emissions (CCC 2020b).

1017. Offshore wind is considered to be able to meet a substantial share of future energy demand, and be an integral component for reaching close to zero GHG emissions for the sector in 2050 (CCC 2020b). The importance of offshore wind in the transition to Net Zero is fully acknowledged in the National Policy Statements (including the revised NPSs) and in the increased generation targets set in the Energy Security Strategy.

4.3.1.2. Existing Climate

1018. The east coast of England currently experiences a 'maritime' climate which is typical of the UK. As the Projects will be situated off the eastern coast of the UK, the Onshore Study Area is situated in a rain shadow of mountains situated in the west and centre, and therefore will have a drier climate than the UK average.

1019. Climate change projection data are available from the UK Climate Projection (UCKP18) database, which will be used to inform the likely changes to key climate parameters within the Study Area (Met Office 2018). It is considered likely that the east of the UK will experience warmer temperatures, and changes to the precipitation regime with drier summers and wetter winters. In addition, it is likely that there will be an increase in the frequency and intensity of storms.

4.3.2. Data Sources

1020. Activity data, including forecast construction and operational emissions data, will be used for the GHG assessment. Emission factors will be obtained from suitable sources, such as BEIS (2022) and the Inventory of Carbon and Energy (ICE 2019).

1021. The climate change resilience assessment will be informed by future climate projection data from the UK Climate Projection (UKCP18) database (Met Office 2018). The UCKP18 database contains future climate projection data for a range of scenarios (known as Representative Concentration Pathways) over the lifespan of the Projects. No surveys are proposed to inform the assessment of impacts related to climate change.

4.3.3. Potential Impacts

1022. As detailed above, the Climate Change chapter will comprise two separate sub-assessments. Firstly, a GHG assessment will be carried out to determine the impact of the Projects on climate change. In addition, a climate resilience assessment will be undertaken to consider the potential impacts of climate change to the Projects.

1023. The GHG assessment will estimate emissions from the full life cycle of the Projects. This will allow the 'carbon' payback and carbon intensity of electricity produced by the Projects to be estimated to evaluate the benefits of implementing them.

4.3.3.1. Greenhouse Gas Assessment

1024. Net emissions arising from the Projects will be assessed across its full lifespan, encompassing construction (including fabrication), operation and decommissioning where information is available. The assessment will quantify emissions generated by operational activities and account for the emissions saving from the provision of renewable electricity to the electricity transmission network.

1025. It is expected that the Projects will result in a net positive impact on the UK's ability to meet the targets set out in the 2008 Climate Change Act and the Sixth Carbon Budget (CCC 2020a), however this will be demonstrated through the GHG assessment.

1026. As GHG emission impacts and resulting effects are global rather than affecting one localised area, the approach to cumulative effects differs from many other EIA topics. Effects of GHG emissions from specific cumulative projects in general should not be individually assessed, as there is no basis for selecting any particular cumulative project that has GHG emissions for assessment over any other. Therefore, a cumulative assessment with other projects has been scoped out of the GHG assessment. This approach is in line with IEMA guidance 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA 2022).

1027. The effects of climate change are by definition transboundary, in that they are felt not in proximity to the sources of emission, and that all releases of GHG's contribute to climate change. However, to proportionately frame the assessment, the GHG assessment will contextualise emissions from the Projects using the UK's most recent Carbon Budget (CCC 2020a). In this sense, the impacts will not be transboundary but national, in the degree to which they contribute to the UK climate targets. Transboundary impacts are therefore scoped out of this assessment. Climate Change Resilience Assessment

1028. As the construction phase is anticipated to occur within the next 10 years, the effects of impacts arising from climate change on construction activities is considered to be unlikely and is scoped out of the assessment.

1029. Operational infrastructure associated with the Projects could be vulnerable to the projected effects of climate change, in particular in relation to flood risk and coastal erosion.

1030. Potential cumulative impacts with respect to climate resilience may arise from other developments, which have the potential to exacerbate the vulnerability of the Projects to the effects of climate change, for example other projects giving rise to increased flood risk or coastal erosion. These cumulative effects will be considered in the relevant EIA topic (for example flood risk and hydrology) and summarised within the Climate Change chapter.

4.3.3.2. Summary of scoping proposals

1031. **Table 4-4** outlines the impacts which are proposed to be scoped into the EIA.

Table 4-4 Summary of Impacts Relating to Climate Change. Topics to be Scoped In (✓) and Out (✗)

Potential Impact	Construction	Operation	Decommissioning
Net contribution to the UK's climate targets	✓	✓	✓
Vulnerability of infrastructure to climate change	✗	✓	✗
Cumulative impacts	✗	✗	✗
Transboundary impacts	✗	✗	✗

4.3.4. Approach to Impact Assessment

4.3.4.1. GHG Assessment

1032. The GHG emissions assessment will be carried out in accordance with the Greenhouse Gas Protocol (WBCSD and WRI 2015), an international standard for corporate reporting. GHG emissions arising from activities associated with the construction, operation and decommissioning of the Projects will be quantified. In addition, the 'net' effect of the Projects will be determined, which will consider the effect of the provision of renewable energy onto the UK electricity grid against the Projects lifetime emissions.

1033. Significance criteria for the assessment will be utilised from IEMA guidance 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA 2022).

4.3.4.2. Climate Resilience Assessment

1034. The climate resilience assessment will use sector-specific guidance and literature to determine the likely climate hazards, based on the UKCP18 climate database, that could affect the operation of the Projects. The climate resilience assessment will use the output of other work streams, such as the FRA, to provide an assessment of the vulnerability of the Projects' infrastructure to climate change.

1035. The methodology for the assessment will be informed by IEMA guidance, Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation (IEMA 2020).

4.4. Major Accidents and Disasters

1036. Following guidance published by IEMA on Major Accidents and Disasters in EIA (IEMA 2020), it is proposed that consideration of major accidents and disasters within the EIA process for the Projects is based on assessments conducted within individual technical chapters where this can be adequately covered by the scope of these chapters.

1037. Following a review of the potential major accidents and disasters which may interact with, or arise from the Projects, the following have been identified:

- Coastal erosion and flood risk (considered within the 'Marine Physical Processes', 'Flood Risk and Hydrology' and 'Climate Change' EIA chapters);
- Accidental spills of hazardous material (considered within the 'Marine Sediment and Water Quality', and 'Human Health' EIA chapters);
- Vessel collision (considered within the 'Shipping and Navigation' EIA chapter); and
- Exposed cables leading to vessel snagging (considered within the 'Shipping and Navigation' chapter and 'Commercial Fisheries' EIA chapters).

1038. As the impacts of these accidents / disasters are being considered individually within technical EIA chapters presentation of a separate Major Accidents and Disasters chapter is not considered to add to the EIA and such a chapter will not be included in the assessment.

5. Conclusion

1039. Sections 2, 3 and 4 of this Scoping Report identify the Projects' potential impacts based on an understanding of the environmental conditions likely to be encountered within the relevant study areas, utilising publicly available data sources. Where potential impacts have been scoped out, justification has been provided within the relevant subsections of this report. **Table 5-1** summarises the impacts which have been scoped in and out from any further assessment.

1040. Consultees are invited to consider all of the information provided in this Scoping Report and provide comments on the proposed approach and in particular whether they agree with the conclusions. Topic specific questions for consultees are provided at the beginning of each technical section which have been designed to focus the review on the key elements of each technical topic in this Scoping Report.

Table 5-1 Proposed Impacts to be Scoped in (✓) and out (✗) from Further Assessment

Potential Impact	**Scoped In / Out of Further Assessment**		
	Construction	**Operation**	**Decommissioning**
Marine Physical Processes			
Impacts on waves and tidal currents	✗	✓	✗
Impacts on bedload sediment transport and changes to seabed and coastal morphology	✓	✓	✓
Impacts on suspended sediment concentrations and transport	✓	✓	✓
Impacts on water circulation (Flamborough Front)	✗	✓	✗
Indentations on the seabed due to installation and decommissioning vessels	✗	✗	✗
Cumulative impacts	✓	✓	✓
Transboundary impacts	✗	✗	✗
Marine Sediment and Water Quality			
Localised temporary increases in suspended sediments	✗	✗	✗
Remobilisation of existing contaminated sediments	✗	✗	✗
Pollution events resulting from the accidental release of pollutants	✗	✗	✗

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×
Offshore Air Quality			
Impacts on human receptors as a result of emissions from vessels	×	×	×
Impacts on ecological receptors as a result of emissions from vessels	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×
Offshore Airborne Noise			
Impacts on human receptors as a result of airborne noise emissions	×	×	×
Impacts on ecological receptors as a result of airborne noise emissions	×	×	×
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Benthic and Intertidal Ecology			
Temporary physical disturbance (including sediment deposition and smothering)	✓	✓	✓
Long term habitat loss	×	✓	×
Increased suspended sediment concentrations	✓	×	✓
Remobilisation of contaminated sediments	×	×	×
Pollution events resulting from the accidental release of pollutants	×	×	×
Underwater noise and vibration (from piling and UXO clearance only)	✓	×	✓
Interactions of EMF (including potential cumulative EMF effects)	×	✓	×
Interactions of heat generated by cables	×	×	×
Colonisation of introduced substrate, including non-native species	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	×	×	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Fish and Shellfish Ecology			
Direct damage (e.g. crushing) and disturbance to fish and shellfish species during construction.	×	×	×
Increase in local suspended sediment concentrations and sediment settlement.	✓	×	✓
Release of sequestered contaminants following sediment disturbance.	×	×	×
Pollution events resulting from the accidental release of pollutants.	×	×	×
Impacts on fish and shellfish species as a result of noise and vibration.	✓	×	✓
Habitat loss / disturbance to spawning and nursery areas, including the installation of turbine foundations, scour protection and cables.	✓	×	✓
Long-term loss of habitat and / or change in habitat type as a result of changes in substrate composition.	×	✓	×
EMF effects arising from cables.	×	✓	×
Reduced fishing pressure within the array areas and increased fishing pressure outside of the array area.	✓	✓	✓
Cumulative impacts	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Transboundary impacts	×	×	×
Marine Mammals			
Physical and Auditory Injury Resulting from Underwater Noise	✓	×	✓
Behavioural and Disturbance Impacts Resulting from Underwater Noise (including from Vessels)	✓	✓	✓
Barrier Effects from Underwater Noise	✓	✓	✓
Disturbance at Seal Haul-Out Sites	×	×	×
Disturbance to Foraging	✓	✓	✓
Vessel Interaction (Increase in Risk of Collision)	✓	✓	✓
Changes to Prey Resource	✓	✓	✓
Changes to Water Quality	×	×	×
Barrier Effects from the Physical Presence of the Wind Farm	×	×	×
Effects from EMFs	×	×	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Offshore Ornithology			
Direct temporary habitat loss/ disturbance due to construction (array and export cable)	✓	×	✓
Indirect impacts through effects on prey species and habitats: Accidental pollution (will be mitigated via Environmental Management and Monitoring Plan).	×	×	×
Indirect impacts on ornithological features due to impacts on prey species and habitats	✓	✓	✓
Operational disturbance and displacement	×	✓	×
Collision impacts	×	✓	×
Barrier effects	×	✓	×
Cumulative impacts	×	✓	×
Transboundary impacts	×	✓	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Commercial Fisheries			
Loss of access to fishing grounds	✓	✓	✓
Displacement of fishing activity into other areas	✓	✓	✓
Impacts (adverse and/or beneficial) on fish and shellfish species	Considered in section 2.6 Fish and Shellfish Ecology, but implications from this on Commercial Fisheries will be considered.		
Increased steaming times	✓	×	✓
Loss or damage to gear due to snagging	✓	✓	✓
Supply chain opportunities for local fishing vessels	✓	✓	✓
Navigational safety	Considered in section 2.10 Shipping and Navigation.		
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Shipping and Navigation			
Displacement of vessels	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	✓	✓	✓
Increased vessel to vessel collision risk between third-party vessels	✓	✓	✓
Vessel to structure allision risk	×	✓	×
Reduction of under keel clearance	×	✓	×
Increased anchor interaction with subsea cables	×	✓	×
Interference with marine navigation, communications and position fixing equipment	×	✓	×
Reduction of emergency response provision including SAR capability	×	✓	×
Cumulative impacts	✓	✓	✓
Transboundary impacts	✓	✓	✓
Aviation and Radar			
Impacts on Staxton Wold military radar system	✓	✓	✓
Creation of an aviation obstacle environment for civil and military aircraft	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Increased air traffic in the area related to wind farm activities	✓	✓	✓
Cumulative impacts on Staxton Wold military radar system	✓	✓	✓
Cumulative creation of an aviation obstacle environment for civil and military aircraft	✓	✓	✓
Cumulative increased air traffic in the area	✓	✓	✓
Transboundary impacts	✓	✓	✓
Infrastructure and Other Users			
Potential interference with other wind farms	✓	✓	✓
Potential interference with oil and gas operations and decommissioning activities	✓	✓	✓
Physical impacts on subsea cables and pipelines	✓	✓	✓
Impacts on aggregate dredging activities	×	×	×
Impacts on MoD activities	✓	✓	✓
Cumulative impacts	×	×	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Transboundary impacts	×	×	×
Offshore Archaeology and Cultural Heritage			
Direct impacts to heritage assets.	✓	✓	✓
Indirect impacts to heritage assets associated with changes to marine physical processes.	✓	✓	✓
Change to the setting of heritage assets, which could affect their heritage significance.	✓	✓	✓
Change to character which could affect perceptions of the HSC.	✓	✓	✓
Cumulative impacts	✓	✓	✓
Transboundary impacts (direct)	✓	✓	✓
Transboundary impacts (indirect)	×	×	×
Seascape, Landscape and Visual Impact			
Seascape and coastal character	×	×	×
Landscape character	×	×	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Designated landscape	×	×	×
Visual receptors	×	×	×
Cumulative seascape, landscape and visual impacts	×	×	×
Transboundary seascape, landscape and visual impacts	×	×	×
Terrestrial Ecology and Onshore Ornithology			
Impacts to designated sites	✓	✓	✓
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and species isolation	✓	✓	✓
Impacts on protected species or on their resting or breeding sites	✓	✓	✓
Disturbance of bird populations	✓	✓	✓
Spread of non-native invasive species	✓	✓	✓
Cumulative impacts	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Geology and Land Quality			
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	✓	✓	✓
Cumulative impacts	✓	✓	✓
Flood Risk and Hydrology			
Direct disturbance of surface water bodies	✓	×	✓
Increased sediment supply	✓	✓	✓
Supply of contaminants	✓	✓	✓
Changes to surface water runoff and flood risk	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Cumulative impacts	✓	✓	✓
Land Use			
Drainage	✓	✓	✓
Agricultural productivity (overground infrastructure)	✓	✓	✓
Agricultural productivity (buried infrastructure)	✓	×	✓
Disruption to farming practices	✓	✓	✓
Disruption to farming practices (soil heating)	×	×	×
Soil erosion	✓	×	✓
Environmental Stewardship Schemes	✓	✓	✓
Existing utilities	✓	×	✓
PRoW and CRoW access	✓	✓	✓
Cumulative impacts	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Onshore Archaeology and Cultural Heritage			
Direct, physical, impacts to designated heritage assets.	✓	×	✓
Direct, physical, impacts to non-designated heritage assets.	✓	×	✓
Indirect, physical, impacts to designated heritage assets.	✓	✓	✓
Indirect, physical, impacts to non-designated heritage assets.	✓	✓	✓
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.	✓	✓	✓
Cumulative impacts	✓	✓	✓
Landscape and Visual Impact			
Those on designated landscapes and protected coastline, landscape character and visual receptors, including cumulative effects (resulting from the landfall and onshore export cables)	×	×	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Those on designated landscapes and protected coastline, landscape character and visual receptors, including cumulative effects (resulting from the onshore substations)	✓	✓	✓
Traffic and Transport			
Driver delay (capacity)	✓	×	✓
Driver delay (highway constraints)	✓	×	✓
Road safety	✓	×	✓
Severance	✓	×	✓
Amenity	✓	×	✓
Abnormal loads	✓	×	✓
Hazardous loads	×	×	×
Cumulative impacts	✓	×	✓
Noise and Vibration			
Noise affecting human receptors	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Vibration affecting human receptors	✓	×	✓
Road traffic impacts	✓	×	✓
Nearshore airborne noise	✓	×	✓
Cumulative impacts	✓	✓	✓
Air Quality			
Impacts of emissions of dust from earthworks and construction on human and ecological receptors	✓	×	✓
Impacts of emissions from plant and machinery on human health and ecological sites	✓	×	✓
Impacts of emissions from road traffic on human health and ecological sites	✓	×	✓
Cumulative impacts on human health and ecological sites	✓	×	✓
Socio-Economics, Tourism and Recreation			
Direct economic benefit (supply chain)	✓	✓	✓
Increased employment	✓	✓	✓

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Change in demographics due to immigration	✓	✓	✓
Loss of, disruption to or pressure on local infrastructure	✓	×	✓
Disturbance (noise, air, visual and traffic) to social infrastructure	✓	✓	✓
Disruption to recreational activities	✓	×	✓
Disruption to the tourism industry	✓	×	✓
Cumulative impacts	✓	✓	✓
Human Health			
Changes in access to open space and recreation affecting health related behaviours and lifestyles.	✓	×	✓
Changes in housing availability affecting population health.	×	×	×
Disruption to the built environment and community infrastructure affecting population health.	×	×	×
Transport, public rights of way and cycle routes affecting population health.	✓	×	✓
Community safety risks affecting population health.	×	×	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Changes in community identity affecting population health.	×	×	×
Education, potential for workforce upskilling benefiting population health.	✓	✓	✓
Employment and investment benefiting population health.	✓	✓	✓
Climate change, the Projects' contribution to reducing health risks.	×	✓	×
Air quality affecting population health.	✓	×	✓
Water quality affecting population health.	✓	×	✓
Soil contamination affecting population health.	×	×	×
Noise disturbance affecting population health.	✓	✓	✓
Actual electro-magnetic field risks affecting population health.	×	×	×
Public concern and understanding of electro-magnetic field risks.	×	✓	×
Additional demand for health and social care services and routine NHS service planning.	×	×	×
Wider societal benefits of energy infrastructure supporting public health.	×	✓	×

Potential Impact	Scoped In / Out of Further Assessment		
	Construction	Operation	Decommissioning
Cumulative effects	✓	✓	✓
Climate Change			
Net contribution to the UK's climate targets	✓	✓	✓
Vulnerability of infrastructure to climate change	×	✓	×
Cumulative impacts	×	×	×
Transboundary impacts	×	×	×

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